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LIETUVOS NEUROCHIRURGŲ DRAUGIJA

1ST INTERNATIONAL VILNIUS NEUROSCIENCE CONFERENCE FOR YOUNG RESEARCHERS

ABSTRACT BOOK

MAY 9–10, 2025

Neurologijos seminarai

2025, PRIEDAS

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2025, PRIEDAS

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Vilnius, Lithuania

The conference is organised by researchers of the Faculty of Medicine of Vilnius University and endorsed by the Lithuanian Neurologists' Association, the Lithuanian Society for Epileptology, the Lithuanian Stroke Association, the Lithuanian Neuroscience Association and the Lithuanian Association of Apheresis and Clinical Toxicology.

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The Effect of Repetitive Transcranial Magnetic Stimulation (rTMS) on Beta Band Power in Schizophrenia: A Preliminary EEG Study

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Repetitive transcranial magnetic stimulation (rTMS) has been explored as a treatment for schizophrenia, particularly for modulating brain activity in regions associated with positive symptoms. Recent studies have demonstrated that rTMS can alter neural activation patterns in areas such as the dorsolateral prefrontal cortex, thalamus, and temporal regions, improving cognitive control and reducing symptoms like auditory hallucinations. Our aim was to investigate whether rTMS is capable of shifting EEG activity in schizophrenia patients toward patterns observed in healthy individuals. In this study, we examined the effects of rTMS on EEG power in schizophrenia patients, particularly those with positive symptoms. Eighteen patients diagnosed with schizophrenia participated, undergoing 15-30 sessions of rTMS. EEG recordings were taken before and after treatment, with rTMS targeting the left temporoparietal junction. Recording was conducted during resting-state conditions with 20 electrodes placed according to the 10-20 system. Beta band power was the most stable and consistent measure, showing a significant reduction following rTMS treatment, with post-treatment levels approaching those observed in healthy individuals. This effect was present across different rTMS protocols. These findings suggest that rTMS may normalize beta band power, which could serve as a potential biomarker for treatment response in schizophrenia, particularly for the modulation of positive symptoms such as auditory hallucinations. Further studies should investigate the clinical implications of these EEG changes and their relevance in long-term schizophrenia management.

Corpus Callosotomy in a Patient with Refractory Status Epilepticus: Case Report and Literature Review

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Introduction. Drug-resistant epilepsy (DRE) is a significant challenge in neurology, affecting approximately one-third of epilepsy patients who do not respond to pharmacological treatment despite the availability of over 30 antiepileptic drugs (AEDs). Corpus callosotomy is a palliative surgical procedure for managing DRE, particularly effective in reducing seizure frequency in selected patients. This study presents a clinical case of a patient in refractory status epilepticus who underwent corpus callosotomy and reviews the role of this procedure in the treatment of DRE.

Methods. A clinical case is presented where corpus callosotomy was performed on a patient in refractory status epilepticus, characterized by persistent focal motor seizures. After the failure of multiple pharmacological treatments, a complete corpus callosotomy was conducted. Additionally, a systematic literature review was performed to analyze patient selection criteria, clinical outcomes, and advancements in surgical techniques.

Results. Postoperative outcomes indicated an 80% reduction in seizure frequency and significant improvements in functional independence, despite persistent focal motor seizures. The literature review supported corpus callosotomy as a viable option for patients with generalized epilepsy who are not candidates for focal resective surgery.

Conclusions. Corpus callosotomy remains a valuable palliative option for managing drug-resistant generalized epilepsy and refractory status epilepticus. Although not curative, it significantly reduces seizure burden and enhances quality of life. Future directions include exploring minimally invasive techniques and neurostimulation therapies to complement surgical interventions.

Recurrent Cerebral Sinus Venous Thrombosis in a Pediatric Leukemia Patient: Investigating the Importance of Interventional Thrombectomy

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Introduction. Cerebral sinus venous thrombosis (CSVT) is an uncommon but potentially fatal condition in children, often associated with primary prothrombotic conditions.

Methods. We present a rare case report of an 11-year-old patient diagnosed with acute lymphoblastic leukemia (ALL) and recurrent cerebral sinus venous thrombosis.

Results. ALL patient, who was prescribed prophylactic anticoagulation following an initial CSVT event and recanalization, experienced a subsequent thrombotic event. Both times thrombosis manifest with clonic-tonic seizures.

During the first episode, the patient developed complete thrombosis of the transverse sinus, left internal jugular vein, and partial thrombosis of the mid-sagittal and right sigmoid sinuses. Despite the following administration of anticoagulation therapy, the patient experienced a new CSVT one month later, involving the left transverse and sigmoid sinuses, left internal jugular vein, and right sigmoid sinus. Additionally, partial thrombosis of the right transverse sinus and bilateral occipital subarachnoid hemorrhages were identified. In an effort to save the patient's life, urgent mechanical thrombectomy was successfully performed and heparin treatment is initiated after 24 hours of surgery. The patient's neurological condition has been successfully treated, resulting in an improvement in the Glasgow Coma Scale (GCS) from 8 to 15.

Conclusions. Mechanical thrombectomy has proven to be a highly effective and robust intervention, significantly enhancing clinical outcomes in pediatric leukemia patients diagnosed with cerebral sinus venous thrombosis.

Endocannabinoid System as a Possible Modulator of Psychiatric Effects of the Adhesion Molecule NEGR1

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Background. Psychiatric disorders are one of the leading causes of disability and socioeconomic burden. Neurobiological bases for these disorders are largely unknown. Neuronal growth regulator 1(NEGR1) is a neural cell adhesion protein that shows strong genetic links with various psychiatric disorders, especially mood disorders. There are currently no drugs on the horizon to target NEGR1, however. The endocannabinoid system (ECS) regulates psychiatric disorders and physiological processes in the brain similar to NEGR1. Interestingly, the endocannabinoid (eCB) 2- arachidonoylglycerol (2-AG) is also reduced in the plasma of Negr1-/- mice. However, whether NEGR1 and ECS interact or modulate each other is unknown.

Aim. This study aims to elucidate whether changes in endocannabinoid (eCB) tone could modulate the effects of NEGR1 by studying the eCB tone in mice lacking Negr1.

Methodology. Endocannabinoid levels were measured using LC-MS/MS procedures, and the expression of ECS-related genes was assessed by RT-qPCR in various brain regions of Negr1-/- mice and their littermate controls. The sensitivity of the eCB system to 5 mg/kg THC was estimated in the Tetrad test.

Results. Preliminary results indicated no significant 2-AG level differences in the hippocampus or hypothalamus across genotypes. However, a significant difference was observed in anandamide (AEA) levels in Negr1-/- mice compared to their controls in the hypothalamus. The tetrad test revealed no genotype differences in females, but males exhibited genotype differences in catalepsy. Ongoing analyses aim to provide further insights into the expression levels of ECS-related genes and their potential modulation by NEGR1.

Conclusion. Understanding the interaction between NEGR1 and the ECS could lead to novel therapeutic strategies for managing psychiatric pathology. Further research is needed to confirm these preliminary findings and explore the therapeutic potential of modulating the ECS and NEGR1.

Developing Artificial Cerebrospinal Fluid for Studying Neurodegeneration-related Protein Aggregation

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Protein aggregation into insolluble aggregates is related to neurodegenerative disorders, such as Alzheimer's (AD) and Parkinson's (PD) diseases. The prevalence of these neurological diseases is rising worldwide, especially with the increasing human lifespan1. While there are multiple reports showing potential drugs, they often provide aggregation data conducted in PBS or phosphate buffer solutions with varying ionic strengths and pH conditions. However, such data does not resonate with the actual conditions where the Aβ, α-synuclein or other disease related proteins aggregate in human brain. Hence, it is crucial to (A) understand the aggregation pathway in physiological conditions, (B) investigate the aggregate morphology and structure that is formed in such medium and (C) test how the target molecules affect the aggregation process. It is important that research is done with serological samples or in the artificial media that closely resembles the conditions in the brain. One of the possible ways is to use major components of cerebrospinal fluid (CSF) that may dictate the protein aggregation pathway and the efficacy of anti-amyloid molecules.

In this research, we composed the artificial medium (aCSF) that mimics CSF and tested the characteristics of Aβ and α-synuclein aggregation. The results shown component dependent aggregation process, formation of distinct aggregate conformation and stability. By using Cryo-EM, we determined the structure of α-synuclein aggregates and found similarities with fibrils found in patients from multiple system atrophy."

The Impact of Background Noise on Cognitive Performance and Contributing Factors

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Introduction. Noise is a constant part of daily life and may impact a person's focus and performance. The aim of this study is to evaluate the impact background noise has on cognitive performance, and how individual factors, such as fatigue and musical training, influence responses to noise.

Methods. 24 participants completed the Fatigue Severity Scale (FSS) questionnaire and reported their musical training (n=13 had an average of 9.77±4.12 years). They performed 4 cognitive tasks in silence and background noise (audio of people talking): Digit Span Task, Trail Making Test, Labyrinth Task, and Corsi Block-Tapping Task. Performance was measured by accuracy or completion time.

Results. The Trail Making Test (numbers only) was completed faster in background noise (20.42±6.11s) than in silence (26.83±8.90 s, p=0.0008). Longer musical training was linked to poorer Corsi Block-Tapping Task performance in silence ($r = -0.64$, $p = 0.0007$). However, musically trained participants had higher Digit Span Task scores in silence ($r = 0.44$, $p = 0.032$). Higher FSS scores were linked to poorer performance on the Corsi Block-Tapping Task in silence, both in reverse ($r = -0.50$, $p = 0.014$) and forward ($r = -0.57$, $p = 0.0037$) order.

Conclusions. The findings suggest that background noise may enhance performance on tasks requiring speed and attention, as seen with the Trail Making Test. Participants with musical training performed better on tasks requiring working memory, particularly those with verbal stimuli (Digit Span Task), and worse on visuospatial memory tasks (Corsi Block-Tapping Task). Fatigue also negatively impacted performance on visuospatial tasks. These results highlight how environmental factors (noise), personal experiences (musical training) and mental status (fatigue) can influence cognitive performance.

SH-SY5Y Cell Response to α-Synuclein Aggregates Formed in Artificial Cerebrospinal Fluid

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Alpha-synuclein (α-syn) is a neuronal protein implicated in the pathogenesis of neurodegenerative disorders, particularly Parkinson's disease (PD). The aggregation of α-syn into fibrils in specific brain regions is a hallmark of PD, contributing to cellular dysfunction and neurotoxicity. However, the final aggregation products can differ as α-syn is able to form structurally distinct amyloid fibrils. Such structural polymorphism in amyloid aggregates can occur as a result of environmental changes in the central nervous system. Cerebrospinal fluid is closely related to the intercellular space of the brain. Therefore it reflects many biochemical processes taking place in the central nervous system, making it a significant focus in understanding disease mechanisms.

This research aims to elucidate the effects of α-syn aggregates on human neuroblastoma (SH-SY5Y) cell line, providing insights at the cellular level. To investigate these effects, artificial cerebrospinal fluid is employed to mimic the extracellular environment of the central nervous system to perform α-syn aggregation.

Here, the cell viability study was used for cellular metabolic activity measurement where it indicated potent viability reduction and aggregate type dependent differences. Meanwhile, the LDH release assay revealed that two types of aggregation products possessed a similar effect on the cell membrane. Additionally, cell imaging was conducted, which revealed that α-syn fibrils formed in aCSF exhibit increased affinity to SH-SY5Y neuroblastoma cells. These results could be addressed to aCSF environment induced structural features of α-syn aggregates.

Atypical Stiff Person Syndrome: A Diagnostic Challenge in a Seronegative Case

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Introduction. Stiff Person Syndrome (SPS) is a rare neuroimmunological disorder with an estimated prevalence of 1–2 cases per million. It is characterized by progressive muscle stiffness and painful spasms, primarily affecting the proximal and truncal muscles. In 75–80% of cases, SPS is associated with autoantibodies against glutamic acid decarboxylase (GAD). The remaining cases, classified as cryptogenic or seronegative SPS, pose a significant diagnostic challenge due to the absence of established biomarkers.

Methods. A case report of seronegative SPS diagnosed based on clinical presentation, electromyographic (EMG) findings, and exclusion of alternative etiologies. The diagnostic pathway, disease manifestation, and treatment response were analyzed.

Results. A 42-year-old male with an 11-year history of progressive pain and symmetrical stiffness affecting the paraspinal, neck, and proximal muscles developed painful spasms, leading to severe functional impairment. Neurological examination revealed exaggerated lumbar lordosis, progressive rigidity, and gait disturbances, with symptoms worsening in an upright position and improving when supine. EMG demonstrated continuous motor unit activity at rest in agonist and antagonist muscles, supporting the SPS diagnosis.

A comprehensive workup, including paraneoplastic antibody screening and imaging, ruled out malignancy. Despite multiple hospitalizations and intravenous immunoglobulin (IVIG) therapy, symptom relief was partial. Symptomatic management included benzodiazepines, baclofen, and pregabalin.

Conclusions. This case highlights the diagnostic complexity of seronegative SPS, where the absence of specific autoantibodies complicates recognition and delays intervention. It emphasizes the need for clinical vigilance and reliance on electrophysiology. Early identification and prompt immunomodulatory therapy are crucial in mitigating disease progression and improving patient outcomes.

Patent Foramen Ovale and Stroke: Applying the Pascal Classification to Improve Secondary Prevention Strategies

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Introduction. The prevalence of patent foramen ovale (PFO) ranges from 14.7% to 31.3% and is up to three times more frequently detected in cryptogenic stroke patients. The primary challenge lies in determining when PFO is the likely stroke etiology, as indiscriminate closure may pose procedural risks and fail to address the underlying cause. The PASCAL classification can aid in identifying suitable candidates for PFO closure.

Methods. This retrospective study included patients aged 18–60 years diagnosed with PFO and treated at VUH Santaros Clinics following ischemic stroke and/or transient ischemic attack (TIA). Demographic, anthropometric, medical history, laboratory, imaging, and treatment data were analyzed. Patients were assessed using the PASCAL classification, though it was not initially used to guide secondary prevention strategy selection.

Results. The study included 180 patients (54.4% women, mean age 39.0±8.7 years); 78 (43.3%) underwent both pharmacological secondary prevention and percutaneous PFO closure, while 102 (56.7%) received pharmacological therapy alone. There were no significant differences in risk factors, gender distribution or comorbidities between the groups.

According to the PASCAL classification, a “”probable”” PFO-related stroke was more frequent in the interventional group (46.2% vs. 29.4%, p=0.002), while the “”unlikely”” category was more prevalent in the medication-only group (18.6% vs. 3.8%, p=0.021). No significant difference was observed in the “”possible”” category (N=92).

Conclusions. The PASCAL classification may be a valuable tool for guiding secondary prevention strategies in PFO patients after stroke or TIA. However, further evaluation is needed for patients in the “”possible”” category to optimize clinical decision-making.

Artery of Percheron Stroke: A Rare Cause of Bilateral Thalamic Infarction

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Introduction. The artery of Percheron (AOP) is a rare anatomical variant supplying both thalami, present in up to 26% of general population. Occlusion of the AOP can lead to bilateral thalamic infarction, a rare cause of ischemic stroke, consisting less than 1% of all cerebral infarctions. It is characterized by altered consciousness, oculomotor disturbances, and memory impairment. Diagnosing AOP infarction is challenging, as conventional head CT may appear unremarkable. However, MRI can reveal the characteristic “”V”” sign in approximately 60% of cases. Management follows standard ischemic stroke protocols.

Case Description. We describe a 61-year-old male with a history of alcohol abuse who presented with sudden loss of consciousness, oculomotor nerve palsy, vertical gaze palsy, and severe hypertension (223/112 mmHg). He had a Glasgow Coma Scale score of 8/15 (E1V2M5). Neurological examination showed no facial asymmetry, normal muscle tone and reflexes, and no pathological reflexes. Routine stroke laboratory tests were unremarkable. Head CT demonstrated bilateral thalamic hypodensity, while MRI confirmed bilateral paramedian thalamic infarction with midbrain involvement. Despite conservative management, his condition showed little improvement, and he remained lethargic and dysarthric. He was discharged to palliative care after two weeks.

Conclusions. AOP stoke, though uncommon, should be considered in patients with unexplained altered consciousness. Early MRI is critical for prompt diagnosis and intervention, emphasizing the need for clinical awareness of this condition.

Determining the Optimal Duration of Routine Eeg for Patients with Epilepsy: A Retrospective Study

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Introduction. The previous consensus-based guidelines of ILAE (Commission Report Commission on European Affairs: Subcommission on European Guidelines), American Clinical Neurophysiology Society and Canadian Society of Clinical Neurophysiologists recommend at least 20 minutes of technically satisfactory recording for routine electroencephalography (rEEG). One large study found no significant difference between the yield of 20 and 30-minute rEEG in adult patients. This retrospective study evaluates whether a 20-minute rEEG is sufficient for detecting epileptiform activity (EA) in patients with epilepsy.

Methods. We analyzed 151 outpatient rEEG recordings for patients with epilepsy, conducted at Vilnius University Hospital Santaros Klinikos. Each rEEG lasted 30 minutes. The onset time of the first EA was identified for each recording. Statistical analysis was performed using MS Excel and R4.2.2, with statistical significance set at $p < 0.05$.

Results. EA was detected in 67.6% of patients. On average, the first EA occurred after 10 minutes 33 seconds. EA was recorded within 10 minutes in 55.9% cases, and within 20 minutes in 80.4%. In 19.6% cases, EA was identified between 20 and 30 minutes. Of these, 55% of patients were asleep. No significant differences in EA detection were found between sexes, epilepsy types, or in relation to age.

Conclusions. The findings suggest that a 20-minute rEEG may be sufficient for the majority of patients. However, a considerable proportion of cases require the standard 30-minute duration to ensure the accurate detection of EA. Optimal rEEG duration should be individualized, according to patient characteristics and clinical judgment of the attending specialist.

Course and Treatment of Primary Progressive Multiple Sclerosis in a Patient With COVID-19: A Case Report and Literature Review

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Introduction. COVID-19 pandemic increased urgency to research multiple sclerosis (MS) disease course in relation to higher infections risk and its disease-modifying therapies' (DMT) safety. Post-pandemic era MS treatment with anti-CD20 drugs requires a thorough long-term results analysis.

Methods. a PubMed database literature review was conducted using search keywords: "Primary progressive multiple sclerosis", "Disease-modifying therapies", "DMT", "Anti-CD20", "COVID-19".

Case report. 52-year-old male K.P. initially complained of headaches in 2009, was diagnosed with multiple sclerosis in 2014 and after further clinical progression has been treated for primary progressive MS with ocrelizumab 600 mg twice yearly since 2018. In June 2022 K.P. tested positive for COVID-19. Fully vaccinated, patient underwent mild infection course and returned to pre-COVID-19 condition. A check-up 3 months later showed complete recovery with the expanded disability severity score (EDSS) of 4.0. The treatment with ocrelizumab was resumed 6 months later, in November 2022. 2.5 years of monitoring showed relapse-free disease management and no subsequent progression.

Results. among people with MS, COVID-19 infection was associated with higher annualized relapse ratio (ARR) and a shorter time-interval to first relapse but not with EDSS progression. Anti-CD20 drugs, especially rituximab, were associated with increased risk of severe COVID-19 outcomes, i.e. hospitalization, ICU and/or artificial ventilation and death. Long-term rituximab use resulted in higher severe and recurrent infection rates.

Conclusions. treatment with rituximab, an off-label anti-CD20 drug, increases the risk of severe COVID-19 in people with primary progressive multiple sclerosis. However, treatment with ocrelizumab, an EMA-approved anti-CD20 drug, is associated with significantly lower risk.

Caregiver Burden and Its Related Factors in Alzheimer's Disease

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Introduction. Alzheimer's disease (AD) is the leading cause of dementia, resulting in the loss of independence for affected individuals. That places significant strain on both patients and their caregivers. The objective of this study was to assess the burden experienced by caregivers of AD patients and the associated factors.

Methods. A cross-sectional study was conducted with 50 caregivers of AD patients. Participants completed a questionnaire that gathered demographic, clinical information, assessed caregiver burden (Caregiver Burden Inventory (CBI)), symptoms of anxiety and depression (Hospital Anxiety and Depression Scale (HAD)).

Results. The average CBI score was 37.05±22.25. 51% of respondents experienced significant burden (CBI ≥36). CBI score correlated with duration of AD (Spearman's Rho=-0.294; p=0.04), Mini-Mental State Examination score (Rho=-0.278; p=0.05), HAD-A (Rho=0.491; p<0.001) and HAD-D (Rho=0.458; p=0.001) scores. Significant anxiety (HAD-A ≥8) was found in 44% and significant depression (HAD-D ≥8) in 18% of respondents. Among caregivers, 42% provided care independently. They had higher HAD-D scores than those who received help (6.76±3.79 vs. 3.55±2.77; p<0.05). 56% of respondents did not receive financial support or rated it poorly. They had higher HAD-D (5.82±3.84 vs. 3.73±2.9; p<0.05) and HAD-A (8.96±4.71 vs. 6.23±4.2; p<0.05) scores than those, who rated the financial support positively. In the regression models, CBI score was the only significant predictor of HAD-A score. HAD-D score was significantly predicted by CBI score, as well as financial and personal help status.

Conclusions. Many caregivers suffer from significant anxiety and depression symptoms, which are influenced by a high burden and lack of support.

Orthostatic Tremor: A Case Report Underlining Diagnostic Challenges of a Rare Disorder

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Introduction. Orthostatic tremor (OT) is a high-frequency, low-amplitude tremor in the legs, evoked during standing and resolving after sitting or lying down. This rare disorder presents a diagnostic challenge because low-amplitude tremors often cannot be visualized. We present a case of orthostatic tremor with an extensive diagnostic evaluation.

Methods. A 72-year-old woman presented with a year-long complaint of leg shaking occurring upon standing and improved by walking or leaning. In addition, she reported unsteadiness and muscular tension radiating from the heels to the gluteal region. Her prior medical history revealed decades of arm tremors. The patient was admitted to the Neurology department for a comprehensive workup.

Results. Neurological examination revealed postural and action tremors in the hands (right > left), orthostatic leg weakness and shaking, a positive Romberg sign, and cogwheel rigidity in the left arm. Brain and cervical spinal MRI, along with thoracic and lumbar spine CT, showed no significant abnormalities. SPECT testing concluded normal I-123 accumulation. A lumbar puncture showed normal cell count and protein level. Autoimmune antibody panels, both in serum and cerebrospinal fluid, were negative. Polyneuropathy was ruled out by normal electroneurography findings. Finally, both surface and needle electromyography demonstrated a 15–16 Hz rhythmic muscle tremor during standing and walking.

Conclusions. OT should be suspected in patients with orthostatic-induced gait difficulties. The diagnosis can be confirmed by EMG detecting a high-frequency (15–18 Hz) leg tremor.

A Case of Eosinophilic Granulomatosis with Polyangiitis and COL4A1 Mutation

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Introduction. Eosinophilic granulomatosis with polyangiitis (EGPA) is a vasculitis affecting small and medium-sized arteries, characterized by asthma, rhinitis, nasal polyps, and prominent eosinophilia. While peripheral nervous system involvement is common, central nervous system manifestations are rare. COL4A1-associated brain small vessel disease is a rare genetic disorder characterized by fragile intracerebral vasculature. We present a case of EGPA in a patient with a pathogenic COL4A1 mutation.

Methods. A 47-year-old male presented with a month-long history of painful sensory disturbances in the legs and progressive leg paraparesis. Since age 16, he had seven hospitalizations for recurrent focal neurological signs, including sensorimotor aphasia and hemiparesis. Medical history included asthma, recurrent sinusitis, several surgeries for nasal polyps, sensorineural hearing loss, and aphakia.

Results. Blood tests revealed eosinophilia (40%). Spinal MRI showed no cord pathology, while electroneurography confirmed sensorimotor demyelinating polyneuropathy, which subsequently progressed from the legs to the arms. Lumbar puncture revealed elevated protein (0.776 g/L) without cytosis. Chest CT demonstrated mild bronchial inflammation, and nasal mucosa biopsy revealed eosinophilic infiltration. Secondary causes of eosinophilia were excluded, confirming the EGPA diagnosis. Head MRI revealed severe diffuse leukoencephalopathy, lacunar infarctions, and T2 hyperintense signal foci consistent with prior hemorrhages. Whole-exome sequencing identified a heterozygous pathogenic COL4A1 variant (p.Gly696Ser).

Conclusions. A multidisciplinary approach is essential when managing patients with multi-organ involvement to enable the earlier diagnosis of rare diseases.

A Systematic Review of ABCB1 Single Nucleotide Polymorphisms in Drug-Resistant Epilepsy: Study Power and Required Sample Size Analysis

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Introduction. ABCB1 single nucleotide polymorphisms (SNPs) rs1045642 (3435C>T, Ile1145Ile), rs2032582 (2677T>G/A, Ser893Ala/Thr), and rs1128503 (1236T>C, Gly412Gly) have been linked to antiseizure medication (ASM) resistance in previous studies. We performed a systematic literature review and evaluated the study power and effect sizes of conducted studies. We also calculated the required sample sizes to achieve a study power of 0.8 with a given effect size (ES).

Methods. Publications were obtained from the National Center for Biotechnology Information dbSNP database, and the systematic review was performed based on PRISMA criteria. The G*Power 3.1 tool was used to perform study power, effect size, and required sample size calculations. Studies were categorized in the very high ($1-\beta \geq 0.9$), high ($1-\beta = 0.8-0.9$), moderate ($1-\beta = 0.7-0.79$), low ($1-\beta = 0.5-0.69$), and very low ($1-\beta < 0.5$) study power groups. ES were categorized into large (>0.5), medium (0.2–0.5), and small (<0.2), respectively.

Results. High and very high statistical power for rs1045642, rs2032582, rs1128503 polymorphisms were achieved in 58.8%, 57.1%, 23.8% of the studies, respectively. For rs1045642, small ES required 720-13,353 participants, medium ES required 31-419, and large ES 9-143 participants. For rs2032582, the needed sample sizes were 725-2,675, 12-585, and 9-81, respectively; and for rs1128503, small, medium, and large ES required 799-5,787, 13-716, and 24-72 participants, respectively.

Conclusions. Our analysis revealed insufficient statistical power in previous ABCB1 SNPs and ASM resistance association studies. ES analysis and sample size calculations will benefit future genetic association studies on drug-resistant epilepsy.

Recurrent Hypothalamitis: A Case Report of Progressive Neuroendocrine Dysfunction and Therapeutic Challenges

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Introduction. Hypothalamitis is an extremely rare and poorly studied inflammatory condition of the hypothalamus that can lead to neuropsychiatric disorders, pituitary dysfunction, dysregulation of autonomic regulation and central diabetes insipidus, which is a cause of life-threatening electrolyte imbalance.

Case report. An 18-year-old male presented to the emergency department exhibiting nonspecific symptoms, such as lethargy and cognitive impairment, while remaining conscious but disoriented. Comprehensive evaluation led to the diagnosis of severe hypernatremia, panhypopituitarism, and diabetes insipidus. The laboratory results demonstrated stabilization through the administration of hypotonic solution and a consistent regimen of multiple hormone replacement therapies. Subsequent diagnostic imaging and pathological assessments identified the presence of chronic hypothalamitis, which provided a plausible pathophysiological basis for all his symptoms and altered lab results. The patient was discharged and instructed to continue the prescribed oral medication plan at home. During a follow-up 10 months after the initial diagnosis the patient once again presented with severe hypernatremia, cognitive deficit and signs of panhypopituitarism. The MRI revealed an increased hypothalamic lesion. High-dose methylprednisolone therapy has been initiated. The patient was reviewed in consultation with the neurology team - the initiation of cyclophosphamide therapy was planned. Further treatment and observation are forthcoming.

Conclusions. This case highlights the complexity of its diagnosis and management, emphasizing the need for long-term monitoring due to the risk of recurrence and disease progression. The recurrence of neurological symptoms and radiological progression despite initial stabilization underscores the refractoriness of the disease, necessitating further research to establish standardized diagnostic and therapeutic guidelines.

Is Mesiotemporal Edema a Reliable Indicator of Autoimmune Encephalitis in Patients with Seizures?

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Introduction. Autoimmune encephalitis (AE) and mesiotemporal lobe epilepsy are both frequently associated with abnormalities of hippocampal and amygdala on T2-FLAIR MRI. The aim of this study was to analyze the relationship between AE and mesiotemporal MRI findings in patients with seizures.

Methods. An anonymized dataset was analyzed, including patients who experienced seizures and presented with hippocampal and/or amygdala edema and/or increased signal intensity on MRI T2-FLAIR sequences. Patients were divided into two groups: those with autoimmune encephalitis and those without. A retrospective analysis was performed, assessing demographic characteristics, clinical presentation, laboratory and neuroimaging findings.

Results. The study included 20 patients (55% women, mean age 43.55 ± 18.3 years), of whom 40% (n=8) were diagnosed with AE, with 50% of them being seropositive. Amygdala edema and hyperintensity were present in 75% of AE cases, while hippocampal edema and hyperintensity were observed in 62.5%. Unilateral MRI changes were more common (87.5%) than bilateral (12.5%) ones. Logistic regression showed no significant associations between AE and MRI findings, including CA edema (OR = 1.000, p = 1.000), CA hyperintensity (OR = 1.500, p = 0.691), hippocampal edema (OR = 2.33, p = 0.365), or hippocampal hyperintensity (OR = 0.556, p = 0.552).

Conclusions. While MRI abnormalities were common, none were statistically significant predictors of AE. Further studies with larger cohorts are needed to better define the role of MRI markers in AE diagnosis.

Basilar Artery Occlusion after the Simultaneous Extraction of Four Wisdom Teeth

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Introduction. Wisdom tooth extraction is a surgical procedure to remove 1-4 third molar teeth according to the indications to avoid problems later in life. All four wisdom teeth can be removed simultaneously. A stroke caused by dissection of the vertebral artery and subsequent occlusion of the basilar artery is an extremely rare complication of this procedure.

Methods and results. A 33-year-old healthy female was admitted to the hospital for the extraction of all four wisdom teeth with intravenous anaesthesia. The next morning after the procedure, the patient complained of dizziness, dysarthria, left-sided numbness, left arm weakness, and discoordination. Suspecting stroke, the patient was transferred to the nearest stroke unit. The neurologist diagnosed vertebrobasilar stroke. Urgent brain CT showed no changes, CT angiography – basilar artery occlusion and left vertebral artery hypoplasia. Urgent mechanical thrombectomy was performed, left vertebral dissection diagnosed. The patient reported neck hyperextension due to severe pain during the teeth extraction procedure. Control CT showed acute cerebellar ischemia. Anticoagulation was initiated. Neurological signs and symptoms regressed. The patient was discharged with aspirin. The follow-up by duplex ultrasonography showed a regress of mural hematoma in vertebral artery after one year.

Conclusions. The one-step extraction of all wisdom teeth could be a strong stress for a patient and cause an acute vertebral artery dissection with subsequent thrombosis of the basilar artery. Urgent mechanical thrombectomy is a highly effective method of treatment. Color-coded ultrasound is a non-invasive, easily repeatable, and accurate diagnostic method for the follow-up of the dissection of cervicocerebral arteries.

Complete Recovery from Collet-Sicard Syndrome Caused by Carotid Artery Dissection with Pseudoaneurysm: Diagnosis and Follow-up with Cervical Duplex Ultrasound

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Introduction. Collet-Sicard syndrome is caused by damage to the four lower cranial nerves (IX-XII). Carotid artery dissection with pseudoaneurysm is one of its rarest manifestations.

Methods and results. A 33-year-old previously healthy male presented with acute numbness of the tongue, palate, and a headache. Blood pressure was 145/95 mmHg, heart rate 68 beats/min. Arterial hypertension was diagnosed. After the correction of blood pressure, the patient discharged. On the next day, he was admitted due to a severe headache, speech and swallowing disorder. Neurological examination revealed left-sided hypesthesia in the tongue, its deviation to the left, absence of posterior pharyngeal reflex, dysarthria, dysphonia, dysphagia. Urgent head CT was without acute changes, however, CT angiography revealed left distal cervical ICA dissection with 70% stenosis. The patient was hospitalized and treatment with anticoagulants initiated. Cervical duplex ultrasound (CDU) showed mural hematoma of ICA and moderate stenosis. The patient was discharged on aspirin. After 10 days left neck pain occurred, neurologically left-sided tongue and shoulder atrophy was detected. CDU revealed left distal ICA high-grade stenosis with pseudoaneurysm, confirmed by MR angiography. It was decided to withheld from interventional treatment due to a high risk of complications. Compression neuropathy of the IX-XII nerves was treated with acetylsalicylic acid. Neurological symptoms regressed within 3 months. Follow-up by CDU showed ICA regression after 9 months, ultrasound data were confirmed by MR angiography.

Conclusions. Collet-Sicard syndrome, caused by trauma-related ICA dissection with pseudoaneurysm may be successfully treated with medications. Follow-up with CDU is highly recommended.

Early Fibrinogen Depletion Coagulopathy after Intravenous Thrombolysis with Alteplase in Patient with Ischemic Stroke

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Introduction. In rare cases, alteplase can lead to fibrinogen depletion and severe bleeding. We present a case of early fibrinogen degradation coagulopathy following intravenous thrombolysis (IVT) in a patient with acute ischemic stroke.

Methods. A 67-year-old man with acute ischemic stroke underwent IVT, followed by mechanical thrombectomy. 4 hours after IVT the patient deteriorated significantly with the NIHSS score worsening from 5 to 14. Head CT showed a massive (~143 cm^3) intracerebral hemorrhage with ventricular and subarachnoid extension, along with an 8 mm midline shift. Additionally, the patient developed systemic bleeding manifestations, including epistaxis and hematuria. The fibrinogen level was <0.4 g/l. The patient received 20 units of cryoprecipitate, 2 g of fibrinogen concentrate, and 2 units of platelets. Subsequently, a craniotomy and hematoma evacuation were performed.

Results. The patient demonstrated no neurological improvement, ultimately leading to death. Literature suggests that early fibrinogen monitoring—both before and 2 hours after IVT—may aid in detecting coagulopathy and preventing fatal complications. Furthermore, tenecteplase may offer a safer thrombolytic profile with the same effectiveness as alteplase.

Conclusions. Fibrinogen monitoring before and shortly after IVT may enable early detection and treatment of severe coagulopathy.

Neurosonology Training for Medical Students – A Needs Assessment

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Introduction. Ultrasound has become an essential tool in medical education, enhancing both theoretical learning and clinical practice. However, standardized ultrasound training for medical students remains lacking, particularly in neurosonology, and data on their learning experiences are scarce. Understanding students‘ perceptions of neurosonology and their experiences could highlight the need for improved training. This study aims to assess students‘ views on neurosonology and explore how it should be integrated into medical curricula.

Methods. In March 2025, an online questionnaire was distributed to medical students at Vilnius University. The survey assessed ultrasound training, exposure to neurosonology and interest in hands-on training.

Results. A total of 144 students responded. While 61.8% (n=89) of students reported having theoretical ultrasound training, only 45.8% (n=66) had hands-on experience. Neurosonology exposure was particularly limited, with 89% (n=127) of students reporting they had never been introduced to it, regardless of their study year. 65% (n=94) of students stated they had no knowledge of neurosonology, and 29% (n=42) rated their knowledge as poor. Despite limited exposure, the majority (76%, n=109) believed that neurosonology plays an important or very important role in neurology. Therefore, 64% (n=92) of students expressed interest in participating in practical neurosonology training and 77% (n=111) supported the integrating it into the curriculum, favoring neurology or radiology courses.

Conclusions. There is a significant gap in neurosonology education, despite strong student interest and recognition of its importance. Standardized ultrasound training for medical students should be incorporated to prepare them for clinical practice.

Outcomes of Status Epilepticus: An Analysis of Causes and Predictors

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Introduction. Status epilepticus (SE) is a life-threatening condition with poor outcomes related to its causes, management and an ageing population. This study aimed to evaluate the causes, case fatality rate, and risk factors associated with death in SE cases.

Methods. We analyzed anonymized data from adult patients (≥18 years) treated for SE at VUHSK between 2005 and 2024. Normality was assessed with Kolmogorov–Smirnov test, Mann-Whitney U test was used for between-group comparisons, and Chi-square, Fisher, and Fisher-Freeman-Halton tests for categorical variables. A stepwise logistic regression model identified independent mortality predictors. The chosen significance level was $p < 0,05$. Analyses were performed using Microsoft Excel 2016 and IBM SPSS 27.

Results. The study included 563 patients (median age: 60 years, IQR: 41–69). Spectrum of etiology comprised acute (43.6%), progressive (9.8%) remote (4.4%) and unknown (5.1%). Alcohol-related (17.1%) and cerebrovascular causes (13.7%) of SE predominated. The overall case fatality rate was 14.9%. Death was more common in patients with structural brain injury while survivors more often had non-structural causes ($p<0.001$). A stepwise logistic regression model showed the following independent predictors of fatality (OR, (95% CI): older age (1.2, (1.1; 1.4), $p=0.002$), refractory SE (21.2, (3.0; 229,7), $p=0.012$), longer SE duration (1.0, (1.0; 1.1), $p=0.02$), longer hospital stay (1.1, (1.0; 1.2), $p=0.041$), and structural etiology (1787.7, (10.7; 299367.7, $p=0.004$).

Conclusions. Predominant SE etiology is alcohol-related and cerebrovascular. Approximately 3 in 20 SE patients die. Deaths in SE patients were most often associated with structural brain injury. Independent risk factors for death include older age, structural brain injury, and prolonged SE duration.

The Impact of Prehospital Factors on the Outcomes of Status Epilepticus

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Introduction. Status epilepticus (SE) is a life-threatening neurological emergency. This study aimed to assess the impact of prehospital factors on the outcomes of SE.

Methods. A retrospective analysis of anonymised data of patients treated for SE at VUH Santaros Clinics between 2021 and 2024, and had completed Emergency medical service (EMS) call forms was conducted. Shapiro–Wilk test was used to assess normality; Mann–Whitney U, Spearman's rho, Chi-square and Fisher's exact tests were applied. A multiple linear regression model was constructed. Statistical significance was set at $p<0.05$. Analysis was performed using Excel 2021 and IBM SPSS 27.

Results. The study included 68 patients, 41 (60.3%) were male. Median age was 66.5 years (IQR=59.0–77.0). The median time to EMS arrival was 12 minutes (IQR=8.0–22.0); time to the start of transportation to the hospital was 40 minutes (IQR=31.0–53.0). Diazepam (DZP) was administered to 45 (66.2%) patients: 8 (17.8%) orally, 12 (26.7%) IM, 23 (51.1%) IV, 2 (4.4%) both IM and IV. Median hospitalisation was 10 days (IQR=6.0–16.0), 45 (66.2%) patients were treated in the ICU, 16 (23.5%) died during hospitalisation. Intravenous DZP administration was associated with shorter hospitalisation ($p=0.043$, $r=-0.246$). Hospitalisation time showed a positive correlation with delay of transportation ($p<0.001$, $r=0.386$). No significant associations were observed between mortality and prehospital factors, including transportation delay, administration of DZP, or the patient's vital parameters. In the multiple linear regression model ($R^2adj=0.209$, $p=0.041$), delay of transportation was the only variable significantly associated with hospitalisation duration ($\beta=0.465$, $p=0.008$, 95%CI [0.073, 0.458]).

Conclusions. Early IV administration of DZP and a shorter interval between EMS call and the beginning of transportation during SE were associated with a reduced hospitalisation time. Prehospital factors were not associated with in-hospital mortality.

Use of Non-Invasive Vagus Nerve Stimulator for Migraine Treatment

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Background. Migraine is a lifelong neurovascular condition that can cause severe headaches, accompanied by symptoms such as nausea, light and sound sensitivity. Affecting over one billion people worldwide, migraine does not always respond to traditional pharmacological treatment. As a result, non-pharmacological methods, such as neuromodulation with a non-invasive vagus nerve stimulator, are increasingly being used. The aim of this literature review was to synthesize the evidence on the use of vagus nerve stimulation in migraine treatment.

Methods. Electronic database search was conducted in PubMed, with a ten-year limit applied. The following keywords were used: non-invasive, noninvasive, vagus nerve stimulation, treatment, migraine. Clinical trials and randomized clinical trials available in English language that explored nervus vagus stimulation in migraine treatment were included.

Results. The analysis showed that the stimulator is a safe device with minimal risk of adverse effects. One of the studies report positive results regarding the use of vagus nerve stimulation in reducing pain during an acute migraine episode. A reduction in the use of medications to relieve migraine attacks was also observed. The literature also describes the preventive effects of the stimulator. When used, especially in the treatment of migraines with aura, the number of headache days tend to decrease. However, a study analyzing inflammatory mediators indicates that neuromodulation using a vagus nerve stimulator does not have a significant effect on changes in anti-inflammatory mediators in peripheral blood.

Conclusion. Vagus nerve stimulation appears to be an effective non-pharmacological method for treating acute migraine episodes and for preventive reduction of migraine headache days.

An Overview of the Cases of Spastic Diplegia Subtype of Cerebral Palsy in the Children's Clinic of Tartu University Hospital

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Introduction. This retrospective study aims to provide an overview the spastic diplegia (SD) subtype of cerebral palsy (CP) in Estonia from 2009-2018, addressing classification and documentation challenges. The last major studies on SD in Estonia were over 15 years ago. This work provides insights into prenatal factors and outcomes for affected children.

Methods. Conducted at the Children's Clinic of Tartu University Hospital, patient data were retrieved using ICD-10 codes G80.0 and G80.1. Inclusion criteria: birth years 2009–2018, SD diagnosis at age >2, brain MRI. Exclusion criteria: other CP subtype or neurological disease. Data collected included motor deficit severity, prenatal factors, HIE (hypoxic-ischemic encephalopathy), brain imaging findings, and long-term outcomes. Motor dysfunction, previously assessed per Talvik (1992), was reclassified using the GMFCS (Gross Motor Function Classification Scale).

Results. The cohort included 46 children (37 boys, 9 girls). Preterm births accounted for 56.5% and 34.8% were born in asphyxia. HIE was found in 57.7% of preterm and 35% of term-born children after retrospective assessment due to inconsistent documentation. Neonatal brain imaging showed abnormalities in 73.7%. Of later MRIs (median age 2.6 years), 71.7% showed CP-related changes. The median follow-up period was 7.1 years. GMFCS classification varied on levels I-IV, none met criteria for level V. Gender differences in severe impairment were noted: girls experienced more severe limitations.

Conclusions. Better HIE documentation in neonates could improve understanding of neurodevelopmental outcomes. The study found lower motor impairment severity than some global CP registries, with 82.6% at GMFCS levels I–II. Implementing GMFCS across Estonia could standardize motor function assessment and allow international comparison. Accurate documentation of risk factors and outcomes is vital for long-term care. Further research on other CP subtypes and age groups is needed.

"The Boy Died of Respiratory Muscle Paralysis": Diagnosis and Treatment Methods of Poliomyelitis in Interwar Lithuania

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Introduction. At the end of the 19th and beginning of the 20th centuries, polio, referred to as Heine-Medin disease, caused widespread epidemics and severe long-term complications, particularly in densely populated areas. This spurred scientific efforts to understand its etiology, pathogenesis, prophylaxis and treatment. This study explores how poliomyelitis was perceived and managed in Lithuania during 1920–1939, focusing on perception of the disease, diagnostic methods, and treatment approaches.

Methods. This article is based on analysis of 12 primary sources addressing poliomyelitis, including 53 articles and 7 papers from the Lithuanian scientific journal Medicina, published during the interwar period, as well as secondary sources. We adopted medical terms and treatment methods typical of the early 20th century and considered the historical context and prevailing approaches to disease management at the time.

Results. By conducting a microanalysis of only one disease – poliomyelitis – and comparing the treatment of polio patients in Lithuania with the data available from other European regions, reflecting the situation in the first half of the 20th century, we also indirectly assess the level of development of medical care in interwar Lithuania.

Conclusions. The medical practices in Lithuania during the interwar period were comparable to contemporary advances in other European regions. Despite limited understanding of the disease etiopathogenesis, Lithuanian physicians demonstrated a commitment to providing the best possible care for their patients, employing methods that reflected the medical progress of the time.

Subacute Sclerosing Panencephalitis Outcomes Based on Treatment Initiation Stage: A Systematic Literature Review

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Introduction. Subacute Sclerosing Panencephalitis (SSPE) is a rare, progressive, and fatal neurological disorder caused by persistent measles virus infection, predominantly affecting children. The recent resurgence of measles globally, driven by declining vaccination rates, has highlighted the need for effective SSPE management strategies. Currently, treatment approaches focus on managing symptoms and slowing disease progression. This review aims to systematically evaluate treatment outcomes for SSPE based on the disease stage at which therapy is initiated.

Methods. A comprehensive PubMed search identified publications from 1994 to 2024, to identify studies that detail SSPE treatment regimens and report patient outcomes by disease stage at treatment initiation. Inclusion criteria: randomized controlled trials, cohort studies, and case reports that clearly documented treatment initiation stages and outcomes. The review classified cases into six treatment groups based on the most used medication combinations for early (stages I-II) and advanced stages (stages III-IV) of SSPE.

Results. A total of 30 studies comprising 80 SSPE cases met the inclusion criteria. Ribavirin combined with interferon and Isoprinosine showed favourable outcomes, particularly in early-stage patients. In contrast, Isoprinosine monotherapy resulted in the highest progression rates across both stages. Other combinations demonstrated varied effectiveness. Antiepileptic drugs provided symptomatic relief but did not alter disease progression.

Conclusions. This systematic review highlights the influence of SSPE treatment initiation stage on patient outcomes, suggesting that a tailored approach based on disease progression may improve efficacy.

Sphenoidal Emissary Foramen: Its Incidence and Clinical Significance

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Introduction. Sphenoidal emissary foramen (SEF) is an inconsistently observed opening located in the greater wing of the sphenoid bone. Prevalence of SEF as reported by different studies ranged from 10% to almost 80%. The goal of this study was to evaluate the incidence of SEF in a sample of dry skulls from Lithuania. It also highlights the clinical significance of SEF and explores its role in various disease processes.

Methods. 72 dry human skulls of known sex and originally collected from burial sites in Lithuania were examined. Documented characteristics of the skulls examined included: sex, presence of SEF, its laterality, and the antimere in which SEF was found. Collected data was statistically analyzed with p-values lower than 0.05 considered statistically significant. A literature analysis was performed to explore the clinical significance of this structure and to contextualize the findings of the study.

Results. Of the 72 skulls investigated, SEF was identified in 43 (59.7%) of them. It was observed more often in female (N=15/21; 71.4%) rather than male (N=28/51; 54.9%) skulls and presenting unilaterally (N=27/72; 37.5%) as opposed to bilaterally (N=16/72; 22.2%). Both the association between the sex and the presence of SEF as well as the difference in frequency of SEF occurring unilaterally vs bilaterally were not statistically significant. Despite SEF more often occurring in the left (N=14/72; 19.4%) as compared to the right (N=13/72; 18.1%) antimere, this difference also lacked statistical significance.

Conclusions. In this study, SEF was found in more than half of the examined skulls and without showing a strong preference for sex, antimere or unilateral vs bilateral occurence. These findings add to the current anatomical knowledge of SEF. This knowledge is especially important during surgical interventions performed close to this structure, as being unaware of SEF could lead to an increased risk of complications.

Atypical Clinical Manifestation of Pseudomeningocele Following Suboccipital Craniotomy for Subependymoma Resection

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Introduction. Pseudomeningocele is an abnormal extradural accumulation of CSF at the operative site following cranial or spinal surgery, with an incidence of 8-28%. A dural tear or improper closure of the dura creates a potential pathway for CSF leakage, which is asymptomatic or presents with symptoms of intracranial hypotension. We present a unique case of an atypical clinical manifestation of a pseudomeningocele following suboccipital craniotomy for subependymoma resection.

Methods. Written informed consent was obtained directly from the patient. A literature review was conducted using PubMed, Google Scholar and ClinicalKey databases, employing the keywords: pseudomeningocele, leg pain, subependymoma, suboccipital craniotomy.

Results. A 49-year-old male with cervical and lumbar stenosis (L3-L4, L5-S1) was incidentally diagnosed with a ~9x12 mm subependymoma on MRI. He underwent a medial suboccipital craniotomy with an uncomplicated recovery. During a routine follow-up, two months post-op, he reported exertion-triggered headaches and sharp, electric-like pain in his left leg provoked by sudden head movements. Additionally, he identified a point near the inion on the occiput, where tapping caused pain radiating down his legs. The force of tapping defined pain distribution, starting in the left anterior thigh, extending to the anteromedial calf, ankle, anterior foot, and spreading to the right leg. A cranial MRI revealed an occipital pseudomeningocele. Observatory management was chosen. A year later, symptoms and pseudomeningocele size had significantly regressed.

Conclusions. To our knowledge, this is the first reported case of transient lower extremity pain triggered by occipital scalp pressure over a pseudomeningocele following suboccipital craniotomy for subependymoma resection.

Prevalence of Cigarette Use Among Medical Students (Years I-VI) at Vilnius University Faculty of Medicine: Transition to Electronic Cigarettes. Advantages and Disadvantages

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Background and aim. Electronic cigarette use has been rising among young adults, including university students. Although often seen as a safer alternative, e-cigarettes still pose health risks. Medical students' smoking habits are especially relevant, as they are future healthcare professionals. The aim of this study is to analyze the prevalence of cigarette use among medical students at Vilnius University Faculty of Medicine and their motives for switching to e-cigarettes, comparing the findings with literature data.

Materials and methods. The student survey was conducted using the Google Forms platform. Statistical analysis was performed using MS Excel and RCommander. The significance level was set at $p < 0.05$. Relationships between variables were assessed using the Chi-square (χ^2) test and binary logistic regression. A systematic literature review was conducted in the PubMed database, focusing on studies from 2014–2024. A systematic literature review was conducted using the PubMed database. Only full-text, freely available articles in English were included. Articles were searched within a 10-year period – from 2014 to 2024. A total of 199 publications were found. After excluding articles with irrelevant titles, reviewing abstracts, and then full texts, 21 articles remained that met the search criteria.

Results. The study included 195 respondents, 38.5% (n=75) smokers. Among them, 52% (n=39) smoked e-cigarettes, and 59% (n=23) had previously smoked traditional cigarettes. E-cigarette use was significantly associated with smoking status (p=0.001) but not with age (p=0.195) or study year (p=0.507). Logistic regression showed that scent was an independent risk factor for starting e-cigarettes (OR=7.583, 95% CI [0.092-1.541], p=0.0238). Literature suggests e-cigarettes are mainly used abroad as a smoking cessation tool, often more effective than nicotine replacement therapy (NRT).

Conclusions. The study found a preference for e-cigarettes among respondents, contrasting with international data, where they are mainly used for smoking cessation. The scent was a key factor in e-cigarette choice.

Psychotropic Medication Non-Adherence Among Adult Patients with Schizophrenia

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Introduction. Schizophrenia is a severe mental disorder, requiring long-term psychotropic medication treatment. Non-adherence is a serious barrier for treatment and is linked to worsened clinical outcomes, including increased hospitalizations, relapses, and poor prognosis. Medication adherence is associated with patient-related, medication-related, illness-related, and external factors.

Methods. Literature review was conducted by searching PubMed, EBSCO, and Google Scholar for articles published between 2012 and 2025. Search terms included "non-adherence," "non-compliance," "schizophrenia," and "psychotropic medication." Studies addressing adult patients with schizophrenia and discussing non-adherence were included.

Results. Literature review identified multiple factors influencing non-adherence to psychotropic medication in schizophrenia. Cognitive impairments, poor insight into the illness, medication side effects, and lack of social support were most important. Non-adherence rates varied widely ranging mostly from 47,2 to 95 %. The consequences were associated with higher medical service utilization. Combined long term strategies, focused on adherence-related problems, were recommended. Patient–related interventions were beneficial in patients with poor awareness of their disease, reducing negative attitudes toward medication and improving cognitive functions. Psychosocial methods, like family-related interventions, were proven efficient (5,10). Good therapeutic alliance was also crucial. Lastly, pharmacological treatment-related interventions had very high adherence rates, up to 96%, in patients under depot treatment, 85% with long-acting injected risperidone and 97% with both.

Conclusions. Psychotropic medication non-adherence remains a major issue in the management of schizophrenia. Addressing cognitive, social, and treatment-related factors through comprehensive patient care strategies is crucial for improving medication adherence and clinical outcomes.

Dissociative Seizures in Clinical Practice: Case Report

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Introduction. Dissociative seizures (DS), also known as psychogenic non-epileptic seizures (PNES), are a disorder characterized by paroxysmal events resembling epileptic seizures, but lacking epileptiform activity on electroencephalography (EEG). DS often coexists with psychiatric disorders and is associated with significant psychosocial distress. Early identification and appropriate management are essential to improve patient outcomes.

Methods. We present the case of a 25-year-old male hospitalized for recurrent seizure-like episodes initially suspected to be epileptic in origin. The patient underwent comprehensive neurological and psychiatric evaluation, including multiple EEG recordings, neuroimaging, and extensive psychological assessments. A structured clinical interview was conducted to evaluate the presence of psychiatric comorbidities, and psychological testing was used to assess dissociative symptoms and emotional distress.

Results. Despite an initial diagnosis of epilepsy, EEG monitoring revealed no epileptiform activity, leading to the reconsideration of the diagnosis. The patient exhibited prolonged, asynchronous movements, absence of postictal confusion, and variability in seizure semiology, suggestive of DS. Further psychiatric assessment revealed comorbid major depressive disorder and attention-deficit/hyperactivity disorder. Treatment included discontinuation of antiepileptic drugs, introduction of antidepressants, anxiolytics, and structured psychotherapy. Over the course of hospitalization, a reduction in seizure frequency was observed, particularly following psychological interventions.

Conclusions. This case highlights the importance of distinguishing DS from epilepsy to avoid unnecessary treatments and hospitalizations. Multidisciplinary management, incorporating psychiatric and neurological expertise, is crucial in addressing underlying psychological distress and improving patient prognosis, early detection and effective intervention.

Inflammation, Brain Structure, and Cognition in Postpartum Depression: Theoretical Model

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Background. Postpartum depression (PPD) is a severe mental health condition that affects maternal well-being and child development. Emerging evidence suggests that systemic inflammation may contribute to neurobiological changes in PPD, yet the underlying mechanisms remain unclear. This study aims to explore the relationship between inflammatory markers, structural and functional brain alterations, and cognitive function in PPD patients.

Methods. The study will employ a multimodal neuroimaging approach, combining structural, functional, diffusion, and spectroscopic MRI to assess brain integrity in women with PPD (n=35) and healthy postpartum women (n=35). Blood biomarkers, including interleukin-6 (IL-6), C-reactive protein (CRP), and tumor necrosis factor-alpha (TNF-α), will be measured to examine their association with brain alterations and cognitive performance. A comprehensive cognitive assessment using the Cambridge Neuropsychological Test Automated Battery (CANTAB) will evaluate executive function, decision-making, and working memory.

Objectives. The research aims to determine whether elevated inflammatory factors correlate with changes in gray matter volume, diffusion metrics, and connectivity patterns, particularly within the dorsolateral prefrontal cortex (dlPFC) and superior-lateral medial forebrain bundle (slMFB). Furthermore, magnetic resonance spectroscopy (1H-MRS) will assess neurochemical alterations in the dlPFC, investigating potential links between systemic inflammation and local neuroinflammatory processes.

Significance. By integrating physiological, neuroimaging, and cognitive data, this study seeks to advance our understanding of PPD's neurobiological mechanisms, providing insight into potential diagnostic biomarkers and therapeutic targets. Findings could contribute to improving early detection and intervention strategies, ultimately benefiting maternal mental health.

Psychosocial Functioning Changes and Coping Mechanisms in Brain Metastases: A Clinical Case Study

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Objective. To analyse the impact of brain metastases on a patient's psychosocial functioning.

Methods. A clinical case study was conducted on a patient with brain metastases using GAD-7, PHQ-9, MMSE, and the Distress Thermometer, as well as literature from PubMed, Clinical Key, Google Scholar.

Introduction. Brain metastases occur in ~20% of oncology patients. As treatment advancements allow patients with metastases to live longer, issues related to quality of life and psychosocial adaptation are gaining significance.

Case Report. A 49-year-old male patient was diagnosed in 2021 with rT3N1 clear cell renal carcinoma in the right kidney. 2023-04, he began experiencing involuntary twitching in his right arm and head, while relatives noticed changes in his behaviour and personality. Brain CT and MRI scans confirmed metastases. The patient underwent targeted therapy (Cabozantinib) and, in 2023-06, received radiation therapy. 2024-02, symptomatic epilepsy was diagnosed. 2024-07, Everolimus treatment was initiated. 2023-09, metastatic lesions were found in the pancreas, lymph nodes, and new areas of the brain.

2024-11, psychiatric evaluation revealed anxiety, irritability, low mood, hand tremor, and ataxic gait. Organic anxiety disorder (F06.4) was diagnosed, and Quetiapine was prescribed. The presentation will evaluate the patient's psychosocial functioning from 2024 to 2025.

Conclusions. Brain metastases cause cognitive, functional and emotional impairments, leading to stigma, isolation, personality alterations, and relationship shifts. Internal factors such as emotional self-regulation and self-awareness, as well as external factors such as social support and family dynamics, play a crucial role in enhancing psychosocial functioning.

Factors Influencing Attitudes Toward Suicide Among Medical Students at Vilnius University

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Introduction. Attitudes toward suicide among medical students are critical for effective prevention, given their future roles in healthcare. This study explores how academic experience, gender, religiosity, prior suicide exposure, and work experience shape attitudes among medical students at Vilnius University using the Attitudes Toward Suicide (ATTS) questionnaire.

Methods. A sample of 232 medical students (129 first-year, 103 fifth-year) in integrated studies at Vilnius University completed the ATTS questionnaire, assessing five factors: Loneliness, Non-Intervention, Unpredictability, Condemnation, and Acceptability. Data were analyzed using the Mann-Whitney U test due to the ordinal nature of Likert-scale responses. Normality tests (Shapiro-Wilk) indicated non-normal distribution for most factors ($p < 0.05$), except Acceptability ($p = 0.164$). A two-tailed approach ensured neutrality in hypothesis testing.

Results. First-year students ($M = 2.71$, $SD = 0.71$) perceived suicide as more unpredictable than fifth-year students ($M = 2.20$, $SD = 0.71$; $p < 0.001$). Religiosity significantly influenced four factors: non-religious students ($N = 153$) associated suicide more with loneliness and non-intervention, and viewed it as more acceptable, while religious students ($N = 79$) were more condemning (all $p < 0.01$). Gender, prior suicide exposure, and work experience showed no significant effects, though exposure trended toward higher acceptability ($p = 0.058$).

Conclusions. Academic experience and religiosity significantly shape medical students' attitudes toward suicide, emphasizing the need for tailored suicide prevention education in medical curricula.

Neurochemical Trends in Antidepressant Research: Moving Past the Monoamine Hypothesis

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Introduction. For over six decades, the monoamine hypothesis has shaped antidepressant pharmacotherapy, yet growing evidence challenges its comprehensiveness. This review seeks to evaluate the most recent scientific research and find emerging theoretical and practical neurochemical trends for treating depression.

Methods. A systematic search on PubMed found 22 reviews (published in the last 5 years) analyzing neurochemical mechanisms and treatments for depression. The articles, including systematic reviews and meta-analyses, were summarized and analyzed regarding their conclusions and recommendations on neurochemical depression treatments.

Results. Ten studies argue that serotonin's role in depression lacks consistent empirical support, with one claiming that classical SSRIs decrease serotonin levels. Alternative pathways are increasingly explored, with nine studies highlighting the significance of glutamate modulation through (S)-ketamine, NMDA antagonists, and dextromethorphan/buproprion (DXM/BUP) as rapid-onset antidepressants. Five studies underscore the role of GABAergic modulation and neurosteroids, particularly brexanolone, in mood regulation. Additionally, four studies identify inflammation and oxidative stress as potential targets, suggesting the therapeutic value of antioxidants and anti-inflammatory treatments (including a novel suggestion – stingless bee honey, SBH). Other emerging areas include brain-derived neurotrophic factor (BDNF) driven synaptic plasticity, mitochondrial function, mesenchymal stem cells, psychedelics and neuromodulation.

Conclusion. These findings emphasize the trend beyond a monoamine-centric perspective toward a multi-system approach in antidepressant development and prescription. Notably, several emerging treatments, such as ketamine and DXM/BUP, have already been approved for clinical use in the U.S., underscoring the growing shift toward exploring alternative neurochemical pathways.

The Impact of Migration Duration on Cognitive Function and Life Satisfaction

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Introduction. The impact of migration duration on cognitive function and life quality is not well understood. Migration involves adapting to new environments, cultures and social systems, which can influence mental well-being. This study assessed the relationship between relocation duration and cognitive performance, including executive function, memory, and problem-solving, as well as life satisfaction in individuals living abroad compared to those who remained in their home country.

Methods. This cross-sectional study included participants aged 18 to 45, categorized into four groups: (1) individuals living abroad for less than 6 months, (2) those abroad for 6–12 months, (3) those abroad for over 12 months, and (4) individuals who had never relocated. Cognitive function was assessed using the Stroop Test, a working memory task, and a problem-solving questionnaire. Quality of life and well-being were measured with the SF-36, Life Satisfaction Scale (LSS), and Migration Stress Scale (MSS). Participants were recruited online through snowball sampling

Results. A total of 120 participants (30 per group) with a mean age of 32 ± 5 years were included. Findings suggest that individuals who have lived abroad long-term may exhibit higher cognitive performance and life satisfaction compared to short-term migrants and non-migrants. Additionally, a moderate negative correlation was observed between migration stress and cognitive performance.

Conclusions. Longer migration duration is associated with better cognitive function and higher life satisfaction. Adaptation to life abroad may positively influence well-being. Further longitudinal research is needed to confirm these findings and explore causal relationships. Providing support systems for recent migrants could reduce stress and enhance cognitive and emotional adjustment.

Suicide Intervention Knowledge Among Medical Students: Role of Academic Experience and Behavioral Factors

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Introduction. Suicide intervention skills are vital for medical professionals, but students' knowledge levels vary. This study assessed suicide intervention knowledge using the Suicide Intervention Response Inventory (SIRI) among medical students, exploring the influence of academic experience, behavioral factors, life satisfaction, and attitudes toward suicide acceptability.

Methods. A cross-sectional study involved 232 medical students from Vilnius University. Participants completed a questionnaire on SIRI scores (0–25), study year, gender, suicide exposure, help-seeking behavior, work experience, alcohol and psychoactive substance use, life satisfaction, and attitudes toward suicide acceptability. SIRI scores were non-normally distributed (Shapiro-Wilk, $p < 0.05$), leading to non-parametric tests: Mann-Whitney U for two-group comparisons, Kruskal-Wallis for multiple groups, and Spearman's correlation for associations.

Results. The mean SIRI score was 15.99 (SD = 2.93), ranging from 7 to 22 correct responses, indicating moderate but varied knowledge (N = 232). Fifth-year students scored significantly higher than first-years ($p = 0.016$). No differences were found by gender, suicide exposure, help-seeking, or work experience ($p > 0.05$). Alcohol use, psychoactive substance use, and life satisfaction showed no impact ($p > 0.05$). SIRI scores did not correlate with alcohol use, psychoactive substances, or life satisfaction ($p > 0.05$), but showed a weak positive correlation with suicide acceptability (rho = 0.130, $p = 0.048$).

Conclusions. Academic experience enhances suicide intervention knowledge, with fifth-year students outperforming first-years. A permissive attitude toward suicide slightly improves knowledge. Targeted training is needed to address knowledge gaps across all study years.

Postpartum Sleep Disorders

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Introduction. Studies show that more than half of women experience sleep disturbances during postpartum period. Sleep disturbances incur high economic costs and contribute to mood disorders like depression. The aim of this study was to assess the prevalence of postnatal sleep disturbance in women up to 6 months postpartum.

Methods. The link to the survey was published on Facebook and Instagram. The survey data was collected between December 2024 and February 2025. The questionnaire consisted of demographic, psychosocial, medical questions, including: Pittsburgh Sleep Quality Index, International Restless Legs Syndrome Scale, Athens Insomnia Scale. Statistical analysis was performed using Microsoft Excel and Python.

Results. Only 12.9% of the 139 women in the study had good sleep quality and 87.1% had poor sleep quality. Restless legs syndrome was experienced by 46.8% of women. Symptoms of insomnia were experienced by 71.2% of the participants. Women had poorer sleep quality in the first months after giving birth if they had a caesarean section, were exclusively formula fed, slept in the same bed with the baby, or had a history of mood disorders. Their sleep quality was also worse when they lacked the support of a partner or relatives.

Conclusions. The results show that the majority of women in the postnatal period have poor sleep quality, insomnia symptoms and almost half of the women in the study had experienced symptoms of restless legs syndrome. Various demographic, psychosocial and medical factors have been found to influence women's sleep quality.

Phagophobia: A Review of Cases

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Introduction. Phagophobia, or the fear of swallowing or choking, is an anxiety disorder that significantly disrupts daily life and can lead to severe consequences like weight loss, malnutrition, and social isolation. Despite its impact, it is often underdiagnosed, making early identification and treatment crucial. Understanding the condition's etiology, presentation, and effective treatments is vital for improving patient outcomes. This review aims to synthesize the available literature on phagophobia, focusing on differential diagnosis and treatment strategies.

Methods. A systematic research of the PubMed database was conducted using keywords such as "Phagophobia," "Choking Phobia," "Swallowing Phobia," and "Psychogenic Dysphagia." Of the 138 articles found, 23 clinical studies in English were included. A total of 93 clinical cases were identified, with 88 relevant cases analyzed. These were categorized into children (54) and adults (34), with the review focusing on adult cases.

Results. The review of 34 adult cases showed that 68% were women and 32% were men, with an average age of 39.1 years. In half of the cases, the phobia was triggered by a choking experience, while others were linked to stressors like family conflicts or medication. 62% of patients received non-pharmacological treatments, and 34% were treated with pharmacotherapy, primarily alprazolam. Exposure therapy was the most effective treatment.

Conclusions. Phagophobia can severely impair an individual's functioning, making early diagnosis and treatment essential. Exposure therapy is the most effective treatment, but accurate differential diagnosis is crucial. Proper specialist training is crucial to differentiate phagophobia from eating and feeding disorders during differential diagnosis.

Early-Onset Schizophrenia Diagnostic Challenges and Treatment Strategies: A Case Report

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Introduction. Early-onset schizophrenia (EOS) is a rare and complex psychiatric disorder, with symptoms occurring before the age of 18. Compared to adult-onset schizophrenia, EOS is associated with higher cognitive dysfunction, a higher probability of treatment resistance, and a worse long-term prognosis. Diagnosis is challenging due to symptom overlap with other psychiatric conditions. Delayed diagnosis and prolonged untreated psychosis worsen functional outcomes and quality of life.

Methods. This case report describes a 17-year-old male diagnosed with paranoid schizophrenia. The patient's clinical data was obtained from medical records and direct interactions between September 2024 and January 2025. A literature review was conducted using PubMed and Google Scholar, prioritizing systematic reviews and meta-analyses published within the past decade.

Results. The case review highlights challenges in diagnosis and treatment, including recurrent psychotic episodes, and persistent symptoms resistant to pharmacological intervention. Despite reaching therapeutic plasma concentrations, clozapine treatment did not produce a satisfactory response, leading to the reinstatement of haloperidol and olanzapine, which proved to be more effective. Persistent cognitive dysfunction and treatment resistance complicated management. Psychosocial interventions including family psychoeducation, cognitive-behavioral therapy, and social skills training show promise in improving functional outcomes. Cognitive remediation therapy (CRT) was identified as a potentially effective intervention for cognitive enhancement.

Conclusions. Early diagnosis and intervention in EOS are critical for improving long-term outcomes. A multidisciplinary approach that integrates pharmacotherapy and psychosocial interventions is essential for improving outcomes and enhancing the quality of life of patients with EOS.

Self-Harm and Mental Health Disorders in Adolescence

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Aim. To identify mental health disorders associated with self-harm in adolescence.

Methods. A retrospective analysis of patients hospitalized at the RVPL University Child and Adolescent Unit from 2022 to 2025. Data included ICD-10 psychiatric diagnoses, self-harm episodes and recurrence, and sociodemographic indicators. Statistical analysis was performed using R-Commander; results were significant at $p<0.05$.

Results. The sample included 600 patients (mean age 15.13; 27% male, 73% female). Self-harm was reported in 71.3% of cases. The most frequent diagnoses among those who self-harmed were depressive disorders (F32.10, F32.30, F33.1), comprising 25.7% of cases. All patients with recurrent depressive disorders (F33.1, F33.2, F33.3) had self-harmed ($\chi^2 = 195.279$, $df = 62$, $p < .001$). Recurrent self-harm was most common in patients diagnosed with moderate depression (F32.10, 20.9%) and paranoid schizophrenia (F20.0, 15.6%). No self-harm was recorded among patients with certain developmental disorders (F84.8, F71.1, F72.1).

Conclusions. Over 70% of hospitalized adolescents had self-harmed. Recurrent depressive disorders strongly predicted self-harm. Moderate depression and paranoid schizophrenia accounted for over one-third of repeated self-harm cases, suggesting these diagnoses indicate increased risk.

Beyond the Label: A Literature Review on the Neurotoxic Effects of Everyday Medications

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Introduction. Medications are crucial in healthcare but can inadvertently cause neurotoxic effects that impact neurological functions. This review highlights the neurotoxic effects of commonly prescribed drugs, aiming to raise awareness and promote safer prescribing practices among physicians.

Methods. A systematic literature review utilized databases like PubMed, Google Scholar, and ScienceDirect, focusing on studies from 2000 to 2024. We included research on the neurotoxic effects and mechanisms of various drug classes. The criteria emphasized studies on oxidative stress, mitochondrial dysfunction, neurotransmitter imbalance, neuroinflammation, ion channel disruption, and blood-brain barrier alterations. Relevant animal studies and grey literature were also considered.

Results. Statins and beta-blockers were linked to cognitive and neuropsychiatric issues. Proton pump inhibitors were associated with cognitive decline through mechanisms like vitamin B12 deficiency and gut-brain axis interactions. Non-steroidal anti-inflammatory drugs were noted for causing neurotoxicity via chronic gut inflammation, nutrient malabsorption, and oxidative stress. Selective serotonin reuptake inhibitors and anti-epileptic drugs were connected to serotonin syndrome, movement disorders, and encephalopathy, while fluoroquinolones caused neuropathy and seizures through mitochondrial damage. Chemotherapy agents were implicated in long-term effects such as peripheral neuropathy and cognitive impairment due to several mechanisms including mitochondrial toxicity and blood-brain barrier disruption.

Conclusions. Drug-induced neurotoxicity remains a significant, yet underrecognized clinical issue. Personalized prescribing and rigorous monitoring is crucial for reducing risks. Future research should focus on mechanistic studies and developing neuroprotective interventions to improve safety and efficacy in treatment outcomes.

Quantitative Comparison of C. Elegans Growth and Development in Monoxenic and Axenic Medium

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Caenorhabditis elegans is a widely used model organism in toxicology, molecular biology, and developmental research due to its genetic similarity to humans, well-characterized biology, and ease of cultivation. Traditionally, C. elegans is grown in a monoxenic medium where Escherichia coli acts as food. However, the presence of bacteria introduces metabolic interactions that can confound toxicological results and reduce experimental reproducibility.

To address this, axenic media—growth environments free of living microbes—have been developed. Semi-defined axenic media provide all necessary nutrients without E. coli, offering a potential alternative. However, milk powder is required to add "crunch", a requirement for the nematodes to consume the liquid media. Yet, composition of axenic media varies due to the complex nature of milk, introducing experimental variability.

In this work, we quantitatively compare the growth and development of worms grown in S-complete (a nutrient-rich, buffered medium supplemented E. coli that is widely used in toxicological studies) vs axenic media supplemented with milk to determine whether the absence of a bacterial food source leads to any morphological or developmental changes.

Our results show that there is no difference in the growth of C. elegans in monoxenic vs axenic media, demonstrating the viability of bacteria-free conditions for toxicological research. Therefore, using axenic media to test the toxicological effects of compounds should become standard practice, as it eliminates the influence of metabolically active bacteria on compound structure and stability, ultimately improving the accuracy and reliability of toxicity assessments.

Caffeine Consumption Trends and Awareness of Its Health Effects: A Comparative Study in Lithuania

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Introduction. This study examines coffee consumption habits, caffeine awareness, addiction prevention and side effects among medical students, high school students and adults in Lithuania, highlighting differences and the need to improve public education on caffeine-related risks.

Methods. The survey, conducted in October 2024 via anonymous questionnaires on Google Forms, targeted medical students, high school students, and Lithuanian adults. A total of 606 respondents completed the survey: 267 coffee drinkers, 202 medical students, and 137 high school students. The questionnaire included general questions common to all groups, along with specific questions for medical and high school students to assess and compare their awareness and knowledge of coffee consumption.

Results. The results highlight important toxicological aspects of caffeine consumption. Although coffee is widely consumed for its habitual and cognitive effects, a significant proportion of respondents—especially medical students—experienced adverse effects such as insomnia, anxiety, and withdrawal symptoms. Despite its clear addictive potential, many individuals were reluctant to switch to decaffeinated alternatives. Medical students were more likely to consider the caffeine content of their intake when ordering coffee. The study reveals a gap between awareness and behavior, emphasizing the need for improved public education on the health and toxic effects of caffeine.

Conclusions. Coffee consumption is prevalent across all groups; however, medical students demonstrate greater sensitivity to the negative effects of caffeine and show less willingness to modify their habits. These findings underscore the need for enhanced public awareness and education on the responsible use of caffeine.

Effect of Phthalates on Hippocampal Structure in First-Generation Female Rats

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Phthalates are endocrine-disrupting chemicals widely used as plasticizers in consumer products. This study investigates the effects of di(2-ethylhexyl) phthalate (DEHP) and dibutyl phthalate (DBP) on the thickness and neuronal density of the hippocampal CA1 and CA3 regions in female rats. These phthalates were selected due to their frequent detection at levels exceeding permissible limits in Lithuanian wastewater. The lowest doses, used alone or in a mixture, reflect environmentally relevant concentrations.

Thirty-six 1-2-month-old Wistar rats were divided into six groups: a phthalate-free control and five exposed to DEHP or DBP via supplemented biscuit pieces. The exposure groups received: 200 μg/kg DEHP, 1000 μg/kg DEHP, 100 μg/kg DBP, 500 μg/kg DBP, or a combination of 200 μg/kg DEHP and 100 μg/kg DBP. Exposure lasted daily for 3.5 months: 2 months prior to mating and 1.5 months during gestation and lactation. On the 21st gestation day, the rats were euthanized, and brains were fixed in formaldehyde. Each brain was hemisected, with one half paraffin-embedded and coronally sectioned at 10 μm thickness. Three hippocampal sections per rat were collected, mounted on histological slides, and stained with Nissl dye.

Neuronal density was assessed in 100 x 200 μm2 areas in CA1 and 200 x 200 μm2 areas in CA3. Thickness was measured by drawing 10 lines across each region.

Prior studies report reduced neuronal density and thickness in the CA1 and CA3 regions of male rat pups following DEHP and DBP exposure; we anticipate similar hippocampal alterations in females.