

## บทคัดย่อ

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# Minimally Clinical Important Differences of Hemifacial Spasm Score-30 (HFS-30) for Patients with Hemifacial Spasm: the Preliminary Analysis

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## Abstract

**Introduction:** Hemifacial spasm (HFS) affects health-related quality of life (HRQoL). The HFS-30 and HFS-7 questionnaires are used to assess the HRQoL of these patients. The minimally clinical important differences (MCIDs) for these have never been estimated.

**Objectives:** We aimed to estimate the MCIDs for HFS-30 and HFS-7.

**Materials and Methods:** We collected data prospectively from patients attending the Botulinum toxin (BoNT) clinic at the Neurology Unit, Faculty of Medicine Siriraj Hospital, Thailand. Patients with HFS were assessed on the HFS-30, HFS-7, SMC grade, PHQ-9, and a global rating scale of change (GRS) in HRQoL at baseline prior to BoNT injection, followed by telephone calls every two days consecutively from the day of injection until the fourteenth day of follow-up to collect HFS-30 and HFS-7. At 1-month after the injection date, the patients were re-assessed on the same measures as a baseline.

**Results:** The preliminary analysis included 76 patients. The correlation analysis of the GRS anchor and HFS showed a significant but weak association in both HFS-30 ( $r = 0.33$ ,  $p$ -value  $< 0.001$ ) and HFS-7 questionnaires ( $r = 0.29$ ,  $p$ -value  $< 0.001$ ). The MCID of standardized HFS-30 and HFS-7 by the anchor-based method were -4.30 pts (95% CI -5.15, -3.46) and -4.11 pts (95% CI -5.77, -2.46), respectively.

**Conclusion:** The anchor-based MCIDs of standardized HFS-30 and HFS-7 were -4.3 pts and -4.11, respectively.

# A Survey of Home-based Cognitive Stimulation Activities in Thai Patients with Mild Cognitive Impairment and Mild Dementia

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## Abstract

**Introduction:** There is evidence that engaging in mentally stimulating leisure activities can slow down cognitive decline.

**Objectives:** This study aims to examine home-based cognitive activities of Thai patients with MCI and mild dementia.

**Materials and Methods:** A study on Thai patients with MCI and mild dementia was conducted. Questionnaires were used to gather data on patient characteristics, home cognitive activities, and ability to use IT device or telecommunication technology. Home activities were categorized into cognitive, physical, and religion-related activities based on frequency.

**Results:** The study enrolled 157 patients, of whom 46.5% were diagnosed with MCI and 53.5% with mild dementia. The MCI group had a significantly higher frequency of activities on reading, writing, playing mobile games, texting on a mobile phone, calculating, listening to music, meditation, praying, almsgiving, doing chores, cooking, and gardening (all  $P < 0.05$ ). MCI patients had a greater ability to use smart IT devices and teleconference technology such as video call or Zoom applications than those with mild dementia (79.5% vs 26.2%,  $p < 0.001$ ; 49.3% vs 11.9%,  $p < 0.001$ , respectively). The study results also showed that older age ( $P < 0.001$ ;  $r = -0.340$ ), a lower body mass index ( $P = 0.043$ ;  $r = 0.163$ ), a lower level of education ( $P < 0.001$ ), patients' IT device literacy ( $P < 0.001$ ) and ability to use telecommunication applications ( $P < 0.001$ ) were found to be factors related with a lower cognitive activity score.

**Conclusion:** Home-based cognitive activities are linked to MCI and mild dementia. The development of home-based cognitive stimulation programs for Thai patients with cognitive issues is possible and recommended.

# Feasibility and Reliability Study of Non-Contrast Computed Tomography (NCCT) of the Brain Imaging in a Catamaran Mobile Stroke Unit

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## Abstract

**Introduction:** The concept of a marine mobile stroke unit, which could provide acute stroke care to patients in riverbank areas is being explored.

**Objective:** To evaluate the feasibility and performance of portable brain CT scanning on a catamaran in terms of image quality and reliability.

**Methods:** Portable brain CT scans on healthy volunteers were performed on a catamaran over 13 days. Six raters (three neurologists and three radiologists) evaluated 13 anatomical positions across three levels (posterior fossa, ganglionic, and supraganglionic) for image quality. Radiation dose and axis rotation data of catamaran was also collected.

**Result:** 170 subjects were included in the analysis. Level of agreement between six raters was substantial at ganglionic (Gwet's AC1 0.63, 95% CI: 0.55–0.70) and supraganglionic level (Gwet's AC1 0.80, 95% CI: 0.75–0.85). Agreement at the posterior fossa level is fair (Gwet's AC1 = 0.21, 95% CI: 0.13–0.29). There are 95%, 93% and 46% of anatomical items at the ganglionic, supraganglionic and posterior fossa level that have adequate image quality.

**Conclusion:** Image quality and reliability of portable CT brain scanning on a catamaran is good at ganglionic and supraganglionic level with almost all of the scans have adequate image quality but have poor performance in evaluation posterior fossa. Portable CT brain on a catamaran might be usable for evaluating the anterior circulation stroke but more study on these issues is warranted.

# Prevalence, Clinical Characteristics, and Quality of Life of Orthostatic Tremor and Orthostatic Myoclonus In Thai Patients with Parkinson's Disease: Prospective Cross-sectional Study

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## Abstract

**Introduction:** Parkinson's disease (PD) is a common movement disorder in which the patients usually have gait and instability problems. Orthostatic tremor (OT) and orthostatic myoclonus (OM) can contribute to these problems. However, there have been no studies on the prevalence of OT and OM in PD patients.

**Objectives:** The primary aim was to investigate the prevalence of OT, OM in PD patients treated at Siriraj hospital. The secondary aim was to compare clinical characteristics and quality of life of the PD patients diagnosed with or without OT or OM.

**Materials and Methods:** We performed a prospective cross-sectional study including patients who attended Parkinson's disease and other movement disorders clinic at Siriraj hospital, Thailand from August 2022 to January 2023. To investigate the prevalence of OT and OM in PD patients, all participants were assessed using surface electromyography. Baseline characteristics, clinical characteristics, and quality of life were collected and then compared between groups for secondary outcomes.

**Results:** This study included 105 patients. The prevalence of OT and OM among PD patients was 17.1% (18 out of 105 patients) and 5.7% (6 out of 105 patients), respectively. Age, modified Hoehn and Yahr stage, and UPDRS part 3.4b had statistically significant differences between normal and OT/OM groups.

**Conclusion:** This is the first study aimed to address prevalence of OT and OM in PD patients. Surprisingly, they are not uncommon. These current results may raise awareness of identifying OT and OM in PD patients. A larger sample size, pathophysiology, clinical follow-up, and optimal treatment are needed to perform in further research in the future.

# Clinical Manifestation and Outcomes of Intravascular Lymphoma Compare with Primary Central Nervous System Lymphoma

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## Abstract

**Introduction:** Intravascular lymphoma (IVL) and primary central nervous system lymphoma (PCNSL) are both rare hematologic malignancies, but only part of IVL patients have neurological manifestations. The difference in clinical presentation and overall survival compared between groups are unknown.

**Objectives:** To determine the difference in overall survival and clinical manifestations between IVL and PCNSL patients

**Materials and Methods:** IVL and PCNSL patients in Siriraj hospital from 2005 to 2022 were retrieved by ICD-10-CM code search. All diagnoses were ascertained by retrospective chart review. IVL patients were divided into IVL with neurological involvement (IVL-neuro) and IVL without neurological involvement (IVL-non-neuro). Clinical manifestations, basic laboratory, neuroimaging, and overall survival by Kaplan-Meier curve were analyzed.

**Results:** Every IVL-neuro group had a neurological problem in CNS as the first symptom of the clinical course. Prolonged fever and weight loss were significantly higher in both IVL and PCNSL groups. However, weakness and other neurological deficits were found in PCNSL rather than both IVL groups without statistically significant. Both IVL groups also showed anemia and elevated LDH more than the PCNSL group. All IVL-neuro patients died within the first year; the mean survival time of IVL-neuro and the non-neuro group was 61.5 (SD 15.9) and 3.1 (SD 1.3) months, respectively, while the mean survival time was 48 (SD 5.4) months in PCNSL group,  $p = 0.003$ .

**Conclusions:** Prolonged fever, weight loss, abnormal CBC, and elevated LDH suggest the IVL-neuro. Overall survival at 1 and 3 years between IVL and PCNSL groups aren't significantly different. However, the IVL-neuro group had a statistically significantly higher mortality rate than PCNSL and IVL-non-neuro groups.

# Validation and Psychometric Properties of the Thai Version of the Hemifacial Spasm Grading Questionnaire (HFS score) for Physician-Assessed Clinical Involvement and Patient-reported Health-related Quality of Life: A Prospective Observational Study

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## Abstract

**Introduction:** Hemifacial spasm (HFS) affects patients' function and health-related quality of life (HRQoL). The HFS score questionnaire is used to assess the therapeutic effect of botulinum neurotoxin A (BoNT-A) therapy in both of the clinical (HFS-Clinical) and HRQoL aspects (HFS-Subjective).

**Objective:** The primary aim was translation to Thai and cognitive debriefing of the Thai version of the HFS score in patients with HFS. The secondary aim was testing the psychometric properties of the translated score.

**Materials and Methods:** A single-centered prospective, observational study was conducted from September 2022 to December 2022. One hundred sixty-one HFS patients treated with BoNT-A were recruited. Before start the BoNT-A treatment, all eligible participants were interviewed using Thai version of the HFS score. Then, the translated score was used to assess all participants again on the third week ( $\pm 1$  week) after the BoNT-A treatment.

**Results:** One hundred fifty-seven patients [mean age=63.6 y (range 31.0, 89.0); female=72.6%] completed the study. Regarding the translated score, Cronbach's alpha showed acceptable internal consistency ( $\alpha=0.90$ ). All HFS-Clinical and HFS-Subjective items showed responsiveness to change between baseline and follow-up (all  $p<0.05$ ).

**Conclusion:** The Thai version of the HFS score showed acceptable psychometric properties for use as a patient-reported HFS HRQoL instrument.

# Predictors for the Prognostic Outcomes of Myasthenia Gravis in Ramathibodi Hospital

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## Abstract

**Objectives:** To determine the predictors of prognostic outcomes, especially worsening outcomes in myasthenia gravis (MG) patients. We hypothesize that MGFA clinical classification at baseline may impact the prognostic result.

**Materials and Methods:** This was a retrospective cohort research that collected data from the Ramathibodi hospital's health records between January 2002 and December 2022. We included 120 patients who were diagnosed with myasthenia gravis via serology or electrodiagnostic testing. Worsening outcomes were those with MGFA classification or score  $\geq 4$  at baseline, MG crisis history, and receiving high doses of prednisolone.

**Results:** Only 18 (15%) patients with worsening myasthenia gravis outcomes were identified. The baseline characteristics of the poor and good outcomes groups were significantly different for several factors. The predictors of worsening outcomes in the univariate analysis included hypertension, dyslipidemia, clinical symptoms, 1st dose prednisolone, thymoma, and MGFA classification  $\geq 4$  at baseline significantly. In contrast to multivariate analysis, the outcome was significant worsening in MGFA classification  $\geq 4$  at baseline [RR 5.428; 95%CI 1.554-18.955, P = 0.008] and essential hypertension [RR 3.958; 95%CI 1.396-11.220, P = 0.010]. These factors served as the representative of the prognostic factors that led to worsening outcomes.

**Conclusion:** MGFA clinical classification and hypertension, these factors can help clinicians to recognize comorbidities and clinical symptoms, and to reduce prognostic factors for improved outcomes, which is beneficial for all ages and serological groups, and useful for the future treatment of myasthenia gravis.



# Predictors and Outcomes in Patients with Recurrent Ischemic Stroke

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## Abstract

**Introduction:** Ischemic stroke is one the leading global causes of morbidity and mortality. The rate of ischemic stroke recurrence varied between 2-50% according to studies worldwide as well as in Thailand. It also leads to impaired functional status and subsequent increased economic costs.

**Objective:** To determine predictors and outcomes of recurrent ischemic stroke in Ramathibodi Hospital

**Materials and Methods:** This research is a retrospective case-control study from January 2019 to December 2021 dividing patients into 2 groups based on recurrence of ischemic stroke, each included 170 patients. Statistical analysis included univariate and multivariate analyses to find risk factors of recurrent ischemic stroke.

**Results:** We included 340 patients with 170 patients in each arms. In recurrent stroke patients, there were more atrial fibrillation/flutter (26 (15.3%) vs 12 (7.1%)), higher rate of antithrombotic agent holding (10 (5.9%) vs 2 (1.2%)) and poor medical compliance (36 (21.2%) vs 19 (11.2%)). However multivariate analysis revealed only poor drug compliance (odds ratio 13.34 (4.83-36.84); p-value < 0.001) with statistical significance. Despite lower low density lipoprotein (LDL) levels in the recurrent stroke group, patients with serum LDL > 70 mg/dL were 76.5% (127 of 170 patients) and serum LDL > 55 mg/dL were 91.6% (152 of 170 patients) while the rate of high intensity statin use was only 33.5%.

**Conclusion:** Dyslipidemia, atrial fibrillation and particularly poor medical compliance were significant risk factors of recurrent ischemic stroke.

# Clinical Outcomes and Risk Factors for Mortality in Status Epilepticus Patients

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## Abstract

**Background:** The outcome and risk factors for mortality in status epilepticus (SE) largely varies depending on clinical characteristics, and assessment tools in SE. The aim of this study is to determine risk factors for short-term mortality and outcomes in SE.

**Materials and Methods:** From January 2014 to August 2021, we performed a retrospective study in SE patients who were admitted at Ramathibodi hospital. All adults ( $\geq 18$  years) with the diagnosis of SE according to the International League Against Epilepsy (ILAE) definition and classification of SE were included. We excluded SE patients with normal awareness, and posthypoxic SE. Univariate and multivariate logistic regression were used to identify risk factors.

**Results:** A total of 124 patients were included (female/male, 73/51, mean age (SD) of 61.29 (21.52)). Thirty-four patients (27.42%) died within 30 days. The median hospital stay (IQR) was 20 (9, 42) days. By using univariate analysis, elderly, therapy delay  $>60$  minutes, baseline mRS  $\geq 4$ , high mSTESS, EEG status, heart disease, liver disease, and infection were significant risk factors. The history of seizure was preventive factor. Multivariate analysis revealed that the time to treatment (OR [95%CI], 2.85 [1.15, 7.05]), history of seizure (0.24 [0.06, 0.89]), heart disease (3.67 [1.24, 10.87]), and liver disease (31.48 [2.46, 402.65]) were significant factors predicting SE mortality.

**Conclusion:** Therapy delay with time to treatment more than 60 minutes, heart disease, liver disease, and infection were significant risk factors for short-term mortality in SE. The history of seizure was a preventive factor for SE mortality.

# Test Positivity Rate and Specificity of Single Fiber Electromyography (SFEMG) in Myasthenia Gravis Patients

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## Abstract

**Introduction:** SFEMG is one of electrodiagnostic techniques in diagnosing myasthenia gravis (MG). This test has proved to be the most sensitive technique in detecting a neuromuscular transmission defect in comparison to other tests. However, SFEMG is more technically demanding than RNS, less widely available, and requires experienced specialist to perform. Therefore, we initiate this study to assess the utility of SFEMG.

**Objectives:** To identify test positivity rate and specificity of single fiber electromyography (SFEMG) in MG patients in Thailand.

**Materials and Methods:** We performed a retrospective study. Patients whose SFEMG have been requested from 1 January 2019 to 30 September 2022 were enrolled. The test positivity and specificity of SFEMG were estimated. SFEMG abnormalities were compared between seropositive and seronegative patients and between test requested from neurologists and non- neurologists.

**Results:** SFEMG was abnormal in 157 from 196 studies. SFEMG was positive in 138 of 149 patients who diagnosed with MG. The sensitivity of SFEMG in diagnosing MG was 92.6 % (95% CI: 0.89–0.96), while the specificity was 59.6% (95% CI: 0.53–0.66), with a positive predictive value of 87.9% (95% CI: 0.83–0.92) and a negative predictive value of 71.8% (95% CI: 0.66–0.78). This study found no significant difference of SFEMG positivity between seropositive and seronegative patients and between requesting physician. In subgroup analysis, the sensitivity and the specificity of SFEMG were higher in GMG patients [sensitivity 95.7% (95%CI: 0.88-1.03), specificity 100%]. Moreover, the degree of SFEMG abnormality, which defined as abnormal mean MCD and more than 10% pairs increased jitter, was significantly greater in patients with bulbar symptom. And SFEMG abnormality was significantly greater in patients with abnormal RNS.

**Conclusion:** Single fiber electromyography (SFEMG) is a very sensitive test for MG but not specific similar to previous studies worldwide. A correlation between SFEMG abnormality and some clinical feature was presented.

# A “PD smile bag” Can Improve Quality of Life for Parkinson’s Disease Patients

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## Abstract

**Introduction:** Both motor and non-motor symptoms have a significant impact on the QoL of Parkinson’s disease (PD) patients. We created a “PD smile bag” for daily use in non-demented PD patients. Reflecting the multidisciplinary care of PD patients, the bag contained the patient’s medication details, emergency contact information, PD precautionary measures information, a simple exercise sheet, a pillbox with timer, PD diary and a “Dr. Hope” stuffed doll.

**Objectives:** To study whether a “PD smile bag” will help PD patients improve their health-related quality of life (HR-QoL), relieve anxiety and depression and reduce caregiver’s burden.

**Materials and Methods:** Non-demented PD patients were divided into two groups: those on stable doses of PD medications (N=10) and those who could adjust PD medications during the study (N=10). They were given a “PD smile bag” for daily use and evaluated using 39-item PD questionnaire (PDQ-39), the hospital anxiety and depression scale (HADS) and MDS-UPDRS part IV (motor complications) at baseline and 12±2 weeks. Zarit burden interview (ZBI) scale was completed by their primary caregivers at the same time. Both patients and caregivers also completed a questionnaire regarding their use of the bag at 6 (telephone call) and 12±2 weeks. PD diary was completed for 5 consecutive days at 6 and 12±2 weeks.

**Results:** Demographic data were not significantly different between the two PD groups, except for higher levodopa equivalent daily dose (LEDD) and HADS score in the meds-adjusted group. PD patients’ PDQ-39 and HADS scores significantly improved after using the bag ( $p=0.018$  and  $p=0.048$  respectively). Caregiver burden also significantly improved ( $p=0.001$ ). Subgroup analysis showed that PDQ-39 and ZBI scores were significantly improved after using the bag in the meds-stable group, but not in meds-adjusted group. Most PD patients (90%) and their primary caregivers (95%) thought that the PD smile bag was useful and would recommend it to others. The main drawback was that the size of the bag was too big.

**Conclusion:** A “PD smile bag” improves PD patients’ QoL, their anxiety and depression scores, lightens their caregivers’ burden. A larger study is needed to confirm these results.

# The Identification of Spastic Dysarthria in Neurological Patients by Speech Analysis with Computational Modelling

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## Abstract

**Introduction:** Neurology faces difficulties in interpreting the speech examination in cases of dysarthria. Automatic Speech Recognition (ASR) tool, a widely-employed communication tool, holds the promise of being specifically configured to detect dysarthric speech by leveraging the distinctive features that are prominently expressed in this condition.

**Objectives:** To assess the diagnostic accuracy of the ASR software through computation modeling by calculating sensitivity, specificity, accuracy and generating ROC curve with AUC, and comparing the results descriptively to those obtained by neurologists.

**Materials and Methods:** 74 Thai adult participants, including 37 patients with spastic dysarthria and 37 healthy controls, were enrolled in the study. Speech samples were recorded in eight tasks over one session for each participant. Recordings were 'scored' by two ASR software, 'LINE' and 'Whisper', selected for the speech recognition task. The scoring was error count of incorrect syllables and intonation. The derived scores were analyzed using logistic regression with ROC/AUC representing diagnostic performance. Raters were neurologists and their diagnostic accuracy was compared with ASR result.

**Results:** Mean errors generated by 'LINE' and 'Whisper' ASR were shown to be statistically significant difference with p-value < 0.05. ROC graphs for 'LINE' and 'Whisper' ASR showed maximal AUC of 0.95 and 0.89 respectively for the sentence articulated with paretic pharyngeal muscles. Neurologists showed a diagnostic accuracy of specificity exceeding 0.90 and sensitivity varying from 0.20 to 0.74.

**Conclusion:** 'LINE' and 'Whisper' ASR were found to be effective in differentiating mild spastic dysarthria from control. Feature selection, based on anatomical basis, strengthens sentence-specific dysarthria detection.

# Accuracy in Predicting Death after Cardiac Arrest by Simple Integration of Amplitude-integrated EEG”

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## Abstract

**Introduction:** Prognostication in cardiac arrest (CA) survivors has been extensively investigated. Several modalities i.e., EEG, serum and CSF biomarkers as well as imaging studies have been used. However, many of them are not feasible or difficult to apply in clinical practice. Integration of amplitude-integrated EEG (aEEG) with five typical patterns is simply applied and may help improve accuracy in prediction of outcomes. To date, only few studies have applied aEEG for prognostication in adult CA patients.

**Objectives:** To assess the added value of aEEG in helping predict functional outcome and mortality at 90 days after hospital discharge in CA survivors.

**Materials and Methods:** All patients with CA from our EEG database during 2013-2022 were reviewed. Cases with complete clinical and EEG data were selected. Functional outcome using modified Rankin Scale (mRS) and mortality were our study outcome and assessed at 90 days after hospital discharge. Baseline functioning status, cardiac arrest information, comorbidities, neurological findings at bedside, conventional EEG findings and imaging characteristics were collected as potential predictive factors. aEEG was individually assessed in each patient and categorized into five typical patterns. Univariate and multivariate logistic regression was employed to find the best model to predict the probability of outcome. Diagnostic performance between two models i.e., with vs without aEEG findings, was evaluated and then compared.

**Results:** 76 patients were included for analysis. Mean age was 59.96 years (SD 19.24). 46 patients (60.53%) were in-hospital CA. Thirteen, 41, 11, 9 and 2 patients were categorized into continuous, discontinuous, burst-suppression (BS), low voltage (LV) and flat aEEG patterns, respectively. All patients with BS, LV and flat patterns had poor outcome (mRS 4-6) at 90 days after discharge. aEEG patterns were only a significant independent predictor for prediction of death, but not for poor outcome. When including aEEG findings in the predictive model for death, diagnostic performance was improved as compared with the model without aEEG data (area under ROC 0.910 vs 0.818).

**Conclusion:** Since trend analysis with aEEG is a built-in software available in all commercial EEG systems and its improved accuracy in prediction of outcome, integration of aEEG by recognizing five typical patterns is promising and simple to be applied for prognostication in adult CA.

# Prevalence of CYP2C19 Poor Metabolizers in Patients with Ischemic Stroke due to Symptomatic Intracranial Atherosclerotic Disease at King Chulalongkorn Memorial Hospital: A Pilot Study

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## Abstract

**Introduction:** Symptomatic intracranial atherosclerotic disease (sICAD) is the second most common cause of acute ischemic stroke in Thai population with high recurrence rate. Short-course dual antiplatelet with clopidogrel containing regimen was the effective secondary stroke prevention. *CYP2C19* is enzymatic function affecting the plasma concentrations and clinical outcomes. Prevalence of *CYP2C19* poor metabolizers (PM) was higher in Thai than Western population. However, the previous studies about effect of *CYP2C19* on ICAD outcome were limited and inconclusive result.

**Objectives:** The study primarily aims to explore the prevalence of *CYP2C19* polymorphism PMs among patients with ischemic stroke due to sICAD at King Chulalongkorn Memorial Hospital. The secondary outcomes aim to investigate the effect of *CYP2C19* loss of function (LOF) allele status on recurrent stroke, major adverse cardiac event (MACE), and bleeding event within 90 days.

**Materials and Methods:** Patients' data were collected from an ongoing cohort since July 2022. All participants were symptomatic ICAD patients who are  $\geq 40$  years old. The sICAD was defined as the acute ischemic stroke syndrome from history, neurological examination, computerized tomography scan of the brain demonstrating the corresponded area of acute ischemic stroke, and computerized arteriography demonstrating significant stenosis of major intracranial artery corresponded with the clinical and area of infarction. The significant stenosis of major intracranial artery was defined as 50-99% stenosis of intracranial internal carotid artery, proximal segment of middle cerebral artery up to M1, proximal segment of anterior cerebral artery up to A1, proximal segment of posterior cerebral artery up to P2, intracranial segment of vertebral artery or basilar artery. Major exclusion criteria are patients who had significant tandem lesion or other possible causes of large vessel disease other than atherosclerotic disease. Baseline characteristics, neuroimaging, and follow-up data were reviewed. Related genes with variant annotation involving clopidogrel pathway was analyzed by MASSARRAY<sup>®</sup> system. *CYP2C19* allele was categorized as wild type (\*1), LOF allele (\*2 or \*3) and gain of function (GOF) allele (\*17). Whereas *CYP2C19* genotype was group into a) extensive/normal metabolizer (EM) (\*1/\*1); b) intermediate metabolizer (IM), containing at least 1 LOF allele (\*1/\*2 or \*1/\*3); c) PM, containing at least 2 LOF alleles (\*2/\*2, \*2/\*3, or \*3/\*3); d) Ultra-rapid metabolizer (UM), containing at least 1 GOF allele (\*1/\*17 or \*17/\*17).

**Results:** Thirty-five patients were enrolled. The prevalence of CYP2C19 PM, IM, EM, and UM was 8.6%, 54.3%, 34.3, and 2.9% respectively. The prevalence of patient with CYP2C19 LOF allele carrier was 22 (62.9%). The effect of CYP2C19 LOF allele status had not demonstrated the significant effect on the secondary outcomes in cox regression analysis.

**Conclusion:** The prevalence of *CYP2C19* PMs in this study was lower than previous large Thai population study (13%). The larger clinical study and longer follow-up is needed to extrapolate the effect of *CYP2C19* polymorphism among Thai ICAD stroke patients.



# The Quantitative Assessment of the Repetitive Finger Tapping Test for Screening and Continuous Care of Minor Motor Dysfunction

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## Abstract

**Introduction:** Detecting subtle motor dysfunction, especially weakness and bradykinesia, is often challenging. The repetitive finger-tapping test demonstrated promising yield in distinguishing between healthy individuals and people with motor dysfunction; however, this examination is subjective and difficult to notice changes during follow-up.

**Objective:** This study aims to develop a quantitative measurement of the finger tapping test that elucidates the differences between minor weakness in ischemic stroke patients, bradykinesia in patients with Parkinson's disease and healthy individuals.

**Materials and Methods:** This is an observational, single-center, analytic cross-sectional study. 135 participants were enrolled and divided into three study subgroups: the STROKE, the PARKINSON, and the CONTROL subgroup. Participants were assigned to perform a finger-tapping test, and the amplitude-time relation graphs were created. Measured parameters indicating the speed (including tap velocity, inter-tapping interval and inter-tapping interval variation) and amplitude (including mean amplitudes and amplitude variation) of the finger-tapping movement were identified from the model. These parameters were compared among three study groups. Logistic regression analysis is used to demonstrate the diagnostic accuracy of a test's parameters.

**Results:** Individuals in the STROKE and PARKINSON subgroups showed reduced finger-tapping speed (low TV, p-value <0.01) and inconsistent speed and amplitude (high SDIT1 & SDA, p-value <0.01 and 0.03, respectively) compared to the CONTROL subgroup. Participants in the PARKINSON subgroup showed small finger-tapping amplitude (low MA) compared to the other subgroups (F=14.79, p-value <0.01). In the logistic regression model, the combination of mean amplitudes and inter-tapping variation possessed the most remarkable performance in predicting bradykinesia and subtle weakness (AUC=0.87 in the STROKE group and AUC=0.81 in the PARKINSON group).

**Conclusion:** Measuring finger movement with a quantitative assessment tool helps physicians recognize the difference between bradykinesia, weakness, and healthy controls. It also provides measurable parameters which can be used for clinical follow-up.

# Plasma Phosphorylated Tau 181 in Relation to Cognition and Alzheimer's Prevalence in the Thai Community

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## Abstract

**Background:** The identification of biomarkers for Alzheimer's disease (AD) in blood samples has the potential to facilitate early diagnosis and improve the accuracy of AD diagnosis. Plasma phosphorylated tau (p-tau) is a promising biomarker for AD with an accuracy potentially comparable to a cerebrospinal sample; however, its utility in the clinical setting has yet to be explored in Thailand. The present study aimed to evaluate the utility of p-tau 181 as a tool for screening cognitive impairment in a non-demented population, estimating the prevalence of AD and investigating its potential as a risk stratification strategy.

**Methods:** The study recruited 138 participants over the age of 40 attending a neurology clinic, comprising 110 non-demented individuals from the family members of patients and 28 neurology patients were analysed for plasma p-tau 181 levels and compared to neuropsychological data. Plasma p-tau 181 levels were measured, and AD prevalence was estimated using a pre-defined cut-off derived from an independent cohort with biomarker-defined AD status according to the current framework (Jack et. al., 2018).

**Results:** The median age of participants was 66 years, and the median mini-mental state examination score was 29. Plasma p-tau 181 levels showed a negative correlation with neurocognitive test scores in all participants ( $Rho = -0.35$ ,  $P < .001$ ) and in non-demented participants ( $Rho = -0.24$ ,  $P .013$ ). The estimated prevalence of AD was 20.0% (95% CI 13.6-28.4) in preclinical and mild cognitive impairment patients when using p-tau as a biomarker, which was higher than the global status report on the public health response to dementia in the South-East Asia Region of 2.82% but was lower than the prevalence estimated using amyloid abnormalities of 30.1% (95% CI 29.2-31.1) (Jansen et. al., 2022) ( $\chi^2 [N = 8944] = 5.28$ ,  $p = .022$ ).

**Conclusion:** The results of this study suggest that plasma p-tau 181 is a promising biomarker to assess cognition and for estimating AD prevalence in non-demented populations in Thailand and may represent those at risk of clinical onset. However, further studies are needed to investigate its utility in risk stratification, public health preparedness, and cognitive performance assessment.

# Mass Spectrometry-Based Proteomic and Peptidomic Analyses of Human Cerebrovascular Thrombi and Its Correlation with Etiology, Brain Computed Tomography and Clinical Outcome by Using Machine Learning Analysis in Patients with Acute Ischemic Stroke Undergoing Thrombectomy

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## Abstract

**Introduction:** Thrombotic material retrieved from acute ischemic stroke patients represents a valuable source of biological data. In this study, we developed a proteomic-based and clinikoradiologic models of cardioembolic (CE) and large artery atherosclerotic (LAA) cerebrovascular thrombi. Artificial intelligence techniques were applied to examine potential protein signatures, compared with a comprehensive clinical-based model between the two selected groups.

**Objectives:** To draw results on the relationship between proteomics and peptidomics analysis and stroke etiologies (divided by TOAST Classification) for clinical application

**Materials and Methods:** Clinical, radiographic, and histological data from acute ischemic stroke patients undergoing mechanical thrombectomy during June 2021 and June 2022 in King Chulalongkorn Memorial Hospital (ThrombiOMIC cohort) were collected. MALDI-TOF mass spectrometry was used to analyze cerebral thrombi from CE and LAA stroke patients according to TOAST classification. The proteomic and clinical results were analyzed and compared to the classical TOAST classification using pairwise comparison of the area under the receiver operating characteristics curve (AUROC).

**Results:** Among the 50 consecutive patients, 29 had CE, 10 had LAA, and 11 had undetermined stroke. Median age was 67 years, and 54% were men. Five hundred five thousand proteins of the cerebral thrombi were identified using untargeted proteomic and peptidomic approaches. Using untargeted proteomic, peptidomic, and clinikoradiologic data, we built the “13Ps-MALDI-TOF MS” and “WANi-OPV” models, which had an AUROC of 1.000 [95% CI = 1,1] for predicting the CE stroke. Both models shown a high degree of correlation and strong discrimination performance.

**Conclusion:** Proteomics and peptidomics analyses of retrieved cerebral thrombi are powerful and promising biological approach in differentiating CE and LAA stroke.

# Prognostic Factors of Unprovoked Seizures in Patients with Alzheimer's Disease

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## Abstract

**Introduction:** Seizures are the third most common neurological disorder affecting older people. AD is important substrate for seizures in the elderly. Many prognostic factors were reported with conflicting results. Moreover, the study is scarce in Asian population.

**Objectives:** Evaluate the incidence rate and clinical prognostic factors for unprovoked seizures in patients with AD.

**Materials and Methods:** This is a retrospective observational cohort study conducting at Maharaj Nakorn Chiang Mai hospital. Incidence and hazard ratios for unprovoked seizure within 10-year follow-up time were estimated. Survival analysis was performed by fitting univariable and multivariable Fine-Gray competing-risks regression with death as competing risk. Multivariable regressions were performed.

**Results:** During the 10-year follow-up period (median follow-up time 4.1 years; IQR, 1.4-6.8), 41/502 AD patients (8.2%) developed unprovoked seizures. The median time from the diagnosis of AD to the occurrence of first unprovoked seizure is 3.1 years (IQR, 0.8-5.1). The incidence rate was 18.84 per 1000 person-years. Twenty (48.8%) had recurrent seizures. In multivariable Fine-Gray competing-risks regression modeling, significant independent prognostic factors of first unprovoked seizure were severe dementia (CDR-3) (HR, 7.13; 95% CI, 1.20-42.41), antidepressant use (HR, 2.89; 95% CI, 1.41-5.93), cortical lesion(s) (HR, 2.79; 95% CI, 1.23-6.33), and severe white matter lesion(s) (HR, 4.52; 95% CI, 1.32-15.48).

**Conclusion:** Epileptic seizures were not uncommon in AD and could occur in any point during the course of dementia. Greater degree of dementia severity, antidepressant use, cortical lesion and high vascular burden were independent prognostic factors for unprovoked seizures in patients with AD.

# Prevalence and Associating Factors of Visual Impairment in Parkinson's Disease

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## Abstract

**Introduction:** Visual impairment is one of the many non-motor symptoms of Parkinson's Disease (PD) and has been recently recognized as a common problem in PD. However, the data regarding its prevalence and associating factors is still lacking in Thai PD patients.

**Objectives:** The aim of this study was to examine the prevalence of visual impairment in PD patients and evaluate for the factors associated with visual impairment in PD patients.

**Materials and Methods:** A prospective cross-sectional study was performed on PD patients who visited at outpatient department at Maharaj Nakorn Chiang Mai Hospital. The visual acuity was evaluated by Snellen eye chart and the color vision was evaluated with Ishihara plates. Other ophthalmological symptoms were evaluated by the Visual impairment in Parkinson's Disease Questionnaire (VIPD-Q).

**Results:** A total of 63 PD patients were recruited with the median age of participants was 65 years. Prevalence of visual impairment and color visual impairment were 57.14% and 61.90% respectively. The factor associated with visual impairment was age (OR 1.09; 95%CI 1.00-1.19) while the factor associated with color visual impairment was duration of disease of more than five years (OR 1.39; 95%CI 1.08-1.79). Prevalence of any ophthalmologic symptom was 98.41% with the ocular surface domain symptom was most frequently found (96.83%).

**Conclusion:** The result of this study emphasizes that visual impairment including color visual impairment and any ophthalmologic symptoms are very common non-motor problems in PD patients. Early screening of these problems should be performed in PD clinic to prevent further consequences.

# A Simplified Risk Score to Predict In-Hospital Newly-Diagnosed Atrial Fibrillation in Acute Ischemic Stroke Patients

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## Abstract

**Introduction:** Atrial fibrillation (AF) is an important cause of stroke, and newly-diagnosed AF (NDAF) is typically detected in the early period of stroke onset.

**Objectives:** We aimed to identify the factors associated with in-hospital NDAF in acute ischemic stroke patients and developed a simplified clinical prediction model.

**Materials and Methods:** Patients with cryptogenic stroke aged 18 years or older who were admitted between January 2017 and December 2021 were recruited. NDAF was determined by inpatient cardiac telemetry. Univariable and multivariable regression analyses were used to evaluate the factors associated with in-hospital NDAF. The predictive model was developed using regression coefficients. The prediction power was validated using the area under the receiver operating characteristic (AuROC) curve analysis.

**Results:** The study enrolled 244 eligible participants, of which 52 NDAFs were documented (21.31%), and the median time to detection was two days (1-3.5). After multivariable regression analysis, parameters significantly associated with in-hospital NDAF were elderly (>75 years) (adjusted Odds ratio (aOR), 2.99; 95% confident interval (CI), 1.51-5.91; P=0.002), female sex (2.08; 1.04-4.14; P=0.04), higher admission NIHSS score (1.04; 1.00-1.09; P=0.05), and presence of HMCAS/MCA dot sign (2.33; 1.13-4.79; P=0.02). The AuROC curve resulted in 0.74 (95% CI 0.65 - 0.80), and the cut-point of 2 showed sensitivity and specificity of 86.54% and 42.31%, respectively.

**Conclusion:** The validated and simplified risk scores to predict in-hospital NDAF contained four clinical parameters. Because it primarily relied on simplified parameters and high sensitivity, it might be used as a screening tool for in-hospital NDAF in stroke patients who initially presumed cryptogenic stroke

# Clinical Manifestation of Autoimmune Encephalitis During COVID-19 Pandemic

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## Abstract

**Introduction:** There have been numerous case reports of neurological illnesses like Guillain-Barre syndrome or autoimmune encephalitis in the following COVID-19 pandemics and vaccinations. There are few clinical studies on the effect of COVID-19 infection and COVID-19 vaccination on autoimmune encephalitis in Thailand. The COVID infection or vaccination may affect the disease pattern in terms of clinical manifestation or severity of autoimmune encephalitis.

**Objective:** To obtain clinical signs and progression of disease in autoimmune encephalitis for comparison between the pre-COVID-19 pandemic era and the COVID-19 pandemic era.

**Material and Methods:** This is a retrospective observational study in which all data are collected from medical records that confirm seropositive autoimmune encephalitis between 1 January 2017 and 31 December 2019 for the pre-COVID-19 pandemic group and between 1 January 2020 and 31 May 2022 for the COVID-19 pandemic group.

**Result:** There are a total of 77 cases. Patients in the pre-COVID-19 pandemic group were 68.2% female, with a mean age of onset of 44 years, whereas patients in the COVID-19 pandemic group were 72.7% female, with a mean age of onset of 39 years. The type of autoimmune encephalitis found in the pre-COVID-19 pandemic group was anti-NMDA (50%), followed by anti-LGI1 (38.6%), which was similar to the type found in the COVID-19 pandemic group, anti-NMDA (54.5%), followed by anti-LGI1 (33.3%). Seizures and behavioral changes are the most common clinical manifestations in both groups. There are no differences in laboratory investigation data, including CSF profiles, EEG and MRI patterns, treatment options, and neurological status outcome between the two groups.

**Conclusion:** The clinical manifestation of autoimmune encephalitis and the clinical outcome after treatment in the pre-COVID-19 pandemic era and the COVID-19 pandemic era are similar. Neither COVID-19 infection nor COVID-19 vaccination affect the outcome of autoimmune encephalitis.

# Histological Clot Composition in Different Etiologies of Ischemic Stroke

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## Abstract

**Introduction:** Ischemic stroke is a major health issue, and differentiation of stroke etiology is highly relevant to prevent recurrent stroke.

**Objectives:** We prospectively and retrospectively evaluated the composition of retrieved clots from ischemic stroke patients to study the association between histological composition and stroke etiology.

**Materials and Methods:** Retrieved clots from intracranial cerebral arteries of 67 patients who underwent mechanical thrombectomy in the Neurological Institute of Thailand (NIT) from 1 July 2015 to 30 June 2022, were collected. Histological analysis was performed by hematoxylin and eosin (H&E) staining. Quantification of red blood cells (RBCs) and fibrin-and-other which included fibrin, platelets, and white blood cells was performed using Orbit Imaging Software. The non-parametric Kruskal-Wallis H test was used to assess statistically significant differences among groups. Categorical variables were compared using the chi-square test.

**Results:** A total of 67 patients were included in the study. All main components showed no significant differences in their percentages between each group of stroke etiology ( $p=0.561$ ), however, large artery atherosclerosis (LAA) clots usually had a trend to have higher RBC component (57.3% vs 51.6%,  $p=0.444$ ) and lower fibrin-and-other component (42.7 % vs 48.4%,  $p=0.444$ ) than cardioembolic (CE) clots. The RBC-rich clots (75% vs 58.1%,  $p=0.45$ ) also had a trend to be more associated with LAA cause than CE cause, whereas fibrin-and-other-rich clots (41.9% vs 25%,  $p=0.45$ ) had a trend to be more associated with CE cause than LAA cause. However, the use of H&E staining alone shows no significant differences in those two causes.

**Conclusion:** Our study found no reliability to differentiate stroke etiology by the H&E use. Further studies should emphasize immunohistochemical, proteomic, and molecular characteristics to determine correlations between clot composition and stroke etiology.



# Risk of Distal Embolization in Acute Large Arterial Occlusion Prior to Endovascular Stroke Treatment in Neurological Institute of Thailand

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## Abstract

**Introduction:** At present, the treatment of acute ischemic stroke (AIS) is with intravenous tissue plasminogen activator (IV tPA) and mechanical thrombectomy (MT) is classified in the treatment guidelines for AIS. However, it was found that the administration of IV tPA has the potential to cause blood clot to move to the distal vessel. Causing the inability to continue inserting the catheter through the blood vessels.

**Objective:** In this study, we aimed to investigate the incidence of clot migration, distal embolization, and their risk factors.

**Methods:** To identify risk factors for and clinical outcomes in the setting of distal embolization and clot migration, the records of all patients with AIS due to anterior circulation large vessel occlusion (LVO) treated with MT at Neurological Institute of Thailand between 1 July 2015 and 31 December 2021 were retrospectively reviewed. Clot location was assessed by pretreatment computed tomography angiogram (CTA) and was compared with clot location identified by digital subtraction angiography (DSA) before planned MT. Univariate logistic model were performed to evaluate risk factors of distal embolization and clot migration.

**Results:** A total of 112 patients were eligible for the analysis, and clot migrations were reported in 19 patients (17.0%). Baseline demographics, underlying diseases, laboratory, Hounsfield unit ratio (rHU), and history of IV tPA administration were similar between the 2 groups. No correlation between IV tPA administration, high rHU and clot migration (p value 0.789, 0.569 respectively). Because of small sample size (n=17), we cannot identify correlation between each variable factor and distal embolization. However, there is no significant difference in clinical outcome between clot migration group and no clot migration group in clinical improvement at discharge (change of NIHSS; 4 vs 8, p-value 0.783) and 90-day mRS (2 vs 2, p-value 0.642).

**Conclusion:** Our results show that IV tPA administration, high Hounsfield unit ratio and other variables are not associated with a risk of clot migration. In distal embolization group, we could not identify risk factor because of a few patients but IV tPA administration tend to be a risk factor of distal embolization. We recommend that future research required more sample size. However, there were no significant differences in clinical outcome at discharge and long-term outcome. When possible, use of IV tPA in combination with MT should remain first line treatment for LVO.

# Factors Associated with Hemorrhagic Transformation in Acute Ischemic Stroke Patients after Endovascular Treatment, Neurological Institute of Thailand

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## Abstract

**Introduction:** HT after EVT showed deteriorate neurological outcome and increased mortality. The predictor factors for HT were multifactorial.

**Objectives:** This study aimed to assess risk factors associated with hemorrhagic transformation (HT) after endovascular treatment (EVT).

**Materials and Methods:** Acute large vessel ischemic stroke patients treated by EVT from January 2017 to December 2022 were retrospective and prospective reviewed, then classified into intracerebral hemorrhage (ICH) group and non-ICH group based on non-contrast CT brain (NCCT). Univariate analysis with stepwise logistic regression was used to test the association among groups.

**Results:** A total of 217 patients were enrolled, 84 (39%) in ICH; 133 (61%) in non-ICH group. The mean age was  $63.22 \pm 13.62$  years (female 44.7%). We found that significant differences in high NIHSS before treatment (odds ratio[OR], 1.05 [95% CI, 1.01-1.10]), low ASPECT score (OR, 1.05 [95% CI, 0.61-1.03]), balloon angioplasty procedure (OR, 2.15 [95% CI, 1.05-4.39]), several trials of aspiration procedure (OR, 1.40 [95% CI, 1.06-1.86]), contrast staining on NCCT after immediate EVT (OR, 3.68 [95% CI, 2.07-6.56]), large infarction (OR, 3.48 [95% CI, 1.96-6.17]) in ICH group. No association for ICH was found in blood sugar level (OR, 1.10 [95% CI, 1.00-1.01]) and prior intravenous thrombolytic administration (OR, 1.34 [95% CI, 0.75-2.40]).

**Conclusion:** Factors associated with HT after EVT were high baseline NIHSS, low ASPECT score, balloon angioplasty procedure, several trials of aspiration procedure, contrast staining on NCCT after immediate EVT and large infarction.

# A Clinical Outcomes Study among Patients Undergoing Non-Contrast Computed Tomography (NCCT) Versus Non-Contrast Computed Tomography (NCCT) with Computed Tomographic Angiography (CTA) in Acute Anterior Circulation Stroke Patients Selected for Mechanical Thrombectomy in Neurological Institute of Thailand

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## Abstract

**Introduction:** Mechanical thrombectomy (MT) has become the standard of care for large vessel occlusion (LVO) patients. NCCT plus CTA or magnetic resonance angiography (MRA) is generally confirm LVO and consider for MT.

**Objectives:** The study was to determine LVO patients that performed only NCCT compared with both NCCT plus CTA followed by MT, how different in clinical outcomes, duration of the operation and safety outcomes.

**Materials and Methods:** This is a retrospective cohort study that was made to evaluate clinical outcomes of patients undergoing MT, between the group that only performed NCCT alone versus NCCT plus CTA before MT. The primary outcome was the modified Rankin Scale (mRS) at 90 days. The secondary outcomes included thrombolysis in cerebral infarction (TICI) score after MT and time metric data. The safety outcomes were any intracranial hemorrhage (ICH), symptomatic ICH (sICH), and mortality within 90 days.

**Results:** A total of 155 patients met the inclusion criteria; 59 (38%) underwent NCCT alone and 96 (62%) underwent NCCT plus CTA. In the NCCT alone group, the door-to-groin puncture, the door-to-reperfusion, the image-to-groin puncture, and the image-to-reperfusion time were shorter by 20, 30.5, 20.5, and 24 minutes, respectively compared with the NCCT plus CTA group ( $p < 0.001$ ). The mRS at 90 days and safety outcomes were no significant differences between groups.

**Conclusion:** Using NCCT alone versus NCCT plus CTA, the clinical outcomes at 90 days did not differ between the two groups as same as the safety outcomes.

# Clinical Characteristics of Guillain-Barré Syndrome in the COVID-19 Era in Neurological Institute of Thailand

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## Abstract

**Introduction:** After the outbreak of SARS-CoV-2, there were increasing reports of GBS. There were reported atypical forms of GBS such as bifacial weakness with paraesthesias variant GBS.

**Objectives:** The relationship between GBS and COVID-19 vaccination is still uncertain. Knowing the important side effects of the vaccine are important for people to decide about whether or not to receive the vaccine. The purpose of this research was to study clinical features of GBS and the relationship between COVID-19 vaccine and GBS.

**Materials and Methods:** GBS patients who were hospitalized in Neurological Institute of Thailand between January 1st, 2021 to April 30th, 2022 were included. We compared GBS patients who got vaccine in 3 months with the patients who did not. We collected demographic data, COVID-19 infection history, COVID-19 vaccination, duration from vaccine to disease onset, clinical course, final diagnosis, laboratory results, treatment response. For further knowledge, we compared with GBS patients from pre-COVID-19 era (January 1st, 2014 to December 31st, 2018).

**Results:** In the group of vaccination in 3 months, we had 6 patients (5 Astra Zeneca, 1 Sinopharm). Duration from vaccination to disease onset were 46 days. None of these reported previous infection with SARS-CoV-2. We found more atypical GBS in post-COVID-19 era which were ataxic variant, pure sensory variant and pharyngo-cervical-brachial variant whereas pre-COVID-19 had more AMAN and MFS subtypes. Disease severity and prognosis was less severe in vaccine in 3 months group and better in post-COVID-19 group.

**Conclusion:** Atypical variants of GBS such as ataxic variant, pure sensory variant, and pharyngo-cervical-brachial variant, are more common and the disease is less severe in post-COVID-19 era group. COVID-19 vaccination does not increase the severity of GBS disease.

# Clinical Outcomes between Combined Intravenous Thrombolysis and Endovascular Thrombectomy Versus Endovascular Thrombectomy Alone in Patients with Anterior Circulation Large Vessel Occlusion at Neurological Institute of Thailand

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## Abstract

**Introduction:** Patients with acute ischemic stroke (AIS) with anterior circulation large vessel occlusion (LVO) are being treated with intravenous thrombolysis (IVT), followed by endovascular thrombectomy (EVT) to achieve effective revascularization.

**Objectives:** This study aims to examine whether EVT alone is equally effective as compared to IVT with EV.

**Materials and Methods:** This retrospective cohort study used data from 217 patients who underwent EVT for anterior circulation LVO from June 2015 through October 2022 at the Neurological Institute of Thailand. Patients were then classified into EVT alone and IVT with EVT group. The primary outcome was modified Rankin Scale score of 0-2 at 90 days. Various secondary outcomes were intracerebral hemorrhage, successful recanalization, and death. The treatment effect was estimated with univariate logistic regression.

**Results:** Of the 217 patients, 82 (37.8%) directly went for EVT and the remaining 113 (62.2%) had both IVT and EVT. Baseline characteristics did not differ between groups. Except for a higher number of referral cases (EVT, 79.3%; IVT with EVT, 91.1%;  $p$  0.022) and a shorter duration from symptoms onset to recanalization (EVT alone, 505 mins; IVT with EVT 400 mins;  $p$  0.001) in IVT with EVT group. Successful recanalization (OR, 0.45; 95%CI, 0.22-0.91) was also higher in the IVT with EVT group. However, functional outcomes, death, intracranial bleeding complications, and procedural complications were similar among groups.

**Conclusion:** There was no difference in functional disability at 90 days among groups, although the percentages of successful reperfusion were significantly higher in the IVT with EVT patients.

# Assessing Naming Ability in Elders without Stroke and Non-Aphasic Stroke Patients with Confrontational and Category Naming to Detect Anomia

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## Abstract

**Introduction:** Aphasia is a disorder of language most commonly due to ischemic stroke. Anomia is possible in all types of aphasia and is conveniently used to screen for aphasia. Bedside confrontational naming or conventional naming tests may fail to detect mild language abnormalities in clinical practice.

**Objectives:** In this study, we additionally performed confrontational naming and category naming in elderly patients and non-aphasic stroke patients in hopes of improving the sensitivity of anomia detection. The relationship of age, sex, education level, stroke location, and vessel type with naming ability was also examined.

**Material and Methods:** An analytical cross-sectional study was performed on 40 patients in two groups of elderly outpatients with no known brain pathology and inpatients being treated for ischemic stroke without aphasia. The 15-item Thai Boston Naming test (T-BNT) was used to test confrontational naming and category naming test of fruits was performed.

**Results:** Non-aphasic stroke patients tended to be slower in naming latency than controls in both univariate ( $p=0.019$ ) and multivariate analysis ( $p=0.063$ ), but did not differ significantly in naming accuracy and category naming. Age, sex, education, stroke location, and vessel types did not impact naming ability. High frequency words were relatively spared compared to low frequency words for both groups.

**Conclusion:** Even in the absence of clinically detectable aphasia, stroke patients were potentially slower on naming tasks. The T-BNT and category naming may be feasible bedside tools to improve sensitivity of detection of language dysfunction in stroke patients beyond standard assessments.

# A Relationship between Shift Work and Quality of Sleep and Excessive Day Time Sleepiness among Health Care Provider at Neurological Institute of Thailand

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## Abstract

**Objective:** To explore the association between shift work and poor sleep quality in healthcare providers.

**Introduction:** Nowadays shift working is inevitable and it is also an important risk factor of various health conditions. However, data of the relationship between shift work and poor sleep quality in Thailand are limited.

**Materials and Methods:** Healthcare providers work at the Neurological Institutes of Thailand were participated. We divided them into two groups, non-shift and shift workers. The Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) scores, self-reported questionnaires were performed in all participants. The outcome were poor sleep quality (PSQI>5) and excessive daytime sleepiness (ESS>10), which were compared between the two groups.

**Results:** 201 healthcare providers were enrolled (94 in non-shift workers and 107 in shift workers group). The global PSQI was significant higher in shift workers group (9.26 vs 7.69) while poor sleep quality, defined as PSQI >5 was not significant higher in those group. Poor subjective sleep quality, longer sleep latency, and decrease sleep efficiency were significant observed in shift worker group compared to non-shift workers group (9.3% vs 0%, 15.4% vs 3.3%, and 29.5% vs 7.7%, respectively). There were no significant differences in ESS score and excessive daytime sleepiness between groups.

**Conclusion:** Shift workers was significant increase PSQI score and trend to have poor sleep quality compared to non-shift workers.

# Early Versus Delayed Immunotherapy for Neuromyelitis Optica Spectrum Disorders: A Longitudinal Analysis Comparison of Clinical Outcomes at A University Hospital, Northeastern Thailand

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## Abstract

**Background:** Acute relapse of Neuromyelitis optica spectrum disorder (NMOSD) generally leads to devastating outcomes. Standard treatment for the acute relapsing event consists of high-dose steroids and plasma exchange (PLEX). Early initiation of immunotherapy is one of the good prognostic factors. However, there are limited longitudinal studies on clinical outcomes in Thailand.

**Objective:** To examine the longitudinal clinical outcomes of early versus delayed immunotherapy for NMOSD.

**Methods:** We retrospectively analyzed data of patients diagnosed with NMOSD who received immunotherapy (high-dose steroids, PLEX, or both) for treating acute relapses and followed up at Srinagarind Hospital between January 2015 and May 2022. Expanded Disability Status Scale (EDSS), Modified Rankin Scale (MRS), gait score and Visual Outcome Scale (VOS) at baseline, discharge status, one month, three months, and six months were collected. A comparison of longitudinal clinical outcomes between the early ( $\leq 30$  days) and delayed ( $>30$  days) immunotherapy groups were analyzed.

**Results:** EDSS was significantly lower in the early immunotherapy group compared to the delayed group at one month (4.82 vs 6.46,  $p=0.019$ ), three months (3.97 vs 6.18,  $p=0.010$ ), and six months (3.78 vs 6.18,  $p=0.006$ ), but no significant difference on discharge date (5.56 vs 6.60,  $p=0.085$ ). There were no significant differences in MRS, gait scores, and VOS at 6 months ( $p=0.164$ , 0.118, and 0.563, respectively). No serious adverse events were reported in both groups.

**Conclusion:** Early immunotherapy in NMOSD leads to better long-term clinical outcomes without serious complications.



# Correlation between D-Dimer Level and Ischemic Stroke in COVID-19 Patients in Rajavithi Hospital

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## Abstract

**Introduction:** COVID-19 may lead to abnormal blood clots and ischemic stroke. The mechanism is a hypercoagulable state, with elevated D-dimer levels seen in COVID-19-infected patients, resulting from activation of both the coagulation and innate immune systems. D-dimer levels are known to increase in patients with severe COVID-19 infections.

**Objectives:** 1. To study the correlation between D-dimer levels and acute ischemic stroke in COVID-19 patients. 2. To study any factors associated with acute ischemic stroke in COVID-19 patients.

**Materials and Methods:** Retrospective case-control study used collected data from Covid-19 patient admitted to the Covid-19 ward in Rajavithi Hospital during July 1, 2020 - June 30, 2022.

**Results:** 25 patients of 18,586 COVID-19 patients had acute ischemic stroke, representing 0.13% of the total. D-dimer and hs-CRP levels showed no significant difference between the two groups. There is no significant relationship between high D-dimer levels and ischemic stroke events in COVID-19 patients. However, the study found that increase in diastolic blood pressure reduced the risk of ischemic stroke by 7% ( $p=0.01$ ) and the use of antiplatelet medication was found to decrease the risk of ischemic stroke by 82% ( $p=0.046$ ).

**Conclusion:** There is no significant relationship between high D-dimer levels and ischemic stroke events in COVID-19 patients. However, the study's conclusions may be limited by the small sample size and short duration of observation and follow-up. Further research with larger study populations and longer observation periods is needed.

# Comparison Efficacy and Safety of Intravenous Push Levetiracetam Vs Midazolam for Seizure Termination in Non-Convulsive Status Epilepticus. A Double-Blind Randomized Controlled Trial

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## Abstract

**Introduction:** Non-convulsive status epilepticus (NCSE) among hospitalized patients results in increased morbidity and mortality. The diagnosis and treatment of NCSE are still challenging in patient care. The role of antiepileptic drug in NCSE has been limited.

**Objectives:** We conducted a trial to investigate the efficacy and safety of levetiracetam compared to midazolam use to treatment of NCSE in hospitalized patients.

**Materials and Methods:** This study was a randomized double blind controlled trial conducted at Thammasat University Hospital, Pathumthani, Thailand. Hospitalized patients aged  $\geq 18$  years and was met the electroencephalography criteria were randomized to levetiracetam or midazolam group. The primary end point was seizure termination. Secondary end points were time to seizure termination, safety, mRs score at discharge and 90-day mortalities.

**Results:** A total of 31 patients were enrolled in the study. The patients were included in an intention-to-treat analysis allocated to the levetiracetam (n=15) or midazolam (n=16) group. The seizure termination incidence rates in levetiracetam and midazolam groups were 5 (33.3%) and 12 (75%) (OR=0.167, 95%CI 0.035-0.793, P=0.020), respectively. The time to seizure termination was 10 minutes in both groups. Neither injection site reaction nor unstable vital sign were reported. The median length of hospital stay was 30 (3-123) versus 27 (6-85), P=0.572 respectively. There were no statistically significant number of antiepileptic drugs (AEDs) use 2 (1-3) versus 1 (1-2) respectively; There were no statistically significant difference in median functional outcome at discharge in 2 groups.

**Conclusion:** Treatment of NCSE with midazolam was statistically increased incidence of seizure termination when compared to levetiracetam in this population group.

# The Development of Sleep Condition Indicator (SCI) Thai Version to Diagnose and Follow up Thai Patients with Insomnia

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## Abstract

**Background:** Insomnia disorder is a common condition that is often unrecognized. Therefore, a simple battery, especially for local language, is required.

**Methods:** The Sleep Condition Indicator (SCI) was translated from the original English into Thai by two bilingualists (English/Thai). Patients in out-patient clinic of Phramongkutklao hospital both clinically insomnia (base on DSM-V) and no insomnia were self-rated by SCI. Receiver operating characteristic (ROC) and area under the ROC curve (AuROC) calculations were analyzed for cut-off points. The reliable change index (RCI) was further assessed among 4-week post-treatment patients.

**Results:** A total of 179 adults, 92 had insomnia disorder (study group) and 87 had no insomnia (control group). Sleep condition indicator (SCI)-Thai had an AuROC value of 0.984 (95%CI: 0.965-1.000). When considering the cut-off point from Youden's index, it was found that an SCI score of less than or equal to 26 was the most accurate in diagnosing insomnia. The sensitivity was 94.6% (95% CI: 87.8-98.2), and the specificity was 100% (95% CI: 95.8-100). Fifty-two of 92 patients with significant clinical improvement after 4 weeks of treatment had a reliable change index (RCI) mean of 3.81 (95% CI: 3.32-4.30; p-value< 0.001). The group with medicine treatment had a 1.53-point difference in the pre-and post-treatment SCI scores more than the non-medicine treatment group (95%CI:0.34-2.73).

**Conclusion:** The SCI Thai version is an efficiency tool for diagnosing insomnia (a cut-off of 26) and following up for post-treatment improvement (a RCI of 4), and all medicine-treated participants had improved clinical symptoms.

# Utilization of the Athens Insomnia Scale-Thai Version (AIS-Thai) among Thai People

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## Abstract

**Introduction:** Insomnia is described as an unsatisfactory level of sleep that is commonly found in clinical practice. There are serious impacts on health. Approximately 43% of the Thai population has insomnia. The Athens Insomnia Scale-Thai (AIS-Thai) is a useful questionnaire to assess for insomnia.

**Objectives:** This study aimed to use the developed AIS-Thai for screening and diagnosing patients at an outpatient Neurological Department for pathological insomnia.

**Materials and Methods:** The participants who met all DSM-5 criteria of insomnia disorder and the participants without insomnia were enrolled in a cross-sectional questionnaire-based study. The participants in both groups completed the AIS-Thai. The ROC curve was conducted to identify the cut-off score of the AIS-Thai for identifying pathological insomnia.

**Results:** A total of 60 participant, who met all DSM-5 criterions of insomnia disorder, were included, 50 with insomnia and 10 without insomnia. The cut-off score for insomnia was calculated at 6 points (sensitivity of 75%, specificity of 100%), equal to the original AIS. Our study also found that ischemic stroke patients had higher sleep disturbances than non-stroke patients.

**Conclusion:** This study demonstrates that the AIS-Thai would be useful for detecting pathological insomnia in outpatient department settings, with a cut-off score of 6 points.

# Gray Matter to White Matter (GM/WM) Density Ratio Prediction on Computed Tomography in Cardiac Arrest Patients

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## Abstract

**Introduction:** Hypoxic-ischemic brain damage is brought on by cardiac arrest or severe hypoxia, which causes patients unconscious and increases their mortality rate by 70 percent. The loss of the gray-white junction in the brain's computed tomography can be seen, which has a poor prognosis and prevents the brain from returning to normal.

**Objectives:** To determine the correlation between the gray-to-white matter (GM/WM) density ratio from computed tomography and the prognosis following cardiac arrest.

**Materials and Methods:** Forty-three patients who resuscitated from cardiac arrest and had performed CT brain within 60 hours were retrospectively investigated. Prognosis has divided 2 group: Glasgow outcome scale (GOS) 1-2 for poor prognosis, GOS 3-5 for good prognosis. Hounsfield units (HU) were measured at the basal ganglion, ganglionic, and supraganglionic levels.

**Results:** Total 43 patients, with 8 having good prognosis and 35 having poor prognosis. The mean age of patients was 62.1 years. The average Hounsfield after post-cardiac arrest in Basal ganglion, ganglionic and supraganglionic level is not significant difference.

**Conclusion:** There was no statistically significant difference in the GW-WM ratio for determining the prognosis of death or vegetative state in the post-cardiac arrest patients in our study.

# Relationship of Core Growth Rate, Collateral Circulation Status and Clinical Outcome in Patients with Acute Ischemic Stroke from Anterior Circulation Occlusion

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## Abstract

**Introduction:** Collateral circulation status demonstrated the strong relationship with core growth rate and clinical outcome inpatient with acute cerebral infarction receiving thrombolysis treatment.

**Objectives:** To evaluate relationship of core growth rate, collateral circulation status, and clinical outcome, in patients with anterior circulation occlusion (known and unknown time of symptom onset.)

**Materials and Methods:** A retrospective chart review was conducted. 47 patients with anterior circulation occlusion (known and unknown time of symptom onset). Core growth rate defined as baseline core volume divided by time of symptom onset or last seen well to CTP. Collateral circulation status was scoring 0 to 5. Spearman correlation coefficients was performed to evaluate the correlation and simple linear regressions were performed the predictive power.

**Results:** The median core growth rate was 1.24 ml/h with IQR 0.55-0.44 ml/h. This study demonstrated the inversely relationship of core growth rate and collateral status ( $Rho = -0.284$ ,  $P\text{-value} = 0.026$ ). The relationship of core growth rate and clinical outcomes showed correlation ( $Rho = 0.043$ ,  $P\text{-value} = 0.386$ ), especially in unknown time of onset group ( $Rho = 0.62$ ,  $P\text{-value} = 0.021$ ). For relationship of treatment, core growth rate and clinical outcomes, IVT plus EVT or EVT only group, core growth rate showed inverse correlation with 3-month mRS ( $Rho = -0.049$ ,  $P\text{-value} = 0.396$ ).

**Conclusion:** The core growth rate has a relationship with collateral status and clinical outcome, in overall and uncertain onset cases.

# Incidence of Neurological Manifestations and Complications in Patients with COVID-19 Infection at Thammasat University Hospital

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## Abstract

**Introduction:** Coronavirus (COVID-19) is a pandemic that began in 2019. Typical clinical manifestations include fever, cough, and dyspnea. However, to our knowledge, neurological manifestations and complications after COVID-19 infection in Thailand are lacking.

**Objective:** The primary aim was to measure the incidence of neurological complications in patients with COVID-19 infection in the Thai population. The secondary aims were to characterize neurological manifestations and assess risk factors associated with developing neurological complications and the mortality rate of COVID-19 infection.

**Methods:** This is a retrospective cohort study of Thai adults hospitalized at Thammasat university hospital (TUH) with diagnosed COVID-19 infection. The characteristic data were presented as descriptive. Propensity score matching (PSM) was used to balance the baseline characteristics between patients with or without neurological manifestations. The independent factors for developing neurological complications were analyzed using multivariable logistic regression analysis.

**Results:** 990 hospitalized patients with COVID-19 infection from April 1st, 2020, to September 30th, 2021, were included. Neurological complications were found in 215 patients (21.7%) and associated with severe infection (aOR) 3.71 (95%CI 1.38-9.97, p 0.010), stroke (0.8%), skeletal muscle injury (16.3%), myopathy (0.2%), acute encephalopathy and delirium (2.4%), impaired consciousness (2.6%), seizure (0.5%), other neurological symptoms (0.4%). Overweight, hypertension, diabetes mellitus, and dyslipidemia with severe infection were significantly associated with an increased risk of developing neurological symptoms presentation (p-value 0.033, 0.007, 0.040, 0.016, and 0.001, respectively). And any presence of neurologic complications was associated with mortality (OR 1.77, 95% CI 1.19–2.62, P 0.005).

**Conclusions:** Neurological manifestations and complications after COVID-19 infection have commonly been found and are mostly associated with severe infection, underlying especially hypertension risk factor that contributes to neurological complications. Rapid clinical deterioration could be associated with a neurologic event such as stroke, contributing to its high mortality rate.

# Cost of Treatment for In-patient with Acute Stroke

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## Abstract

**Background:** Stroke is a common disease, causing disability or death leading to high treatment costs. It was found that there had been no official record about the actual medical expenses and the appropriate amount of reimbursement.

**Objective:** To investigate the actual medical expenses, the expenses requested for reimbursement from welfares, and the amounts of reimbursement. In addition, to study the factors affecting medical expenses.

**Methods:** A cross-sectional descriptive study was performed. The population consisted of patients who were older than 18 that admitted with acute strokes, from January 2017 to December 2021. The population were categorized into 5 groups: 1) ischemic stroke with r-tPA, 2) ischemic stroke without r-tPA, 3) hemorrhagic stroke requiring surgery, 4) hemorrhagic stroke not requiring surgery, and 5) transient ischemic attack. The information was retrieved from the electronic medical records using the Health Object system. The research tools were ICD10 and ICD9.

**Results:** We included 3,518 patients which reduced to 3,377 patients due to incomplete information. 57.28% were male, and 42.72% were female. The most common age range were 61–80-year-olds (53.27%). The most frequently used medical welfare was the universal coverage scheme (47.75%). The first 3 discovered comorbidities were hypertension, diabetes mellitus, and hyperlipidemia, respectively. The average costs of treatment (per patient) in 5 groups had been 73,656.68-baht, 27,057.11-baht, 237,788.76-baht, 84,902.66-baht, and 17,277.78-baht, respectively. Two statistically significant factors affecting medical expenses were found: endotracheal intubation or mechanical ventilation (p-value < 0.001) and blood transfusions (p-value 0.001).

**Conclusion:** Based on the difference between expenses requested for reimbursement and the amount of reimbursement, it was discovered that the hemorrhagic stroke requiring surgery had the greatest losses, while the ischemic stroke without r-tPA had the greatest profit.



# Relationship between Atrial Fibrillation and Worse Outcomes in Stroke Patients after Intravenous Thrombolysis

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## Abstract

**Introduction:** Atrial fibrillation (AF) is considered a predictor for severe stroke and poor outcome. However, It is unclear whether AF is associated with poor outcome in acute ischemic stroke patients treated with intravenous thrombolysis. To investigate the effect of AF on stroke outcomes among rtPA-treated patients is essential for optimizing approach to patient management.

**Objectives:** The aim was to evaluate whether AF is associated with poor outcome in acute ischemic stroke patients treated with intravenous thrombolysis and to investigate the relationship between pre-stroke CHA<sub>2</sub>DS<sub>2</sub>-VAsc scores and the difference in outcomes following IV thrombolysis among patients with AF.

**Materials and Methods:** We retrospectively identified acute ischemic stroke patients who received intravenous recombinant tissue plasminogen activator (IV rtPA) treatment at the Faculty of Medicine Vajira Hospital between June 2005 to June 2021 from our institutional stroke database. All eligible patients were divided into two groups by presence of AF. Vascular risk factors, stroke characteristics, and outcome measures were compared between patients with and without AF. Multiple logistic regression was performed to identify factors associated with unfavorable outcome (modified Rankin scale at 90 days >2) and symptomatic ICH.

**Results:** 141 patients were included in our analysis (mean age, 66.2 years, with 50% of patients being men). There were 46 (32.62 %) patients had AF. 14 patients had a first-detected episode of AF, and 32 patients had chronic AF. The incidence of symptomatic intracerebral hemorrhage was significantly higher in patients with AF than in patients without AF (45.7% vs 11.6%), and the incidence of unfavorable functional outcome was significantly higher in patients with AF than in patients without AF (71.7% vs 32.6%). The increase risk of symptomatic intracerebral hemorrhage among patients with AF remained significant after adjusting for age and baseline National Institutes of Health Stroke Scale score (odds ratio, 4.21 [95% CI, 1.69-10.51]). The increase risk of unfavorable functional outcome among patients with AF remained significant after adjusting for age and baseline National Institutes of Health Stroke Scale score (odds ratio, 3.08 [95% CI, 1.27 -7.48]). There were no differences in outcomes between patients with a first-detected episode of AF and patients with chronic AF. Patients with AF who had CHA<sub>2</sub>DS<sub>2</sub>-VAsc Score >3 had a higher incidence of symptomatic ICH and unfavorable functional outcome compared with those who had CHA<sub>2</sub>DS<sub>2</sub>-VAsc Score ≤3.

**Conclusion:** Patients with AF had significantly a higher incidence of symptomatic ICH and unfavorable functional outcome after intravenous thrombolysis when compared to those without AF and patients with AF who had CHA<sub>2</sub>DS<sub>2</sub>-VAsc Score >3 had a higher incidence of symptomatic ICH and unfavorable functional outcome compared with those who had CHA<sub>2</sub>DS<sub>2</sub>-VAsc Score ≤3.

# Predictors of Seizure Control in Patients with Cerebral Arteriovenous Malformation

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## Abstract

**Introduction:** Cerebral arteriovenous malformation (AVM) can produce various neurological symptoms. Seizure is considered as one of the chronic symptoms affection the quality of life.

**Objective:** We aim to identify the predictors of 2-year seizure free

**Materials and Methods:** Cerebral AVM patients diagnosed by the magnetic resonance angiography or cerebral angiography who has the last follow up between January 2002 And 31 November 2020 were retrospectively review. We compared clinical, radiological characteristics, treatment and seizure control outcome between the patients who achieved and not achieved 2-year seizure-free. The factor with  $p < 0.05$  in univariate analysis were entered into the multivariate logistic regression analysis to determine an independent factor of 2-year seizure-free.

**Results:** Of 372 cerebral AVM, 105 patients (28.23%) experienced seizure. There were no significant differences in seizure semiology, clinical presentations, mode of treatment and AVM obliteration achievement between the two groups. The seizure-control group had the smaller cerebral AVM diameter (median (IQR) 32(20.25-44.00) vs 40(32.00-50.00) millimeters,  $p = 0.027$ ) and less number of anterior cerebral artery feeding vessel (45.00% vs 68.00%,  $p = 0.045$ ). In multivariate logistic regression analysis, the cerebral AVM diameter less than 3 centimeters was an independent predictor of 2-year seizure free achievement (adjusted odd ratio (aOR) = 3.166,  $p = 0.043$ , 95% C.I. 1.039-9.651) and the diagnosis of epilepsy prior to the diagnosis of cerebral AVM was the poor prognostic factor for 2-year seizure free (aOR = 0.143,  $p = 0.012$ , 95% C.I. = 0.013-0.654).

**Conclusion:** The cerebral AVM diameter less than 3 centimeters was an independent predictor of a 2-year seizure-free achievement while the diagnosis of epilepsy prior to the diagnosis of cerebral AVM was the poor prognostics factor for 2-year seizure free.

# Comparison of Early Onset Versus Late Onset Neuromyelitis Optica Spectrum Disorders: Clinical Characteristics and Outcomes at A University Hospital, Northeastern Thailand

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## Abstract

**Background:** Neuromyelitis optica spectrum disorder (NMOSD) is an autoimmune demyelinating disease of the central nervous system and generally follows a relapsing course, leading to neurologic disability. Older age at onset was associated with worse disease prognosis. However, there was a small number of research comparing the outcomes of patients with early-onset NMOSD (EO-NMOSD) and late-onset NMOSD (LO-NMOSD) in Thailand.

**Objective:** To compare clinical characteristics and outcomes between patients with EO-NMOSD (age at onset 18 - 49 years) and LO-NMOSD (age at onset  $\geq 50$  years).

**Methods:** We retrospectively analyzed data of patients diagnosed with NMOSD who visited Srinagarind Hospital between January 2015 and October 2021. Patient demographics, clinical attacks, MRI findings, laboratory data, Expanded Disability Status Scale (EDSS), and treatment were collected. A comparison of clinical characteristics and outcomes between the EO-NMOSD and LO-NMOSD was analyzed.

**Results:** Of 76 patients, there 44 patients were in the EO-NMOSD group, and 32 were in the LO-NMOSD group. The majority were females (90.8%), and the mean age of onset was  $45.3 \pm 14.7$  years. There was no significant difference in clinical characteristics between the two groups, except the CSF protein was significantly higher in LO-NMOSD than in EO-NMOSD (62 vs. 37 mg/dL,  $P < 0.001$ ). There was a significant positive correlation between the age of onset and EDSS on discharge date ( $r = 0.323$ ,  $p = 0.004$ ) and at six months ( $r = 0.359$ ,  $p = 0.004$ ).

**Conclusion:** Patients with LO-NMOSD have similar clinical characteristics but worse outcomes than EO-NMOSD.

# Role of Etifoxine as an Adjunctive Treatment in Patients with Drug-Resistant Epilepsy with Comorbid Anxiety Symptoms

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## Abstract

**Introduction:** Treatment-resistance epilepsy affects quality of life. Therefore, further medical studies are needed. Most of the patients experience anxiety symptoms and this can aggravate seizures. The anxiolytic etifoxine used to treat anxiety states and adjustment disorder, a class of Benzoxazines (non-Benzodiazepines), acts as a dual mechanism against GABAergic transmission. From such a mechanism it is likely to be synergistic affects the function of the GABAergic neurotransmission system for better.

**Objectives:** Drug-resistance epilepsy affects quality of life, researchers aimed to determine the role of etifoxine, a class of Benzoxazines (non-Benzodiazepines) GABA-A receptor agonist, as an adjunctive treatment in patients with drug-resistant epilepsy who had anxiety comorbidity.

**Materials and Methods:** This was a randomized single-blind placebo-controlled study. Patients with drug resistant focal epilepsies treated at Phramongkutklao Hospital were invited to participate. The patients received etifoxine (50 mg) 2 capsules BID or matched placebo and follow up for 12 weeks. Questionnaires including Hamilton Anxiety Rating Scale; (HAM-A), depression (Patient Health Questionnaire-9 Thai version; PHQ-9T), and quality of life (Patient Weighted Quality of Life in Epilepsy-10; QOLIE-10) were completed at baseline, and subsequent visits. In addition, seizure diaries were collected in order to determine seizure frequency.

**Results:** Total of 40 patients met selection criteria: intervention group (n 20), and placebo group (n 20). Mean age of the etifoxine group was 35.06 years old, while the placebo group was 33.94 years old,  $p$ -value 0.666. Male in the etifoxine group was 9 (52.9 %), and the placebo group was 10 (58.8 %),  $p$ -value 0.730. In etifoxine group, HAM-A score was significantly reduced from 16.0 (baseline) to 12.2 (visit 5),  $p$ -value 0.009, while the score didn't reach statistically significant reduction in the placebo group, 13.2 (baseline) to 11.8 (visit 5),  $p$ -value 0.279. The anxiety reduction was significantly reduced in subgroup for fear for the Etifoxine group, baseline 1.7 to 0.7,  $p$ -value 0.035. There was no significant difference for the improvement of depression, quality of life and seizure controls between the etifoxine group and the placebo groups. Etifoxine was safe in the epilepsy population.

**Conclusion:** Etifoxine for patients with drug-resistant epilepsy (DRE) reduced HAM-anxiety score over the study time, which the benefits appeared especially on fear and sleep subtypes of anxiety.

# The Efficacy and Safety of Extended Dosing Interval of Rituximab in Thai Multiple Sclerosis and Neuromyelitis Optica Spectrum Disorder: A Choice for Low to Middle-Income Countries

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## Abstract

**Introduction:** Most Thai patients with multiple sclerosis (MS) and neuromyelitis optica spectrum disorder (NMOSD) have limited access to disease modifying therapies (DMTs). If rituximab can be given in extended dosing interval and less cost, more patients could afford the treatment.

**Objectives:** To evaluate efficacy and safety of rituximab in Thai MS and NMOSD patients with the CD19-adjusted interval regimen.

**Materials and Methods:** Retrospective review of MS and aquaporin-4 antibody-positive NMOSD patients who had received rituximab for more than two years, at Siriraj Hospital from January 1994 to January 2023. The primary outcomes were changes in annualized relapse rate (ARR), Expanded Disability Status Scale (EDSS) score, and time to first relapse after rituximab initiation. The secondary outcome was the safety of rituximab.

**Results:** 48 patients were included; 23 patients (47.9%) were MS, and 25 patients (52.1%) were aquaporin-4 antibody-positive NMOSD. 42 patients (87.5%) had no relapse after starting rituximab, with a median follow-up period of 35.5 (IQR 18-120) months. The median ARR was significantly reduced from 0.98 (IQR 0.14-24.00) to 0 (IQR 0-0.97),  $p < 0.001$ . The EDSS score decreased from 3.5 (IQR 0-7.0) to 3.0 (0-7.0),  $p = 0.001$ . A subgroup analysis in patients receiving an extended dosing schedule of rituximab to every 8-10 months, showed a significant ARR and EDSS reduction. 26 patients (54.2%) experienced minor adverse events.

**Conclusions:** Rituximab is effective for relapse prevention in Thai MS and NMOSD patients with a moderate risk of adverse events. Extending the dosing interval of rituximab under B-lymphocyte monitoring is warranted

# Thrombolysis in Minor Stroke with Motor Deficit or Limb Ataxia: A Single-Center Cohort in Thailand

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## Abstract

**Introduction:** More than half of acute ischemic stroke patients have a minor neurological deficit. About one-third of these patients are not treated with thrombolytic drugs, and a similar number of patients become functionally disabled within 90 days. The standard guidelines do not mention robust criteria for selecting thrombolytic-eligible patients with minor stroke.

**Objective:** This study aimed to assess the effectiveness and safety of thrombolysis in minor stroke with a motor deficit or ataxia and to identify clinical features that can guide the decision for such therapy.

**Materials and Method:** The study design was a retrospective matching cohort. Inclusion criteria include acute ischemic minor stroke (NIHSS of 0-5) with a motor deficit or ataxia within 12 hours of symptom onset. Thrombolytic and non-thrombolytic patients were matched for age and admission ward. The primary outcome was the excellent functional outcome (mRS 0-1) at 90 days. Safety outcomes include sICH and mortality within 90 days.

**Results:** From Jan 2005 to 2022, Our study enrolled 183 patients in the thrombolysis group and matched them with 366 non-thrombolysis patients. Excellent functional outcome at 3 months was found in 128 (68.6%) patients in the thrombolysis group and 235 (64.2%) patients in the non-thrombolysis group ( $p$  0.28). Symptomatic intracranial hemorrhage (sICH) was significantly higher in the thrombolysis group (11 patients: 6%) vs. 4 patients (1.1%) in the non-thrombolysis group ( $p$  0.001).

**Conclusion:** Intravenous thrombolysis in minor stroke with limb weakness or ataxia did not show significance in terms of excellent functional outcome at 3 months, but with significant association with sICH and tends to higher mortality. Further randomized controlled studies are required to assess the efficacy and safety of thrombolysis in minor stroke patients with other criteria, which may lead to significant advances in the clinical care of minor stroke.

# Efficacy and Safety of Perampanel in Super-refractory Status Epilepticus

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## Abstract

**Introduction:** Super-refractory status epilepticus (SRSE) is a life-threatening neurological emergency with high morbidity and mortality. In SRSE,  $\gamma$ -aminobutyric acidergic drugs become less effective and glutamate plays a major role in seizure controlled. Perampanel is a novel anti-seizure medication (ASM) which acts as a non-competitive  $\alpha$ -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor (AMPA) receptor antagonist to reduce glutamate-mediated postsynaptic excitation. Previous animal studies and a few case reports have suggested that it may be effective to treat SRSE. Data on the efficacy of perampanel in treatment of SRSE in humans are limit.

**Objectives:** To access efficacy and safety of perampanel in the treatment of SRSE.

**Materials and Methods:** All in-hospital patients with SRSE in Ramathibodi hospital between 1<sup>st</sup> January 2017 and 31<sup>st</sup> August 2022 were enrolled. The baseline characteristics, modified rankin scale (mRS) at admission and discharge, seizure semiology, duration of SRSE termination, ASM and dosages were corrected.

**Results:** For one hundred and two patients with SRSE were included. There was 40.2% of patients received perampanel as add-on treatment. The average initial and maximum dose were 4.5 mg/day and 10.5 mg/day, respectively. The time to SRSE controlled were 77 hours in perampanel group and 72 hours non-perampanel group, with p-value 0.142. This represented that no difference on efficacy of seizure cessation compared to non-perampanel group. The time from initial perampanel administered to SRSE controlled was 26 hours. The persistent vegetative stage found in 34.2% in perampanel group compared with 40.9% in non-perampanel group. No serious adverse events were reported.

**Conclusion:** Although, this study shows insufficient evidence to support the usage of perampanel in SRSE treatment. However, this requires further clinical studies to establish the appropriate timing, dosing, and titration that are efficacious and safe for SE.

# Comparison of Maternal and Fetal Outcomes, in Epileptic and Non-Epileptic Mothers: A Retrospective Case-Control Study

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## Abstract

**Introduction:** Epilepsy is a neurological disorder requiring medical management during pregnancy which can affect the course of pregnancy, labor, delivery, and fetal development. There have been no reports on obstetric outcomes in pregnant Thai women who have had epilepsy.

**Objective:** The study was designed to compare maternal morbidity, mode of delivery, and fetal adverse outcomes in epileptic and non-epileptic mothers.

**Materials and Methods:** We performed a retrospective case-control study by collecting data from 200 mothers who attended antenatal care and delivery at the Faculty of Medicine Vajira Hospital between January 2012 to 2023.

**Result:** Two hundred patients' medical records were included in the study. All 12 epileptic mothers (6%) were assigned to the study group. The average age of epileptic mothers was of 26.50 ( $\pm 6.67$ ) years old which was younger than the control group (30.66  $\pm 7.01$  years old) and the BMI on delivery in the epileptic group was 28.23 ( $\pm 5.24$ ) which was lower than the control group (28.31  $\pm 5.26$ ) with statistically significant. We found 25% of premature birth, fetal low birth weight, and low APGAR score in the epileptic mothers' group which is significantly higher than the control group. Moreover, all epileptic mothers who have had valproic acid even in low doses ( $< 800$  mg) were found to have preterm birth and low fetal birth weight.

**Conclusion:** From our study, epileptic mothers had a higher rate of unfavorable fetal outcomes at birth than non-epileptic mothers which may be associated with valproic acid.



# Distinct QEEG Features Help Diagnose Sporadic Creutzfeldt-Jakob Disease: Visualizing the Elusive Disease

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## Abstract

**Introduction:** Sporadic Creutzfeldt-Jakob disease (sCJD) is a fatal and untreatable disease. A clear distinctive feature to differentiate the sCJD from other causes of dementia (non-sCJD) is required and has been extensively studied. In daily practice, diagnostic challenging is encountered in patients who are lack of typical EEG pattern i.e., periodic sharp wave complexes (PSWCs) or present with nonspecific neurological symptoms. Quantitative electroencephalogram (QEEG) is a promising tool which may provide distinctive features to help diagnose sCJD. However, until now there have been only few studies using QEEG and their results remained impractical to be applied in clinical practice.

**Objectives:** To explore the QEEG features using Persyst<sup>®</sup> commercial software and assess their performance in helping differentiate sCJD from non-sCJD.

**Materials and Methods:** This is a multicenter cross-sectional study collecting sCJD cases from 3 centers in Thailand including two centers in Bangkok i.e., the Chulalongkorn Comprehensive Epilepsy Center of Excellence (CCEC) and Neurology Institute of Thailand, and one center in Southern part of Thailand i.e., Surat Thani Hospital. Non-sCJD cases and normal controls were collected from CCEC EEG database. Clinical characteristics in each group were described. QEEG parameters i.e., amplitude-integrated EEG (aEEG) and rhythmicity spectrogram (rs) were compared among 3 groups using Kruskal-Wallis along with Holm-Sidák multiple comparison correction. To develop a clinical and QEEG model to predict the probability of sCJD, a logistic regression model was used. Specific QEEG model for patients without PSWCs was also developed. Added values of QEEG in diagnosis of the patients who presented with nonspecific neurological symptoms were also demonstrated.

**Results:** Nineteen sCJD and 49 non-sCJD patients were included. Ten patients without clinically dementia, EEG requested due to transient episodes suspicious for syncope and had normal EEG were included as normal controls. Group matching with age  $\pm$  5 years was performed. Mean age was 64.42 (SD 11.41), 69.18 (SD 14.05) and 69.30 (SD 9.93) for sCJD, non-sCJD and normal controls, respectively. PSWCs were found in 16/19 (84.21%) of the sCJD patients. Based on our study population, predictive performance of the developed clinical model for sCJD which consisted of visuospatial dysfunction, visual agnosia and myoclonus was high (AUC 0.915). QEEG i.e., aEEG and rs findings showed significant difference when compared sCJD with non-sCJD. QEEG model using rs findings was a best model for prediction of sCJD,

with reasonable performance (AUC 0.766). Specific model to help diagnose in the patients who were lack of PSWCs was also developed, but lower in performance (AUC 0.646). Higher performance was demonstrated when adding QEEG findings to help diagnose in the patients who presented with nonspecific symptoms i.e., spasticity (AUC 0.794 vs 0.702), hyperreflexia (AUC 0.793 vs 0.601) and memory problem (AUC 0.807 vs 0.681).

**Conclusion:** Our study provides evidence of potential use of commercial QEEG software to visualize distinct EEG features i.e., greater aEEG values and increased rhythmicity of specific frequency bands (delta, theta and low beta) as compared with non-sCJD. This is also applied to the patients who present with nonspecific neurological symptoms and may give some clues for helping diagnose in patients who are lack of typical PWSCs.