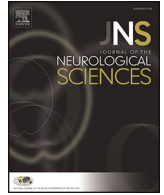


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## Stroke 3

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Stroke 3

### Thrombus histology and cryptogenic stroke – a different approach to determine etiology

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**Objective:** Ischemic stroke of undetermined cause is considered to be a major health issue and therefore recommended to be a top research focus in the field. Histopathological analysis of human “in-vivo”, mechanically extracted thrombi of patients with large vessel occlusion may contain additional “in-depth” information concerning the underlying pathology. Aim of this study was to elucidate the clinical problem of cryptogenic stroke by use of a multiparametric approach, analyzing histological, interventional and clinical outcome data of stroke patients.

**Methods:** Thrombi of 145 consecutive patients with large vessel occlusion were collected during mechanical recanalization. The HE-stained specimen was analyzed concerning overall appearance and relative quantitative component fractions of erythrocytes, fibrin/thrombocytes and leucocytes. Detailed clinical and interventional data were obtained. Statistical analysis was performed searching for significant differences or pattern similarities in different stroke subtypes, defined by the international TOAST criteria. IRB and patient approval has been obtained.

**Results:** In a consistent and conclusive overall pattern, arterio-embolic and TOAST 4 (mostly dissections) differ significantly from cardio-embolic and cryptogenic stroke subtype in histological parameters (e.g. lower erythrocyte fraction in cardio-embolic and cryptogenic groups,  $p = 0.038$ ), interventional (e.g. higher number of maneuvers in cardio-embolic and cryptogenic groups,  $p = 0.012$ ) and outcome (e.g. higher mRS in cardio-embolic and cryptogenic groups,  $p = 0.011$ ) data. Cardio-embolic and cryptogenic subtype show matchable thrombus structure and similar clinical and interventional characteristics.

**Interpretation:** The findings of this multiparametric approach strongly support the hypothesis of predominantly cardio-embolic mechanisms accounting for the majority of cryptogenic strokes.

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Stroke 3  
Blood based biomarkers to identify subclinical brain damage in essential hypertension

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**Background:** Neuroimaging has demonstrated that subclinical brain damage in essential hypertension is more prevalent than cardiovascular or renal impairment; nevertheless, screening for nervous system involvement is difficult due to low accessibility and high cost techniques.

**Objective:** To explore if hemochemical markers of brain damage and inflammation could predict the presence of subclinical brain damage in hypertensive patients.

**Patients and methods:** 101 patients with essential hypertension and 53 controls with no clinical evidence of neurological disease were recruited. Serum concentrations for two brain specific proteins (S100B and neuron specific enolase, NSE) and for inflammatory markers (C-reactive protein, CRP;  $\alpha$ 1-antitrypsin, AAT; C3 and C4 complements) were determined. Target organ damage (TOD) to the brain, heart and kidneys was evaluated in HT patients. Patient and Institutional Review Board approval were obtained.

**Results:** Multiple regression analysis revealed that only NSE and CRP were independently associated with the condition of being hypertensive. NSE was associated to diastolic blood pressure and grade of retinopathy. TOD to the 3 organs was evaluated in 34 patients, showing damage to the brain in 70.6%, heart in 58.5% and kidneys in 50%. NSE was associated with more severe MRI damage (white matter hyperintensities), while inflammatory markers were not related to TOD. After ROC analysis, NSE (cutoff level: 11  $\mu$ g/L) was found to predict more severe MRI lesions with 84% sensitivity and 55% specificity.

**Conclusion:** Serum NSE could constitute a starting point for future investigations in the field of blood based biomarkers for the detection of subclinical brain damage in arterial hypertension.

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Stroke 3  
Imaging assessment of post cardiac arrest hypoxic ischemic encephalopathy

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**Purpose:** To evaluate imaging changes in subjects with hypoxic ischemic encephalopathy (HIE) post cardiac arrest.

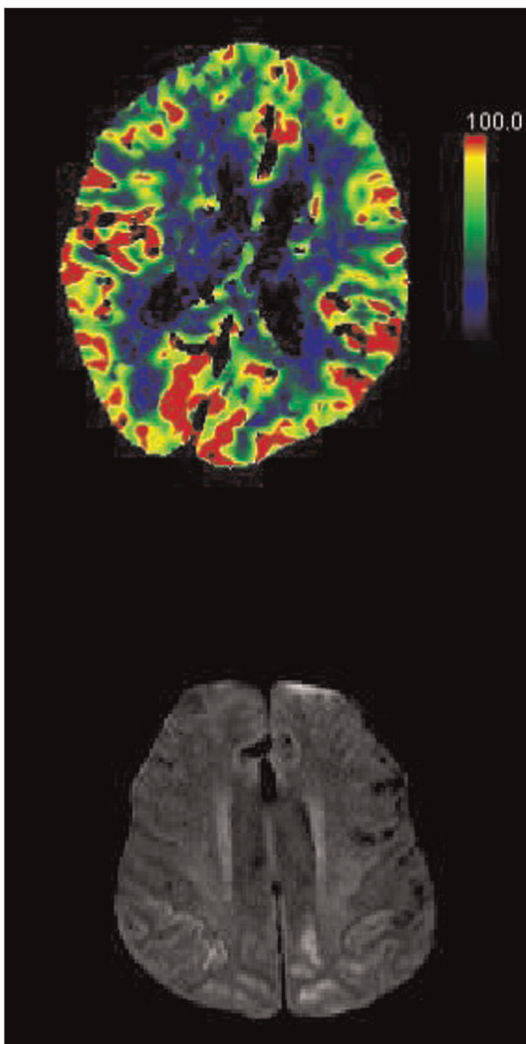
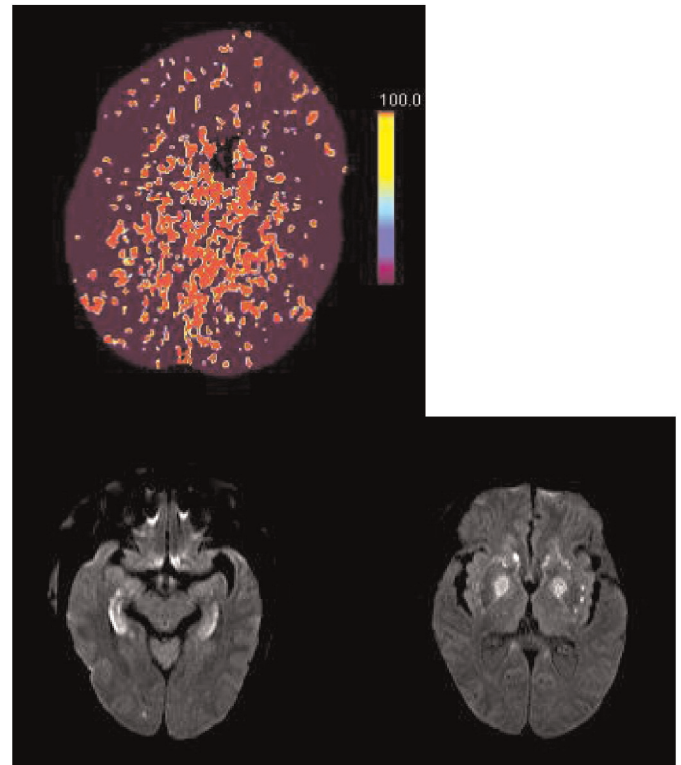
**Method:** From 2013 to 2014, 6 subjects admitted to Intensive Care Unit after successful post cardiac arrest cardiopulmonary resuscitation, were assessed with imaging which included baseline plain computed tomography (CT) and also with perfusion CT (pCT) and magnetic resonance imaging MRI, given lack of improvement of their Glasgow coma scores (GCS) after induced hypothermia. They were also assessed clinically, neurologically and with electroencephalography.

Cortical flow was assessed on pCT with relative blood flow (rBF), relative blood volume (rBV), time to peak (TTP) and mean transit time (MTT) series, following the same protocol in use to assess acute stroke subjects at our institution. MRI included diffusion weighted imaging (DWI) series and apparent diffusion coefficient (ADC) maps. Imaging findings were correlated with clinical assessment. There were no control subjects given the particular clinical situation triggering the protocol mentioned above.

**Results:** All subjects showed ischemic-type signal intensity changes in cortical areas of the posterior circulation and basal ganglia, which matched an abnormally increased rBFV showing flow rates above 80 ml/min/100 g, when scans were obtained in a period of 48 hours

post induced hypothermia. One of them had a follow up pCT 72 hours post induced hypothermia showing a marked generalized flow drop to 22 ml/min/100 g in cortical regions and basal ganglia.

**Conclusion:** pCT was a reliable indicator of abnormal flow post induced hypothermia in this cohort of subjects not regaining alertness or improving GCS, showing abnormal flow increase post treatment apparently due to impaired self regulation.



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Stroke 3

**Endovascular treatment of acute middle cerebral artery occlusion – comparison of treatment methods and identification of outcome predictors**

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**Background:** In the treatment of acute middle cerebral artery occlusion (MCAo), endovascular treatment (EVT) becomes preferred recanalization method. EVT comprises also percutaneous transluminal angioplasty (PTA) and mechanical thrombectomy (MT); only limited data are available regarding their comparison.

**Objective:** To evaluate safety and efficacy of PTA and MT in the treatment of acute MCAo, including intravenous thrombolysis (IVT) with subsequent EVT, and to identify outcome predictors.

**Patients and methods:** In the retrospective study, data from the Czech national multicenter registry of cerebral mechanical recanalizations were analyzed. The set consisted of 126 acute ischemic stroke patients (64 males; mean age  $68.0 \pm 13.3$  years) with radiologically confirmed MCAo. Patient approval was obtained, as necessary.

**Results:** Good 90-day clinical outcome (mRS 0–2) was achieved more frequently in patients treated with IVT + MT (56.4%) than with IVT + PTA (33.3%) ( $P = 0.04$ ). Other differences found between the particular groups (PTA, MT, IVT + PTA, IVT + MT) were not statistically significant: successful recanalization in 89.1%, 93.1%, 86.7% and 91.4%, resp., and good 90-day clinical outcome in 41.1%, 51.0%, 33.3% and 56.4%, resp. ( $P > 0.05$  in all cases). Diastolic blood pressure on admission (OR = 0.940, 95% CI: 0.902–0.980,  $P = 0.004$ ) and neurologic deficit at the time of treatment (OR = 0.820, 95% CI: 0.728–0.922,  $P = 0.001$ ) were identified as independent negative predictors and, achieved recanalization – TICI 2–3 (OR = 20.8, 95% CI: 1.400–319.1,  $P = 0.029$ ) as an independent positive predictor of good 90-day clinical outcomes.

**Conclusion:** Data from this registry showed that both PTA and MT represented safe and effective recanalization methods of acute MCAo. Supported by the IGA MH CR grant NT/13498–4/2012.

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Stroke 3

**Extent of investigation and classification criteria impact etiologies of ischemic stroke in the young**

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**Background:** There is no consensus about the extent of investigation or the etiological classification to be applied for ischemic stroke (IS) in young adults.

**Objectives:** 1. To evaluate the impact of the extent of investigation on definition of IS etiology as “undetermined”, in young patients with stroke; 2. To evaluate the impact of classifying IS in patients with isolated patent foramen ovale (PFO) as “cardioembolic” or of “undetermined etiology”.

**Patients and methods:** We evaluated data from 143 patients with IS, aged 14–45 years. The extent of investigation was characterized according to two protocols: “stepwise” or “extensive”. Statistical analysis was performed using Chi-square tests. I have obtained Institutional Review Board (IRB) approval for this study.

**Results:** The mean ( $\pm$  standard deviation) age was  $35.1 \pm 7.6$  years and there was a female predominance (62%). According to the extensive protocol, the etiology was considered determined in 69% of patients undergoing “complete” investigation, and 58% in patients undergoing “incomplete” investigation. Performance of the extensive protocol was not associated with increase in determination of IS

etiology, compared to the stepwise protocol (Chi-square = 1.45;  $p = 0.228$ ). When IS associated with an isolated PFO was classified as “cardioembolic”, the frequency of IS of “undetermined etiology” was 38%. When this type of IS was classified as of “undetermined etiology” the frequency of IS of “undetermined etiology” increased to 57% (Chi-square = 145.1;  $p < 0.001$ ).

**Conclusion:** These results help to explain heterogeneous results reported by different studies. Evidence-based, cost-effective protocols of investigation are deeply need, as well as consensus about etiologic classification of IS in the young.

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WFN15-0615  
Stroke 3

**Sex differences in characteristics of ischaemic strokes in a prospective series of 334 young patients**

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**Background and purpose:** to analyze trends in risk factors, aetiologies and clinical outcome of ischaemic stroke (IS) related in men versus women.

**Methods:** We have prospectively included 334 young adults (<45 years) between 2005 and 2014 with an acute IS confirmed by MRI. We have obtained patients approval, as necessary. The patients were investigated by standardized protocol including biological and toxicological screenings and cardio-vascular check-up.

**Results:** In the whole series of 334 patients, mean age was  $36.8 \pm 0.36$  and sex ratio 1.1. Lifestyle risk factors were significantly more common in men: smoking in 54.8% vs 44% ( $p = 0.03$ ), active cannabis use 23.4% vs 10.6% ( $p = 0.02$ ), alcohol 22.8% vs 6.2% ( $p < 0.001$ ). Also potentially modifiable risk factors as hypercholesterolemia, hypertension and diabetes were more common in men respectively (49.7 vs 32%,  $p = 0.01$ ; 30.2% vs 16.3%,  $p = 0.02$ ; 7.4 vs 1.8%,  $p = 0.01$ ). History of migraine was more prevalent in women 37.1% vs 12.5%,  $p < 0.001$ . The following aetiologies had similar prevalence in both sexes: cardioembolism, intracranial arterial stenosis, isolated patent foramen ovale, haematological diseases, atherosclerosis. Small vessel disease and aneurysm were present only in men 1.7% and 1.1% respectively. Cervical dissection was more frequent in women 15% vs 8%. Aetiology of IS was unknown in 26% for both. The mRS at 3–6 months was  $\leq 2$  in about 90% for both.

**Conclusion:** Non-modifiable and modifiable lifestyle risk factors are highly prevalent in men. IS are more frequently associated with migraine and cervical dissection in women. The clinical outcome is similar despite differences in aetiologies and risk factors.

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WFN15-0644  
Stroke 3

**Renal impairment and symptomatic hemorrhagic transformation in Korean patients receiving intravenous thrombolysis**

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**Background:** Recent two large studies from US and Europe came to contradicting results about the association between renal impairment and symptomatic hemorrhagic transformation (SHT) after intravenous thrombolysis (IVT).

**Objectives:** We investigated the impact of renal impairment on SHT in Korean stroke patients receiving IVT.

**Method:** We identified the 2258 consecutive acute stroke patients treated with IVT from the prospective multicenter stroke registry (the Clinical Research Center For Stroke-5<sup>th</sup> Division) database. Renal impairment was categorized with *International Classification of Diseases* definition; normal (Glomerular Filtration Rate, GRF  $\geq 90$  mL/min per  $1.73 \text{ m}^2$ ), mild ( $60 \geq$  to  $<90$ ), moderate ( $\geq 30$  to  $<60$ ) and severe ( $<30$ ). Primary outcome measure was SHT defined with the Safe Implementation of Thrombolysis in Stroke Monitoring Study (SITS-MOST) criteria.

**Results:** Of 2258 patients enrolled, patients with normal renal function were 63% and those with moderate to severe impairment were 19%. Overall SHT rate was 4.2% and the incidence of SHT was tended to increase as the decreasing GFR; 2.3% in normal function, 4.7 % in mild, 6.7% in moderate, and 6.0% in severe impairment. The multivariable analysis showed there was an independent dose-response relationship between the risk of SHT and the severity of renal impairment ( $p = 0.01$  on the likelihood ratio test for trend). A decrease of GFR by  $10 \text{ mL/min}/1.73 \text{ m}^2$  increased a 12% (95% confidence interval, 3%–21%) of risk of SHT after IVT.

**Conclusions:** This study suggests that a Korean stroke patient with renal impairment who receiving IVT may have an increased risk of

SHT. Residual confounding and ethnicity can explain the discrepancy between studies.

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Stroke 3

Scale for severe dysphagia in lateral medullary stroke

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**Background:** Lateral medullary stroke (LMS) is the most common brainstem infarct. Despite its favorable prognosis, identification of patients at high risk of complications associated with severe dysphagia may benefit of early therapeutic intervention.

**Objective:** To derivate a robust and simple dysphagia severity classification system than can help to identify patients that require percutaneous endoscopic gastrostomy (PEG)

**Patients and methods:** 65 consecutive patients (36 men, 29 women, mean age  $47 \text{ years} \pm 13$ ) with diagnosis of LMS were studied. Potential variables were selected and introduced into a multivariate-adjusted analysis to determine independent predictors of PEG requirement. Hosmer and Lemeshow goodness of fit test and proportional hazard ratio analysis were used.

**Results:** We developed a scale that ranges from 0 to 6 points (higher score, more severity) that consists of cough after swallowing (3 points,  $p < 0.001$ ), abnormal gag reflex (1 point  $p < 0.001$ ), rostral pattern in MRI (1 point,  $p < .001$ ) and dysphonia as adjustment variable (1 point). Patients with score between 4 and 6 required PEG. The best cut-off point for the model was 3 points representing the best scale performance in specificity, efficiency, and predictive value. ROC analysis showed area under the curve value of 0.94 (IC 95% 0.88–1.0;  $p < 0.001$ ).

**Conclusion:** This scale can represent an easy-to use tool to determine the need of PEG in patients with LMS.

I have obtained patient and/or Institutional Review Board (IRB) approval, as necessary.

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