Oral and Poster Presentations Abstracts
O1-1-1  Seven year experience of the first tele-stroke program in Hong Kong

Wing Chi Fong (Department of Medicine, Queen Elizabeth Hospital, Hong Kong)
Joyce Wai Ting Lo, Moamina Ismail, Vivianne Ching On Luk, Simon Chi Him Chan, Fiona Chong Ching Chan, Jessica Tsz Ching Li, Andrew Lung Tat Chan, Germaine Hiu Fai Chan, Ka Wing Fong, Yuk Fai Cheung
Department of Medicine, Queen Elizabeth Hospital, Hong Kong

[Introduction] Intravenous thrombolysis by tissue plasminogen activator had been shown to be beneficial to acute ischaemic stroke patients, presented within 4.5 hours window. However, previous studies had shown that it is under-utilized. One of the main reasons is the lack of stroke specialists to provide careful assessment and make the decision to treat the patients after risk and benefit analysis.

The first tele-stroke program was introduced in Hong Kong since 2009, in order to provide 24-hr intravenous stroke thrombolysis, and its outcome was reviewed.

[Methods] Patients were prospectively recruited over 7 years period from 2009 till 2015. Time intervals during the diagnostic process preceding thrombolysis were recorded. Prespecified outcome parameters were the National Institutes of Health Stroke Scale (NIHSS) score before treatment, occurrence of symptomatic intracerebral haemorrhage (SICH) and modified Rankin Scale at three months after stroke.

[Results] 409 patients were treated by intravenous thrombolysis. The median door-to CT time was 22 minutes and the door-to-needle time was 72 minutes. The baseline median NIHSS is 13. Mean age was 68. SICH developed in 3.5% according to SITS-MOST definition. And 47.7% of patients had excellent functional outcome at 3-month as defined by modified Rankin scale 0-1, which was comparable with overseas studies.

[Conclusion] The implementation of tele-stroke can overcome the barrier of limited neurologist workforce and make 24-hour stroke thrombolysis feasible, safe and effective.

O1-1-2  Stroke outcomes with use of antithrombotics within 24 hours after recanalization treatment

Beom Joon Kim (Department of Neurology and Cerebrovascular Diseases, Seoul National University Bundang Hospital, Republic of Korea)
Han-Gil Jeong¹, Mi Hwa Yang², Moon-Ku Han², Hee-Joon Bae²
¹Department of Neurology, Seoul National University Hospital, Republic of Korea
²Department of Neurology, Seoul National University Bundang Hospital, Republic of Korea

[Objective] We compared clinical outcomes for patients that received early initiation (<24 hours) of antithrombotics with those who received standard management (antithrombotics administered ≥ 24 hours).

[Methods] A total of 712 patients who had an acute ischemic stroke and underwent intravenous (IV) or endovascular (IA) recanalization between July 2007 and March 2015 were selected from a prospective clinical registry. Antithrombotics were initiated by an individual clinical decision. We systemically gathered information regarding the exact timing of antithrombotic initiation from a database of the electronic bar-code medication administration system.

[Results] The recanalization treatment cases included in this study comprised 34% (n=243) IV-only, 32% (n=229) IA-only, and 34% (n=240) combined IV-IA strategies. Antithrombotics were administered within 24 hours in 64% (n=456) of the patients. Earlier initiation of antithrombotics was associated with decreased odds of having any hemorrhages (adjusted OR, 0.56; 95% CI, 0.35 - 0.89), but it was not associated with symptomatic hemorrhages (0.85; 0.35 - 2.10) and mRS scores of 0-1 at 3 months after stroke (1.09; 0.75 - 1.59). Ultra-early initiation (<12 hours) did not increase the odds of hemorrhagic transformation (0.26; 0.12 - 0.52). The effects of earlier antithrombotics on the clinical outcomes were not significantly modified by the modality of recanalization treatment.

[Conclusions] In our retrospective analysis of a prospective registry, early antithrombotic (within 24 hours after initiation) administration did not increase hemorrhages after recanalization treatment. Early antithrombotic therapy may be advantageous for a subset of stroke patients despite the current guidelines.
**O1-1-3** The phased change of strategy cut delay of intravenous thrombolysis to 20 minutes

Yuya Shigehatake (Department of Stroke Neurology, Kohnan Hospital, Japan)

Ryo Itabashi¹,², Yukako Yazawa¹, Kazuki Fukuma¹, Yohei Takayama¹, Eisuke Furui¹, Etsuro Mori²

¹Kohnan Hospital, Japan
²Tohoku University Graduate School of Medicine, Japan

**[Purpose]** The aim of this study is to evaluate whether the phased change of strategy affects the delay of intravenous thrombolysis (IVT) for acute ischemic stroke.

**[Methods]** We retrospectively studied consecutive 357 patients treated with IVT in our department from October 2005 through June 2016. We have changed the strategy of IVT as follows: hospital pre-notification (since Oct. 2005), simplification of brain imaging (July 2012), premixing of tPA (April 2014), blood cell counter located at ER (June 2015), and manual bolus administration of tPA before preparation of continuous infusion (Jan 2016). We analyzed the effects of change of strategy on the annual median of door-to-needle time (DTN). Multivariable logistic regression analysis was performed to elucidate the clinical or logistic factors associated with delay of IVT.

**[Results]** The median of initial NIHSS score was 11 (interquartile range: 6-19). The number of symptomatic intracranial hemorrhage was 15 (4%), and stroke mimics was two (0.6%). The median of DTN was reduced annually, from median 90 minutes (55-98) on 2006, to 23 minutes (17-38.5) in 2015, further on to 16.5 (15-24) in 2016. In 2015, 95% of patients were treated within 60 minutes from arrival. In only patients from 2015 to 2016, out-of-hours arrival (OR 10.3, 95% CI 3.14-40.0) was independently associated with DNT > 20 minutes.

**[Conclusion]** The phased change of strategy successfully cut delay of intravenous thrombolysis to 20 minutes. The next strategy should focus on out-of-hours settings.

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**O1-1-4** Prior antiplatelet agent use and outcomes after intravenous thrombolysis with recombinant tissue plasminogen activator in acute ischemic stroke: A meta-analysis

Jie Yang (Department of Neurology, Nanjing First Hospital, Nanjing Medical University, China)

Xiding Pan, Junshan Zhou, Yingdong Zhang

Nanjing First Hospital, Nanjing Medical University, China

**[Background]** There is uncertainty surrounding the influence of prior antiplatelet (AP) agent use on outcomes after intravenous thrombolysis with recombinant tissue plasminogen activator (rtPA) in acute ischemic stroke (AIS).

**[Aim]** We performed a meta-analysis to evaluate the efficacy and safety of prior AP use before intravenous rtPA for AIS.

**[Summary of review]** We searched PubMed and Embase databases from 1997 to 2014. Primary outcome was functional outcome at the end of follow-up; secondary outcomes were symptomatic intracranial hemorrhage (SICH) and recanalization rate. The meta-analysis was performed with Review Manager 5.2. Eleven studies with a total of 19453 patients were included. 6517 (33.5%) patients who had received intravenous rtPA were taking AP agent before stroke onset. Statistically significant difference was not found between the prior AP and the AP-naive patients in functional outcome (OR 0.86; 95% CI 0.73-1.01; P=0.06) and recanalization rate (OR 1.23; 95% CI 0.30-4.99; P=0.77). The risk of SICH was significantly increased in the AP group (OR 1.65; 95% CI 1.44-1.90; P<0.01).

**[Conclusions]** In AIS patients receiving intravenous rtPA therapy, prior antiplatelet agent use did not lead to a significant difference in functional outcome and recanalization rate, although it significantly increased the risk of SICH. In the subgroup analysis, prior clopidogrel mono therapy may not increase the risk of SICH, which will need further studies to confirm.
**O1-1-5 Early neurologic improvement and late functional recovery after thrombolysis**

Richard Leigh *(NINDS, National Institute of Health, US)*

Emi Hitomi

NINDS, National Institute of Health, US

**Background**

Mechanisms of late functional recovery (LFR) in stroke patients who have received thrombolysis are poorly understood.

**Hypothesis**

Clinical and MRI measures during the first 24 hours after stroke will identify patients who are going to have a LFR.

**Methods**

Good functional outcome was defined as a modified Rankin score (mRS) of 0-1. Patients who had an MRI scan prior to treatment with IV tPA but had not achieved a GFO five days later were included in this study. From this population, patients who had reached a GFO at 90 days after their stroke were considered to have had a LFR.

**Results**

58 patients met the inclusion criteria. Pretreatment NIHSS (p=0.579), pretreatment stroke volume (p=0.572), pretreatment perfusion deficit (p=0.989), mismatch ratio (p=0.375), percent reperfusion at 2 hours (p=0.146), and final infarct volume at 24 hours (p=0.562) did not correlate with LFR. However change in NIHSS over the first 24 hours was highly correlated with LFR (p=0.006), with an odds ratio of 1.21 (CI: 1.05,1.38) indicating a 20% increased chance of having a LFR with each point of improvement on the NIHSS independent of whether or not the patient was discharged to rehab.

**Conclusions**

Regardless of stroke severity or radiographic response to treatment, early neurologic improvement in patients who do not have a GFO at discharge is associated with a higher likelihood of subsequent LFR. This may be helpful in distinguishing patients who are likely to have a spontaneous biologic recovery, from those who should be enrolled in a rehabilitation trial.

**O1-1-6 Technical challenges, solutions and outcome of off-site mobile telestroke with iPad for thrombolysis in Hong Kong**

Yannie Soo *(Department of Medicine and Therapeutics, The Chinese University of Hong Kong, Hong Kong)*

Vincent Ip1, K. T. Leung1, Anne Chan1, Lisa Au1, Florence Fan1, Howan Leung1, Colin Graham2, F. H. Tang3, Lawrence Wong1, Thomas Leung1

1Department of Medicine & Therapeutics, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

2Department of Emergency Medicine, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

3Department of Health Technology and Informatics, The Hong Kong Polytechnic University, Hong Kong

**Background**

Currently most telestroke safety data are from models using hospital-based teleconsultation under optimal network and technical support. Due to lack of neurologists in Hong Kong, we adopt a hub-less telestroke model to support thrombolysis service through mobile teleconsultation performed off-site with iPad in the community during non-working hours. Off-site teleconsultation is technically challenging, as mobile connectivity is variable and technical support is not immediately available during the time-critical triage.

**Methods**

We describe our technical problems, backup solutions and treatment outcome of thrombolysis by telestroke at Prince of Wales Hospital during the period from 2012 to 2015.

**Results**

A total of 213 patients were evaluated through telestroke, 109 patients received intravenous thrombolysis. Technical problems were present in 33 (15.5%) cases, most commonly due to access failure to CT brain (78.8%). Diagnosing patients with top-of-basilar syndrome with videoconference were difficult in 3/5 patients. Rate of technical problems decreased from 25.0% in 2012 to 9.4% in 2015. Backup solutions used include use of an alternative teleradiology system and video clips instead of videoconference. Outcome of patients thrombolysed by telestroke, including modified Rankin Scale at 3 months, symptomatic intracerebral haemorrhage (2.8% vs 3.1%, p=0.866) and mortality (9.2% vs 10.9%, p= 0.654), were comparable to patients treated on-site. Annual thrombolysis rate has increased from 2% before 2012 to 9% in 2015.

**Conclusions**

Technical problems are common during mobile teleconsultation with iPad in the community. Nevertheless, with readily available backup solutions in place, this model is feasible, safe and greatly increases patients' access to thrombolysis.
**O1-1-7**  
**Estimation of thrombolysis efficacy in ischemic stroke based on asymptomatic hemorrhagic transformation**

Shukhrat Mubarakov (Department of Neurology, Republic Research Center of Emergency Medicine, Uzbekistan)

【Background and Purpose】The purpose was to evaluate the outcome of hemorrhagic transformation (HT) after thrombolysis in patients with acute stroke due to middle cerebral artery (MCA) occlusion.

【Methods】48 patients (29 male, 19 female, aged from 22 to 85 years, average age 61.0±13.9) were investigated. All patients were selected by National Institute of Neurological Disorders and Stroke recommendations. To estimate results of thrombolysis National Institutes of Health Stroke Scale (NIHSS), the modified Rankin scale (mRs) were used. After angiographic detection of artery occlusion IAT with Streptokinase in dose 100,000 units was applied in 32 patients. In 16 patients Actilyse in dosage 0.9 mg/kg was applied intravenously.

【Results】MCA occlusion was detected by cerebral angiography in all patients. NIHSS score at admission was 14.4±3.4, 220±35.1 minutes elapsed from symptom onset. In 7 patients in control CT hemorrhage transformation was revealed (in 6 patients (12.5%) asymptomatic, in 1 patient (2.1%) symptomatic). 11 patients (22.9%) had excellent outcome (mRs score 0 to 1), 31 - (64.6%) a good outcome (mRs score 2). 6 - (12.5%) poor outcome (mRs score 3 to 4). In these patients large brain ischemic zone was detected on control CT and 1 patient had symptomatic hemorrhage transformation. In group with excellent and good outcomes 6 patients had asymptomatic HT with small petechiae along the margins of infarct zone (HI1-HI2 by radiographic classification of HT).

【Conclusions】Thrombolysis-related HI (HI1-HI2) represents a marker of early successful recanalization which leads to a reduced infarct size and improved clinical outcome.

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**O1-1-8**  
**Cerebral angiography and intraarterial thrombolysis with streptokinase in acute ischemic stroke**

Shukhrat Mubarakov (Department of Neurology, Republic Research Center of Emergency Medicine, Uzbekistan)

Farrukh Djalalov, Amet Seydaliev  
Department of Neurology, Republic Research Center of Emergency Medicine, Uzbekistan

【Background and Purpose】The purpose of this study was to evaluate the safety and efficacy of intra-arterial thrombolysis (IAT) using Streptokinase under cerebral angiography control (CAC) in patients with acute ischemic stroke due to middle cerebral artery (MCA) occlusion.

【Methods】After angiographic detection of artery occlusion IAT with Streptokinase in dose 100,000 units under CAC was applied. 32 patients (20 male, 12 female, aged 22 - 85 years, average age 57.8±13.3) were investigated. All patients were selected by National Institute of Neurological Disorders and Stroke (NINDS) recommendations. To measure outcome National Institutes of Health Stroke Scale (NIHSS), the modified Rankin scale (mRs) were used.

【Results】MCA occlusion was detected by CAC in all patients. NIHSS average score at admission was 14.3±3.7, 272±36.5 minutes elapsed from symptom onset. 16 patients (50%) had excellent outcome (mRs score 0 to 1), 10 patients (30%) a good outcome (mRs score 2), 6 patients (20%) had no changes (mRs score 3 to 4). In these 6 patients brain ischemic zone was detected on control CT. In group with excellent and good outcomes 3 patients had asymptomatic hemorrhagic transformation (AHT) with small petechiae along the margins of infarct zone. Vessel recanalization was 80%. Average NIHSS score improved from 14.3±3.7 to 7.9±5.8. Average Rankin score improved from 4.5±0.6 to 2.6±1.5 No patients died.

【Conclusions】IAT with streptokinase under CAC administered in closely selected patients can be considered as effective method in patients with acute ischemic stroke. Thrombolysis-related AHT is a marker of successful recanalization.
**O1-1-9**  Spinal cord injury misdiagnosed as cerebral infarction and given thrombolytic therapy: A case report

Jie Yang (Department of Neurology, Nanjing First Hospital, Nanjing Medical University, China)

Jing Hang, Junshan Zhou, Yingdong Zhang
Department of Neurology, Nanjing First Hospital, Nanjing Medical University, China

【Background】Spinal Cord Injury Without Radiographic Abnormality (SCIWORA) covers a broad spectrum of neurological deficits, which can be confused with cerebral infarction when patients present with hemiparesis and a history of minor injury.

【Methods】A 56-year-old man presented with weakness of the left limbs along with shoulder and back pain of three and half hours duration with normal findings on brain computed tomography and thoracic and abdominal computed tomography angiography. He was diagnosed as cerebral infarction and given intravenous thrombolytic treatment. On retaking his history, it was found that he had suffered a traumatic injury 2 days ago without headache and back pain. Additionally, sensory disturbance presenting as hypoalgesia was detected below the right C-4 dermatome level. Hence, the patient underwent cerebral and cervical magnetic resonance imaging after administration of strong analgesia. T2-weighted imaging revealed focal hyperintensity of the spinal cord at levels C6/7 on the left. Following this, the diagnosis was corrected as spinal cord injury and he underwent successful surgical management. The patient made a full recovery by 12 days post-admission.

【Results】Potential reasons for misdiagnosis were as follows: Firstly, not only did the clinician omit some important medical history, but he also neglected performing a systematic neurological examination. Secondly, essential imaging was delayed in part due to the incorrect initial diagnosis.

【Conclusion】Although hemiparesis due to spinal cord injury is not common, when patients with hemiparesis present with back pain and minor injury history, spinal cord injury should still be considered as an important differential diagnosis.

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**O1-2-1**  Assessment of DWI profile in acute ischemic stroke

Manabu Inoue (Department of Cerebrovascular Medicine, National Cerebral and Cardiovascular Center, Japan)

Kazutaka Sonoda1, Shinichi Wada1, Sohei Yoshimura1, Shoichiro Sato1, Mikito Hayakawa1, Hiroshi Yamagami2, Kazuyuki Nagatsu2, Kazunori Toyoda1
1Department of Cerebrovascular Medicine, National Cerebral and Cardiovascular Center, Japan
2Department of Neurology, National Cerebral and Cardiovascular Center, Japan

【Background】The efficacy of endovascular therapy (EVT) in acute stroke has been established but the imaging criteria have not yet been assessed. “Malignant profile” is a magnetic resonance imaging (MRI) pattern that is associated with poor outcomes. We estimated this profile by diffusion weighted image (DWI) in patients treated with EVT.

【Methods】Acute anterior ischemic stroke patients with baseline DWI before EVT were included. Outcome was assessed by modified Rankin Scale (mRS) at discharge. DWI volume was measured by semi-automated software. Receiver operating characteristic (ROC) curve analysis was performed to identify optimal DWI volumes with poor outcome (mRS 4-6).

【Results】Total of 36 patients were included in this study. Mean age was 74±11 years and median (interquartile range: IQR) National Institute of Health Stroke Scale was 18 (11-23). Median (IQR) mRS was 3 (1-4), onset time to MRI (median, IQR) was 151.5 (81.8-531.3) minutes and door to MRI time was 24.5 (19.8-27.5) minutes. The DWI volume (median, IQR) was 13.5 (4.1-45.6) mL and time from onset to puncture (median, IQR) was 208 (121.0-474.3) minutes. Out of 36 patients, 29 (81%) had Thrombolysis in Cerebral Infarction (TICI) score of 2B/3. ROC analysis determined DWI volume with poor outcome as 49.5 mL (83.3% specificity and 50% sensitivity, AUC 0.70).

【Conclusion】The volume of the malignant profile on DWI is approximately 50mL in EVT-eligible patients. Clinical outcome of these patients are very poor despite recanalization. The imaging criteria for EVT should be well considered to achieve better outcomes.
01-2-2 Investigation of optimum conditions of iodine extraction image in after recanalization therapy of acute ischemic stroke

Kotaro Fukuda (Department of Radiation Laboratory, Tokyo Women’s Medical University Yachiyo Medical Center, Japan)

Masataka Hayashi2, Shizuka Nishikawa1, Rika Fukui3, Isao Tanaka3
1Tokyo Women’s Medical University Yachiyo Medical Center (Department of Radiology), Japan
2Tokyo Women’s Medical University Yachiyo Medical Center (Department of Neurosurgery), Japan
3Tokyo Women’s Medical University East Medical Center (Department of Radiology), Japan

【Background and purpose】After acute recanalization of ischemic stroke, we distinguish contrast agent leak and bleeding by dual energy CT (DECT). Discrimination confirmed the contrast agent leakage in Iodine map(IM), and confirmed bleeding in the Virtual non-contrast. However, the analysis in the default setting of IM would extract the lateral ventricle(LV). The purpose of this study is to make IM more clearly with different method which is using ΔCT values.

【Materials and methods】CT scanner using the Aquilion ONE ViSION Edition(TOSHIBA). Postoperative DECT of 28 patients after acute recanalization therapy were retrospectively analyzed. The default setting conditions of IM, the reference material has been set in two (fat, soft tissue). We set a pair of basis substance in intracranial (thalamus:TM, Cerebrospinal fluid:CSF, white matter:WM, gray matter:GM), it created the IM of each pattern. Region-of-interest is set in the LV of each IM, it was measured ΔCT value. ΔCT value was made of DECT data. High ΔCT means high intensity in IM. We analyzed which is the most effective combination to make low ΔCT value at LV.

【Results】ΔCT value of the LV in IM that has been set in each condition was default:23.7, CSF/GM:5.67, CSF/WM:2.38, WM/TM:26.6.
Statistical significance wasn’t recognized between default and WM/TM, but was recognized difference among default and CSF/GM or CSF/WM(P<0.001). In addition, was a significant difference in CSF/GM and CSF/WM(P<0.001).

【Conclusion】DECT images with CSF/WM ΔCT value have possibility of more accuracy that has distinguished between contrast enhancement leakage and hemorrhage.

01-2-3 CT perfusion may reveal Todd’s paralysis as a stroke mimic?

David Orion (Department of Neurology, Tel Aviv University, Israel)

Shahar Shelly1, Nicola Maggio1,2,3, Marina Boxer1
1Department of Neurology, The Chaim Sheba Medical Center, Israel
2Talpiot Medical Leadership Program, The Chaim Sheba Medical Center, Israel
3Department of Neurology, Tel Aviv University, Ramat Aviv, Israel

【Background】Brain perfusion changes have been detected in patients following epileptic seizures.

【Methods】We retrospectively identified 721 patients who presented at our stroke center between 2012 and 2015 with a suspected acute stroke and underwent examination thorough a stroke protocol including cerebral CT Perfusion (CTP) and CT Angiography (CTA) within 8 hours from the onset of symptoms. Patients were excluded from the analysis if their seizures occurred as a result of a secondary process known to alter brain perfusion parameters.

【Results】Out of 721 patients, 25 presented abnormal EEG findings within 24-72 hours from the symptoms onset without evidence of vascular occlusion in CTA. While 15 patients had to be excluded from the study due to a concomitant brain pathology, we found a specific reduction in Cerebral Blood Volume and Cerebral Blood Flow occurring at the ictal zone, which was identified by a post hoc EEG investigation.

【Conclusion】Our study shows that CTP is a prompt, reliable tool in detecting changes in blood flow dynamics among post ictal patients. Thus, we propose the use of CTP in emergency settings for discrimination between postictal changes and acute vascular events.
Oral Session

O1-2-4  Radiological predictive model of 2-year recurrence after ischemic stroke; The Boramae Stroke Risk Score (BSRS)

Ki-Woong Nam (Department of Neurology, Seoul Metropolitan Government-Seoul National University Boramae Medical Center, Republic of Korea)

Hyung-Min Kwon1, Jae-Sung Lim2, Yong-Seok Lee1
1Seoul Metropolitan Government-Seoul National University Boramae Medical Center, Republic of Korea
2Hallym University Sacred Heart Hospital, Republic of Korea

[Background] There have been several predictive models of recurrence after ischemic stroke, which mainly composed with demographic and clinical factors. With medical improvement, the influence of known risk factors might be changed, considering recent 90-days recurrence score with radiological marker. We tried to make predictive score of 2-year recurrent stroke.

[Methods] We recruited consecutive first ever ischemic stroke patients within 7 days of symptom onset. Cox regression analysis was used with time to stroke recurrence to evaluate association between 2-year recurrence and demographic, clinical, and radiological factors. The 2-year risk of recurrence was calculated by summing up the number of independent predictor which weighted by their β-coefficient in multivariate analysis. We called the resultant score as the Boramae Stroke Risk Score (BSRS).

[Results] A total of 958 patients were enrolled, and 63 patients had 2-year recurrence of ischemic stroke during follow-up periods. In multivariate analysis, multiple staged lesion, isolated cortical lesion, severe leukoaraiosis, higher number of lacunar infarcts, and symptomatic stenosis were independently associated with 2-year recurrence, and then included in the BSRS scoring model. The BSRS score presented good discrimination (area under the ROC curve [AUC] = 0.80 [0.72-0.88]), which was continued with internal validation using 1000 times bootstrap method (AUC = 0.74 [0.64-0.84]).

[Conclusions] In the patients with first ever ischemic stroke, the BSRS score might accurately evaluate the risk of 2-year recurrence of ischemic stroke. The importance of radiological findings rather than clinical or demographic findings seems to be increasing with medical improvement.

O1-2-5  The value of brachial pulse pressure in acute stage of ischemic stroke for predicting long-term event outcome

Keon-Joo Lee (Department of Neurology, Seoul National University Bundang Hospital, Republic of Korea)

Joon-Tae Kim1, Ki-Hyun Cho1, Dong-Ick Shin2, Min-Ju Yeo2, Jae-Kwan Cha3, Dae-Hyun Kim3, Hyun-Wook Nah3, Dong-Eog Kim3, Wi-Sun Ryu4, Hee-Joon Bae5
1Department of Neurology, Chonnam National University Hospital, Republic of Korea
2Department of Neurology, Chungbuk National University Hospital, Republic of Korea
3Department of Neurology, Dong-A University Hospital, Republic of Korea
4Department of Neurology, Dongguk University Ilsan Hospital; on the behalf of CRCS-5 Investigators, Republic of Korea
5Department of Neurology, Seoul National University Bundang Hospital, Republic of Korea

Pulse pressure is proposed as a marker of arterial stiffness and its association with stroke outcome has been studied often. However, the results are controversial and studies on long-term event outcomes in a large scale are lacking. We investigated whether pulse pressure obtained during acute stage is associated with one-year event outcomes after acute ischemic stroke, and, if it is, whether that association is independent of other blood pressure parameters.

Ischemic stroke patients who were hospitalized with 48 hours of onset and were registered in a multicenter stroke registry database in South Korea were subjected to this study. Blood pressure measured within 3 days after symptom onset was collected and mean values of each patient were used for the analysis. A composite of stroke recurrence, myocardial infarction and death up to one year after stroke onset was captured prospectively and used as a primary outcome measure. A total of 9,762 patients were analyzed for this study. Cox’s proportional hazard models showed an increasing trend of the primary outcome events by higher pulse pressure quartiles ($\chi^2$ trend = 7.993, P = 0.005). And an adjusted hazard ratio of the highest quartile of pulse pressure compared to the other quartiles was 1.23 (95% confidence interval, 1.07-1.42; P <0.001) with adjustment for known clinical determinants. Pulse pressure lost its prognostic significance after further adjustment for systolic or mean blood pressure but not for diastolic blood pressure.

In conclusion, our study shows that pulse pressure during acute stage of ischemic stroke may be an indicator of future events, but its effect would be confounded by other blood pressure parameters.
Oral Session

O1-2-6  Leukoaraiosis as a predictor of pneumonia after acute ischemic stroke

Ki-Woong Nam (Department of Neurology, Seoul National University Hospital, Republic of Korea)

Hyung-Min Kwon¹, Jae-Sung Lim², Yong-Seok Lee³
¹Department of Neurology, Seoul Metropolitan Government-Seoul National University Borame Medical Center, Republic of Korea
²Department of Neurology, Hallym University Sacred Heart Hospital, Republic of Korea

【Background and purpose】 Stroke-associated pneumonia (SAP) is common in patients with acute ischemic stroke, and several risk factors have been reported. However, the relationship between underlying leukoaraiosis (LA) and SAP has not been addressed.

【Methods】 We recruited consecutive patients with acute ischemic stroke within 24 hours of symptom onset. SAP was defined as (1) a new-onset auscultatory crackle on the lung fields with a fever of 37.7°C or higher, (2) definite radiological findings of pneumonia, or (3) new-onset or aggravated purulent sputum. LA was graded using the Fazekas scale in both the periventricular and subcortical areas. We evaluated LA burden by summing the grade and dichotomized into mild LA (0-2) or severe LA (3-6). Relationship between LA and SAP was analyzed by binary logistic regression analysis with variables of P < 0.05 in bivariable analysis.

【Results】 308 consecutive patients were enrolled, and SAP developed in 36 patients (12%). Bivariate analysis revealed that SAP correlated with age, initial NIHSS score, fasting blood sugar, atrial fibrillation, impaired consciousness, dysphagia, severe LA, body mass index, low-density lipoprotein cholesterol (LDL-C), albumin, and hyperlipidemia. Severe LA [adjusted OR (aOR) = 5.33, 95% CI = 1.69-16.85, P < 0.01], dysphagia [aOR = 4.60, 95% CI = 1.31-16.13, P = 0.02] and lower LDL-C levels [aOR = 0.98, 95% CI = 0.97-1.00.11, P = 0.02] remained independent predictors of SAP in multivariable analysis.

【Conclusions】 Underlying severe LA is an independent predictor of SAP in acute ischemic stroke. Careful observation of these high risk patients is mandatory.

O1-2-7  Prevalence of complete internal carotid artery occlusion in Persian stroke population

Fariba Yadolahí (Physical Therapy Department, School of Rehabilitation, Shahid Beheshti University of Medical Sciences, Iran)

Masoud Mehrpour
Department of Neurology, Faculty of Medicine, Iran University of Medical Sciences, Iran

【Background】 Stroke is the main cause of disability among the adults around the world which. The annual incidence of first ever stroke among the Iranian population which is significantly higher than in most western countries and also occurs at lower age ranges. The most common cause of ischemic stroke is atherosclerotic stenosis of the major intracranial arteries.

【Objective】 We aimed to investigate the Prevalence of Internal Carotid Complete Occlusion among Iranian Population.

【Methods】 In this population based study 1033 patients with ischemic stroke who admitted in referral stroke unit center enrolled. TCCS was performed for all of them and ICA complete occlusions was confirmed with using cerebral angiography.

【Results】 Among 1033 subjects, 75 have ICA complete occlusions (7.26%). 52 patients were male (69.3%) and 23 patients were female (30.7%).

【Conclusion】 To our knowledge This is the first study defined prevalence of ICA complete occlusions in the Iran. In our center was 7.26% and rate of ICA complete occlusions in Male was higher than female.
**O1-2-8  Prevalence of vertebral artery atherosclerotic changes in healthy heavy smokers: A population-based study**

Fariba Yadollahi (Physical Therapy Department, School of Rehabilitation, Shahid Beheshti University of Medical Sciences, Iran)

Masoud Mehrpour
Department of Neurology, Faculty of Medicine, Iran University of Medical Sciences, Iran

**[Background]** Cigarette smoking seems to contribute to progression of atherosclerosis in vertebral artery. The aim of this study was to investigate the prevalence of asymptomatic vertebral artery stenosis and potential risk of cigarette smoking in healthy volunteers.

**[Methods]** 200 healthy volunteers on the basis of inclusion and exclusion criteria were studied. Among 200 healthy volunteers, 17 heavy smoker cases were found. 68 healthy non-smoker controls (fourfold) were randomly chose among 183 remained samples. All subjects underwent vertebral artery Color-Duplex Ultrasonography. For comparison of two groups we provided Odds Ratio of logistic regression by Stata software.

**[Results]** The mean age of participants was 42.8. The mean arterial diameter of proximal vertebral artery for right side in case was 4.31 (SD 0.75) and for left side was 4.36 (SD 0.66). The diameter for control groups in right and left sides were 4.23 (SD 0.79) and 4.18 (SD 0.70), respectively. The mean peak systolic velocity in cases was 1.25 (SD 0.58) in right side and 0.95 (SD 0.25) in left side and also for control, were 0.64 (0.19 SD) for right and 0.62 (0.19 SD) for left. The results of risk factors analysis for vertebral stenosis for our study were included for age, sex. We provided the bivariate analysis for each factors. The Odds Ratio for age was 0.99 with 95%CI (0.92-1.07) and for sex it was 0.96 with 95% CI (0.32-2.83).

**[Conclusion]** Our results established that Cigarette smoking is a highly associated for proximal vertebral artery stenosis in healthy subjects.

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**O1-2-9  Basilar artery plaque and the location of pontine infarction**

Bum Joon Kim (Department of Neurology, Kyung Hee University, Republic of Korea)

Gahwa Moon, Hye Young Byun, Dae-il Chang
Department of Neurology, Kyung Hee University, Republic of Korea

**[Background]** Basilar artery (BA) plaques are associated with vascular geometry, and influence the clinical course of pontine infarction. We have hypothesized that the location of plaque may differ according to the level of pontine infarction and the vascular geometry.

**[Methods]** Patients with isolated pontine infarction were consecutively enrolled. Patients received high-resolution MRI (HR-MRI) to evaluate the location of BA plaque; anterior, posterior, left-lateral and right-lateral. The vertical location of pontine infarction was categorized as: upper middle and lower pontine infarction. The angle between BA and dominant vertebral artery (BA-VA angle) and the maximum BA angle was measured from the lateral and anterior-posterior view of BA, respectively.

**[Result]** Among the 96 patients enrolled, Pontine infarctions were located at the upper (32.3%, n=31), middle (42.7%, n=41) and lower (25.0%, n=24) pontine. No plaque was observed form near half of upper pontine infarctions (48.4%). In the other hand, in the middle pontine infarction the plaques were frequently located at the anterior (26.5%) and left-lateral side (26.8%). In lower pontine infarctions, the most frequent location of plaque was at the posterior wall (58.3%). BA-VA angle was larger in patients with lower pontine infarction comparing to those with upper or middle pontine infarction. The maximum angle of BA was larger in patients with middle pontine infarction comparing to those of upper or lower pontine infarction.

**[Conclusion]** The location of BA plaque differs according to the location of pontine infarction, and the vascular geometry may influence the location of BA plaque and pontine infarction.
**O2-1-1** Atrial fibrillation modifies the effect of chronic kidney disease on outcome of stroke patients potentially eligible for intravenous thrombolysis

Cheng-Yang Hsieh (Neurology, Tainan Sin Lau Hospital, Taiwan)

Huey-Juan Lin¹, Sheng-Feng Sung², Chih-Hung Chen³

¹Department of Neurology, Chi Mei Medical Center, Taiwan
²Division of Neurology, Department of Internal Medicine, Ditmanson Medical Foundation Chiayi Christian Hospital, Taiwan
³Department of Neurology, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Taiwan

**Background** Atrial fibrillation (Af) increases risk of stroke and is a common comorbidity in patients with chronic kidney disease (CKD). However, the interaction between Af and CKD on stroke outcome has not been determined.

**Methods** We identified all consecutive AIS patients admitted within 4.5 hours of onset between 2007-2013. CKD was defined by an estimated glomerular filtration rate < 60 ml/min/1.73 m², while Af was documented on ≥ 1 electrocardiogram tracing during the admission or prior medical records. Patients with age > 80 years, and a National Institute of Health Stroke Scale score < 4 or > 25 were excluded. Poor outcome was a modified Rankin Scale score 3-6 at 3 months. We determined the effect of Af and CKD on outcome in a multivariate analysis.

**Results** Of the 929 patients, 39%, 29%, and 51% had CKD, Af, and intravenous thrombolysis, respectively. Poor outcomes occurred in 45% vs. 41% of patients with and without CKD (p = 0.197). In a multivariate analysis, the odds ratios (95% CI; p) of Af and CKD for poor outcome were 0.62 (0.42-0.91; p = 0.014) and 0.97 (0.71-1.33; p = 0.865). Significant interaction was noted between Af and CKD (p = 0.010). CKD was associated with less risk of poor outcome in patients with Af (0.52 [0.28-0.96; p = 0.037]), but not in patients without Af (1.22 [0.84-1.76; p = 0.297]).

**Conclusions** Atrial fibrillation favorably modifies the effect of CKD on outcome of our stroke patients potentially eligible to intravenous thrombolysis.

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**O2-1-2** Impact of clinical trial participation on ‘door-to-needle’ time performance: The ENCHANTED trial

Jie Yang (Department of Neurology, Nanjing First Hospital, Nanjing Medical University, China)

Craig Anderson
The George Institute for Global Health, University of Sydney and Royal Prince Alfred Hospital, Australia

**Purpose** We aimed to determine (i) whether Door-to-needle time (DNT) improved over time among participants of the ENCHANTED trial, (ii) the clinical predictors of DNT.

**Methods** Data were derived from the first 1027 patients enrolled in the ENCHANTED trial, an international, quasi-factorial, open (0.6mg/kg vs. 0.9mg/kg rtPA; intensive vs. standard BP control), blinded outcome assessed, randomized controlled trial of rtPA-eligible AIS patients. Secular trends in DNT were assessed across tertiles of time since the start of the study in March 2012: 1st 0-132 days (n=301), 2nd 133-294 days (n=299) and 3rd 295-623 days (n=301). Predictors of longer DNT (>60 min) were determined in a logistic regression model.

**Results** In 954 (93.0%) patients with available data, overall median DNT (min) is currently 76 (95%CI 49-120) and comparable to international rtPA registries, but it has increased significantly over time (tertiles): 73 (69-78), 72 (68-77) and 85 (80-91) (p<0.01). There has been a non-significant decline in DNT for patients in China (n=376; 125, 123, 115 min, p=0.10) compared to those elsewhere (n=525; 58, 52, 56 min, p=0.29). China (OR 28.06, 95%CI 16.87-46.68; p<0.01), onset-to-door time (0.99, 0.98-0.99; p<0.01) and few (<10) patients treated per year (1.64, 1.02-2.70; p=0.04) were independent predictors of longer DNT.

**Conclusions** Overall DNT in ENCHANTED is comparable to international rtPA registries, but secular and geographical trends are emerging. Participation in an acute stroke clinical trial does not necessarily translate into improved DNT. Programs to improve the delivery of rtPA are needed in China.
Oral Session

O2-1-4  Long-term survival after alteplase - 3 year results from the IST-3 trial

William Whiteley (Centre for Clinical Brain Sciences, University of Edinburgh, UK)

Eivind Berge2, Joanna Wardlaw1, Richard Lindley3, Peter Sandercock1, IST-3 Collaborative Group1
1Centre for Clinical Brain Sciences, University of Edinburgh, UK
2Department of Internal Medicine, Oslo University, Norway
3George Institute for Global Health, University of Sydney, Australia

[Background] We report the effect of intravenous alteplase on long-term survival after ischaemic stroke of participants in the Third International Stroke Trial (IST-3).

[Methods] IST-3 randomly assigned participants to treatment with intravenous 0.9 mg/kg alteplase plus standard care or standard care alone within 6 h of ischaemic stroke. We followed up participants in the UK, Sweden and Norway for survival up to 3 years after randomisation with data from national registries.

[Findings] IST-3 enrolled 3035 participants; of these, 1948 (64%) were scheduled for analysis of 3 year survival, and 1946 (>99%) included in this analysis. By 3 years after randomisation, 453 (47%) of 967 participants in the alteplase plus standard care group and 494 (50%) of 979 in the standard care alone group had died (risk difference 3.6% [95% CI 0.8 to 8.1%]). Participants allocated to alteplase had a significantly higher hazard of death during the first 7 days (99 [10%] of 967 died in the alteplase plus standard care group vs 65 [7%] of 979 in the standard care alone group; hazard ratio 1.52 [95% CI 1.11-2.08]; p=0.004) and a significantly lower hazard of death between 8 days and 3 years (354 [41%] of 868 vs 429 [47%] of 914; 0.78 [0.68-0.90]; p=0.007).

[Interpretation] Alteplase treatment within 6 h after ischaemic stroke led to a small, non-significant reduction in risk of death at 3 years, but among individuals who survived to 7 days, treatment was associated with a significant increase in long-term survival.
Oral Session

O2-1-5  Feasibility of using magnetic resonance imaging as a screening tool for acute stroke thrombolysis

Yuki Sakamoto (Department of Neurological Science, Nippon Medical School, Japan)
Seiji Okubo, Satoshi Suda, Arata Abe, Junya Aoki, Kanako Muraga, Takuya Kanamaru, Kentaro Suzuki, Kazumi Kimura
(Department of Neurological Science, Nippon Medical School, Japan)

[Background] Feasibility of performing MRI first for suspected hyperacute stroke patients in real-world practice has not been fully examined. Moreover, most past studies of reducing door-to-needle time (DNT) in intravenous thrombolysis were conducted using CT. The aim of this study was to evaluate the feasibility of an MRI-first policy and examine the effects of a quality improvement (QI) process for reducing DNT using MRI.

[Methods] From January 2014 to August 2015, consecutive acute stroke patients who were treated with thrombolysis were prospectively enrolled into the present study. In principle, multimodal 1.5T-MRI was performed first for patients with suspected acute stroke. A step-by-step QI process for decreasing DNT, including prenotification by the emergency medical service, limiting the MRI sequence, and introduction of a rapid examination tool, was also implemented during this period. Time metrics for thrombolysis were compared between specific time periods.

[Results] A total of 73 patients (27 women; median age 74 years) were included in the present study. More than 80% of the patients were screened with MRI. More patients were managed with the MRI-first policy in the late phase (p=0.018). DNT (83 min in the early phase, 68 min in the middle phase, and 54 min in the late phase, p<0.001) was significantly reduced across phases. The percentage of patients with DNT <60 min increased significantly across time periods (p<0.001).

[Conclusion] An MRI-first policy was feasible, and DNT was substantially reduced with a QI process. This process may be applicable to other hospitals.

O2-1-6  Utility of items of baseline NIH stroke scale as predictors of functional outcomes 3 months after mild ischemic stroke

Jay Chol Choi (Department of Neurology, Jeju National University, Republic of Korea)

Jun Lee¹, Jae-Kwan Cha², Joon-Tae Kim³, Hee-Joon Bae⁴
¹Department of Neurology, Yeungnam University Hospital, Republic of Korea
²Department of Neurology, Dong-A University College of Medicine, Republic of Korea
³Department of Neurology, Chonnam National University Hospital, Republic of Korea
⁴Department of Neurology, Seoul National University Bundang Hospital, Seoul National University College of Medicine, Republic of Korea

[Background and Purpose] Predicting outcomes of acute stroke patients initially presenting with mild neurologic deficits is crucial in decision-making regarding thrombolytic therapy. We examined the utility of individual NIH Stroke Scale (NIHSS) score items or clusters of items as predictors of functional outcomes 3 months after mild stroke.

[Methods] Using a multicenter stroke registry database, we identified patients with acute ischemic stroke who presented within 4.5 hours of symptom onset and had initial NIHSS scores ≤ 5. Functional outcomes at 3 months were dichotomized as favorable (modified Rankin Scale [mRS] score zero or 1) or unfavorable (mRS 2-6). Individual NIHSS items, clusters of items, and the total score were tested for their ability to predict outcomes in multivariable models. Area under the ROC curve (AUC) was used to assess model performance.

[Results] Of the 2,209 patients who met eligibility criteria, 588 patients (26.6%) exhibited unfavorable functional outcomes at 3 months. Of the 15 items of the NIHSS, all items except for items 8 (sensory) and 11 (extinction) were significantly associated with unfavorable functional outcomes in bivariate analysis (p’s < 0.05). Among the multivariable models, the model with the total NIHSS score exhibited an AUC similar to that of the model with all NIHSS items in predicting functional outcomes (0.758 [95% confidence interval, 0.739 -0.775] vs. 0.759 [0.740 - 0.776]; p = 0.75 for pairwise comparison).

[Conclusions] Simply using the total score was as effective as using all NIHSS items or clinical stroke syndromes in predicting outcomes of mild stroke patients.
Oral Session

**O2-2-1 Analyses of thrombi in cerebral arteries with endovascular thrombectomy for acute ischemic stroke: A consensus statement**

David S. Liebeskind (Neurovascular Imaging Research Core and UCLA Stroke Center, on behalf of the Clot Summit Group. US)

Simon F. De Meyer¹, Tommy Andersson², Blaise Baxter³, Martin Bendszus⁴, Patrick Brouwer⁵, Waleed Brinjikji⁶, Bruce Campbell⁷, Vincent Costalat⁸, Antoni Dávalos⁹, Andrew Demchuk¹⁰, Diederik Dippel¹¹, Jens Fiehler¹², Urs Fischer¹³, Michael Gilyarr¹⁴, Matt Gounis¹⁵, Jan Graafl¹⁶, Olav Jansen¹⁷, Tudor Jovin¹⁸, David Kallmes¹⁹, Pooja Khatri²⁰, Kennedy Lees²¹, Elena López-Cancio²², Charles Majoie²³, Henk Marquering²⁴, Ana Paula Narata²⁵, Raul Nogueira²⁶, Peter Ringler²⁷, Adnan Siddiqui²⁷, István Szikora²⁸, David Vale²⁹, Rüdiger von Kummer³⁰, Albert Yoo³¹, Werner Hacke³²

¹Laboratory for Thrombosis Research, KU Leuven Campus Kulak Kortrijk, Belgium
²Department of Clinical Neuroscience, Karolinska Institute, Stockholm, Sweden
³Department of Medical Imaging, AZ Groeninge, Belgium
⁴Department of Radiology, Erlanger Hospital, University of Tennessee, US
⁵Department of Neuroradiology, University Medical Center, Germany
⁶Department of Neuroradiology, University of Heidelberg, Germany
⁷Department of Medicine and Neurology, Melbourne Brain Centre at the Royal Melbourne Hospital, University of Melbourne, Australia
⁸Interventional and Diagnostic Neuroradiology, Montpellier University Hospital, France
⁹Acute Stroke Unit, Department of Neurosciences, Hospital Universitari Germans Trias i Pujol, Spain
¹⁰Department of Clinical Neurosciences and Radiology, Cumming School of Medicine, University of Calgary, Canada
¹¹Department of Neurology, Erasmus University Medical Center, Netherlands
¹²Department of Neurosciences, Neurology, University Medical Center, Germany
¹³Department of Neurology, Inselhospital, Bern University Hospital, University of Bern, Switzerland
¹⁴Neuravi Thromboembolic Initiative, Neuravi Ltd, Ireland
¹⁵Division of Neuroimaging and Intervention and New England Center for Stroke Research, Department of Radiology, University of Massachusetts Medical School, US
¹⁶Institute of Diagnostic and Interventional Neuroradiology, Inselhospital, Bern University Hospital, University of Bern, Switzerland
¹⁷Department of Radiology and Neuroradiology, UKSH, Germany
¹⁸Department of Neurology, University of Pittsburgh Medical Center, US
¹⁹Department of Neurology, University of Cincinnati, US
²⁰Institute of Cardiovascular and Medical Sciences, University of Glasgow, Scotland
²¹Department of Radiology, Academic Medical Center, the Netherlands
²²Department of Biomedical Engineering and Physics, Academic Medical Center, the Netherlands
²³CHRU Hôpitaux de Tours, France
²⁴Department of Neurology, Emory University, US
²⁵Department of Neurology, University of Heidelberg, Germany
²⁶Department of Neurosurgery, University of Buffalo, US
²⁷Department of Neuroradiology, National Institute of Neurosciences, Hungary
²⁸Universitätsklinikum Carl Gustav Carus, Germany
²⁹Texas Stroke Institute, US
³⁰Department of Neurology, University Hospital Heidelberg, Ruprecht-Karls University, Germany
³¹Neurovascular Imaging Research Core and UCLA Stroke Center, University of California, US

Limited data exist on the composition and detailed characteristics of arterial thrombi associated with large vessel occlusion in acute ischemic stroke. Advances in endovascular thrombectomy and related imaging modalities have created unique opportunity to analyze clots removed from cerebral arteries with a variety of approaches. Research insight on occlusive clot composition, etiology, physical properties, behavior and neurovascular interactions may lead to future advancements in acute ischemic stroke treatment and improved clinical outcomes. Advances in imaging techniques may enhance clot characterization and inform therapeutic decision-making prior to treatment and for secondary prevention. Stroke thrombi are complex and varied. Cellular and molecular components may be present in varying proportions in different thrombi but also within an individual thrombus. Current imaging techniques can provide some information about clot, but there remains much to evaluate on relationships that may exist between clot composition, various occlusion characteristics and treatment outcomes. Further improvements in revascularization with thrombolysis and thrombectomy may be facilitated by such analyses of pathophysiology and clinical correlates from ongoing studies. Improved characterization of clot types, their properties and how these properties change over time may greatly assist this effort. Interdisciplinary approaches covering clinical, engineering and scientific aspects of clot research will be key to advancing the understanding of clot and improving acute ischemic stroke therapy. This consensus statement integrates recent research on thrombi in cerebral arteries and proposes a rational and systematic approach for further analyses conducted around the world.
**O2-2-2  Proteomic analysis to determine stroke thrombus origin**

Neal Matsumori Rao (Department of Neurology, Stroke Center, University of California, Los Angeles, US)

Joseph Capri1, Whitaker Cohn1, William H. Yong2, Lucas Restrepo-Jimenez2, David S. Liebeskind2, Julian P. Whitelegge2

1University of California, US
2David Geffen School of Medicine at UCLA, US

**Introduction** The specific protein composition of stroke-causing emboli is unknown. Because ischemic stroke has a varied etiology, it is possible that the composition of the originating thrombus will have distinctive molecular characteristics reflective of the underlying pathophysiology. In this study, we used mass spectrometry to evaluate the protein composition of retrieved emboli from three patients with differing stroke etiologies.

**Methods** Emboli from three consecutive acute stroke patients were retrieved by embolectomy during routine stroke care. Thrombus proteins were extracted, digested and multidimensional fractionation of peptides was performed. Fractionated peptides underwent nano-liquid chromatography with tandem mass spectrometry. Spectra were searched using Mascot software in which results with p<0.05 (95% confidence interval) were considered significant and indicating identity.

**Results** 118 identified proteins were common to all three emboli. All samples contained hemoglobin, and various subunits of fibrinogen, and cytoskeletal proteins such as actin. Among proteins unique to each patient, we found proteins associated with their suspected stroke etiology. For instance, in the patient with atrial fibrillation and likely cardioembolic stroke, we found myotrophin – a protein upregulated in patients with dilated cardiomyopathy. In the patient with aortic arch and large vessel plaque, we found Rho GDP-dissociation inhibitor 1, a protein associated with atherosclerosis.

**Conclusion** Although these findings are tempered by a small sample size, we provide preliminary support for the feasibility of utilizing proteomic analysis of emboli to determine ischemic stroke etiology.

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**O2-2-3  Mechanical thrombectomy for acute ischemic stroke patients older than 80 years of age**

Tatsuya Mori (Department of Neurosurgery, Toyooka Public Hospital, Japan)

Taichiro Imahori1, Kazuhiro Tanaka1, Atsushi Arai1, Ryoji Shiomi1, Daigo Fujiwara1, Makoto Kobayashi2, Atsushi Fujita3, Kohkichi Hosoda3, Eiji Kohmura3

1Department of Neurosurgery, Toyooka Public Hospital, Japan
2Tajima Emergency & Critical Care Medical Center, Toyooka Public Hospital, Japan
3Department of Neurosurgery, Kobe University Graduate School of Medicine, Japan

**Background** Mechanical thrombectomy (MT) has proven effective for selected patients with acute ischemic stroke (AIS); however, the efficacy for very elderly patients is unknown. We evaluated our experience including octogenarians to determine whether age predicts the outcome after MT.

**Methods** Between April 2015 and May 2016, 65 endovascular revascularizations for anterior acute large vessel occlusion were performed using the Trevo stent retriever as the first-line device at our institute. We compared the outcome between octogenarian (>80 years old, n=25) and non-octogenarian (≤80 years old, n=35) groups, excluding 5 patients whose score of mRS before onset was ≥3. Additionally, we assessed the prognostic factor of good outcome (mRS 0-2) among all patients.

**Results** Except for age, there was no significant difference in the baseline characteristics between the octogenarian (median age, 85 years; median baseline NIHSS, 16; median ASPECTS, 8) and non-octogenarian groups (age, 72 years; NIHSS, 20; ASPECTS 8). Successful revascularization (TICI 2b) (80% vs 89%, p=0.47), complete recanalization (TICI 3) (40% vs 51%, p=0.44), and good outcome at discharge (36% vs 40%, p=0.79) were achieved more often in the non-octogenarian group but did not reach statistical significance. Multivariate logistic regression analysis showed complete recanalization was the only significant prognostic factor (OR, 4.10; 95% CI, 1.26-15.01; p=0.024), adjusting for the following variables: octogenarian, baseline NIHSS, ASPECTS, and complete recanalization.

**Conclusions** Our study showed the results of MT for octogenarians were comparable with those for non-octogenarians, and complete recanalization was the strongest predictor of good outcome over age.
**O2-2-4**  Introduction of mechanical thrombectomy for acute ischemic stroke in a rural region covering an area within a radius of 80km with air ambulance in Japan

Taichiro Imahori (Department of Neurosurgery, Toyooka Public Hospital, Japan)

Kazuhiro Tanaka¹, Atsushi Arai¹, Ryoji Shiomî¹, Daigo Fujiwara¹, Tatsuya Mori¹, Makoto Kobayashi², Atsushi Fujita³, Kohkichi Hosoda³, Eiji Kohmura³

¹Department of Neurosurgery, Toyooka Public Hospital, Japan
²Tajima Emergency & Critical Care Medical Center, Toyooka Public Hospital, Japan
³Department of Neurosurgery, Kobe University Graduate School of Medicine, Japan

**Background** Mechanical thrombectomy (MT) has proven effective for selected patients with acute ischemic stroke (AIS). We evaluated the effect of introduction of MT on outcome of AIS in a rural Kitakinki region in Japan, covering an area within a radius of 80km with air ambulance.

**Methods** Between January 2014 and May 2016, 192 patients with acute large vessel occlusion (175 patients in the anterior circulation and 17 in the posterior circulation) admitted to our institute were analyzed. Any endovascular treatment was not performed before April 2015, and MT was performed thereafter. We compared the outcome of the patients during the period before and after introduction of MT.

**Results** In Pre-introduction group, all 86 patients (median age, 82 years; median NIHSS, 20) were treated medically. In Post-introduction group, among 106 patients (age, 83 years; NIHSS, 20), 37 patients were treated medically, and remaining 69 patients underwent MT (TICI 2b or 3, 86%). Although median transfer distance increased (23km in the Pre-introduction group vs 29km in the Post-introduction group, p=0.047), median time from call to admission was equivalent (42min vs 42min, p=0.03) because of the increase in the proportion of the helicopter transfer (30% vs 44%, p=0.052). Both the rate of patients who underwent revascularization therapy with intravenous tPA or MT (24% vs 69%, p<0.001) and good outcome (mRS 0 to 2) at discharge (12% vs 25%, p=0.017) increased significantly.

**Conclusions** Our study showed introduction of MT in collaboration with air ambulance improved AIS therapy in a rural broad area in Japan.

**O2-2-5**  Thrombectomy for Trousseau syndrome-related acute cerebral vessel occlusion: Histological examination

Hitoshi Fukuda (Department of Neurosurgery, Amagasaki General Medical Center, Japan)

Naoki Matsumoto, Miyako Kobayashi, Akira Handa, Sen Yamagata

Kurashiki Central Hospital, Japan

**Background and Purpose** Trousseau syndrome is characterized as cerebral embolism due to hypercoagulation related to malignancy. Treatment of Trousseau syndrome is yet to be elucidated, and histological examination of Trousseau syndrome-related thrombi would contribute to establish effective secondary prevention. The purpose of this study is to investigate specific histopathological findings of the thrombi of Trousseau syndrome, which were retrieved through thrombectomy.

**Methods** We retrospectively analyzed the histopathology of 9 thrombi retrieved from occluded large cerebral vessels through endovascular thrombectomy in our institution between March 2015 and October 2015. We compared the thrombi of Trousseau syndrome with those of other causes.

**Results** Among 9 thrombi, 2 were categorized as related to Trousseau syndrome. The thrombi of Trousseau syndrome were solid and mainly contained fibrin. On the other hands, thrombi associated with atherosclerosis or cardiac embolism were fragile, and had smaller area of fibrin with a large amount of red and white blood cells.

**Conclusions** The thrombi of Trousseau syndrome, which caused large cerebral vessel occlusion, were solid and almost exclusively consisted of fibrin. Histological findings in this study may facilitate further research of clinical entity and treatment of Trousseau syndrome.
O2-2-6  Collateral flow detected by arterial spin labelling MR imaging can predict outcome in endovascular recanalization for acute ischemic stroke

Yoichi Morofuji (Department of Neurosurgery and Stroke Center, Nagasaki University, Japan)

Yohei Tateishi1,2, Nobutaka Horie1,2, Eisaku Sadakata2,3, Minoru Morikawa4, Tsuyoshi Izumo2,3, Akira Tsujino1,2, Takayuki Matsuo1,2
1Department of Neurology and Strokology, Nagasaki University, Japan
2Stroke Center, Nagasaki University, Japan
3Department of Neurosurgery, Nagasaki University, Japan
4Department of Radiology, Nagasaki University, Japan

【Purpose】Several randomized-control trials could recently demonstrate that ischemic stroke caused by large vessel occlusion can be treated effectively by endovascular treatment. These studies corroborated the strong association between preoperative collateral flow and clinical outcome after recanalization. However, even in the era of rapid and effective recanalization using endovascular approaches, the percentage of patients with good outcomes varies between 33 and 71%. The purpose of this study was to test whether arterial spin labeling (ASL) MR imaging could predict outcome of endovascular recanalization.

【Methods】Among 910 patients who presented with acute ischemic stroke at our institution from January 2012 to March 2016, 106 patients (11.6%) underwent endovascular treatment. Image data were included in this study if (1) preoperative ASL MR imaging was performed and (2) successful reperfusion (TICI 2b/3) was achieved. Correlation between distal intra-arterial sign (IAS) on ASL and mRS at 90 days was retrospectively studied.

【Results】A total of 53 patients with a mean age of 75 years and median National Institutes of Health Stroke Scale (NIHSS) of 14 were analysed. Functional independence (mRS 0-2) at 90 days was 91% in the distal IAS positive group when compared with 38% in the distal IAS negative group (P=0.0001). Eleven patients without distal IAS in the anterior circulation resulted in mRS 3-6. Negative distal IAS is a strong predictive value of poor outcome (mRS 3-6) at 90 days.

【Conclusion】We provide evidence that good clinical outcome following successful reperfusion is collateral-dependent as well as time-dependent.

O2-2-7  Different diagnosis with Dual energy CT imaging between hemorrhage and contrast agents for acute revascularization therapy patients

Masataka Hayashi (Department of Neurosurgery, Tokyo Women’s Medical University, Yachiyo Medical Center, Japan)

Kotaro Fukuda1, Isamu Miura1, Akane Tanda1, Tomomi Ishikawa1, Akitsugu Kawashima1, Takakazu Kawamata2
1Department of Neurosurgery, Tokyo Women’s Medical University, Yachiyo Medical Center, Japan
2Department of Neurosurgery, Tokyo Women’s Medical University, Japan

【Introduction】After acute revascularization with endovascular technique, sometimes it is difficult to distinguish hemorrhage and contrast agents in postoperative CT scans.

【Purpose】In our institute, we used Dual CT energy Scan imaging to confirm hemorrhage or Ion contrasts, and will show some typical experiences.

【Method】Dual CT energy imaging was made by CT Aquilion ONE VISION EDITION (@TOSHIBA, 320 lines), and we chose rotate/rotate method, one of the ways of Dual energy CT scan. Its condition is this way. (80kV/500mAS/EC and 135 kV/220mAS/EC) After IVR, we took Dual energy CT imaging, and normal CT image in postoperative day1, to determine hemorrhage or contrast agents.

【Result】In our institute, total acute revascularization IVR therapy was received 24 patients. With Dural energy CT, 22 patient (91.6%) was diagnosed correct discrimination, in postoperative immediate image.

【Result】Dual energy CT image is effective tool to distinguish hemorrhage and contrast agents in acute revascularization therapy.
O3-1-1  Factors related to subarachnoid hemorrhage after stroke thrombectomy using stent retriever

Mikito Hayakawa (Department of Cerebrovascular Medicine, National Cerebral and Cardiovascular Center, Japan)

Hiroshi Yamagami¹, Naoko Funatsu², Kazutaka Sonoda², Takeshi Yoshimoto¹, Tetsu Satow³,
Jun Takahashi³, Kazuyuki Nagatsuka¹, Kazunori Toyoda²
¹Department of Neurology, National Cerebral and Cardiovascular Center, Japan
²Department of Cerebrovascular Medicine, National Cerebral and Cardiovascular Center, Japan
³Department of Neurosurgery, National Cerebral and Cardiovascular Center, Japan

【Objective】To clarify whether vessel curvature and/or frequency of passage influence the occurrence of subarachnoid hemorrhage (SAH) after stent-retriever (SR) thrombectomy.

【Methods】We prospectively registered 133 acute stroke patients who underwent endovascular reperfusion therapy in our institute from November 2011 to May 2016, and retrospectively analyzed all patients with embolic anterior-circulation occlusion who underwent SR thrombectomy and of whom MCA was passed by SR. We summed the angles of bend or branching sites from the ICA-C2 on the affected side (or the tip of an intermediate catheter if used) to the SR-achieving site using the final angiograms. We investigated the associations between the occurrence of SAH and the number of SR passage through the MCA or the sum of angles of the SR-passing vessels.

【Results】A total of 55 patients (27 women, 75±10 years old) with median baseline NIHSS score of 18 was included. Successful reperfusion was obtained in 78% and functional independence at 90 days was obtained in 44%. Thirteen patients (24%) developed SAH. In SAH group, the number of passage (2 vs 1, p=0.013) and the sum of angles (263° vs 165.5°, p=0.001) were larger than in non-SAH group. After multivariate adjustment, the number of passage (OR, 3.88; 95%CI, 1.04-14.4) and the sum of angles (OR/10-degree, 1.23; 95%CI, 1.05-1.44) were associated with the occurrence of SAH.

【Conclusion】The number of SR passage through the MCA and the sum of angles of the SR-passing vessels were associated with the occurrence of SAH after stroke thrombectomy for acute anterior-circulation occlusion.

O3-1-2  Prognostic factors for patients with acute ischemic stroke treated by mechanical thrombectomy

Katsuharu Kameda (Baba Memorial Hospital, Japan)

Junji Uno, Shota Yoshida, Ryosuke Otsuji, Nice Ren, Shintaro Nagaoka, Kazushi Maeda, Yoshiaki Ikai, Hidefuku Gi
Baba Memorial Hospital, Japan

【Background and purpose】To elucidate the prognostic factors for mechanical thrombectomy (MT), we investigated (retrospectively) a series of patients with acute ischemic stroke (AIS) treated with MT in our hospital.

【Method】Of 215 consecutive cases who underwent MT from 1 November 2011 to 31 December 2015, 161 patients who had a pre-stroke modified Rankin Scale (mRS) <2 were enrolled in the study. Patients were divided into two groups according to the mRS 90 days after treatment: “good” outcome (0-2) and “poor” outcome (3-5). We estimated several factors: age, sex, medical history (hypertension, diabetes mellitus, dyslipidemia, cerebral infarction/transient ischemic attack, coronary artery disease, recent smoking), National Institutes of Health Stroke Scale (NIHSS) upon hospital admission, intravenous recombinant tissue plasminogen activator (rtPA) time from onset to recanalization (OTR), recanalization prevalence (thrombolysis in cerebral infarction (TICI)), and hemorrhagic complications (hemorrhagic transformation (HT), subarachnoid hemorrhage (SAH)).

【Result】A total of 55 patients (27 women, 75±10 years old) with median baseline NIHSS score of 18 was included. Successful reperfusion was obtained in 78% and functional independence at 90 days was obtained in 44%. Thirteen patients (24%) developed SAH. In SAH group, the number of passage (2 vs 1, p=0.013) and the sum of angles (263° vs 165.5°, p=0.001) were larger than in non-SAH group. After multivariate adjustment, the number of passage (P<0.001; odds ratio, 37.8; 95% confidence interval, 4.18-453), HT (0.0233; 5.0; 1.23-26.2), and SAH (0.0033; 10.3; 2.11-76.7) were associated with the occurrence of SAH.

【Conclusion】Hemorrhagic complications and OTR are poor prognostic factors for patients with AIS treated by MT.
O3-1-3  The effect of the first-line devices for endovascular treatment on the recanalization efficacy and the functional outcome in acute ischemic stroke patients

Ryo Itabashi (Department of Stroke Neurology, Kohnan Hospital, Japan)

Yuya Shigehatake1, Yukako Yazawa1, Kazuki Fukuma1, Yosuke Akamatsu1, Shunsuke Omodaka1, Yasushi Matsumoto1, Etsuro Mori2
1Kohnan Hospital, Japan
2Tohoku University Graduate School of Medicine, Japan

【Purpose】The aim of this study is to evaluate whether the choice of a first-line device for endovascular treatment (EVT) would affect the recanalization efficacy and the clinical outcome in acute ischemic stroke patients.

【Methods】We retrospectively studied consecutive 67 patients treated within 24 hours after stroke onset with EVT in our department from January 2014 through July 2016. The patients were classified into the following three groups based on the first-line devices used in EVT: ACE group, in which A Direct Aspiration, First Pass Technique (ADAPT) with 5 MAX ACE was performed; Stent group, in which Revive, Solitaire or Trevo were used; Other group, including percutaneous transluminal angioplasty, direct aspiration from balloon guiding catheter, or other procedure. We compared the recanalization efficacy, the clinical outcome and the complication rate between ACE and Stent groups.

【Results】The median of initial NIHSS score was 18 [interquartile range: 14-25]. Thirty-five patients (52%) were treated with intravenous thrombolysis before EVT. The rate of successful recanalization (TICI grade 2b-3) was 84%. The number of symptomatic intracranial hemorrhage was 3 (4%). The median of onset to groin puncture time (OTP) was 220 minutes [148-312], and groin puncture to successful recanalization time (PTR) was 68 minutes [41.5-112]. The number of patients was 16 in ACE group, 40 in Stent group, and 11 in Other group. PTR (67 min. vs 73 min.), the rate of successful recanalization (75% vs 85%) and symptomatic intracranial hemorrhage (6.3% vs 5%), and the rate of mRS 0-2 at discharge (19% vs 25%) was not significantly different between ACE and Stent groups.

【Conclusion】The choice of first-line devices for acute EVT did not affect the recanalization efficacy and the functional outcome in acute ischemic stroke patients.

O3-1-4  Intravenous thrombolysis before mechanical thrombectomy: Does it matter? The single centre experience

Aleksandras Vilionskis (Clinic of Neurology and Neurosurgery, Vilnius University, Lithuania)

Inga Slautaite1,2, Dalia Jatuzis1,3
1Vilnius University, Clinic of Neurology and Neurosurgery, Lithuania
2Republican Vilnius University Hospital, Department of Neurology, Lithuania
3Vilnius University Hospital Santariskiu Klinikos, Department of Neurology, Lithuania

【Introduction】Recent studies have confirmed the benefits of mechanical thrombectomy (MTE) for acute stroke patients. The role of intravenous thrombolysis (IVT) before MTE remains unclear. The aim of study was to compare the efficacy and safety of MTE alone and bridging therapy (IVT followed by MTE; BT) in acute clinical setting.

【Methods】The study included all acute stroke patients treated with MTE (n=77) from Jan-2014 to Jun-2016 in Republican Vilnius University hospital. The primary endpoint was the mean change between initial and 24h NIHSS score. Secondary endpoint was significant neurological improvement (SNI). Safety criteria were symptomatic intracerebral haemorrhage (sICH) according to SITS-MOST definition and mortality within the first 7 days.

【Results】MTE alone was applied to 25 patients, and BT - 52 patients. Demographic and clinical features were similar in both groups. The mean time from arrival to groin artery puncture was shorter in MTE group compared to BT group (178 min and 198 min, respectively; p<0.05). Other logistics markers were similar in both groups. The mean NIHSS score changes were 6.8 points in MTE group, and 5.1 points - in BT group (p>0.05). SNI occurred similarly in both groups (52.6% and 56.3%, respectively; p>0.05). The rate of sICH in MTE and BT groups did not differ significantly (0% and 1.9%, respectively, p>0.05). The 7 days’ mortality were similar in both groups.

【Conclusions】The results of our study suggest that MTE alone and BT are both effective and safe treatments in clinical practice. The further multicentre study needs to confirm our results.
O3-1-5  Innovation of laser thrombolysis system for good clinical practice

Teiji Nakayama (Department of Neurosurgery, Hamamatsu Medical Center, Japan)

Kazuo Umemura¹, Yuji Matsumoto¹, Kazuyuki Hokamura¹, Hiroyuki Okada², Tsuyoshi Kosugi², Yoshiyuki Shimizu², Youhei Takata²

¹Hamamatsu University School of Medicine, Japan
²Hamamatsu Photonics K.K., Japan

As a treatment for acute cerebral infarction, we developed a laser thrombolysis system with the second harmonic generation of microsecond Nd:YAG laser. For good clinical practice we innovated this system. Firstly, we optimized the condition of laser irradiation. Secondly, we evaluated the thrombolytic efficacy using internal carotid artery embolism models in cynomolgus monkeys. We made autologous emboli and injected it from common carotid artery. After confirmation of cessation of blood flow, laser irradiation treatment was started with an optical fiber within a microcatheter inserted from the femoral artery. We observed that the embolus in the internal carotid artery was thrombolyzed by laser irradiation. We also confirmed that there were no cerebral infarction from T2 weighted images and diffusion weighted images of MRI. Moreover, the cerebral blood flow was kept normal at 24 hours after laser treatment. Microscopic investigation with HE staining revealed no vascular endothelial damage. In addition, any infarction and any intracerebral hemorrhage were not observed in the brain tissue. From the above results, we think this laser thrombolysis system is safe and effective for acute cerebral infarction. We also changed catheter tips and adapted “over the guide wire technique”. We could reduce vessel damages with these modifications. In near future, this system should be a mainstream of treatment for acute cerebral infarction together with tPA treatment.

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O3-2-1  Effect of transdermal glyceryl trinitrate, a nitric oxide donor, on global outcome in patients treated within 6 hours of stroke onset

Philip Bath (University of Nottingham, UK)

Lisa Woodhouse, Polly Scutt, Nikola Sprigg

University of Nottingham, UK

[Background] Glyceryl trinitrate (GTN) is a candidate reperfusion and hypotensive treatment for hyperacute stroke, and improved dependency, death, disability, cognitive impairment, mood disturbance, and quality of life in two trials. However, individual outcomes do not provide a global estimate of effect.

[Methods] The global effects of ultra/hyper-acute administration of GTN were tested using three statistical approaches: Hotelling T2 test (combines continuous variables), Wei-Lachin test (combines continuous or ordinal variables), and Wald test (combines dichotomous variables, as used in NINDS alteplase trial). Raw and dichotomised, outcome data at 90 days included telephone assessments of dependency (modified Rankin Scale, mRS>2), disability (Barthel index, BI<60), mood (Zung depression scale, ZDS>70), cognition (t-Mini Mental state examination, tMMSE<14) and quality of life (health utility status, HUS<0.5, as derived from EuroQol-5D).

[Results] 312 patients (GTN 168, no GTN 144) were randomised within 6 hours of ictus into ENOS-early (n=273) and RIGHT (39). GTN improved individual and global outcomes for both the ENOS-early and RIGHT trials respectively:

Individual tests
- mRS: OR 0.55, (p=0.0055); 0.27, (p=0.0306)
- BI: MD 13.5, (p=0.0029); 25.4, (p=0.0724)
- ZDS: MD -10.3, (p=0.0013); -14.3, (p=0.0631)
- tMMSE: MD 3.5, (p=0.0007); 4.3, (p=0.1151)
- HUS: MD 0.09, (p=0.0753); 0.21, (p=0.0618)

Global tests
- Hotelling T2: T2 24.91, (p=0.0087); 9.85, (p=0.1763)
- Wei-Lachin: MW 0.64, (p=0.0018); 0.73, (p=0.0301)
- Wald: OR 0.52, (p=0.0011); 0.38, (p=0.0826)

[Conclusions] GTN improved global aggregates of dependency, disability, mood, cognition and quality of life data. This exploratory finding is being tested prospectively in the ongoing 850-patient RIGHT-2 trial. Reporting global tests adds information on treatment effects.
Oral Session

O3-2-2  Resistant hypertension as a poor prognosticator for acute ischemic stroke

Chi Kyung Kim (Department of Neurology, Korea University Guro Hospital, Republic of Korea)

Changwoon Choi1, Jin-Man Jung2, Kyung-Hee Cho3, Sungwook Yoo3, Kyungmi Oh1, Woo-Keun Seo4
1Neurology, Korea University Guro Hospital, Republic of Korea
2Neurology, Korea University Ansan Hospital, Republic of Korea
3Neurology, Korea University Anam Hospital, Republic of Korea
4Neurology, Samsung Medical Center, Republic of Korea

【Purpose】Some patients have a resistant hypertension even though they take three or more classes of antihypertensive drugs. There was not any study related to the outcomes of ischemic stroke in patients with resistant hypertension.

【Methods】We recruited 2,053 hypertensive patients with acute ischemic stroke in three university hospitals in Korea. Hypertensive patient was defined as those who took antihypertensive drugs before the occurrence of stroke, and resistant hypertensive patient was done as those who took four classes antihypertensive drugs or three classes antihypertensive drugs including diuretics. The prognosis of these patient was evaluated as a 7-day modified Rankin Scale (mRS), recurrence of ischemic stroke and coronary artery diseases, and mortality in a follow-up period.

【Results】Among 2,053 patients, resistant hypertension was detected in 335 (17%) patients. Resistant hypertensive patients were had more severe initial stroke severity, and more proportion of diabetes and chronic kidney diseases. After adjusting age, sex, diabetes, stroke severity and subtype, resistant hypertension was significantly related to poor outcome at 7 days (> 2 mRS; adjusted OR, 1.41; 95% confidence interval, 1.04 - 1.90). and increased the recurrence of coronary artery diseases (adjusted HR, 1.98, 95% confidence interval, 1.20 - 3.28). Although resistant hypertension was not associated with the recurrence of ischemic stroke, mortality of these patients was marginally related to resistant hypertension (adjusted HR, 1.51; 95% confidence interval, 0.99 - 2.30).

【Conclusions】Resistant hypertension is closely related to the poor prognosis of acute ischemic stroke, especially for 7-day functional outcome and occurrence of coronary artery diseases.

O3-2-3  The development of visual management web system for acute ischemic stroke therapy

Shoji Matsumoto (Department of Neurology, Kokura Memorial Hospital, Japan / Department of Neurology, Neurological Institute, Graduate School of Medical Sciences, Kyushu University, Japan)

Hiroshi Koyama1, Taketo Hatano2, Nobutake Sadamasa2, Yasutoshi Kai2, Makoto Saka2, Tetsuya Hashimoto3, Ichiro Nakahara4, Izumi Nagata2, Jun-ichi Kira5
1Graduate School of Industrial Technology, Advanced Institute of Industrial Technology, Japan
2Department of Neurosurgery, Kokura Memorial Hospital, Japan
3Department of Neurology, Kokura Memorial Hospital, Japan
4Department of Comprehensive Strokology, Fujita Health University Medical School, Japan
5Department of Neurology, Neurological Institute, Graduate School of Medical Sciences, Kyushu University, Japan

【Background and Purpose】The benefits of intravenous tissue-plasminogen activator and endovascular therapy in acute ischemic stroke are highly time-dependent. However, there are so many cross-departmental tasks to eligible patent that many stroke centers have difficulty achieving the guideline recommended 1-hour Door-to-Needle time. We developed a visual management web system named “Task Calc. Stroke” to support in-hospital task processing for acute stroke treatment efficacy. We aim to introduce the system and the results of the initial evaluation survey.

【Methods】“Task Calc. Stroke” is a ready-to-deploy web system that displays the real-time key task processing on the wall-mounted each iPads in the ER, CT, MRI, Angiography, Laboratory rooms and Stroke Care Unite via network. This system shear information within medical staff efficiency. A questionnaire survey regarding working environment among medical staff including nurse, radiology technician, and laboratory technician were conducted.

【Results】There were 35/36 (97%) valid respondents to the survey. Using this system, 53% (18/35) of them felt relieved of a burden in information sharing compare using a cellular phone. Especially as for nursing staff 86% (12/14) of them felt improvement by using the system. Among the nursing staff, the frequency of phone call after patient arrival was significantly decrease in the patients with the system compared with those without it [1.6 times vs. 13.7 times for one patient, p < 0.01].

【Conclusions】“Task Calc. Stroke” reducing the burden of medical staffs information shearing in-hospital task processing of acute stroke therapy.
Breakthrough of modern reperfusion therapies for acute stroke in Lithuania: The importance of integrated government support and national stroke care network

Dalius Jatuzis (Vilnius University, Faculty of Medicine, Clinic of Neurology and Neurosurgery, Lithuania / Vilnius University Hospital Santariskiu Klinikos, Center of Neurology, Lithuania)

Aleksandras Vilionskis¹,², Daiva Rastenyte³,⁴
¹Vilnius University, Faculty of Medicine, Clinic of Neurology and Neurosurgery, Lithuania
²Republican Vilnius University Hospital, Department of Neurology, Lithuania
³Hospital of Lithuanian University of Health Sciences Kauno klinikos, Department of Neurology, Lithuania
⁴Lithuanian University of Health Sciences, Medical Academy, Department of Neurology, Lithuania

Incidence of ischemic stroke remains high in Lithuania (>10,000 new strokes every year) because of high prevalence and poor control of vascular risk factors. The intravenous thrombolysis (IVT) was started in 2002 in 2 Vilnius hospitals. Since 2007 IVT was recommended as first line treatment for acute ischemic stroke according to national guidelines. Nevertheless, the total annual number of IVTs remained low across the country (less than 100 procedures) until 2011. During 2012-2013 number of IVTs increased up to 160 and 207, respectively, however, only few centres in largest two cities were active, and access to IVT and mechanical thrombectomy (MTE) in other regions was very limited. Since 2014 multiple activities for promotion and implementation of modern reperfusion therapies for stroke patients started on the national level. Government support (announcing stroke as priority of health care; legislation; establishment of Stroke steering committee and regular reports of activities; adequate financing) and implementation of national stroke care network (11 stroke centres around the country) have led to very rapid and significant positive impact. Integrated efforts allowed to increase the number of IVT more than twice, MTE - more than 4 times, and to activate 3 new stroke centres within 2014. In 2015-2016 we observed further increase in actual accessibility of IVT/MTE and procedural numbers (503 IVT and 118 MTE in 2015), implementation of “fast-track” stroke logistics and written protocols for urgent management, building adequate infrastructure in stroke centres, improvement of quality indicators (decrease of DNT, prehospital and in-hospital delay), increased stroke awareness.

What is the right dose in patients who experienced cerebral hemorrhage under direct oral anticoagulant therapy?

Hirokazu Miyashita (Department of Stroke Treatment, Shonan Kamakura General Hospital Stroke Center, Japan)

Takahisa Mori, Yoshinori Nakai, Yuhei Tanno, Shigen Kasakura, Kazuhiro Yoshioka
Shonan Kamakura General Hospital Stroke Center, Japan

[Background and Purpose] Direct-oral-anticoagulants(DOACs) have standard and lower dosage. There were patients who experienced cerebral hemorrhage(CH) under DOAC therapy(DOACt). The purpose of our study was to investigate how many patients among them had contraindication to different DOACs or should have taken their lower dosage.

[Patients and Methods] Included in our analysis were patients 1) who were admitted to our institution due to CH under DOACt from July 2013 to December 2015, 2) who had information of their age, body weight(BW) and renal function. Evaluated were patient’s baseline characteristics, serum creatinine level(Cre), creatinine clearance(CCr), dosage of a DOAC which they had taken and an appropriate dose of different DOACs (Dabigatran: Db, Apixaban: Ap, Rivaroxaban: Rb, Edoxaban: Ed).

[Results] Seventeen patients matched our criteria for analysis. There were one patient treated with Db, thirteen with Rb, three with Ap, and zero with Ed. The patient with Db 150mg had renal impairment(RI), the patient should have taken lower dose of Rb or Ed. Five of the thirteen with Rb experienced CH in spite of inappropriate lower dose. Two of the three with appropriate Rb 10mg had RI, and had contraindication to Db. One with appropriate Rb 15mg were aged 72 years and had low BW, the patient should have taken lower dose of Ed. One with AP 2.5mg had taken inappropriate lower dosage.

[Conclusion] Among patients who experienced CH under DOACt, 22% of them would have had contraindication to different DOACs or should have taken its lower dosage, 35% of them had taken inappropriate lower dosage of some DOACs.
O3-2-6 Intracerebral hemorrhage under antithrombotic medication in a recent year

Taizen Nakase (Department of Neurology and Stroke Science, Research Institute for Brain & Blood Vessels - Akita, Japan)

Tatsuya Ishikawa¹, Akifumi Suzuki²
¹Department of Neurological Surgery, Research Institute for Brain & Blood Vessels - Akita, Japan
²Research Institute for Brain & Blood Vessels - Akita, Japan

Antithrombotic medication will be a risk of hemorrhagic complication. Meanwhile, direct oral anticoagulants (DOACs), which are recently introduced in the clinical use, are reported to show lower risk of intracerebral hemorrhage (ICH) compared with warfarin. However, the severity at onset and the outcome of ICH patients with DOACs are still controversial. Therefore, this study aimed to reveal the clinical features of recent ICH patients with antithrombotic medication including DOACs.

Between April 2014 and March 2015, ICH patients who admitted to our hospital were consecutively screened. Hematoma size was assessed by brain CT images on admission. Outcome was measured by modified Rankin Scale (mRS). Favorable outcome was defined as mRS<3.

Twenty-eight of 129 ICH patients (21.7%) were taken antithrombotic agents (7 warfarin, 4 rivaroxaban, 1 dabigatran, 8 aspirin, 3 tienopiridins, 1 cilostazol, 3 antiplatelet and anticoagulant and 1 dual antiplatelets). Mortality was 14.3% and 8.9% in patients with and without antithrombotic agents, respectively. Frequency of favorable outcome was 0%, 33.3%, 63.6% and 83.3% in patients with dual antiplatelets, with antiplatelet and anticoagulant, with anticoagulant and with antiplatelet, respectively. Hematoma size was not different between warfarin and DOACs (29.7ml and 31.3ml, respectively). Patients with DAOCs showed favorable outcome compared with patients with warfarin, although the difference of percentage was not significant (p=0.398: 66.7% and 43.3%, respectively).

In conclusion, outcome of patients who were taking antithrombotic agents, especially to whom multiple antithrombotic agents were prescribed, is worse. The difference of outcome among different DOACs also needs to be investigated in the future.

O3-2-7 Study of a novel small molecule, LT3001, in a thromboembolic stroke model in non-human primates

Sheng-Wen Yeh (Lumosa Therapeutics Co., Ltd., Taiwan)

Tzulin Yeh, Wendy Huang
Lumosa Therapeutics Co., Ltd., Taiwan

LT3001 is a novel small molecule designed to have thrombolytic and free radical scavenging activities. Its potential safety and efficacy in treating acute ischemic stroke was evaluated using a thromboembolic stroke model in adult Cynomolgus macaque.

Pre-formed blood clots were introduced into middle cerebral artery through catheter cannulated into internal carotid artery of the animal. The stroke lesions were examined with 3T MRI (DWI/FLAIR) at 0.5, 3, 6 and 24 hours (animals sacrificed) after vessel occlusion and TTC staining was performed at 24 hours. Penumbral volume at each time point was calculated based on total infarct volume at 24 hours. Effects of intravenous LT3001 (10mg/kg) on cerebral blood flow, neurological outcome and infarction volume were evaluated and compared to those of rt-PA (0.9mg/kg) (n=4 per group).

Calculated penumbral volumes were 77.7% and 53.5% at 3 and 6 hours, respectively. Infarct volume calculated using MR images also showed good correlation with that using TTC staining (TTC vs DWI: r² = 0.9328, TTC vs FLAIR: r² = 0.9024) and employed in the following study.

When administered after 3 hours of stroke onset, LT3001 induced better vessel patency (32.9% vs. 22.2%), and neurobehavioral score (39.3 +/- 6.6 vs. 60 +/- 9.8, score 0 indicated normal, while score 77 indicated death, measured at 72 hours after stroke).

【Conclusion】 LT3001 appears to be a more potent thrombolytic compound with superior safety profile than IV rt-PA when given at 3 hours after the stroke onset. Further investigation is warranted for its potential in the treatment of AIS.
**Poster Session**

**P1-1**  
**Outcome of intravenous recombinant tissue plasminogen activator (rt-PA) for acute ischemic stroke in Thailand**  

Somsak Tiamkao (Department of Medicine, Faculty of Medicine, Khon Kaen University, Thailand)

Ekkawit Tanpradit1,2, Kannikar kongboonkiat1,2, Narongrit Kasem sap1,2  
1Department of Medicine, Faculty of Medicine, Khon Kaen University, Thailand  
2North-eastern Stroke Research Group, Khon Kaen University, Thailand

【Background】Acute ischemic stroke is the major problem of Thailand and many countries. The standard treatment of acute ischemic stroke in Thailand is rt-PA within 4.5 hours in the hospital.

【Objectives】Assess the outcome of acute ischemic patient with rt-PA.

【Methods】This study was descriptive retrospective study. Data from the National Health Security Office (NHSO), Thailand, during 2004-2013 (2013; valid to 31th January 2013). The outcome, complication, factor that affect the treatment of acute ischemic stroke were analyzed.

【Results】The total 244,032 acute ischemic stroke patients in Thailand, received rt-PA 2,102 patients (0.9 %), the mean age 65.2 years. Male gender 128,539 (52.7%) and female 115,493 (47.3%). The average of length of hospital stay was 7.8 days, death 126 patients (6%), improved status 1,863 patients (88.7%), complete improved 19 patients (0.9%) and not improved 93 patients (4.4%). The most complications were pneumonia (7.4%). The factor that affected of the mortality rate was the underlying of patients such as coronary artery disease, dyslipidemia, congestive heart failure and atrial fibrillation. The complication that affect mortality rate in hospital are decubitus ulcer, pneumonia, status epilepticus, septicemia, gastrointestinal hemorrhage and intracranial hemorrhage. Hemorrhagic transformation in rt-PA received patients found in the comorbidities of coronary artery disease, hypertension, congestive heart failure and atrial fibrillation.

【Conclusions】Coronary artery disease, dyslipidemia, congestive heart failure and atrial fibrillation are the factors that effect of outcome.

**P1-2**  
**Experience of setting up acute thrombolysis service in a public hospital in a developing country, Malaysia**  

Wee Yong Tan (Department of Neurology, Hospital Kuala Lumpur, Malaysia)

Hanip Mohd Rafia  
Department of Neurology, Hospital Kuala Lumpur, Malaysia

Hospital Kuala Lumpur is a 2300 beds hospital providing tertiary health care service in the capital of Malaysia and its surrounding vicinity, covering 5-6 million population. The Neurology Department admit almost 1200 to 1400 stroke patient per annum, majority of them ischaemic stroke. Acute thrombolysis service was started in June 2013 until now. So far a total of 50 patients has received thrombolysis service in this hospital.

Problems were identified during the setting up of acute thrombolysis service such as funding of medication, for example high cost of rtPA, the awareness of general public regarding symptoms of stroke and arrival time of the ischaemic stroke, organising effective CT scan in Emergency department, training of nursing / doctor regarding NIHSS scoring, and monitoring, supporting service from neurosurgery, radiology and emergency department and most importantly educating public regarding this treatment available and possible risk and complication.

From this retrospective study, there is still very low awareness of timely and prompt arrival to ED department after symptoms of stroke had developed. (Almost 102 minutes). Almost 80 percent of patient had hypertension and Diabetes Mellitus as their comorbid. From this study, we hope to create greater awareness among general public in Malaysia regarding the availability of this acute thrombolysis treatment and reduced the arrival time to Emergency Department. We envisaged that all state/general hospital in Malaysia can start thrombolysis service by studying our model.
**P1-4**  
**Thrombolysis in extremes of age-Two case reports pushing the boundaries of convention**

Vishaka Gorur *(Stroke Medicine, Broomfield Hospital, UK)*

Andrew Burgess, George Zachariah
Broomfield Hospital, UK

Thrombolysis for acute ischaemic stroke has become a standard treatment across the world. We describe two cases at the extremes of age, in which thrombolysis was administered with successful outcomes. 
A 101 year old lady presented to the Emergency department with a left sided facial droop, dysarthria and left sided neglect. She presented 3 hours and 45 minutes after the onset of her symptoms. Her past medical history included Alzheimer’s disease and atrial fibrillation. Her National Institute of Health Stroke Scale Score (NIHSS) on presentation was 9. Her CT head scan was normal. The patient was thrombolysed within 30 minutes of arrival to hospital. A day later her NIHSS was 4 and she was discharged within very little residual disability.

In the second case, a fourteen year old girl presented acutely with a dense right hemiplegia and complete aphasia. Her NIHSS on admission was 18. Her CT head scan showed a thrombus in the left middle cerebral artery. There are no national or regional guidelines for the treatment of paediatric ischemic stroke in UK. The local stroke and paediatric physicians decided to thrombolysde this previously healthy teenager. When assessed a week later having undergone extensive diagnostic tests at the regional tertiary Centre, her NIHSS was 0.

There are no clear guidelines currently advocating thrombolysis as a treatment for ischemic stroke in extremes of age. These cases demonstrate that it is a potentially useful therapy from teenage years (above age of 13) onwards without any upper age limit.
**P1-5**  
**Thrombolysis with tPA 3-4.5 h after acute ischemic stroke in 5 hospital groups in Japan**

*Ryuta Morihara* (Okayama University, Japan)

Syoichiro Kono¹, Toru Yamashita¹, Kentaro Deguchi¹, Yasuhiro Manabe², Takako Yoshi², Kenichi Kashihara², Satoshi Inoue³, Hideki Kiriyama³, Koji Abe¹

¹Okayama University, Japan  
²Okayama National Hospital Medical Center, Japan  
³Kurashiki Heisei Hospital, Japan  
⁴Okayama Kyokuto Hospital, Japan  
⁵Okayama Citizens’ Hospital, Japan

Clinical data from Japan on the safety and realworld outcomes of alteplase (tPA) thrombolysis in the extended therapeutic window are lacking. The aim of this study was to assess the safety and real-world outcomes of tPA administered within 3-4.5 h of stroke onset. The study comprised consecutive acute ischemic stroke patients (n=177) admitted across five hospitals between September 2012 and August 2014. Patients received intravenous tPA within <3 or 3-4.5 h of stroke onset. Endovascular therapy was used for tPA-refractory patients. In the 3-4.5 h subgroup (31.6 % of patients), tPA was started 85 min later than the <3 h group (220 vs. 135 min, respectively). However, outcome measures were not significantly different between the <3 and 3-4.5 h subgroups for recanalization rate (67.8 vs. 57.1 %), symptomatic intracerebral hemorrhage (2.5 vs. 3.6 %), modified Rankin Scale score of 0-1 at 3 months (36.0 vs. 23.4 %), and mortality (6.9 vs. 8.3 %). We present data from 2005 to 2012 using a therapeutic window <3 h showing comparable results. tPA following endovascular therapy with recanalization might be superior to tPA only with recanalization (81.0 vs. 59.1 %). Compared with administration within 3 h of ischemic stroke onset, tPA administration within 3-4.5 h of ischemic stroke onset in real-world stroke emergency settings at multiple sites in Japan is as safe and has the same outcomes.

**P1-6**  
**Symptomatic intracranial hemorrhage risk and functional outcome by age and stroke severity strata**

*KyuYoon Chung* (Neurology, Inje University, Republic of Korea)

Hye Jung Lee¹, Jay Chol Choi², Ji Sung Lee³, Tai Hwan Park⁴, Hee-Joon Bae⁵, Keun-Sik Hong¹

¹Inje University Ilsan Paik Hospital, Republic of Korea  
²Jeju National University Hospital, Republic of Korea  
³Clinical Research Center, Asan Medical Center, Republic of Korea  
⁴Seoul Medical Center, Republic of Korea  
⁵Seoul National University Bundang Hospital, Republic of Korea

【Background】Age and stroke severity are the most powerful predictors for symptomatic intracranial hemorrhage (SICH) and outcome after IV-TPA. We explored the risk and outcome for age- and stroke severity-based strata.  
【Methods】From a prospective stroke registry, we identified patients treated with IV-TPA within 4.5 hours between Apr 2008 and Mar 2015. Exclusion criteria were endovascular therapy added to IV-TPA, prestroke modified Rankin Scale (mRS) score >2, IV-TPA at outside hospital, and unavailability of discharge mRS score. SICH was defined as any hemorrhagic transformation associated with NIHSS score worsening ≥4 points. Age was stratified as <49, 50-59, 60-69, 70-79, and ≥80. NIHSS score was stratified as 0-5, 6-10, 11-15, and >15. The crude SICH and discharge mRS 0-2 outcome rates were calculated for 20 strata combining age and NIHSS score.  
【Results】Of 3,148 patients treated with IV-TPA, this study included 1,991 patients. Overall, the average crude rates (95% CI) was 3.52% (2.75%-4.42%) for SICH and 52.4% (50.2%-54.7%) for discharge mRS 0-2 outcome. With one level increase in age strata, SICH rates increased by 1.1% and mRS 0-2 outcome decreased by 8.3%, while with one level increase in NIHSS score strata, SICH rates increased by 1.8% and mRS 0-2 outcome decreased by 18.5%. Thereby, across 20 strata, the rates were substantially variable: SICH rates between 0% and 10.61% and mRS 0-2 outcome rates between 12.8% and 81.1% (Tables 1 and 2).  
【Conclusions】These simplified age- and NIHSS score-based estimates might help clinicians quickly predict the risk and benefit of IV-TPA therapy.
**P1-8** “Triage Stroke Code” program with series of training lessons shorten the time to thrombolysis in emergency department setting

Ching-Yi Lai (Department of Neurology, Stroke Center and Department of Neurology, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Taiwan)

Han-Chieh Hsieh, Pi-Shan Sung, Chih-Hung Chen

Stroke Center and Department of Neurology, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Taiwan

**[Background]** How to shorten the time to thrombolysis for acute ischemic stroke (AIS) patients is crucial in practice.

**[Method]** We conducted a “Triage Stroke Code” program with series of training lessons at our emergency department (ED) since 2008. The triage nurses and ED doctors could activate the “stroke code” while the patients met the criteria as below: acute weakness of any extremities, absence of hypoglycemia and seizure, and symptom onset within 3 hours. And the code would be delivered to neurologists, stroke case manager, ED doctors, radiologists and the radiology technicians. In the first two years, we trained the triage nurses to recognize the patients who met the criteria. And then, we designed different scenarios that might confuse them at triage for advanced training. We also held quarterly meetings for case discussion.

**[Results]** The positive predictive value of stroke code increased from 56.7% in 2008 to 77.2% in 2015. The sensitivity also improved from 81.3% to 95.7%. A total of 376 patients received intravenous thrombolytic therapy after they presented to our ED due to AIS since 2006, and 325 of them had “Triage Stroke Code” activated. The door to needle (DTN) time for intravenous thrombolysis was shortened from 98.5 minutes in 2006 to around 60 minutes in recent two years. The DTN time significantly reduced if “Triage Stroke Code” was activated (mean: 58.7 minutes versus 86.9 minutes, p<0.0001).

**[Conclusion]** The notification of “Triage Stroke Code” facilitated the process for rescuing AIS patients.
**P1-10** The size of ischemic lesions on diffusion-weighted images of MRI is a more critical factor in determining their outcomes after using IV t-PA than is kidney function itself in acute ischemic stroke with a decreased renal function

Jae-Kwan Cha  (Department of Neurology, University of Dong-A, Republic of Korea)

**[Background]** There has been no study that explores the long-term outcomes after using IV t-PA in decreased renal function while considering the size of ischemic lesions. In this study, we investigated the outcome of using IV t-PA based upon MRI in AIS patients with a decreased renal function.

**[Methods]** We retrospectively studied 3809 AIS patients using IV t-PA between 2010 and 2015. Among them, we selected only those patients who received an MRI before thrombolysis. The size of ischemic lesions was calculated by using diffusion-weighted imaging (DWI) on MRI. Primary outcome measures included poor functional three-month outcome, which was defined as mRS scores of 3 to 6.

**[Results]** During the observation period, we enrolled 407 patients using IV t-PA under MRI screening. Among them, 82 patients (20.1%) had a decreased renal function (eGFR<60). At 3 months, the proportion of poor outcome (mRS 3-6) was much higher in patients with a decreased renal function than those without it. After multivariate adjustment for established outcome predictors, a decreased renal function itself (OR, 0.96, 95% CI, 0.51-1.82, p=0.90) was not an independent predictor, but a larger size of ischemic lesions on DWI (>22.2 CC; OR, 2.27; 95% CI, 1.29-5.40; p=0.03) before thrombolysis showed independent significant significance for an occurrence of poor outcomes after using IV t-PA.

**[Conclusions]** The present study suggests that patients with eGFR <60 presenting with AIS have no obstacles in using IV t-PA if we consider the size of ischemic lesions before thrombolysis.
**P2-1** Mechanical thrombectomy of M2 occlusion in a low volume stroke center

Osamu Hamasaki (Department of Neurosurgery, Miyoshi Central Hospital, Japan)
Motoki Takano, Hidekazu Chikuie
Department of Neurosurgery, Miyoshi Central Hospital, Japan

【Background】Mechanical thrombectomy is beneficial for patients with acute ischemic stroke, but it is unclear if these results can be extrapolated to patients with M2 occlusion. This study was performed to examine technical aspects, safety, and outcomes of mechanical thrombectomy with a stent retriever in patients with an M2 occlusion treated in our hospital.

【Methods】Stent retriever-based thrombectomy was performed in 12 patients with acute occlusions in the anterior circulation between April 2015 and May 2016. These cases consisted of internal carotid artery (IC) or M1 occlusion (n=6) and M2 occlusions (n=6). The groups were compared with regard to recanalization success, periprocedural complications, hemorrhage, and modified Rankin Scale (mRS) at 90 days.

【Results】Although arteriosclerosis due to the advanced age of our patients (mean 82.4 years), thrombolysis in cerebral infarction 2b/3 reperfusion was frequent in both two groups (83.3%). A good clinical outcome (mRS 0 - 2) was more frequent in the M2 group (66.7% vs. 16.7%, respectively) and mortality was higher in the IC or M1 group (40% vs. 0%). There were two periprocedural complications in the IC or M1 group and one in the M2 group.

【Conclusions】Endovascular treatment of M2 occlusion in severely affected patients is not associated with higher rates of periprocedural complications. Compared with IC or M1 occlusions, there was a greater chance for good angiographic and clinical outcome in our cases. Therefore, stent retriever-based thrombectomy should also be considered for patients with severe symptoms due to acute M2 occlusion.

**P2-2** The results of thrombectomy in the elderly patients

Morito Hayashi (Department of Neurosurgery, Toho University Ohashi Medical Center, Japan)
Satoshi Iwabuchi¹, Masashi Ishii², Kenichiro Sato², Masashi Ikota¹, Satoshi Fujita¹, Jyunya Iwama¹,
Nozomi Hirai¹, Norihiko Saito¹, Kazuya Aoki¹, Tetsuya Yokouchi²

¹Toho University Ohashi Medical Center, Japan
²Yokohama General Hospital, Japan

Since stent retriever was introduced in our hospital, we have been aggressively performing thrombectomy on patients over 80 years old. In this study, we analyzed the result of thrombectomy in these patients. Thirty four patients underwent thrombectomy for acute stroke between July 2014 and May 2016 in our hospital. These patients were divided into 2 groups: younger than 79 years old (group A: 19 cases) and older than 80 years (group B: 15 cases). Average age was Group A: 66.4 (31-79) years old, Group B: 87.0 (81-92) years old. Reperfusion rates (TICI 2b, 3) were higher in Group B (86.7 %) than in group A (78.9%). The average interval between onset and reperfusion in group B (224min) was shorter in Group A (245min). However, the rate of good prognosis (mRs: 0-2 at 30 days) in Group B (26.7%) was smaller than Group A (47.4 %). Mortality rate was 0% in the both group.

Since elderly patients tend to develop perioperative systemic complications and the effect of rehabilitation are often insufficient, elderly patient may have more difficulty achieving good outcome. Thrombectomy for patient over 80 years old needs earlier reperfusion and higher reperfusion rate than patient younger than 80 years old for good outcome.
**P2-4**  
**Association between pre-stroke warfarinization and successful recanalization with mechanical thrombectomy**

Keisuke Tokunaga  (Department of Neurosurgery, Stroke Center, Kokura Memorial Hospital, Japan)

Taketo Hatano, Nobutake Sadamasa, Yasutoshi Kai, Mitsushige Ando, Makoto Saka, Hideo Chihara, Wataru Takita, Takahiko Kamata, Izumi Nagata  
Department of Neurosurgery, Stroke Center, Kokura Memorial Hospital, Japan

**[Background]** It is known that pre-stroke warfarinization improves severity and functional outcome of ischemic stroke. The purpose of the present study was to reveal whether pre-stroke warfarinization contributed successful recanalization with mechanical thrombectomy or not.

**[Methods]** A total of 72 acute ischemic stroke patients (39 men, 75±11 years) who were admitted to our department and underwent mechanical thrombectomy from December 2013 to September 2015 were consecutively enrolled. Thrombolysis In Cerebral Infarction (TICI) score was used to evaluate technical results of mechanical thrombectomy. Successful recanalization was defined as TICI 2b or 3. The patients were classified into the successful and non-successful recanalization groups. The association between pre-stroke warfarinization and successful recanalization with mechanical thrombectomy was assessed using the multivariate analysis.

**[Results]** A total of 52 patients (31 men, 74±11 years) were enrolled in the successful recanalization group, and the remaining 20 patients (8 men, 76±10 years) were enrolled in the non-successful recanalization group. The number of pre-stroke warfarinized patients was significantly larger in the successful recanalization group than in the non-successful recanalization group (23% versus 8%, P=0.049). In the multivariate analysis, pre-stroke warfarinization was independently associated with successful recanalization with mechanical thrombectomy (odds ratio, 5.97; 95% confidence interval, 1.03-113.69; P=0.045).

**[Conclusions]** Pre-stroke warfarinization contributed successful recanalization with mechanical thrombectomy.
**P2-5**  
**Endovascular recanalization therapy in the patients with acute ischemic stroke and active malignancy**

Man-Seok Park (Department of Neurology, Chonnam National University Medical School and Hospital, Republic of Korea)

Bang-Hoon Cho¹, Kang-Ho Choi¹, Joon-Tae Kim¹, Seung-Han Lee¹, Woong Yoon², Ki-Hyun Cho¹  
¹Department of Neurology, Chonnam National University Medical School and Hospital, Republic of Korea  
²Department of Radiology, Chonnam National University Medical School and Hospital, Republic of Korea

**[Background]** Patients with cancer who have acute ischemic stroke are often precluded from intravenous tPA due to high risk of bleeding. In this case, endovascular recanalization therapy may be an alternative treatment option.

**[Methods and Results]** We analyzed 10 acute ischemic stroke patients with current malignancy who underwent endovascular mechanical thrombectomy. Periprocedural complication and long-term clinical outcomes were investigated. No intracerebral bleeding was observed on the brain CT after endovascular treatment. 6 patients showed favorable long-term outcome. Analysis of individual cases suggests that careful selection of patients eligible to endovascular thrombectomy is the key factor for safe and effective reperfusion treatment. Faster achievement of reperfusion might also be associated with favorable outcome. Regarding 4 patients with poor outcome, re-occlusion of target artery may cause unfavorable outcome.

**[Conclusion]** Although there is adverse outcome in some patients, endovascular mechanical thrombectomy could be an alternative treatment option for acute ischemic stroke patients with active malignancy.

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**P2-6**  
**Combined mechanical thrombectomy technique using retrieval stent (Trevo) and intermediate access guiding catheter (5 DAC)**

Kuhyun Yang (Department of Neurosurgery, Gangneung Asan Hospital, College of Medicine, Ulsan University, Republic of Korea)

Seung-Hoon You¹, Woo-Young Jang², Moon-Kyu Lee², Kwang-Deog Jo²  
¹Department of Neurosurgery, Gangneung Asan Hospital, College of Medicine, Ulsan University, Republic of Korea  
²Department of Neurology, Gangneung Asan Hospital, College of Medicine, Ulsan University, Republic of Korea

**[Introduction]** Recently, mechanical thrombectomy with retrieval stent was the most preferred method of the available options in the management of acute ischemic stroke due to large vessel occlusions. When we retrieve the stent, the embolization to uninvolved vessel by the fragmentation of entrapped thrombus, “missing clot”, is one of the important complications. We tried to do mechanical thrombectomy with retrieval stent and 5 DAC simultaneously for it.

**[Combined mechanical thrombectomy technique]** After intermediate access 5 DAC catheter was advanced just proximal to the lesion, through 5 DAC, a 21 inch Trevo-microcatheter was passed beyond the thrombus with microwire. 6 × 25 Trevo stent was used. After adhering distal tip of 5 DAC to thrombus, the stent retrieval was done while simultaneous aspiration was done by maintenance of negative pressure using a 50 cc syringe, through the “Y” connector that is attached to the 5 DAC. And then, aspiration from 9 French balloon tip guiding catheter using a 50 cc syringe was also done for M1 occlusion.

**[Results and Conclusion]** Successful recanalization was done in all six patients without any distal embolic complication. The average number of stent retrieval was 1.3 until full recanalization. Combined mechanical thrombectomy technique seems to be a good option for prevention of “missing clot”.

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Poster Session

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**P2-7** Developments in Stent retriever position and recanalization rate

Masataka Takeuchi (Department of Neurosurgery, Seishou Hospital, Japan)

Michitsura Yoshiyama, Tadateru Goto
Department of Neurosurgery, Seishou Hospital, Japan

**Introduction** Mechanical thrombectomy in acute cerebral large vessels occlusive disease, its usefulness has been demonstrated in 2015 ISC. As device, in MR CLEAN, stent retriever device (SRD) it has been used in 97%. The positional relationship between the SRD and the thrombus can be confirmed in the image, but report that examined the difference in the recanalization rate (pass number of times and TICI) due to the positional relationship.

**Methods** Select the SRD (Trevo Provue) in the cerebral large vessels occlusive disease from July 2014, in 55 patients who underwent recanalization therapy (IC-terminal: 8, M1: 31, M1: 12, BA: 12 VA: 4), M1: were studied retrospectively per 31 patients. P group present in the thrombus proximal in Stent entire length, M group that is present in the center, were classified into group D present in the distal portion.

**Results** TICI 2b-3 in 1 pass is 20 cases (64.5%), M group: 14, P group: 5, D group: 0 was in the order of. TICI 2b-3 in 2 pass and later M1 was 28 cases (90.3%).

**Discussion** To obtain an effective recanalization rate (TICI2b-3), the position of the thrombus and the SRD that there is important has been suggested. [Conclusion] The recanalization rate, it is important to indwelling position of SRD, it is a technical tips to predict of thrombus site from the initial angiography.

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**P2-8** The workflow using a hybrid operation room for reducing door-to-puncture times in acute stroke interventions in St Luke’s

Shinsuke Sato (Department of Neurosurgery, St. Luke’s International Hospital, Japan)

Yasunari Niimi, Yoshikazu Okada, Shougo Shima, Yousuke Moteki, Tatuya Inoue, Motoharu Fujii, Masaki Shinoda, Masahito Takagi, Tetuya Kimura
St. Luke’s International Hospital, Japan

**Background and purpose** The treatment such as stroke interventions needed protocols. We report on the workflow using hybrid operation room for reducing door-to-puncture times for endovascular therapy in acute ischemic stroke.

**Methods** Hybrid operation room was used anytime for endovascular therapy of acute ischemic stroke in the department of Neurosurgery at our hospital. Retrospectively recorded treatment times were compared in two groups of patients who were treated ‘before’ (n=8) or ‘after’ (n=9) the protocols. The following time intervals were measured: hospital arrival to groin puncture, baseline imaging to first stent deployment, groin puncture to first stent deployment.

**Results** The hospital arrival to groin puncture time was 119 (±49) min in the ‘before’ and 91(±36) min in the ‘after’ group (p=0.3379). The baseline imaging to first stent deployment time was 169 (±58) min in the ‘before’ and 85 (±27) min in the ‘after’ group (p=0.0109). The groin puncture to first stent deployment time was 66 (±18) min in the ‘before’ and 29(±16) min in the ‘after’ group (p=0.0078). The improved times were seen when compared ‘before’ group with ‘after’ group.

**Conclusions** A protocol process using hybrid operation room can significantly improve efficiency of care in time-sensitive stroke interventions.
**P2-9 Clinical outcome of weekend and nighttime admitted patients due to acute ischemic stroke**

Noriyoshi Nakai (Department of Stroke Treatment, Shonan Kamakura General Hospital Stroke Center, Japan)

Takahisa Mori, Yuichi Tanno, Shigen Kasakura, Kazuhiro Yoshioka
Department of Stroke Treatment, Shonan Kamakura General Hospital Stroke Center, Japan

【Background and purpose】Acute ischemic stroke (AIS) requires urgent diagnosis and subsequent treatment including thrombolytic or neuroendovascular revascularization (tNER). AIS is time-sensitive and weekend and nighttime admission (ENtime) may be associated with poor clinical outcome because of therapeutic delay. The aim of our study was to investigate differences in any in-hospital mortality and clinical outcome between ENtime and weekday daytime (DDtime) admitted patients due to AIS.

【Method】Included in our study were acute ischemic stroke patients who were admitted within 8 hours after onset between 2011 and 2015. Evaluated were patients’ baseline features, utilization of tNER, in-hospital mortality and clinical outcome at discharge.

【Results】One hundred twenty three patients were analyzed: 64 patients of ENtime admission and 59 of DD time admission. There were no differences in patients’ baseline features: average age (77 and 79.5, p=0.22), NIHSS on admission (16 and 15, p=0.75), NIHSS at discharge (12 and 12, p=0.66), and their in-hospital mortality (9.4% and 3.4%, p=0.17), respectively. During ENtime, 18 patients underwent tNER and during DDtime 19 patients underwent it (p=0.62). Among tNER patients, the rate of good outcome (modified Rankin scale 0-2 at 3 months) during ENtime was similar to that during DDtime (33% and 21%, p=0.62).

【Conclusion】There were no differences in in-hospital mortality nor clinical outcome between ENtime and DDtime in our institution.

**P2-10 Successful delayed angioplasty of basilar artery occlusion presenting with intraarterial signal**

Masahiro Oomura (Department of Neurology and Neuroscience, Nagoya City University Graduate School of Medical Sciences, Japan)

Yuya Ohno¹, Yusuke Nishikawa², Mitsuhiro Mase², Noriyuki Matsukawa¹

¹Department of Neurology and Neuroscience, Nagoya City University Graduate School of Medical Sciences, Japan
²Department of Neurosurgery, Nagoya City University Graduate School of Medical Sciences, Japan

【Background and purpose】Generally, neurointervention is undertaken within 8 hours after the onset. Here, we reported a case of basilar artery occlusion (BAO) treated with neurointervention 21 hours after the onset.

【Case report】A 69-year-old man was admitted to our hospital because of dizziness. The patient had to be known as having severe stenosis of basilar artery, and dual anti-platelet therapy was undertaken. However, lack of patient cooperation was resulted in loss of close observation. At the admission, MR angiography showed a severe stenosis of basilar artery. The degree of the stenosis was progressed. He was treated with aggressive medical thrombotic therapy. The second hospital day, his consciousness became disturbed. On the same day, a quadriplegia developed. Emergent MR angiography showed an occlusion of basilar artery. Diffusion-weighted image disclosed acute infarcts involving brain stem. FLAIR image showed intraarterial signal in basilar artery. Emergent neurointervention was undertaken. The right internal carotid angiogram showed that the basilar artery was partially opacified in a retrograde fission through the right posterior communicating artery. The occluded basilar artery was reanalyzed with percutaneous angioplasty. The neurological symptoms were improved after the angioplasty. The ADL at 3 months was mRS 3.

【Comments】In the case, a retrograde flow of basilar artery through the right posterior communicating artery exhibited as intraarterial signal in basilar artery. This retrograde flow is considered to prevent penumbral tissue from infarct. It is considered that cases with BAO presenting with intraarterial signal are good candidate for neurointervention.
**P3-1  Main aspects of stroke secondary prevention**

Ziyoda Abdulkhaevna Akbarkhodjaeva (Neurology, Tashkent Medical Academy, Uzbekistan)

Gulnora Rakimbaeva  
Tashkent Medical Academy, Uzbekistan

The maximum risk of recurrent stroke observed in the first days after stroke, so the beginning of the preventive measures should fall on the acute period and continue recovery period. Main aspects of stroke secondary prevention (SSP) includes primarily the correction of risk factors and non-pharmacological, medical, surgical procedures. Non-drug methods include the rejection of bad habits - smoking and alcohol intake, diet, physical exercise. Antithrombotic therapy includes antiplatelet agents at noncardioembolic subtype (atherothrombotic, lacunar, stroke of unknown etiology) and indirect anticoagulants - at cardioembolic. Correction of dyslipidemia requires statins for a long time. Statins used for both secondary and primary prevention of stroke in patients with high risk of CVD. Normalization of blood pressure - one of the most effective areas of SSP. According to the meta-analysis of randomized trials with effective therapy of arterial hypertension is possible prevention of recurrent stroke up to 42%. Neuroprotective therapy remains great interest of physicians for many years. In experimental studies in animals and in vitro it was evidence the effectiveness of many neuroprotective drugs, however, till now there are no results of large randomized studies that have proven effectiveness of these drugs in SSP.  

**Conclusion** Management of patient in the early recovery period of stroke should be comprehensive, include non-drug and drug methods. Patient and his relatives should be explained the purpose of various methods of therapy and the importance of implementing all these measures. A combination of several methods of SSP can reduce the risk of recurrent stroke by nearly 80%.

**P3-2  Withdrawn**
Poster Session

P3-3  Anticoagulant’s character: hemorrhagic vs. ischemic stroke
Tatsuya Koike (Stroke Center, Shonan Kamakura General Hospital, Japan)
Takahisa Mori, Kazuhiro Yoshioka, Yuhei Tanno, Shigen Kasakura, Noriyoshi Nakai
Stroke Center, Shonan Kamakura General Hospital, Japan

[Background] Anticoagulants have switched from warfarin to direct oral anticoagulants (DOACs) because they are believed to have more effects and lower hemorrhagic risks. However, intracranial hemorrhage really occurs in patients treated with DOACs.

[Purpose] The aim of our retrospective study was to investigate ratio (R) of hemorrhagic vs. ischemic stroke of an anticoagulant as its specific character.

[Objectives and Methods] Included in our study were acute stroke patients 1) who were admitted to our institution between Jan 2012 and Dec 2015, 2) who had taken some anticoagulants at arrival, i.e., warfarin (WF), dabigatran (Db), rivaroxaban (Rv), apixaban (Ap) or edoxaban (Ed). Hemorrhagic stroke patients’ numbers divided by ischemic stroke patients’ one was defined as the anticoagulant’s specific ratio (R) of hemorrhagic vs. ischemic stroke. Then, R was compared among anticoagulants.

[Results] Two hundred fifty-three patients matched our inclusive criteria. Their average age was 78.2 years, their average body weight was 54.6kg, their average creatinine clearance (CCr) was 49.6ml/min. There were 15 Db, 35 Rv, 14 Ap, 1 Ed and 188 WF patients. Among 15 Db patients, there was no hemorrhagic stroke (R=0, 0/15). Among 35 Rv patients, there were 13 hemorrhagic and 22 ischemic strokes (R=0.59). Among 14 Ap patients, there were 4 hemorrhagic and 10 ischemic strokes (R=0.4). Among 188 WF patients, there were 49 hemorrhagic and 139 ischemic strokes (R=0.35). Their average INR (international normalized ratio) was 1.53. In WF patients with INR of 1.6 or more at arrival, there were 38 hemorrhagic and 41 ischemic strokes (R=0.93). Ed patient was only one and excluded from comparison. Db had the lowest R and Rv the highest R. However, WF under INR of 1.6 or more had the highest R.

[Conclusion] Warfarin under INR of 1.6 or more had the highest R and dabigatran had the lowest R in the real world.

P3-4  A recurrent stroke stabilization after using novel Oral Anti-Coagulant
Jeong Ho Han (Department of Neurology, Veterans Health Service Medical Center, Republic of Korea)
Doo Eung Kim, Seung Min Kim, Sang Woo Han, Sang Won Ha
Veterans Health Service Medical Center, Republic of Korea

[Background] Current stroke guidelines recommend the administration of non-vitamin-K-antagonist oral anticoagulant (NOAC) for the prevention of cardioembolic stroke induced by nonvalvular atrial fibrillation. We report a patient who suffered from recurrent posterior circulation strokes occurring eight times in 4 months even under adequate antiplatelet medication. Changing the medication from antiplatelet agents to NOAC stopped the stroke recurrence.

[Case] A 68 year old man developed sudden onset of vertigo, nausea, vomiting and gait ataxia was admitted. He was treated with mono-antiplatelet. Brain MRI showed acute right cerebellar ischemic stroke with hemorrhagic transformation. Brain MRA revealed occlusion of right vertebral artery and focal stenosis in both P1 segments. We decided to stop antiplatelet and discharge. But he was readmitted only a week after being discharged for right visual field defect. MRI showed acute ischemic stroke in left occipital lobe and right cerebellum. His neurologic symptoms and signs showed fluctuative pattern. We checked brain MRI image whenever the patient’s symptom was worsened through 5 times. MRI image revealed newly onset recent infarction 5 times. We tried triple antiplatelet agent, but recurrence of infarction was continued. Echocardiogram was negative too. We had decided try anticoagulation. Because his initial infarction was hemorrhagic stroke, we chose Dabigatran instead of conventional Warfarin. After started to take Dabigatran, the patient’s symptoms was stabilized and follow up image also shows no other newly appearing infarction.

[Discussion] We suggest that NOAC has a role in the prevention of recurrent stroke of undetermined etiology in the posterior circulation.
**P3-5**  
Antiplatelet therapy in a patient with carotid stump syndrome

Kwang Deog Jo  
(Department of Neurology, Gangneung Asan Hospital, University of Ulsan College of Medicine, Republic of Korea)

Wooyoung Jang¹, Moon Kyu Lee¹, Kuhyun Yang², Seung Hoon You²
¹Gangneung Asan Hospital, University of Ulsan College of Medicine, Republic of Korea  
²Department of Neurosurgery, Gangneung Asan Hospital, University of Ulsan College of Medicine, Republic of Korea

**Background**  
Carotid stump, the blind remnant of an occluded proximal segment of the internal carotid artery (ICA) can be a potential source of microembolism. Most reported cases of symptomatic carotid stump syndrome have been treated with surgical exclusion of the carotid stump with endarterectomy or carotid stenting for exclusion from the vascular lumen to prevent the recurrence of a microembolism. We present the case of recurrent amaurosis fugax in a 54-year-old man possibly associated with a carotid stump syndrome (CSS), successfully treated with antiplatelet medication.

**Case**  
A 54-year-old man with a history of smoking presented to the out-patient clinic complaining of repeatedly developing visual impairment in his right eye that has been persisted for 5 days. The symptoms usually lasted 1 to 2 minutes and it appeared 10 to 20 times per day. He had no headache and ocular pain. There were no other neurologic deficits. Brain MRI showed old lacunes in the pons. Diagnostic cerebral angiography showed total occlusion of the right proximal ICA with retrograde leptomeningeal collateral flow of contralateral distal middle cerebral artery (MCA) from the left anterior cerebral artery and posterior circulation. One microembolic signal was detected during transcranial doppler monitoring. After the administration of aspirin and clopidogrel, his visual symptoms disappeared. And there has been no recurrence of ischemic symptoms during follow-up of 4 years.

**Conclusion**  
We suggest that antiplatelet therapy rather than endovascular or surgical treatment is sufficient for preventing stroke in patients with CSS.

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**P3-6**  
Acute revascularization of internal carotid artery pseudo-occlusion in our institution

Naoki Hashimura  
(Department of Neurosurgery, JCHO Kobe Central Hospital, Japan)

Keigo Matsumoto, Kazuya Matsuda, Zhe Li, Toshiki Nagai  
JCHO Kobe Central Hospital, Japan

The stenosis of internal carotid artery (ICA) is one of the causes for ischemic stroke. In particular, pseudo-occlusion of ICA tends to show progressive neurological deficits due to hemodynamic instability. Therefore the surgical intervention for symptomatic ICA pseudo-occlusion is preferred to be performed in early stage, but the timing of the surgical intervention is not established on evidence based. In this study, we assessed 8 cases performed acute revascularization for ICA pseudo occlusion in our hospital between September 2011 and February 2016. The diagnosis of ICA pseudo occlusion is made by two radiological findings. The one of findings is that magnetic resonance angiography (MRA) shows poor visualization of ICA. The other finding is that ultra sound (US) scan shows severe stenosis of ICA and remains anterograde flow. The selection of carotid artery stenting (CAS) or carotid endarterectomy (CEA) depends on the character and volume of the plaque by MRI plaque imaging, the position of the stenosis, and the anatomical characteristics of vessels to access the carotid artery via femoral artery. In results, 4 patients were performed CEA and 4 patients performed CAS. The average duration between onset symptoms and surgical intervention is 14.4 days (0-34 days). The average NIHSS score before surgical intervention is 6.6pt (0-17pt). The average NIHSS score on discharge is 1.5pt (0-6pt). There is no perioperative complications in our series. In this study, acute revascularization for symptomatic ICA pseudo occlusion is safe and gets good result.
P3-7  Ipsilateral regional cortical injury after carotid endarterectomy
Sungwook Yu (Department of Neurology, Korea University College of Medicine, Republic of Korea)
Young-Min Park, Kyung-Hee Cho
Department of Neurology, Korea University College of Medicine, Republic of Korea

[Background] Neurological complications following carotid endarterectomy (CEA) are usually related to ischemia caused by embolization. In a subset of patients, cerebral hyperperfusion after CEA causes severe neurological dysfunction. We report a patient who had focal neurologic deficits after CEA with delayed manifestation of ipsilateral regional cortical injury on diffusion-weighted images.

[Case] A 73-year-old man had scattered cortical infarction in the bilateral hemispheres without neurologic deficits. He had a history of diabetes mellitus, hypertension and coronary heart disease. Brain CT angiography showed severe stenosis in the left proximal internal carotid artery (ICA) and moderate stenosis in the right ICA. Left carotid endarterectomy was done under general anesthesia. Neurologic examination after CEA revealed right side weakness and impaired comprehension. Mean flow velocities on both middle cerebral arteries were within normal range in transcranial Doppler. Brain MR diffusion-weighted images (DWI) and electroencephalography (EEG) showed no abnormalities. Five days after CEA, he had only transcortical sensory aphasia. Follow-up MR DWI revealed hypointensity lesion in the cortex of the left cerebral hemisphere with continuous slow waves in the corresponding region in EEG. Compared to the pre-operative perfusion CT, increased cerebral blood flow was found in the left hemisphere. Blood pressure was maintained between 130/70 and 150/75mmHg. The neurological symptoms were slowly resolved.

[Conclusion] Neurologic deficit after CEA caused by cortical injury could be confirmed by delayed DWI. Cerebral hyperperfusion with autoregulatory failure might be a potential underlying pathophysiologic mechanism.

P3-8  Nerve function differs according to selection of treatment for symptomatic cerebral aneurysms
Hideo Chihara (Neurosurgery, Kokura Memorial Hospital, Japan)
Akira Ishii1, Nobutake Sadamasa2, Yasutoshi Kai2, Makoto Saka2, Mitsusige Ando2, Wataru Takita2, Keisuke Tokunaga2, Taketo Hatano2, Izumi Nagata2
1Kyoto University, Japan
2Kokura Memorial Hospital, Japan

[Background] The Pipeline Flex Embolization Device (PED) has paved the way for a new stage of treatment selection. Flow diverters change the flow to thrombosed aneurysms and thus do not deteriorate the mass effect. However, thrombosis is associated with the induction of inflammation that could become a concern if it spreads to surrounding nerves.

[Methods] We treated 19 symptomatic aneurysms using PED, stent-assisted and balloon-assisted coiling and then compared the clinical courses of nerve symptoms.

[Results] Symptoms in eight patients with aneurysms treated by PED significantly improved, but remained unchanged in three and became exacerbated in one. In contrast, symptoms improved in one patient treated by balloon- or stent-assisted coiling, remained unchanged in two and became exacerbated in four. Symptoms in all patients treated by PED without coiling improved, whereas those in patients treated by balloon- or stent-assisted coiling did not.

[Discussion and conclusion] Symptoms that became temporarily exacerbated in some patients after treatment by PED improved over several months. Thus, the clinical period appeared to be associated with the stabilization of aneurysmal thrombosis. More patients treated by PED achieved symptomatic improvement. The PED should be recommended for treating symptomatic aneurysms.
**P3-9**  
**Stent salvage for coil protrusion of ruptured intracranial aneurysm**

Dong-Jun Lim (Department of Neurosurgery, Korea University, Republic of Korea)

Sung-Won Jin, Sung-Kon Ha, Won-Hyoung Kim  
Korea University, Republic of Korea

Despite recent advances in technology, parent vessel coil herniation occasionally complicates successful coil embolization, particularly in wide-necked aneurysms. We report endovascular stent deployment specifically to treat this complication.

A 50-year-old man underwent coil embolization of ruptured aneurysm at anterior communicating artery. Coil herniation into the parent vessel developed during procedure. Endovascular stent deployment was performed to isolate the herniated portion of the coil from the parent vessel lumen.

The occluded parent vessel was completely recanalized right after the deployment of stent. The patient recovered very well and follow-up angiography at 6 months demonstrated no aneurysm recanalization and no stenosis of the parent vessel in the stented region.

The use of intraluminal stents has been reported to be a helpful technical adjunct to the conventional endovascular treatment of aneurysms. One additional indication for the use of this technology is sequestering herniated coils from the lumen of the parent artery to reduce potential embolic or occlusive sequelae.

**P3-10**  
**Trans-venous stent assisted coil embolization for intractable pulsatile tinnitus caused by sigmoid sinus diverticulum - Case report -**

Sung-Won Jin (Department of Neurosurgery, University of Korea, Republic of Korea)

Dong-Jun Lim  
Department of Neurosurgery, Korea University Ansan Hospital, Republic of Korea

**Objective** Venous sinus diverticulum is a rare vascular cause for pulsatile tinnitus characterized by an out pouching of the venous sinus into the calvarium, usually involving the sigmoid venous sinus. We describe a case of sigmoid sinus diverticulum in a 24-year-old woman who presented with a six-year intractable pulsatile tinnitus in the right ear that was successfully treated with stent assisted coil embolization.

**Methods** After finding the bony defect about 14.3 x 10.7 mm, in her right temporal bone on contrast enhancement CT. We confirmed the presence of sigmoid sinus diverticulum with the cerebral angiogram. We performed a trans-venous coil embolization using 8 detachable coils and 3 fibered coils to obliterate the diverticulum and a stent to avoid coil migration under regional anesthesia.

**Results** After the complete packing on diverticulum, symptom was improved.

**Conclusion** The adequate identification of the possible etiology of pulsatile tinnitus is of utmost importance to determine the appropriate treatment for each case. Stent assisted coil embolization was an effective procedure for our patient. Thus, it may be performed in patients with an intractable pulsatile tinnitus with an etiological diagnosis that calls for such treatment.
**P4-2**

**DWI-ASPECTS and NIHSS at baseline predict responsiveness to the mechanical endovascular thrombectomy after thrombolysis for acute ischemic stroke**

Tetsuro Abe  
Department of Neurology, Tokai University Hachioji Hospital, Japan

Yuuka Chin1, Taira Nakayama1, Kazuyuki Iijima1, Takashi Yasuda1, Masaaki Imai2, Fumimasa Komatsu2, Kentaro Tokouka1, Shiniro Oda2, Masami Shimoda2, Shigeru Nogawa1

1Department of Neurology, Tokai University Hachioji Hospital, Japan  
2Department of Neurosurgery, Tokai University Hachioji Hospital, Japan

**[Background]** Multicenter randomized control trials have demonstrated that additional endovascular thrombectomy (EVT) after intravenous infusion of rt-PA may improve functional outcome of patients with acute ischemic stroke. However, it could potentially trigger hemorrhagic transformation. We, therefore, tried to elucidate factors to determine responsiveness to EVT.

**[Subjects and Methods]** Sequential 24 patients (67.0 ± 14.0 years old) with acute ischemic stroke who underwent thrombolysis followed by EVT were enrolled. According to the change in NIHSS by EVT, we divided them into two groups: Good Responsive (PR) group (ΔNIHSS > 4, n = 9) and Poor Responsive (PR) group (ΔNIHSS < 3, n = 15), and compared these two groups in various measures.

**[Results]** 1) Duration from the onset to the inguinal puncture in PR group (3:56 ± 1:00) was not different from that in GR group (3:33 ± 1:28). 2) At infusion of rt-PA, NIHSS in GR group (13.1 ± 6.5) was significantly lower (p < 0.05) than that in PR group (21.3 ± 7.5). 3) DWI-ASPECTS in GR group (8.3 ± 2.1) was significantly higher (P < 0.05) compared with that in PR group (5.6 ± 2.2). 4) The recanalization rate (> TICI 2b) in GR group was 100%, while that in PR group was 46.7%. 5) NIHSS at the discharge and mRS at 3 months in GR group were significantly lower than those in PR group.

**[Conclusion]** DWI-ASPECTS at the baseline (> 6) and NIHSS at the initiation of rt-PA (< 20), but not the onset to the puncture time (if it is < 5-6 hr), may predict good responsiveness to EVT after thrombolysis and functional recovery.
**P4-3**

The association between time to recanalization and clinical outcomes depends on pre-treatment cerebral blood volume in endovascular therapy for acute ischemic stroke

Tomohide Yoshie (Department of Strokeology, Stroke Center, St. Marianna University, Toyoko Hospital, Japan)

Toshihiro Ueda, Tatsuro Takada, Shinji Nogoshi, Satoshi Takaishi, Ryuou Yamamoto, Takayuki Fukano, Daiki Tokuura, Kentaro Tatsuono

Department of Strokeology, Stroke Center, St. Marianna University, Toyoko Hospital, Japan

【Background and Purpose】Faster times to recanalization improve clinical outcomes in patients after endovascular thrombectomy. Whether the association between time to recanalization and clinical outcomes depends on cerebral blood volume (CBV) obtained from pre-treatment CT perfusion (CTP) was investigated.

【Methods】In consecutive patients with acute ischemic stroke who achieved successful recanalization (TICI 2A-3) by endovascular thrombectomy for intracranial internal carotid artery or M1 occlusion, we investigated the effects on clinical outcome of time to recanalization and the relative CBV value (rCBV). The patient population was divided into two groups according to rCBV: normal rCBV group (rCBV ≥0.9) and low rCBV group (rCBV <0.9). In each group, time to recanalization from CTP was compared between the good clinical outcome group and the poor clinical outcome group.

【Results】Sixty-nine patients were eligible for this study. In the normal rCBV group, no association was found between clinical outcome and time to recanalization. In the low rCBV group, time to recanalization from CTP (101 versus 136 minutes, p=0.038) was significantly shorter in the good clinical outcome group. In good clinical outcome patients with low rCBV, time to recanalization from CTP showed a trend to a moderate correlation with rCBV (Spearman correlation coefficient 0.650, p=0.058) whereas no correlation was found in good clinical outcome patients with normal rCBV.

【Conclusions】The association between time to recanalization and clinical outcomes depends on rCBV obtained from pre-treatment CTP. Time to recanalization is more important for good clinical outcomes in patients with low rCBV than in patients with normal rCBV.

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**P4-4**

Endovascular thrombectomy in a patient with acute left internal carotid artery occlusion receiving rivaroxaban

Han-Chieh Hsieh (Department of Neurology, Stroke Center and Department of Neurology, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Taiwan)

Chih-Yuan Huang1, Yu-Hsiang Shih2, Chih-Hung Chen3

1Department of Surgery, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Taiwan

2Department of Diagnostic Radiology, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Taiwan

3Stroke Center and Department of Neurology, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Taiwan

The 78-year-old female patient came to our emergency department (ED) due to acute consciousness disturbance, global aphasia and right-sided weakness onset within 3 hours. She had hypertension, persistent non-valvular atrial fibrillation treated with rivaroxaban 10mg/day, and previous stroke with sequel of left-sided paralysis. Her pre-stroke modified Rankin Scale (mRS) was 2. NIHSS score was 32 at ED, partially contributed by previous stroke. And her creatinine clearance was 50ml/min, international normalized ratio (INR) was 2.38. Thus, she was not a candidate for intravenous tissue plasminogen activator. Cerebral angiography and perfusion CT scan showed occlusion between C7 segment of left internal carotid artery (ICA), M1 segment of left middle cerebral artery (MCA) and A1 segment of left anterior cerebral artery (ACA) with a large ischemic penumbra. We performed endovascular thrombectomy (EVT) to aspirate the thrombus in left ICA and MCA (Penumbra System®). Successful reperfusion was achieved with thrombolysis in cerebral infarction (TICI) score grade 3. Right hemiparesis improved mildly with NIHSS score 29 at the time thrombectomy completed. The patient’s consciousness improved from E1V1M4 to E2V2M5 but global aphasia remained. Although, the eligibility criteria of EVT was not established in patients with previous disabling stroke, we still consider EVT as a good alternative approach in patients with ICA occlusion receiving anticoagulants.
**P4-6**  Outcomes of endovascular recanalization therapy for elderly patients with acute ischemic stroke

Hiroshi Saito (Department of Neurosurgery, Research Institute for Brain and Vessels Akita, Japan)

Junta Moroi, Jun Tanabe, Tatsuya Ishikawa
Research Institute for Brain and Vessels Akita, Japan

**Introduction**  Mechanical thrombectomy has been proven effective and the number of elderly patients with acute ischemic stroke (AIS) receiving thrombectomy is expected to increase. We examined thrombectomy outcomes in elderly patients treated for AIS.

**Materials & methods**  Of the 32 patients who received a thrombectomy since 1 July 2014, eight patients (25%) were older than 80 years. We retrospectively analyzed the eight patients who received thrombectomy for AIS.

**Results**  All patients received a cardioembolic stroke diagnosis. The average National Institutes of Health Stroke Scale score was 17.1 points and the ASPECT score was 8.8 points. One patient had an internal carotid artery occlusion, six patients had a middle cerebral artery occlusion, and one patient had an anterior cerebral artery occlusion. Five patients used retrievable stents and a Penumbra 5MAX ACE, while the Penumbra system was used in one patient and intra-arterial thrombolytic agents were used in another patient. Reperfusion (TICI score 2b or 3) was achieved in four patients (50%). The average time from onset to recanalization was 314.8 minutes, while the average time to ICA catheterization was 63.3 minutes due to tortuous vessels. The modified Rankin Scale score of patients was more than four points at discharge (not available for one patient) due to embolization to a new territory and hemorrhagic complications.

**Conclusion**  Endovascular recanalization therapy is often slow to perform in elderly patients and is associated with inferior outcomes. It is important to choose a device that shortens recanalization time and reduces the complications of endovascular recanalization therapy.
**P4-7**  Endovascular treatment for acute basilar artery occlusion

Eisaku Sadakata  (Department of Neurosurgery, Nagasaki University Hospital, Japan)

Nobutaka Horie, Yoichi Morofuji, Tsuyoshi Izumo, Takayuki Matuso
Department of Neurosurgery, Nagasaki University Hospital, Japan

**Introduction** Acute basilar artery occlusion (ABAO) is associated with high mortality rate and poor outcome in patients treated conservatively. We treated patients with ABAO with aggressive reperfusion therapy in combination with several endovascular modalities.

**Method** We retrospectively identified 24 patients with ABAO who underwent endovascular treatment in our institution. We analyzed baseline characteristics, endovascular modalities, successful recanalization rate (Thrombolysis in Cerebral Infarction grade), and clinical outcome (modified Rankin scale).

**Result** The mean prethrombectomy National Institute of Health Stroke Scale (NIHSS) score was 18.5. Thirteen patients (54%) were cardiogenic embolism, five patients (21%) were atherosclerotic stenosis. Recanalization was successful (TICI grade 2b-3) in 13 patients (54.2%). Favorable outcome (mRS 0-3) after 90 days were 11 cases (45.8%).

**Conclusion** Although the efficiency of endovascular reperfusion therapy in the anterior circulation is shown, it is considered to be equally effective in the posterior circulation. Aggressive endovascular reperfusion therapy may be beneficial for patients with ABAO and can clinical outcome.

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**P5-1**  Prehospital medicine reduce the door to needle time for iv t-PA

Kensuke Fujita  (Department of Emergency Medicine, Hachinohe City Hospital, Japan)

Shinichiro Osawa¹, Kensuke Kimura², Toshimi Okushima³, Tsuyoshi Kawamura¹, Tatsuya Nodagasira³, Akihide Kon³
¹Department of Neurosurgery, Hachinohe City Hospital, Japan
²Department of Neurology, Hachinohe City Hospital, Japan
³Department of Emergency Medicine, Hachinohe City Hospital, Japan

**Background and Purpose** For the better outcome of ischemic stroke patients various approaches were discussed to shorten the door to needle time (DTNT) for iv t-PA , but few studies reported the effectiveness of prehospital medicine (PM, which includes Helicopter emergency medical service and Rapid Response Car).

In our hospital we introduced HEMS in 2008 and RRC in 2009 but clinical outcomes or DTNT was not improved. In 2015 we renovate the clinical protocol for ischemic stroke in all sections (emergency department, PM, radiological department and cross-sectional doctor team). Here we show the clinical outcome of ischemic stroke treated by iv t-PA before and after the introduction of protocol 2015.

**Subjects and Methods** We compared DTNT time before & after the introduction of the new protocol 2015. For all patients treated by iv t-PA between April 2014 to March 2016, we analyzed clinical characters, DTNT and outcome.

**Result** DTNT for iv t-PA was significantly shorter in the patients treated by new protocol than before (88.0±5.8min vs 30.0±2.8min, p<0.001). In addition, DTNT with PM was significantly shorter than without PM (42.0±5.9min vs. 66.3±9.0min ,p=0.03).

**Conclusion** Cross-sectional involvement was needed to optimize the clinical results in acute ischemic stroke patients. Under such condition, PM could contribute to reduce the DTNT.
Poster Session

P5-2  The effect of statin use in acute ischemic stroke patients treated with thrombolytic therapy

Jong-Moo Park (Neurology, Eulji University, Republic of Korea)

Tae Kyoung Kim, Eui Sung Jung, Kyusik Kang, Wonong-Woo Lee, Jungju Lee, Ohyun Kwon, Byung-Kun Kim
Department of Neurology, Eulji General Hospital, Eulji University, Republic of Korea

[Background] This study investigated the effects of statins for the acute ischemic stroke patients after thrombolysis on the stroke outcome considering statin intensity and time window.

[Methods] Consecutive stroke patients who received intravenous and/or intra-arterial thrombolysis within 8 hours after index stroke in Hospital between April 2004 and March 2015 were included. Efficacy outcomes were neurologic improvement (NIHSS ≤ 4 points from baseline or NIHSS=0) and favorable functional outcome at 3 months (mRS ≤ 2), while safety outcomes were neurological deterioration (NIHSS ≤ 4 points from baseline or death at 7 days) and symptomatic hemorrhagic transformation.

[Results] Among 323 patients, 229 (70.9%) were treated with statins during admission. On multivariable analysis with adjustment, statin use was associated with better neurologic improvement (OR 2.16, 95% CI 1.15-4.08, p=0.02), lower risk of neurologic deterioration (OR 0.11, 95% CI 0.04-0.26, p=0.01), favorable functional outcome at 3 months (OR 8.56, 95% CI 1.08-68.11, p=0.04), and reduced risk of sICH occurrence (OR 0.10, 95% CI 0.04-0.27, p<0.01). High-intensity statin use was noted in 97(42.4%). And early statin use within 24 hours after thrombolysis was noted in 45(19.6%) of statin use group. Although, high intensity statin and early statin use within 24 hours failed to prove better efficacy outcomes, risk of sICH was not increased compared with others regimens.

[Conclusions] In patients treated with thrombolysis, statin use in acute phase was associated with better outcome of safety and efficacy. High intensity statin use and early statin use within 24 hours after thrombolysis did not increase the risk of hemorrhagic transformation.

P5-3  Reperfusion therapy in carotid occlusion with collaterals through the circle of Willis

Seong Hwan Ahn (Department of Neurology, Chosun University School of Medicine, Republic of Korea)

In Sung Choo, Hyun Gu Kang, Sang Woo Ha
Chosun University School of Medicine, Republic of Korea

[Introduction] In large artery occlusion, endovascular treatment shows better recanalization rate than intravenous tPA alone. In reperfusion therapy, excellent collaterals through the circle of Willis has better prognosis. We hypothesized that intravenous tPA only is comparable to endovascular therapy in carotid occlusion with patent ‘T’.

[Methods] Between January 2010 and December 2015, in acute stroke patients who had receive reperfusion therapy, carotid artery occlusion with good collateral via the circle of Willis was selected. In all patients, non-contrast CT and CT angiography were conducted before reperfusion therapy and at 24 (+/-6) hours and/or clinical worsening. Stroke severity was assessed with NIHSS at baseline and discharge. The prognosis of reperfusion therapy was assessed by modified Rankin Scales at 3 months.

[Results] In 529 patients treated by reperfusion therapy, 29 patients (5.5%, male 21, median age 76) had internal carotid artery occlusion with patent ‘T’. In tPA alone (24 patients, 82.8%) baseline NIHSS were non-significantly higher than in endovascular treatment (10 vs 15, p=0.224). Recurrent stroke, which was confirmed with follow up angiography, was developed in 8 of tPA alone. In endovascular treatment, one had a distal embolization. In 22 patients who could be assessed by MRS, 10 patients (45.5%, tPA in 9, IA in 1) had good mRS and 6 patients (27.3%) were expired.

[Conclusions] Carotid occlusion with good collaterals via the circle of Willis was uncommon. tPA alone resulted in recurrent stroke with clinical worsening. Endovascular treatment may be better option in carotid occlusion with patent ‘T’.
**P5-4** Reducing revascularization time in acute ischemic stroke: A single center trial

Mikito Saito (Stroke Center, Kyorin University Hospital, Japan)

Rieko Suzuki¹, Koichiro Komatsubara², Masataka Torii¹, Hiroki Sasamori¹,², Tomohisa Dembo⁴, Eishi Sato², Yoshiaki Shiokawa¹,², Teruyuki Hirano¹

¹Stroke Center, Kyorin University Hospital, Japan
²Department of Neurosurgery, Kyorin University Hospital, Japan
³Department of Neurosurgery, Koyama Memorial Hospital, Japan
⁴Department of Neurology, Saitama Medical University International Medical Center, Japan

**Objective** Benefits of acute revascularization therapy are time-dependent. We refined our in-hospital process of care and analyzed the effect on reducing treatment time.

**Methods** Consecutive ischemic stroke patients who were treated with acute revascularization therapy between June 2012 and August 2015 were registered. Times required for each in-hospital process were compared between phase 1 (before refinement: June 2012, to May 2014) and phase 2 (after refinement: June 2014, to August 2015). Details of refinement were 1) clarifying the clinical strategies, 2) rapid laboratory testing, 3) rapid acquisition and interpretation of brain imaging (using 320 multi-detector CT and reduced MRI imaging protocol), and 4) prompt data feedback. Door-to-image time (DIT), door-to-needle time (DNT), door-to-puncture time (DPT), door-to-recanalization time (DRT), door-to-CT time (DCT), CT-to-MRI time (CMT), MRI-to-Needle time (MNT), Needle-to-Puncture time (NPT), and puncture-to-recanalization time (PRT) were analyzed. Statistical analysis were performed using JMP 9.0.2 (SAS Institute, Cary, NC).

**Results** We obtained 25 patients (men 14, age 75±12) during phase 1, and 33 patients (men 18, age 75±13) in phase 2. DIT (median 45 vs. 36min, p=0.018), DNT (94 vs. 73min, p=0.001), DPT (171 vs. 112min, p=0.004), DRT (290 vs. 183min, p=0.003), MNT (49 vs. 34min, p=0.007), NPT (64 vs. 42min, p=0.034), PRT (110 vs. 68min, p=0.036) were reduced. No differences were observed in DCT (20 vs. 17min, p=0.395) or CMT (23 vs. 20min, p=0.22).

**Conclusions** Refinement of in-hospital process of acute revascularization therapy leads to reduction of treatment time.

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**P5-5** Perfusion-weighted MRI parameters for prediction of early progressive infarction in middle cerebral artery occlusion

Hoon Kim (Department of Neurosurgery, Bucheon St. Mary’s Hospital, College of Medicine, The Catholic University of Korea, Republic of Korea)

Kwang Wook Jo, Seong Rim Kim, Ik Seong Prak, Young Woo Kim

Department of Neurosurgery, Bucheon St. Mary’s Hospital, College of Medicine, The Catholic University of Korea, Republic of Korea

**Objective** Early progressive infarction (EPI) is frequently observed and related to poor functional outcome in patients with middle cerebral artery (MCA) infarction caused by MCA occlusion. We evaluated the perfusion parameters of magnetic resonance imaging (MRI) as a predictor of EPI.

**Methods** We retrospectively analyzed patients with acute MCA territory infarction caused by MCA occlusion. EPI was defined as a National Institutes of Health Stroke Scale increment ≥2 points during 24 hours despite receiving standard treatment. Regional parameter ratios, such as cerebral blood flow and volume (rCBV) ratio (ipsilateral value/contralateral value) on perfusion MRI were analyzed to investigate the association with EPI.

**Results** Sixty-four patients were enrolled in total. EPI was present in 18 (28%) subjects and all EPI occurred within 3 days after hospitalization. Diabetes mellitus, rCBV ratio and rTTP ratio showed statically significant differences in both groups. Multi-variate analysis indicated that history of diabetes mellitus [odds ratio (OR), 6.13; 95% confidence interval (CI), 1.55-24.24] and a low rCBV ratio (rCBV, <0.85; OR, 6.57; 95% CI, 1.4-30.27) was significantly correlated with EPI.

**Conclusion** The incidence of EPI is considerable in patients with with acute MCA territory infarction caused by MCA occlusion. We suggest that rCBV ratio is a useful neuro-imaging parameter to predict EPI.
**P5-6**  
**Angiogram-negative subarachnoid hemorrhage after intravenous thrombolysis in a patient with acute ischemic stroke**  
Kyung-Hee Cho (Neurology, Korea University Anam Hospital, Republic of Korea)

Jae-Gyum Kim, Sungwook Yu, Kyung-Hee Cho  
Department of Neurology, Korea University College of Medicine, Republic of Korea

【Background】The use of intravenous recombinant tissue plasminogen activator (IV rtPA) is associated with the development of symptomatic intracranial hemorrhage (ICH) in 6.4% of patients. However, a few cases of subarachnoid hemorrhage (SAH) after administration of rtPA have been reported, including the aneurysm rupture and arterial dissection. We describe a patient with SAH immediately after thrombolytic therapy.

【Case】A 72-year-old man visited emergency room with aphasia 50 minutes after onset of the symptom. He had hypertension, diabetes mellitus, and end-stage renal disease. Initial National Institute of Health Stroke Scale score was 8. Computed tomography (CT) of the brain showed no evidence of hemorrhagic lesion, and he had no other contraindications for thrombolytic therapy. We used standard 0.9mg/kg dose of IV rtPA 110 minutes from the onset. In CT angiography, left middle cerebral artery (MCA) was patent, and the evidence of aneurysm or dissection was not found. About 12 hours after administration of rtPA, the patient showed drowsy mentality. In emergent brain CT, there were hematomata in suprasylvian area, and SAH in basal cistern, intraventricular hemorrhage in both lateral ventricles and hydrocephalus. Follow up angiography was not performed due to his unstable condition. The patient died after 3 days.

【Conclusions】In this case, left MCA territory infarction was suspected and the ICH can be thought as hemorrhagic transformation inside the infarcted area. However, common causes of SAH, like aneurysm or dissection were not observed in initial CT angiography. Other conditions such as vasospasm, thrombosed aneurysm, microaneurysm, arterio-venous malformation, or arterio-venous fistula can be suggested as the underlying cause of angiogram negative SAH. Also, extension of primary ICH into the subarachnoid space can be a cause. Repeat CT angiography or digital subtraction angiography can help to find the occult vascular lesion if suspected.

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**P6-1**  
**Experimental model of acute incomplete cerebral ischemia in rats**  
Djakhangir Tursunov (Biochemistry, Tashkent Medical Academy, Uzbekistan)

【Objective】To modeling of acute incomplete cerebral ischemia in rats.

【Methods】To analyzed existing methods of experimental modeling of acute incomplete cerebral ischemia.

【Results】Modeling of acute incomplete cerebral ischemia in rat tissues is observed increasing in gray matter peroxidation process and antplatelet activity and decreased superoxide dismutase activity. In post-ischemic reperfusion injury of the brain it is enhanced lipid peroxidation, increases the activity of antioxidant enzymes, are normalized platelet activating and procoagulant properties. Changes in these reactions in of brain tissues led to normalization of platelet aggregation and blood clotting. In patients with various disorders of cerebral blood flow (ischemic and hemorrhagic stroke) in the brain tissue rapidly activated reaction of lipid peroxidation, hemostasis and fibrinolysis was inhibited. The blood of such patients is reduced and increased hemostatic antioxidant function with inhibition of fibrinolysis on this background reactions.

【Conclusion】Using of antioxidant vitamins (A, E, C, F) in the rat experimental conditions and returns platelet activating procoagulant properties of its tissue to the level observed in intact animals. Applying this background platelet aggregation inhibitors (aspirin, indomethacin, tiklid) led to different reactions. Aspirin did not prevent aggregation enhancing properties of brain tissue caused by its ischemia (presumably as prostacyclin inhibitor). Indomethacin, and particularly in this respect tiklid operated more favorably reducing aggregation properties of the brain tissue.
**P6-2 Neurovascular unit protection using nitroxide radicals-containing nanoparticles (TEMPO-RNP) for cerebral ischemia-reperfusion injury**

Hisayuki Hosoo (Department of Neurosurgery, University of Tsukuba, Japan)

Aiki Marushima1, Yukio Nagasaki2, Aki Hirayama3, Hiromu Ito4, Ami Niwano1, Hideo Tsurushima1, Wataro Tsuruta1, Kensuke Suzuki5, Tetsuya Yamamoto1, Akira Matsumura1

1Department of Neurosurgery, University of Tsukuba, Japan
2Graduate School of Pure and Applied Sciences, University of Tsukuba, Japan
3Center for Integrative Medicine, Tsukuba University of Technology, Japan
4Department of Gastroenterology, University of Tsukuba, Japan
5Department of Neurosurgery, Dokkyo Medical University Koshigaya Hospital, Japan

**Purpose** Reperfusion injury after thrombolytic therapy or mechanical thrombectomy would adverse neurological outcome. Generation of reactive oxygen species (ROS) due to reperfusion is relevant for aggravation. The development of drug therapy for scavenging free radical is expected to lead to better neurological prognosis. We developed a new core-shell type nanoparticle, RNP (radical containing nanoparticle), which consists of micelle containing 4-amino-TEMPO. The purpose of this study is to evaluate an efficacy of intra-arterial injection of RNP after reperfusion using tMCAO mice model. **Methods** C57BL/6J mice underwent tMCAO for 60 minutes and received RNP by intra-arterial injection from common carotid artery. We evaluated infarction size, neurological scale, and Evans blue extravasation at 24h after reperfusion. We further examined immunofluorescence of CD31, Occludin, TUNEL, dihydroethydium, and 8-hydroxydeoxyguanosine (8-OHdG). Multiple free radical scavenging capacity of ischemic hemisphere was analyzed by Electron Paramagnetic Resonance (EPR). **Results** The infarction size, neurological scale, Evans blue extravasation of the mice treated by RNP were significantly lower than the mice treated by PBS, control group. Intra-arterial RNP treatment preserved endothelium and expression of occludin in the ischemic brain. Further, apoptosis of neuronal cells and production of superoxide anions and 8OHdG were suppressed. By using EPR, multiple ROS scavenging capacity (⋅OH, ⋅ROO, ⋅O2-) of the ischemic brain treated by RNP were higher. **Conclusions** These results suggest that intra-arterial injection of RNP have efficacy of neurovascular unit protection and reduce infarction volume by improving multiple ROS scavenging capacity.

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**P6-3 Prevalence of stroke in the world**

Ziyoda Abdulkhaevna Akbarkhodjaeva (Neurology, Tashkent Medical Academy, Uzbekistan)

Jakhangir Tursunov
Tashkent Medical Academy, Uzbekistan

**Objective** To analyse the static data of the stroke incidence in the world.

**Background** Stroke, or brain attack, is when poor blood flow to the brain results in cell death. In 2013, approximately 6.9 million people had an ischemic stroke and 3.4 million people had a hemorrhagic stroke.

**Methods** Statistics and epidemiological analysis of the data.

**Results** Stroke was the second most frequent cause of death worldwide in 2011, accounting for 6.2 million deaths (~11% of the total). Approximately 17 million people had a stroke in 2010 and 33 million people have previously had a stroke and were still alive. Between 1990 and 2010 the number of strokes decreased by approximately 10% in the developed world and increased by 10% in the developing world. Overall, two-thirds of strokes occurred in those over 65 years old. South Asians are at particularly high risk of stroke, accounting for 40% of global stroke deaths.

**Conclusions** Stroke is the disease of brain, which requires a long-term treatment and the number of patients have ranked third place in the world after diabetes. It is very difficult to get the accurate numbers of the diseases dissemination due to unavailability of a single registry as well as the fact that stroke is often intentionally or mistakenly not diagnosed or passes under the different diagnoses (related and movement disorders), which are not taken into the overall statistics of stroke.
**P6-4  Vascular imaging features and outcomes of acute cervicocerebral artery dissection**

Jun Lee (Department of Neurology, Yeungnam University Medical Center, Republic of Korea)
Jungim Gwon, Mingyeong Kim
Department of Neurology, Yeungnam University Medical Center, Republic of Korea

**Objectives** We investigated the angiographic outcomes and prognostic factors for imaging features of acute cervicocerebral artery dissection.

**Methods** We included 162 consecutive patients who presented with acute ischemic symptoms and/or headache due to acute cervicocerebral artery dissection and underwent cerebral vascular imaging within seven days after symptoms onset. The angiographic features and the degree of stenosis between baseline and follow-up vascular images (6-month or 1-year after symptom onset) were compared.

**Results** A total of 70 patients who underwent baseline and 6-months or a year vascular imaging were included for these analysis. The presence of infarction on baseline MRI was in 84.3%. Regarding the lesion sites, a dissection was more common in the intracranial (82.9%). Baseline vascular images identified an aneurysm in 40%, stenosis or occlusion in 77.1% and occlusion in 21.4%. Follow-up images showed complete improvement in 77.8% (40-95%) at 3 months and 83.3% (51-91%) at 6 months. Patients who had an occlusion on the baseline images had complete resolution in 20% (5-49%) and partial or complete resolution in 37.5% (16-64%). The odds ratio for complete or partial improvement on the follow-up images were 0.16 (0.48-0.52, p=0.002) from vertebral artery dissection and 0.09 from dyslipidemia (0.01-0.94, p=0.045) by multivariate analysis.

**Conclusions** The rate of complete or partial recovery of dissected artery on the 6-month or 1-year follow-up images is over 80% (more than half of complete occlusion). Dyslipidemia is a poor prognostic factor for the recovery of cervicocerebral artery dissection.

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**P6-5  Left ventricular diastolic dysfunction and arterial occlusion in ischemic stroke related to atrial fibrillation**

Wi-Sun Ryu (Department of Neurology, Dongguk University Ilsan Hospital, Republic of Korea)

Eun-Kee Bae
Inha University Hospital, Republic of Korea

**Background** Left ventricular diastolic dysfunction lead to left atrial stasis and thus increases a risk of left atrial appendage thrombus in patients with atrial fibrillation. We investigated whether left ventricular diastolic dysfunction is associated with embolic burden in patients with ischemic stroke related to atrial fibrillation.

**Method** A consecutive series of 99 patients with atrial fibrillation related stroke was included. Mitral inflow E velocity and tissue Doppler mitral annulus velocities (e’) were measured, and E/e’ ratios were calculated. To assess embolic burden, arterial occlusion was evaluated by computed tomography (CT) or magnetic resonance angiography. In addition, hyperdense middle cerebral artery sign on noncontrast brain CT, the marker of acute thrombus burden, was assessed in 69 patients. Multivariable logistic regression analysis was used to assess independent association of E/e’ with arterial occlusion and hyperdense middle cerebral artery sign.

**Results** Mean age was 73.2±10.2 and 56% were men. 36 (36.4%) patients had arterial occlusion on arterial imaging. E/e’ ratios were independently associated with arterial occlusion with odds ratio of 1.23 (per 1 increase, 95% confidence interval 1.11?1.37, P<0.001). Receiver operating characteristics curve demonstrated that E/e’ ratios have an excellent discriminatory capacity in predicting arterial occlusion with an AUC of 0.77 (P<0.001). In addition, E/e’ ratios were higher in patient with hyperdense middle cerebral artery sign than those without (19.1 vs. 14.0, P<0.001).

**Conclusion** E/e’ ratios were positively associated with higher embolic burden in atrial fibrillation related stroke and may play a role in identifying patients at high risk for severe stroke.
Poster Session

P6-6  Withdrawn