

Issued since 1920

2024

VOLUME 60 SUPPLEMENT 1

MEDICINA

- ABSTRACTS

**of the International Scientific
Conference on Medicine**

organized within the frame of the 82nd
International Scientific Conference
of the University of Latvia

Riga, Latvia

ISSN 1648-9233

**Abstracts
of the International
Scientific Conference
on Medicine**

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Scientific Conference
of the University of Latvia**

Riga, 2024

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Compiled by: Madara Marija Ose

Authors are fully responsible for the content of their abstracts.

Publishing supported by the corporation 'Sistēmu Inovācijas' and
Latvian Innovative Medicine Foundation.

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Oral presentations

ANAESTHESIOLOGY, REANIMATOLOGY AND INTENSIVE CARE

Correlation of corrected carotid artery flow time with left ventricular outflow tract velocity time integral after mini fluid challenge for assessment of fluid responsiveness

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Background. Corrected carotid artery flow time (ccFT) assessed by ultrasound may be an attractive method for detecting fluid responsiveness in critically ill patients. However, it is not clear whether a mini fluid challenge can induce changes in carotid flow measurements.

Aim. In our study, we attempted to compare whether ccFT changes after a mini fluid challenge and how it correlates with left ventricular outflow tract velocity time integral (LVOT VTI).

Methods. The study involved 20 adult patients. Only patients who met all inclusion criteria were included. Patients with acute pancreatitis and any type of gastrointestinal bleeding were selected. Carotid artery flow time was measured by ultrasonography. ccFT was calculated using Wodey's formula. All measurements were taken before and after the mini fluid challenge with 100 mL crystalloid fluid. LVOT VTI was measured automatically. The fluid responsiveness was defined as an increase of 10% in LVOT VTI. All examinations were performed by a single physician in the intensive care unit.

Results. Among 20 patients, 12 (60%) were fluid responders. The average change in carotid corrected flow time after the mini fluid challenge for fluid responders was 14 ms (\pm 12 ms). ccFT increase in 7 ms was defined as fluid responsiveness with a sensitivity of 80% and specificity of 67%. The positive predicted value was 80.2% and the negative predicted value was 66.8%. The positive likelihood ratio was 2.40 (95% CI 0.46–13) and the negative likelihood ratio was 0.30 (95% CI 0.04–2.06). There was no significant difference between groups (pancreatitis vs gastrointestinal bleeding).

Conclusion. ccFT may be a useful test to predict fluid responsiveness among critically ill patients using a mini fluid challenge test.

Comparison of pain intensity according to patient gender on the first post-operative day

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Background. Pain is an integral complication after surgery. This research investigates gender-based differences in post-operative pain intensity. Understanding these distinctions is crucial for tailoring effective pain management strategies in postoperative care.

Aim. To compare the intensity of immediate postoperative pain between female and male patients.

Methods. Altogether 258 patients were enrolled in this prospective cohort study, conducted at the Hospital of Traumatology and Orthopaedics in Riga, Latvia from November 2022 up to December 2023, focused on post-operative patients. On the first post-operative day, eligible patients, who had been in the ward for at least 6 hours and were conscious, were randomly selected. They were administered a questionnaire, utilizing a rating scale from 0 to 10 (0 = was no pain, 10 = worst possible pain), to assess the intensity of their worst and least pain. Additionally, patients were assessed for their emotional state which may have been altered due to pain, time, spent in the severe pain and involvement in the decisions about pain treatment. This study was conducted as part of an international project "PAIN OUT".

Results.

Gender	Number of participants	Worst pain median [IR]	Least pain median [IR]	Satisfaction with pain treatment since surgery median [IR]
Male	118	5 [3; 7]	1 [0; 3]	9 [7; 10]
Female	135	7 [3; 8]	2 [0; 4]	9 [7; 10]
p-value (Sig.)		0.008	0.023	0.647

The study involved 118 men and 135 women. The analysis reveals notable distinctions in post-operative pain perception between genders.

The study found that the median level of helplessness felt since surgery was 2 for females and 1 out of 10 for males ($p = 0.006$).

In terms of involvement in decisions about pain treatment, male patients appreciated their allowance as 7, while females rated it as 5 ($p = 0.019$). Regarding the time proportion of experiencing severe pain since surgery, men experienced severe pain 20% of the time since surgery, while women reported experiencing it 30% of the time ($p < 0.001$).

Conclusions. Data shows women experience more intense post-operative pain than men, highlighting the need for gender-specific interventions in pain care.

Acknowledgements. No conflict of interest regarding the topic of the study.

Complications of tracheal intubation in children under 2 years of age during general anaesthesia

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Background. In the paediatric population complications related to tracheal intubation most frequently develops in newborns and children under 2 years of age. More than two direct laryngoscopy attempts in children are associated with a high failure rate and an increased incidence of severe complications.

Aim. To assess the frequency and types of tracheal intubation complications and their main causes, predisposing factors, and the best method to ensure safe airways with the first attempt.

Methods. The RedCap registry consists of prospectively collected tracheal intubation data from children's hospital. 78 patients undergoing surgery with general anaesthesia were included. In all cases of tracheal intubation, we were present to observe and document the entire intubation process, vital signs, induction medications, incidence of complications 30 min after intubation. Exclusion criteria were patients with Jet ventilation, one-lung ventilation, face-cranial genetic disorders.

Results. A study of 78 patients with ages varying from 1 day to 2 years. The occurrence of complications was associated with more than two tracheal intubation attempts, a weight of less than 10 kg ($n = 12$, 15.38%, $p = 0.006$). Laryngospasm ($n = 10$, 83%) desaturation $SpO_2 < 90\%$ ($n = 27$, 34%, $p = 0.001$). The most frequently attempted first tracheal intubation was direct laryngoscopy ($n = 58$, 74.35%), with first-attempt success rates 81.03%. Second attempt with videolaryngoscopy ($n = 21$, 77.82%), success rate 92.59%, $p = 0.002$. At first tracheal intubation attempt anaesthesiologist with experience more than 5 years use direct laryngoscopy ($n = 16$, 94.1%), trainees ($n = 19$, 48.7%, $p = 0.01$), videolaryngoscopy doctors with 5 and more years of experience use ($n = 1$, 5.9%), trainees ($n = 18$, 51.3%, $p = 0.014$). An inadequate tracheal tube had been used in 28.5% of patients submitted to tracheal intubation. Tracheal intubation with 3rd attempt ($n = 4$, 5.2%). Almost in all cases when intubation was successful at the first time position with a roll under the shoulders was used ($n = 47$, 89%, $p = 0.001$).

Conclusion. Temporary hypoxemia was the most frequent complication. Videolaryngoscopy may not be as effective in children < 6 months as in older children. Anaesthesiologist with experience of more than 5 years most often uses direct laryngoscopy – trainees' glidescope. Limiting the number of direct laryngoscopy attempts and quickly transitioning to an indirect technique would improve intubation success rates.

Acknowledgements. There are no conflicts of interest.

Administration strategies of propofol during paediatric magnetic resonance imaging

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Background. The demand for magnetic resonance imaging (MRI) is increasing because MRI is a powerful radiation-free diagnostic tool for a wide range of clinical conditions. Propofol is a widely used anaesthetic in day care paediatric anaesthesia due to its properties: short duration of action, quick recovery time, smooth emergence, and antiemetic properties. The optimal dosing strategy is still yet to be determined.

Aim. The purpose of our study was to determine whether a propofol bolus or infusion is more effective in paediatric patients, without increasing the risk of adverse events.

Methods. Patients aged three months to eight years undergoing sedation with propofol for MRI were included. Patients with acute illness, exacerbation of a chronic illness, or an ASA score of three or more were excluded. Data of patient age, weight, administered propofol dose and infusion rate, desaturation episodes, need for airway intervention, length of MRI scan and timing of movement were gathered in specific forms. Sedation failure was defined as any movement, need for additional drugs or any other unplanned interruption of the procedure.

Results. A total of 116 patients were enrolled, with a median age of 4.5 years (IQR: 2–6) and a mean weight of 18.8 kilograms (SD = 7.5). Twelve patients were excluded due to not meeting the inclusion criteria or the forms being incomplete. Propofol was administered as boluses to 56 patients and as an induction bolus followed by infusion to 60 patients. Sedation failure occurred in 16 cases (29%) in the bolus group, compared to eight cases (13%) in the infusion group (RR 2.14, CI 0.99–4.6). There were 9 desaturation episodes in the bolus group and 11 in the infusion group (RR 0.87, CI 0.39–1.46). Airway instrumentation with oropharyngeal airway was used in one case in the bolus group and three cases in the infusion group. In two cases infusion was switched to laryngeal mask anaesthesia. There was a trend towards more movement episodes in the bolus group for procedures longer than 30 minutes.

Conclusion. Our findings suggest that propofol infusion may be preferable during MRI scans, particularly for longer procedures, due to its higher success rate and comparable rate of adverse events compared to the bolus method.

Acknowledgements. Authors have no conflict of interest to declare.

The impact of cerebral haemodynamics on outcome in patients with raised intracranial pressure

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Background. Ensuring an adequate cerebral perfusion is crucial for intensive care unit patients with neurotrauma or spontaneous intracerebral haemorrhage. Insufficient cerebral perfusion reduces oxygen supply to brain tissue leading patients to mild or severe disability or even death.

Aim. The aim of this study was to evaluate the significance of the outcome of the mean flow velocity (MFV) of the middle cerebral artery in patients with raised intracranial pressure.

Methods. In total, 21 intensive care patients – 11 females and 10 males with average age 55 ± 18 years, hospitalized in Riga East University Hospital from November 2023 to January 2024 with neurotrauma or spontaneous intracerebral haemorrhage (ICH) were enrolled in the study. Serial optic nerve sheath diameter (ONSD) ultrasound and the MFV of the middle cerebral artery were obtained using GE Venue™ Linear array transducer (3.4–12.6 MHz) and Phased array transducer (2–7.5 MHz), once daily up to three days. As primary outcome we analysed MFV impact to functional outcome according to modified Rankin scale (mRS) at discharge and intra-hospital mortality. Secondary we analysed ONSD impact to functional outcome and intra-hospital mortality. Statistical significance $p < 0.05$.

Results. From 21 patients, 20 had increased ICP according to ONSD all follow up time with mean diameter 6.7 ± 0.7 mm. Poor neurological outcome in survivors (mRS 4, 5) was obtained in 2 patients (9.5%) and intra-hospital mortality was 33.3% ($n = 7$). In survivals MFV was higher all follow up time (MFV₂₄ 62 vs. 55 cm/s, $p = 0.25$; MFV₄₈ 63 vs. 50 cm/s, $p = 0.12$; MFV₇₂ 72 vs. 43 cm/s, $p < 0.05$). Similarly, patients with good functional outcome had higher MFV compared to bad, but statistical significance was not achieved. ONSD in survivors in first 24 hours was higher compared to patients who died (6.8 ± 0.5 vs. 6.7 ± 0.7 mm, $p = 0.84$). However, ONSD in survivors decreased dynamically, while it increased in patients who died (6.5 ± 0.7 vs. 7 ± 0.7 mm, $p = 0.24$). Analogously, in patients with poor neurological outcome ONSD was greater and dynamically increased, but statistical significance was not achieved.

Conclusion. Low cerebral perfusion indicates unfavourable clinical outcome in patients with raised ICP. Timely detection of low MFV and continuous monitoring may lead to modification of therapy to improve cerebral perfusion, thereby achieving a more favourable clinical outcome.

Acknowledgements. The authors declare no conflicts of interest.

Central venous catheter fixation: an evaluation of diverse suturing strategies

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Background. Good fixation of central venous catheters (CVC) is an important safety measure to avoid catheter slippage or dislodgement in intensive care patients. For this purpose, fixation with sutures is widely used. However, there is little evidence regarding the optimal suturing technique for the most effective fixation of CVCs.

Aim. The primary objective of this study was to determine the most effective suture technique for the fixation of CVCs.

Methods. In this bench test study, we tested the fixation of three-lumen CVCs from one manufacturer. Four different fixation methods were included and experimentally tested: 'clamp only', 'clamp and compression suture', 'finger trap' and 'complete', meaning 'clamp + compression suture + finger trap'. The pigskin was attached to a board with screws and a construction clamp. CVCs were placed in pigskin, surgical silk suture (silk 2/0) was used for fixation. The peak axial pull test was used to measure the force and time to dislodge the catheter from the insertion site. Each fixation method was tested ten times.

Results. When 'clamp only' and 'clamp and compression suture' were used, the catheters slid with the same force (12.7 N), but the start of slippage time was different ($p = 0.004$, 2 vs. 8 s). Contrary results were obtained with 'finger trap' and 'complete' methods – different forces were needed to slip the catheter ($p = 0.005$, 35.6 vs. 62.8 N), but the time was the same, and catheter slip was achieved only after thread rupture.

Conclusion. CVCs are often fixed using 'clamp only', which is the least secure method. The most reliable method was 'complete', which we recommend for ICU patients.

Acknowledgements. All authors declare no conflict of interest associated with this research, and no external funding has been received for the study.

Pharmacokinetic evaluation of cefazolin antimicrobial prophylaxis in spinal surgery

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Background Surgical site infections (SSI) following spine surgery significantly impact patient morbidity and mortality. Antibacterial prophylaxis (AP) using cefazolin is a key strategy for preventing SSI.

Aim. This observational study aimed to examine the pharmacokinetics of guideline-recommended cefazolin AP in spine surgery.

Methods. Nine patients (aged 50 ± 14 years, renal function 99 ± 30 mL/min/72 kg) undergoing spine surgery received AP with 2 g cefazolin. Blood samples were collected at 5, 10, 30, 60 and 90 minutes intraoperatively for measuring total cefazolin concentrations by high-performance liquid chromatography. Patients were monitored for SSI during and post-hospitalization. Total concentrations at wound closure were compared to the target concentrations of ≥ 40 mg/L.

Results. The interval between cefazolin administration and wound closure ranged between 40 and 190 minutes. Total plasma cefazolin concentrations peaked at 214 ± 35 mg/L within 15 minutes following cefazolin dose. Total plasma cefazolin concentrations at wound closure were 68 ± 30 mg/L. 12.5% of cefazolin concentrations at wound closure were < 40 mg/L. Longer surgery duration was associated with below-target concentrations. None of the patients in the study developed SSI.

Conclusion. The study demonstrates that current intraoperative AP with cefazolin achieves target plasma concentrations in the majority of patients. Duration of surgery is a critical factor in considering alternative dosing regimens.

Effectiveness of transversus abdominis plane block after ileostomy closure surgery

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Background. Regional anaesthesia such as the *transversus abdominis plane* (TAP) block has been introduced to lessen the requirement for opioids. However, evidence of their effectiveness compared with standard multi-modal analgesia in ileostomy closure surgery is still emerging.

Aim. To evaluate the effectiveness of TAP block in reducing postoperative pain and opioid consumption among patients undergoing ileostomy closure surgery.

Methods. The prospective cohort study included 35 ASA I-III patients with an average age of 59.49 years (95% CI = 54.98–63.99), 17 (51.43%) males who underwent an ileostomy closure surgery under general anaesthesia in 2023. They were randomly allocated to receive TAP block (n = 17) or included in a control group without it (n = 18). The TAP block was administered after the surgery using 30 mL of 0.25% bupivacaine in the fascial space between the *transversus abdominis plane* and *obliques internus muscles* and 8 mg of dexamethasone intravenously. Both groups received standard multi-modal analgesia with NSAIDs, paracetamol, metamizole and opioids if needed (NRS > 6).

We compared post-operative opioid usage frequency, incidence of nausea and vomiting, pain levels at 1 h, 3 h, 8 h, and 24 h between groups and used a patient questionnaire to evaluate satisfaction with analgesia. The data was analysed with *SPSS Statistics 27.0* using descriptive statistics, chi-square, Fisher's, Kruskal-Wallis and independent-sample t-tests.

Results. Results indicated statistically lower NRS scores in the TAP group at all analysed post-operative intervals compared to the control group: by 59.1% in 1 h (mean: 2.00 vs. 4.89; p < 0.001), 57.9% in 3 h (mean: 1.71 vs. 4.06; p < 0.001), 47.8% in 8 h (mean: 2.18 vs. 4.17; p < 0.001), and 22.5% in 24 h (mean: 3.06 vs. 3.94; p = 0.014).

Statistically significantly ($\chi^2 = 25.945$; p < 0.001) the TAP group received opioids 87.2% less frequently than the control group (mean: 0.24 vs. 1.83; p < 0.001). This group did not experience nausea and vomiting, while it was observed for 27.8% of the control group patients (p = 0.018).

Furthermore, the results using a score of 0–10 indicated an increased patient satisfaction with analgesia by 25.7% in the TAP group vs. control group (mean: 8.59 vs. 6.83; p < 0.001), 58.4% fewer pain-related activity limitations (mean: 1.94 vs. 4.67; p < 0.001) and a 55.6% lower need for additional analgesia (mean: 2.29 vs. 5.17; p < 0.001).

Conclusion. The TAP block has a positive impact on reducing opioid usage frequency, post-operative pain and increasing patient satisfaction. The TAP group experienced less pain at all post-operative intervals, while their mean NRS score tended to converge by 24 h.

Acknowledgements. The authors declare no conflict of interest.

Arytenoid asymmetry and laryngeal mask malposition: an ultrasonographic study

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Background. Correct laryngeal mask placement is crucial for ensuring a secure airway seal, thereby ensuring adequate ventilation. A properly placed mask should maintain a seal with no leak even with positive end-expiratory pressure (PEEP) up to 15 mmH₂O for 5 consecutive breaths.

Aim. This study aimed to investigate the feasibility of detecting correct laryngeal mask placement using ultrasonography (USG).

Methods. In this observational study, 26 patients undergoing surgery with general anaesthesia were included. After induction and laryngeal mask placement, ultrasound (USG) images of the larynx were obtained. Following confirmation of adequate ventilation, positive end-expiratory pressure (PEEP) was increased stepwise, with each step being 5 mmH₂O for 5 consecutive breaths up to a maximum of 20 mmH₂O. If there was no leak with PEEP set at 20 mmH₂O, the seal was considered to be good. PEEP was discontinued when a leak was detected by the anaesthesia machine and the level of PEEP when the leak occurred, was noted. Subsequently, the obtained images were evaluated for arytenoid asymmetry, graded on a scale from 1 to 3. The correlation between the PEEP level when the leak occurred and arytenoid asymmetry was assessed.

Results. The incidence of asymmetrical arytenoids on USG was 46%. The incidence of laryngeal mask malposition detected by the leak was 77%. The sensitivity of detecting malposition of the laryngeal mask by USG was 66.7% and the specificity – 50%. The accuracy of USG in predicting proper LMA placement was 53.8%.

Conclusion. While ultrasonography demonstrated sensitivity in detecting malposition of laryngeal masks, its overall diagnostic accuracy remains modest, emphasizing the need for further refinement before widespread clinical application.

Acknowledgements. There are no conflicts of interest.

BASIC MEDICAL SCIENCE

Effects of glutapyrone on DNA integrity *in vitro* and *in vivo*

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Background. Glutapyrone is a derivative of 1,4-dihydropyridine complexed with a glutamic acid residue. It appears to be a promising radioprotector.

Aim. The aim of the current study was to evaluate the ability of the compound to protect DNA against damage *in vitro* and *in vivo*.

Methods. Radical production was determined by EPR spectroscopy, DNA binding and peroxyxynitrite scavenging by UV/VIS spectroscopy. DNA damage was evaluated by single-cell or plasmid DNA electrophoresis. Gene expression was monitored using the RT-PCR, glutapyrone metabolites were identified by thin-layer chromatography.

Results. In the cell-free systems, the compound increased the concentration of the hydroxyl radicals produced in the Fenton reaction, it did not scavenge peroxyxynitrite and did not protect plasmid DNA against damage by products of the Fenton reaction. The compound did not bind calf thymus DNA. In cell cultures glutapyrone protected HeLa cells against damage by peroxyxynitrite and B-lymphocytes against DNA damage in the conditions of oxidative stress induced by transfection of the Tat protein derived from the HIV virus. Administration of the compound to rats triggered a significant increase in DNA damage in white blood cells. The compound modified the expression of several genes involved in the DNA repair. To explain discrepancies with the effects of glutapyrone on cultured cells described above, the metabolism of the compound was studied. Glutapyrone is either oxidized, or the residue of glutamic acid is removed, glutapyrone turns into AV-153, and the latter is metabolized to smaller compounds.

Conclusion. The formation of AV-153, a DNA binder and genotoxic compound in high concentrations can explain DNA damage in the white blood cells and stimulation of DNA repair.

Acknowledgements. The work was supported by the State Research Programme 'Biomedicine 2014' and the Inner grant of the Latvian Institute of Organic Synthesis, No. IG-2018-02.

Predictive modelling of medication adherence using blood analysis results: a neural network approach

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Background. In the face of growing patient populations and evolving medical demands, healthcare providers increasingly rely on patient medication adherence for effective treatment. As patient numbers increase, innovative tools are needed to achieve treatment success and optimize healthcare accessibility. Predicting patient adherence is crucial for personalized medicine. Addressing this issue is of paramount importance as it can revolutionize treatment strategies by enabling more personalized and effective care approaches, improve patient outcomes, and reduce healthcare expenditures.

Aim. The aim of the current study was to develop a predictive model for medication adherence using patient blood profiles, with the goal of enhancing treatment effectiveness and patient outcomes.

Methods. A cross-sectional study included blood profiles of patients with cardiovascular diseases hospitalized in Riga, Latvia. A multilayer perceptron neural network model was created where network information consisted of dependent variables, factors, and covariates. Dependent variables were 16 different medications, the factor was one's gender, and covariates were 12 different blood test indicators. The Multilayer Perceptron consists of multiple layers of interconnected nodes (neurons). Each neuron processes information and passes it to the next layer. The network learns from the data by adjusting the weights of connections between neurons during training. The neural network model was trained on the training dataset (70%) by adjusting the weights to minimize prediction errors. After training, the model was tested on a separate testing dataset (30%) to evaluate its performance. A between-subjects t-test was performed to assess whether the individual medication had a significant impact on the blood test indicators.

Results. In this study, 950 patients' blood profiles were analysed, of which 549 (57.8%) were male. With the available data, the neural network was most accurate (100%) in predicting the patient intake of aspirin, anticoagulants, angiotensin II receptor blockers (ARBs), statins, calcium channel blockers (CCBs), nitrates, antiarrhythmics, antidiabetics, and anticonvulsants. The next most accurate prediction (85.7%) was for angiotensin-converting enzyme inhibitors (ACEIs) and mineralocorticoid receptor antagonist (MRA) usage. The most important indicators of blood tests for determining medication usability were statistically significant.

Conclusion. The utilization of a Multilayer Perceptron neural network model, incorporating gender, blood test indicators, and medication adherence, offers a powerful approach for enhancing patient-specific treatment strategies and optimizing healthcare outcomes.

Acknowledgements. The authors declare the absence of a conflict of interest.

Development of *in vitro* bone marrow niche model system for acute myeloid leukaemia therapy resistance screening

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Background. There is currently no specific cancer model system at the organ-on-chip level in the world that would show how the bone marrow microenvironment of acute myeloid leukaemia (AML) works. AML is a haematological disease with high lethality. The altered signals of the cancer microenvironment contribute to the formation of abnormal subpopulations of macrophages and the differentiation of M2-type macrophages is strongly stimulated, which leads to increased immunosuppressive response in the cancer microenvironment. As the disease progresses, accumulations of poorly differentiated myeloid cells occur in the bone marrow and blood, as well as in other tissues and organs. Despite the innovations in the treatment of the last decades, the 5-year survival rate of patients reaches 30%, with elderly patients dropping to 5%–10%. Therefore, it is important to study the deeper mechanisms of this pathology to improve the effectiveness of clinical treatment options, especially for groups of patients who are resistant to standard therapy.

Aim. Develop *in vitro* AML bone marrow niche model system that contains polarized macrophages from PBMCs, THP-1 macrophage cell line and AML cells.

Methods. THP-1 macrophage cell line polarization was performed by 150 nM PMA treatment. Proceeding with LPS (10 pg/mL) and IFN- γ (20 pg/mL) stimulation to polarize M1 phenotype, and IL-4, IL-13 (20 pg/mL) stimulation for M2 phenotype. Same protocol was applied to polarize PBMC derived macrophages.

Co-cultures with PBMCs derived polarized macrophages and AML cell line U937 was cultivated in 2D. Macrophage polarisation status changes were monitored with Flow cytometry cell surface antigen stain (CD64, CD206, HLA-DR, CD86, CD14, CD163, Arg-1, iNOS). Supernatants were tested for Nitric oxide levels, multiplexed cytokine production levels (TNF α , IL-23, IL-6, IL-1b, CXCL10, CCL22, IL-10).

Results. Preliminary results show successful macrophage polarization in THP-1 cell line tests. Distinct phenotype dependent macrophage cell morphology can be observed in M0, M1 and M2 subpopulations. Surface marker expression and cytokine profile changes show positive differences in polarized cells. Polarisation levels are dependent on AML cell co-localisation.

Conclusion. Using this results, next level model system can be developed using 3D culture techniques and flow assisted setups for tumour microenvironment monitoring.

Acknowledgements. The study was supported by *Mikrotikls Ltd* research grant administrated by University of Latvia Foundation.

MYBPC1-associated myopathy with myogenic tremor, a study of an animal model

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Background. Congenital myopathy with tremor, currently classified as congenital myopathy-16, represents a highly rare disease phenotype associated with domain-specific variants in the *MYBPC1* gene. This gene encodes myosin binding protein-C slow (sMyBP-C), a cytoskeletal protein expressed in skeletal muscle tissues with at least 10 different isoforms. This protein plays a crucial role in stabilizing the thick filament and regulating actin-myosin binding during cross-bridge formation. Previous research has indicated that observed sarcomeric deficits may underlie the molecular mechanisms causing the disease.

Aim. In our study, we generated a mouse model harbouring a patient-specific variant (c.739T>C, p.(Y247H)). Here, we present a comprehensive description of the observed phenotype using a plethora of quantitative and qualitative methods.

Methods. Included behavioural tests, immunofluorescent microscopy, protein quantification, biochemical assays including spectrophotometric measurements of OXPHOS enzyme activities, transcriptome analysis by RNA-seq, and proteomics.

Results. Our findings reveal strength deficits, myogenic tremor, and homozygous lethality in the model, as well as the localization of the mutant protein, similar to a previous model, carrying another patient-specific variant in the *MYBPC1* gene. While we observed expected sarcomere disorder and misalignment, they were not as pronounced. Transcriptome data and biochemical assays unveil not only morphological abnormalities in mitochondria but also functional deficits in the oxidative phosphorylation system.

Conclusions. This research reinforces the myogenic tremor phenotype observed in patients and the initial animal model, highlighting the correlation between phenotypic severity and changes in the binding potential of the mutant protein, as suggested in our previous work. Additionally, we demonstrate that this disease involves an aspect of mitochondrial dysregulation.

Acknowledgements. ERAF Nr. 1.1.1.1/18/A/097.

Organ-on-a chip model of primary human pancreatic ductal adenocarcinoma

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Background. There is an unmet need for therapies and personalized treatment approaches for pancreatic ductal adenocarcinoma (PDAC). Recently, protocols to establish human pancreatic organoids have been developed which offer new ways to model pancreatic disorders. Organoid cultures can be further introduced in an organ-on-a-chip (OOC) system sophisticated by addition of endothelial barrier and constant physiological flow, which is especially relevant for ductal epithelial structures. Such pancreatic OOC could represent a reliable alternative for 2D and 3D cell cultures for drug screening and personalized therapy decision approaches.

Aim. To model PDAC with functional endothelial barrier in an OOC system for drug testing.

Methods. Primary human PDAC organoids expressing CK19, PDX1 and GATA6 markers were used along with human umbilical vein endothelial cells (HUVECs) (Merck). Cells were cultured in a vertically stacked design chip made from cyclo-olefin copolymer (COC) and a polyester (PET) membrane under constant media flow (4 μ l/min) and in cell-specific media. HUVECs were seeded at a concentration of 6×10^6 /mL in the bottom channel of the microfluidics chip. After a week of culture, PDAC organoids were seeded in the upper channel at 3×10^6 cells/mL. Chip outflows from both channels were collected daily and stored for viability detection, multiplex and ELISA-based analyte detection. Cells on the chip membrane fragments were fixed, immunolabelled and analysed by fluorescent microscopy.

Results. We report successful establishment of PDAC OOC system. Both PDAC organoid cells and endothelial cells could be cultured to confluency and further maintained in culture on the chip for prolonged periods. Cells grown on the chip were characterised using tissue-specific pancreatic tumour and endothelial markers. Cell viability could be assessed during culture, metabolites and PDAC biomarkers could be detected in the chip outflows. Further we compare the 2D and 3D cell culture approaches to OOC system and discuss potential advantages.

Conclusion. We demonstrate a proof of concept OOC model of PDAC with functional endothelial barrier that offers advantages over traditional cell culture methods and could be further used for personalized medicine applications.

Acknowledgements. The study is supported by the National Research Programme project 'Smart Materials, Photonics, Technologies and Engineering Ecosystem' (No. VPP-EM-FOTONIKA-2022/1-0001).

Melatonin demonstrates antiviral potential in human gastrointestinal organoids through modulation of stat protein expression

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Background. Melatonin, a natural compound, has been discovered to play a role in antiviral processes and is being actively studied as a potential therapeutic agent for various infectious diseases. Signal transducer and activator of transcription (STAT) proteins serve as key factors mediating antiviral and proinflammatory responses in case of viral invasion.

Aim. The aim of the study was to evaluate the effect of melatonin on STAT expression in Poly(I:C)-stimulated gastrointestinal organoids.

Methods. The human intestinal epithelial Caco-2 cell line (passages 10–20) was used for the *in vitro* infection model. The cells were cultured in DMEM media at 37°C 5% CO₂ for 21 days until they formed organoids. The monolayer was then either pretreated with melatonin (at concentrations of 1, 10, 50 or 100 μM) for 24 hours, followed by stimulation with different concentrations of Poly(I:C) for another 24 hours, or treated with melatonin for 24 hours at aforementioned concentrations after stimulation with Poly(I:C) for 24 hours. STAT1-3 expression was analysed using flow cytometry. Statistical analysis was performed using SPSS 29.0.

Results. Poly(I:C) induced higher levels of STAT1-3 in Caco-2 cells compared to control cells. Pretreatment with melatonin slightly reduced STAT1-3 production in infected Caco-2 cells. Noninfected Caco-2 cells pretreated with melatonin exhibit higher levels of STAT1-3 than control cells. In cells treated with melatonin after Poly(I:C) stimulation, STAT1-3 production was lower than in pretreated cells. There was a moderate correlation between STAT1-3 production, with the strongest correlation observed between STAT1 and STAT3 ($r = 0.683$, $p < 0.001$). However, neither a higher concentration of melatonin nor a higher Poly(I:C) concentration demonstrated a stable effect on STAT1-3 production. The levels of STAT1-3 did not show a significant correlation with apoptosis neither in pretreated, or treated cells.

Conclusion. In our study, melatonin, when used as a pretreatment, revealed its ability to elicit an antiviral effect even in noninfected cells, while its application as treatment demonstrated a decrease in STAT1-3 levels. Our initial findings underscore the significance of melatonin as a potential therapeutic approach for virus-induced infections, highlighting the crucial need for judicious and timely consideration in its administration. Further studies are needed to emphasize melatonin's importance in antiviral effects.

Characterisation of *Plasmodium* spp. lactate dehydrogenase specific aptamer binding affinity and selectivity

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Background. Malaria is a life-threatening disease caused by several species of *Plasmodium* parasite. The World Health Organization (WHO) has launched an ambitious plan to eradicate malaria that will require population screening, which is not feasible with current diagnostic tools that are either too sophisticated or display insufficient sensitivity. Cost-effective, storage stable and sensitive analytical systems are needed to face the challenges caused by malaria worldwide. Aptamers are short oligonucleotide sequences that can selectively bind to specific targets in a similar fashion to monoclonal antibodies. Aptamers pose several advantages over antibodies, including their small size, low production costs, chemical stability, simpler modification, and higher shelf-life. This makes aptamers ideal for developing point-of-care diagnostic biosensors for malaria detection.

Aim. The aim of the current study was to characterise the binding affinity and selectivity of five full-length and truncated aptamers, selected against *Plasmodium falciparum* lactate dehydrogenase (Pf-LDH).

Methods. The binding affinity of five leader aptamers selected against Pf-LDH was assessed by enzyme-linked oligonucleotide assay (ELONA). In brief, Ni-NTA HisSorb™ plate was coated with Pf-LDH, blocked, and incubated with biotinylated aptamers. Next, poly-HRP streptavidin was added, followed by TMB substrate incubation. The optical density was measured at 450 nm by Tecan Infinite M200 plate reader. Next, full-length and truncated aptamer affinity and selectivity towards Pf-LDH, *P. ovale*, *P. vivax* and *P. malariae* LDHs was determined. Aptamer stability at 37°C was tested in human serum and lysed human whole blood using agarose gel electrophoresis.

Results. C8N1 showed exclusive selectivity to Pf-LDH with K_d of 2.74 nM. C8N2, C8N3, C8N4, C8N5 showed high binding affinity also to *P. ovale* LDH (5.9 nM, 1.8 nM, 1.84 nM, 2.2 nM). None of the aptamers bound to *P. vivax* LDH, while the affinity for *P. malariae* LDH was low. Of the truncated aptamers, C8N3t and C8N4t showed the highest affinity towards *P. falciparum* LDH with K_d values of 0.21 nM and 0.33 nM. Aptamers were stable in 100% and 10% human serum for up to 24 hours at 37°C.

Conclusion. All the selected aptamers bind *P. falciparum* LDH with high affinity. Truncated aptamers show improved affinity compared to full-length aptamers. C8N2, C8N3, C8N4, C8N5 are cross-reactive to *P. ovale* LDH. The aptamers produced could serve as sensitive and selective synthetic receptors to develop cost-efficient point-of-care biosensors for malaria point-of-care diagnosis.

Acknowledgements. The study was funded by *EuronanomedIII* project 'Quantitative and storage-stable point-of-care diagnostic device', No. ESRTD/2022/3.

Selection of urothelial carcinoma biomarker nectin-4 selective aptamers for the development of targeted therapeutics

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Background. According to World Health Organisation bladder cancer is the 10th most common cancer type worldwide. Every year approximately 600 000 people are diagnosed with bladder cancer worldwide and for more than 200 000 people it is a cause of death. Bladder cancer is characterized by a very high recurrence rate. Depending on the stage and clinical parameters risk of recurrence is 15%–61% in the first year and 31%–78% in five years. Cystoscopy and urine cytology is the current standard for bladder cancer diagnostics. Cystoscopy is invasive and expensive while urine cytology has a low sensitivity in low-grade tumours. Nectin-4 is a member of a nectin cell adhesion molecule family and it is overexpressed in urothelial carcinoma (UC) and other cancers. It serves as an excellent candidate for targeted tumour therapy. Aptamers are short oligonucleotide sequences that can selectively bind to specific targets on the surface of cancer cells. Using protein-systemic evolution of ligands by exponential enrichment (SELEX) the target-specific sequences can be determined through a progressive selection using an oligonucleotide library, which could be used to develop a novel targeted therapeutic.

Aim. The aim of the current study was to select aptamers specific to a UC biomarker nectin-4 and test their binding selectivity and affinity *in vitro*.

Methods. Aptamers against nectin-4 were enriched using a protein-SELEX method. In brief, a randomized ssDNA aptamer library (Integrated DNA Technologies) was incubated with recombinant His-Tag nectin-4 protein (R&D systems) covered NTA magnetic beads (DynabeadsTM). Bound aptamers were eluted and amplified by PCR to increase the nectin-4 specific aptamer pool. After eight SELEX cycles, the aptamer pool was sequenced using the next-generation sequencing method (Illumina MiSeq). Selected lead sequences were assessed for their ability to bind to nectin-4 by enzyme-linked oligonucleotide assay (ELONA). In brief, the Ni-NTA HisSorbTM plate was coated with nectin-4, blocked and then incubated with biotinylated aptamers. Next, poly-HRP streptavidin reagent was added, followed by TMB substrate incubation. The optical density was measured at 450 nm by Tecan Infinite M200 plate reader.

Results. Based on enrichment analysis of high throughput sequencing data, five aptamer sequences were selected for nectin-4 binding analysis. The affinity of leading sequences towards nectin-4 protein was confirmed by ELONA.

Conclusion. Detected nectin-4 sequences can be further used to develop diagnostic tools and biosensors for bladder cancer.

Acknowledgements. This study was funded by *Mikrotīkls Ltd* and administered by the University of Latvia Foundation and UL Biomedicine and pharmacy fundamental research grant.

Development and characterization of the calpainopathy patient-derived induced pluripotent stem cells

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Background. Induced pluripotent stem cells (iPSCs) serve as a patient-specific disease model to study the molecular mechanisms of diseases and facilitating the discovery of new therapies. Calpainopathy, also known as calpain-3-related limb-girdle muscular dystrophy (LGMD) R1, is the most common autosomal recessive muscular dystrophy subtype that accounts for up to 30% of all recessive LGMD cases. Currently, there is no treatment available for this orphan disease.

Aim. The aim of the study was to establish iPSC clones from calpainopathy patients and confirm the cell reprogramming by pluripotency marker expression.

Methods. Fibroblasts were isolated from a calpainopathy patient skin biopsy by mechanical disruption. The patients provided informed consent, and all procedures were approved by the Central Medical Ethics Committee (01-29.1.2/2344 from 25.05.2023). The fibroblasts were propagated in DMEM/F12 growth nutrient mixture (3:1) cell culture medium supplemented with 10% foetal bovine serum, 1× non-essential amino acids, and 1% penicillin and streptomycin (complete medium) in T25 flask, at 37°C, 5% CO₂ and 95% humidity. Cells were passaged at 90% confluency using TrypLE. For cell reprogramming, 2nd passage fibroblasts were plated in a 6-well plate and transduced with CytoTune™ 2.0 Sendai reprogramming vectors according to the manufacturer's instructions. On day 7, cells were lifted with TrypLE reagent and plated in Geltrex-coated 6-well plate in complete medium. After 24 hours, the medium was changed to complete E8 medium. Cell cultures were monitored for colony appearance up to day 28. Emerging colonies were picked manually and plated on a Geltrex-coated 6-well plate. Colonies were passaged by 0.5 mM EDTA up to passage 10 and screened for Sendai virus (SeV) clearance. SeV cleared iPSC clones were analysed for pluripotency marker Oct-4, Sox2, SSEA-4 and Tra-1-60 expression by fluorescence microscopy.

Results. Fibroblast cultures were obtained from three calpainopathy patients. Following cell reprogramming, three iPSC clones from each patient were established with PSC-like morphology, forming densely packed and round colonies with smooth edges. All the tested iPSC clones expressed Oct-4, Sox2, SSEA-4 and Tra-1-60 pluripotency markers.

Conclusion. The iPSC clones from three calpainopathy patients were successfully established. The pluripotency marker expression and colony morphology analysis confirmed the characteristic morphology and phenotype of iPSCs. These iPSC clones will serve as a model system for the screening of novel calpainopathy therapies.

Acknowledgements. National Research programme Innovation Fund – Sectoral Research Programme Agreement No. VPP-EM-BIOMEDICĪNA-2022/1-0001. We thank COST CA20140 project CorEuStem for protocol assistance.

Search for disease-specific genetic markers originated from the vitamin D binding protein gene polymorphisms in the multiple sclerosis cohort in the Latvian population

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Background. Vitamin D (VD) is a nutrient and hormone that plays an important role in the pathogenesis of autoimmunity-related diseases including multiple sclerosis (MS). VD acts by binding to a specific vitamin D binding protein (DBP) which is involved in VD transport and storage. Polymorphisms found in the *GC* gene, encoding DBP, have distinct biochemical phenotypes and have been studied as a potential risk factor for MS.

Aim. This study aimed to identify the potential association of *GC* gene polymorphisms with the MS cohort, the effect of *GC* genotypes on plasma 25OHD concentration, and the association of specific phenotypes with VD deficiency in Latvians.

Methods. *GC* (rs7041 and rs4588) were genotyped in 296 MS patients and 253 healthy individuals; the 25(OH) concentration was determined using a commercial ELISA kit. Analysis of single and multi-locus genotypes and haplotypes was performed and relevance between plasmatic 25(OH), haplotypes isotype/*GC* variants was analysed.

Results. Significant associations with MS for both *GC* loci were found for common alleles, homozygotes for common alleles, and the most frequent G1S protein isotype. Rare alleles, homozygotes for rare alleles of both loci and haplotypes coding G1F and G2 protein isotypes showed a protective effect. Average VD levels were expected to be highest in carriers of the GC1f/1f protein isotype, the lowest level was represented by the GC1s/GC2 isotype and accounted for 45% of the experimental MS cohort.

Conclusion. *GC* (rs7041 and rs4588) polymorphisms might be related to multiple sclerosis susceptibility in the Latvian population. The association may be acquired through regulating DBP levels.

Acknowledgements. The study was funded by UL project No.1.1.1.2/VIAA/4/20/718 ‘The role of vitamin D and its receptor gene polymorphisms in the modulation of intestinal inflammation in patients with relapsing and progressive forms of multiple sclerosis’, European Regional Development Fund project 1.1.1.1/16/A/016, and by a fundamental research grant in Biomedicine and Pharmacy ‘Research of biomarkers and natural substances for acute and chronic diseases’ diagnostics and personalized treatment’ by the Faculty of Medicine, University of Latvia.

CARDIOVASCULAR MEDICINE

Paediatric ischemic stroke associated with cardiac disorders Children's Clinical University Hospital 2018–2022

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Background. A cardiogenic stroke is an ischemic stroke caused by embolic material formed in the cavities or valves of the heart and constitutes up to 30% of paediatric arterial ischemic strokes (AIS). The causes and pathomechanisms of cardiogenic stroke in the paediatric population are different from those in adults. In an analysis of children with ischemic stroke (Dowling MM et al., 2012), 30.6% were diagnosed with heart disease. Congenital heart defects were found in 59.3%, acquired cardiovascular abnormalities in 19.6%, and PFO (patent foramen ovale) in 15.2%. All the paediatric patients with congenital and acquired cardiac pathologies and paediatric stroke in Latvia are treated at Children's Clinical University Hospital (CCUH).

Aim. To analyse data of all the paediatric patients treated with ischemic stroke associated with cardiac disorders during the years 2018–2022.

Methods. From the CCUH electronic database, all the patients treated with ischemic stroke were selected, and those with association with cardiac disorders were further analysed.

Results. From January 1, 2018, until December 31, 2022: 22 children with acute ischemic stroke were treated in CCUH. 7 patients (3 boys (43%), 4 girls (57%)) had clinically detected acute ischemic stroke associated with cardiac disorder: 3 congenital heart diseases (43%), 1 myocarditis (14%), 3 PFO (paradoxical embolization) (43%). 2 patients had prior cardiac surgery (29%) 1-angiography 14%. Age at presentation with stroke 7.83 ± 5.5 years, manifestation: right-sided hemiparesis 71% (n = 5), left-sided hemiparesis 29% (n = 2), aphasia n = 1 (14%). Only 1 patient had a positive family history (14.3%), 1 patient (14.3%) had genetically proven thrombophilia. 2 patients (28.6%) had a positive ANA. The mean hospitalization time was 30.7 ± 15.5 days. Initial treatment: 6 low molecular weight heparins (86%), 1 aspirin (14%). Further treatment: 4 new anticoagulants (rivaroxaban) (57%), 2-warfarin (29%), 1-aspirin. 3 patients underwent transvalvular PFO closure. Patients were followed up for 13.9 ± 6 months, at the end of follow up in 3 patients neurological findings had resolved (43%), but in 4 (57%) hemiparesis remained. At the end of follow up 4 patients received aspirin (57%), 1-warfarin (14%).

During the study period, 1 infant boy treated with infectious endocarditis (large mitral valve vegetation, *S. aureus*) had clinically asymptomatic cerebral micro embolus detected on MRI before cardiac surgery but did not show neurological findings.

Conclusion. Cardiac disorders are connected with approximately one-third of all cases of paediatric ischemic strokes with a need for a long-term follow-up, treatment, rehabilitation and long-term neurological sequel in the majority of patients.

Acknowledgements. No conflicts of interest. No funding.

Is the aortic augmentation index associated with cardiovascular events among Lithuanian subjects with metabolic syndrome?

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Background. Metabolic syndrome (MetS) and its components may increase arterial stiffness and the risk of cardiovascular disease. The aortic augmentation index (Aix) is an indirect measure of arterial stiffness. Arterial stiffness measurement difficulties and controversial publications remain relevant issues and encourage the search for the optimal arterial stiffness marker that can predict cardiovascular disease.

Aim. The objective of the study was to investigate the association between Aix and the occurrence of cardiovascular events among Lithuanian subjects with MetS.

Methods. 8231 patients (4723 women and 3508 men, mean age 53 ± 6 years) with MetS were enrolled in the follow-up study, which was conducted from 2010 to 2021 at Vilnius University Hospital Santaros Clinics. At baseline, aortic pulse wave velocity (aPWV) was measured using the applanation tonometry system. Aix was calculated using aPWV and central arterial pressure and used as a marker of arterial stiffness. At follow-up visits, all patients underwent repeated cardiovascular assessment and were followed up for cardiovascular events: myocardial infarction, stroke, and sudden cardiac death.

Results. The study showed that during the follow-up period (median 5.5 years), 1171 subjects (14%) experienced a cardiovascular event. Aix was statistically significantly higher in the group of subjects who have experienced a cardiovascular event in comparison to the event-free group ($n = 1171$; 27 ± 11 vs $n = 7060$; 25 ± 11 , $p < 0.001$). Aix was found to be statistically significantly higher among women ($n = 735$; 30 ± 11 vs $n = 436$; 22 ± 11 , $p < 0.001$) while comparing Aix between different genders in the event group. Aix was also statistically significantly higher among subjects with than without arterial hypertension ($n = 7413$; 26 ± 11 , vs $n = 705$; 24 ± 11 , $p < 0.001$). In addition, a weak, but statistically significant positive correlation between Aix and age ($r = 0.32$, $p < 0.001$) was found. However, there was no statistically significant difference between patients with and without dyslipidaemia ($n = 7955$; 26 ± 11 vs $n = 79$; 25 ± 11 , $p = 0.81$).

Conclusions. The results of our study suggest that an elevated Aix is associated with an increased incidence of cardiovascular events among Lithuanian subjects with MetS. However, further detailed studies are needed to be able to use it widely in clinical practice.

Acknowledgements. We declare no conflicts of interest.

Systemic immune inflammation index – a predictor of coronary atherosclerotic lesions

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Background. Coronary artery disease (CAD) is the leading cause of mortality and morbidity worldwide. Atherosclerosis is a major cause of CAD, associated with a persistent inflammatory and immune response. Recently, a new index, the systemic immune-inflammation index (SII), has been developed based on circulating immune-inflammatory cells such as platelets, neutrophils, and lymphocytes.

Aim. The aim of this study was to assess the association between SII and the severity of CAD in patients with stable angina pectoris (SAP).

Methods. A retrospective study of patients with SAP examined at the Cardiology Department of Kaunas Clinics from July 2023 to December 2023 who met inclusion criteria (no history of acute coronary syndrome, revascularisation, other comorbidities (except arterial hypertension (AH), dyslipidaemia) or major surgery in the last month). Statistical analysis was performed using the Mann-Whitney U, the χ^2 tests, and the Spearman correlation. SII is calculated by multiplying platelet count by the neutrophil-to-lymphocyte ratio. Patients who underwent coronary angiography (CA) were divided into three groups according to the Gensini scale to assess the relationship between CAD and its severity: 0–11 points, 12–35 points and above. Patients who underwent coronary computed tomography angiography (CCTA) were divided into five groups according to the CAD-RADS classification.

Results. Of the 168 patients in the study, 48.5% were male. The median age was 59 (31–82) years. CA or CCTA was performed in 51.79% of patients. Among them, 88.5% of patients were diagnosed with CAD and they were statistically significantly older ($p = 0.032$). Among patients with CAD, dyslipidaemia and AH were statistically significantly more common ($p = 0.013$; $p = 0.016$, respectively). There was a significant difference and moderate correlation between SII in group 1 and group 3 according to the Gensini scale ((422 (149–834) vs 568.91 (243.10–1344) $p = 0.018$); $\rho = 0.404$, $p < 0.001$). There was no significant difference between SII and the severity of coronary stenosis assessed by the CAD-RADS scale. Although CAD-RADS and Gensini scales were statistically significantly correlated ($\rho = 0.737$, $p < 0.001$). There were no significant differences between SII and high-sensitivity C-reactive protein (hs-CRP), age, body mass index, uric acid, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglycerides, apolipoprotein B, and lipoprotein(a) (Lp(a)), but a weak correlation between Lp(a) and hs-CRP levels ($\rho = 0.215$, $p = 0.033$). SII did not differ by gender, but the Gensini index was significantly higher in men than in women ($p = 0.003$).

Conclusion. Our study suggests that SII positively correlates with CAD severity.

Acknowledgements. This research received no external funding. The authors declare no conflict of interest.

Combined prognostic value of non-invasive diagnostic tests in chronic heart failure patients

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Background. Chronic heart failure (CHF) is a complex clinical syndrome associated with poor prognosis, especially in the elderly. The overall 5-year survival rate is 45.5% and the overall 15-year survival rate is only 12.7%. The combination of the amino-terminal pro-B-type natriuretic peptide (NT-proBNP), transthoracic echocardiography (TTE), six-minute walk test (6MWT), and transthoracic impedance cardiography (ICG) tests may help more accurately predict patient's functional capacity, disease severity, and prognosis.

Aim. To compare NT-proBNP, TTE, 6MWT, and ICG prognostic value in predicting lethal outcomes in CHF patients.

Methods. An observational prospective study was conducted in Lithuania, in 2019–2022. The study was approved by the Kaunas Regional Biomedical Research Ethics Committee. In this study, we analysed data from serum NT-proBNP, TTE, 6MWT, and ICG. *IBM SPSS Statistics 29.0* was used for data analysis. Results were considered statistically significant when the p-value was < 0.05.

Results. The study included 87 patients (49 men and 38 women) hospitalized for CHF. The median age of the participants was 71 years. Throughout a median follow-up period of 23 months (min 2, max 36) there were 29 (33.3%) lethal outcomes in total. By multivariate Cox proportional analysis parameters such as serum potassium (hazard ratio [HR] 0.306, 95% confidence interval [CI] 0.110–0.852, p = 0.023), thoracic fluid content (TFC) ≥ 41.1 l/k Ω (HR 32.354, 95% CI 2.758–379.488, p = 0.006), NT-proBNP ≥ 332.0 pmol/L (HR 4.739, 95% CI 1.656–13.559, p = 0.004), six-min walk distance (6MWD) ≤ 203.5 m (HR 3.975, 95% CI 1.002–15.770, p = 0.005), dilatation of the right pulmonary artery on chest X-ray (dRPACXR) (HR 5.555, 95% CI 1.714–18.005, p = 0.004) were independently associated with lethal outcome. For the prediction of cardiac death in patients with CHF, TFC ≥ 41.1 l/k Ω had a sensitivity (SN) of 89.7%, specificity (SP) of 70.7%, positive predictive value (PPV) of 60.5%, negative predictive value (NPV) of 93.2%, and predictive accuracy (PA) of 77.0%. NT-proBNP ≥ 332.0 pmol/L had a SN of 62.1%, SP of 96.6%, PPV of 90.0%, NPV of 83.6%, PA of 85.1%. 6MWD ≤ 203.5 m had a SN of 58.6%, SP of 93.1%, PPV of 81.0%, NPV of 81.8%, PA of 81.6%. dRPACXR had a SN of 62.1%, SP of 70.7%, PPV of 51.4%, NPV of 78.8%, PA of 67.8%.

Conclusion. Serum potassium, TFC ≥ 41.1 l/k Ω , NT-proBNP ≥ 332.0 pmol/L, 6MWD ≤ 203.5 m, and dRPACXR had a combined prognostic value in predicting lethal outcomes in CHF patients.

Acknowledgements. The authors declare no conflict of interest or external funding.

Use of machine learning models to predict the level of trimethylamine N-oxide

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Background. Trimethylamine N-oxide (TMAO) is a molecule generated from choline, betaine, and carnitine via gut microbial metabolism. The plasma level of TMAO is determined by several factors including diet, gut microbial flora, drug administration and liver flavin monooxygenase activity. In humans, recent clinical studies showed a positive correlation between elevated plasma levels of TMAO and an increased risk for major adverse cardiovascular events. The possibility of predicting TMAO levels in patients may improve the identification of patients with high TMAO levels in the future.

Aim. The aim of the current study was to build machine learning models to predict possible TMAO levels, using data on variables that may have an impact on the level of TMAO.

Methods. We performed a retrospective analysis of data on 92 subjects from a database with known TMAO levels (0.0645–62.8865 $\mu\text{mol/L}$). Patients were categorised in quartiles based on the level of TMAO ($\mu\text{mol/L}$) (1 = [0.06–1.57]; 2 = [1.58–2.09]; 3 = [2.10–2.99]; 4 = [> 3]). Irrespective of TMAO levels, patients were randomly separated into two non-repetitive *Learn* (n = 52) and *Test* (n = 40) groups that were used to build a double-layer, Python programming language-based machine learning model with self-check sensitivity, specificity and accuracy interface.

Results. Among tested models, a 48-factor model was identified with the best prediction of TMAO categories with a sensitivity of 0.66, specificity of 0.72, positive predictive value of 0.67, negative predictive value of 0.77. The accuracy of the model was 0.69. The 48-factor model included variables such as age, gender, body mass index, diabetes, cardiovascular events, coronary revascularization, dietary factors (fish/meat/type of fats), biochemical factors (low-/high-density lipoprotein cholesterol, glucose), level of TMAO precursors (carnitine, γ -butyrobetaine, choline) and renal function.

Conclusion. The tested Python-based machine learning model was able to predict TMAO-level categories with 69% accuracy. This approach should be tested and fine-tuned in larger samples and compared to conventional methods.

Acknowledgements. The authors declare no conflict of interest. This analysis received no funding.

Complex coronary bifurcation treatment

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Background. Coronary bifurcation lesions pose challenging issues in interventional cardiology due to the complex anatomy and hemodynamic considerations involved. They are a common site for atherosclerotic plaques, necessitating specialized treatment strategies. Complex coronary bifurcations are rarer and more challenging to treat compared to non-complex coronary bifurcations.

Aim. The aim of this study was to compare two groups of patients divided according to the major criteria of the Complex Coronary Bifurcation lesions Definition, and to present the clinical description, periprocedural, and intrahospital outcomes.

Methods. A retrospective analysis of the ongoing Coronary Bifurcation Treatment registry (PCI performed from 01.01.2017 to 31.12.2023) was conducted. Patients enrolled in this study were divided into two groups – non-complex coronary bifurcation lesions (1st group) and complex coronary lesions (2nd group). The Definition major criteria used were: SB stenosis greater than 90% with stenosis length greater than 10 mm. The study aimed to evaluate procedural and intrahospital outcomes in complex coronary bifurcations.

Results. Altogether, 513 patients were divided into two groups: the complex lesion group – 63 patients (12.3%), and the non-complex lesion group – 450 patients (87.7%). Predilatation of the side branch was more frequently performed in the complex bifurcation group (1st group 39.9% (n = 179) vs 2nd group 84.1% (n = 53), p < 0.001). Postdilatation of the side branch was also more common in the complex bifurcation group (1st group 61.9% (n = 278) vs. 2nd group 81.0% (n = 51), p = 0.013), as well as final kissing balloon inflation (1st group 33.0% (n = 148) vs. 2nd group 54.0% (n = 34), p = 0.001). The double stenting technique was more frequently employed (1st group 16.0% (n = 728) vs. 2nd group 41.3% (n = 26), p < 0.001). Complications included perforation (1st group 0.2% (n = 1) vs. 2nd group 0%, p = 0.708), side branch occlusion (1st group 2.9% (n = 15) vs. 2nd group 0%, p = 0.141), cardiogenic shock (1st group 0.2% (n = 1) vs. 2nd group 0%, p = 0.708), and periprocedural myocardial infarction (MI) (1st group 4.7% (n = 21) vs. 2nd group 3.2% (n = 2), p = 0.590).

Conclusion. The study revealed that complex bifurcation lesions, characterized by significant side branch stenosis and lesion length, necessitate more intricate procedural interventions, such as increased rates of predilatation, postdilatation, final kissing balloon inflation, and the double stenting technique. Despite these complexities, the incidence of complications did not significantly differ between the non-complex and complex lesion groups.

Acknowledgements. There is no conflict of interest to disclose.

Comparison of various measurement methods for low-density lipoprotein cholesterol in hypercholesterolemic patients without severe hypertriglyceridemia

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Background. The Friedewald equation commonly used to determine low-density lipoprotein cholesterol (LDL-C) levels may be inaccurate in some patients.

Aim. To determine how often and how significantly LDL-C levels would differ if newer calculation methods were used.

Methods. This retrospective study included data from the Latvian Registry of Familial Hypercholesterolemia. We selected cases with triglyceride (TG) levels < 4.5 mmol/L who had full lipidogram obtained at the same time: high-density lipoprotein cholesterol (HDL-C), total cholesterol (TC), TG, and LDL-C. LDL-C levels were calculated using the Friedewald, Martin-Hopkins (MH), and Sampson equations and were mutually compared. IBM SPSS Statistics 29.0 was used to analyse the data.

Results. In total, 1981 lipidograms obtained from 1334 patients by December 2023 were analysed. Triglycerides in the range of 2.3 to 4.5 mmol/L were present in 15.1% (n = 300) and LDL-C below 1.4 mmol/L in 1.9% (n = 37) of cases. The calculated LDL-C difference between the Friedewald and MH equations by at least 0.4 and 0.2 mmol/L was observed in 1.3% (n = 25) and 7.4% (n = 146) of cases, respectively, and LDL-C with the MH method was higher in all these cases. Patients with differences between Friedewald and MH equations of LDL-C \geq 0.4 mmol/L compared to those with < 0.2 mmol/L had higher TG and lower TC and HDL-C levels (median levels 3.72 vs 1.30 mmol/L, 4.66 vs 7.06 mmol/L, 1.29 vs 1.51 mmol/L, respectively, $p < 0.01$). The calculated LDL-C difference between the Friedewald and Sampson equations by at least 0.4 and 0.2 mmol/L was found in 0.1% (n = 2) and 2.6% (n = 52) of cases, respectively. The calculated LDL-C difference between the MH and Sampson equations by at least 0.4 and 0.2 mmol/L was seen in respective 4.6% (n = 91) and 12.5% (n = 248) of cases. The MH method more frequently showed higher values than the Sampson method.

Conclusion. LDL-C estimated with the MH equation showed higher values compared to the Friedewald equation in a substantial number of patients. Patients with the most discrepancy tended to have higher TG and lower TC and HDL-C levels.

Acknowledgements. No conflict of interest to disclose. This research was partially funded by the Latvian Council of Science, project No. lzp-2020/1-0151.

Comprehensive analysis of echocardiographic and clinical features in patients with hypertrophic cardiomyopathy

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Background. Hypertrophic cardiomyopathy (HCM) is an autosomal dominant disease resulting from sarcomere protein gene mutations, exhibits increased left ventricular (LV) wall thickness, leading to LV outflow tract (LVOT) obstruction (LVOTO), diastolic dysfunction, ischemia, and mitral regurgitation. Obstructive HCM (OHCM) is confirmed by the presence of LV outflow tract obstruction in about two-thirds of cases. Exercise stress echocardiography is essential for detecting latent findings and revealing hidden symptoms during activity.

Aim. This study aimed to evaluate echocardiographic disparities in HCM patients with and without LVOTO using exercise stress echocardiography.

Methods. We retrospectively analysed 36 HCM patients at the Hospital of Lithuanian University of Health Sciences, Kaunas Clinics, from 1 January 2020 to 1 January 2022. Exercise echocardiography was performed for all patients. Patients were categorized into two groups based on LVOTO presence. Data analysis employed *SPSS Statistics* with p values < 0.05 considered statistically significant.

Results. Of 36 patients, 25 were male (69.4%), 11 were female (30.6%) (median age: 61 ± 16.2 years). OHCM was diagnosed in 41.67% (n = 15). LVOTO group (13 males, 2 females) and non-LVOTO group (12 males, 9 females) differed in Vmax and gradient in LVOT, with LVOTO group showing higher resting Vmax (2.26 ± 0.87 vs. 1.62 ± 0.84 m/s), exercise Vmax (3.57 ± 1.13 vs. 2.21 ± 0.90 m/s), also LVOT peak gradient at rest (22.73 ± 18.54 vs. 8.63 ± 4.22 mmHg) and exercise (55.64 ± 35.28 vs. 21.93 ± 25.49 mmHg) (p < 0.05). In both groups, exercise-induced right ventricle (RV) pressure does not differ significantly (LVOTO group 17.04 ± 14.98 vs. non-LVOTO 18.17 ± 10.55 mmHg). During exercise, the LVOTO group's tricuspid regurgitation (TR) changed from 0 to I grade, and the non-LVOTO group's TR from I to II (p < 0.05). Laboratory tests, BNP levels showed no statistically significant difference. Although BNP levels had a tendency to be higher in the LVOTO group (237.63 vs. 175.40 pg/mL). All LVOTO patients were treated with beta-adrenergic blockers, while in the non-LVOTO group only 71.4%. One of the LVOTO patients underwent septal myectomy, with a pre-intervention LVOT max gradient of 150 mmHg.

Conclusion. Our study found higher rest and exercise-induced LVOT peak gradients in HCM patients with LVOTO. Additionally, BNP levels were higher in LVOTO patients.

Acknowledgements. The authors declare no conflicts of interest.

Comparison of coronary artery bypass grafting performed by junior surgeons using single mammary artery grafting versus bilateral mammary arteries

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Background. Despite improved long-term survival of myocardial revascularization using bilateral mammary arteries (BIMA), concerns exist about its technical complexity and associated learning curve.

Aim. This study was conducted to determine the difference of intraoperative data between standard single mammary myocardial revascularization and bilateral mammary myocardial revascularization techniques performed by junior surgeons.

Methods. This retrospective single-centre study was conducted at Pauls Stradins Clinical University Hospital, Riga, Latvia. We analysed and compared intraoperative and predischage data between two surgical techniques of coronary artery bypass grafting (CABG) performed by four junior surgeons (A; B; C; D). The first group included all patients between 2017 and 2022 who underwent CABG using BIMA as a composite graft in Y configuration (BIMA Y). The second group included all patients in 2018 who underwent myocardial revascularization using a single mammary artery (SIMA).

Results. 412 patients were included in two study groups: BIMA Y (n = 241) and SIMA (n = 171). In the BIMA Y group patients were younger – 64.95 ± 8.81 compared to the SIMA group 67.53 ± 8.35 (p = 0.005) and more male patients (81.3% vs. 57.9%, p ≤ 0.001). We observed no difference in aortic cross-clamp times between both techniques except for surgeons C whose mean aortic cross-clamp time was significantly higher in the BIMA Y group (68.43 ± 18.94 min vs. SIMA 58.92 ± 14.26 min, p = 0.025). The average total operation time (skin-to-skin time) in the BIMA Y group for surgeons A, B, C (p = 0.003; p = 0.007; p ≤ 0.001) was significantly higher than in the SIMA group but did not reach significant difference with surgeon D (p = 0.389). For the rest of the surgeons mean aortic cross-clamp time was not significantly different. In both groups, the number of coronary anastomoses per patient did not differ, which shows equality in completeness myocardial revascularization (BIMA Y vs SIMA, 3.03 vs. 3.24, p = 0.075).

Conclusions. Myocardial revascularization performed by junior surgeons using bilateral internal mammary arteries mostly does not prolong the mean aortic cross-clamp time nor reduces the completeness of revascularization but it can increase total operation time.

Acknowledgements. Coronary artery bypass grafting (CABG), bilateral internal mammary arteries, left internal mammary artery, coronary artery disease, atherosclerosis, cardiac surgery.

Temporal trends in stress echocardiography over the 20 years period

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Background. Stress echocardiography is a well-established diagnostic modality. However, patient's pathways and the possible role of stress testing can change during the year.

Aim. To assess temporal trends in the age of patients referred to stress echocardiography and rate of test positivity over 20 years.

Methods. A total of 28 239 dobutamine and exercise test results were obtained from the database of stress echocardiography tests at the Vilnius University Santaros Clinics for the period from January 2002 to June 2022. Data was collected prospectively during patient visits and included demographics, reason for the referral, ultrasound, ECG changes, symptoms at rest and stress. Repeated tests on the same patient, referral for cardiac obstruction, valvular pathology and tests with poor ultrasound image quality have been excluded.

Results. The final population comprised of 21 244 patients. There were 10 063 men (47%) and 10 959 women (52%). Men's mean age at the time of the stress test was 62.4 ± 10.2 , and women's 65.9 ± 9.26 . SE was normal in 14 055 of the patients (66%). Ischemia on SE was detected in 3 562 patients (17%), while 3 627 (17%) were inconclusive.

Data showed a marked aging of patients undergoing stress echo testing. The average age of women was 63.1 years during the period 2002–2005 and 68.0 years in the most recent 2020–2023 period ($p < 0.001$). The average age of men increased from 60.2 to 63.1 years in the corresponding periods ($p < 0.001$).

The percentage of positive tests for ischemia has significantly decreased over the years ($p < 0.001$). For comparison, in 2002, the proportion of positive tests was 38.3%, while in 2022 it remained only 5.1%.

Conclusion. Over the period of the last 20 years, the age of patients undergoing stress echocardiography increased and the rate of positive for ischemia tests significantly reduced.

Acknowledgements. The authors declare that they have no competing interests.

GYNAECOLOGY AND OBSTETRICS

A comparative analysis of caesarean section rates: insights from Baltic States and European nations

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Background. Caesarean section (CS) is second the most often performed surgical procedure in Europe. In the presence of medical indications, CS proves to be an effective intervention, reducing maternal and infant mortality. However, according to the World Health Organization (WHO), a CS rate exceeding 10% is not associated with improved outcomes for mothers and infants, thus the ideal rate is considered to be between 10% and 15%.

Aim. The aim of this study was to compare CS rates between Baltic States and European nations, seeking insights into trends and outcomes to contribute valuable perspectives for maternal healthcare considerations.

Methods. Data for this comparative analysis was sourced from Eurostat, focusing on CS rates in Baltic States and European nations from 2011 to 2021. The dataset underwent rigorous cleaning to address missing values and ensure data consistency. Statistical data was processed by *IBM SPSS* and *Microsoft Excel*.

Results. The CS rate in Lithuania decreased from 23.2% to 21.1% in the span of ten years. The reduction of the CS rate in Latvia and Estonia was lower: from 23% to 21.9% and from 20.2% to 20% respectively. Overall, the CS rate in the Baltic States decreased from 22.5% to 21%. The average CS rate in European countries was 25.4% in 2011 and it increased to 27.8% in 2021. The lowest CS rate was in Iceland (14.9% in 2011 and 14.3% in 2021), while the highest - in Cyprus (54.1% in 2011 and 60.0% in 2021). The most significant reduction in the CS rate during the analysed decade was observed in Italy. It was 5.4%. Meanwhile in Bulgaria CS rate grew more than 13%.

Conclusion. The Baltic States have lower CS rates than the European average and based on the dynamics of CS rates over the years Baltic countries implement effective strategies for lowering CS rates. However, considering the European region, CS rates increased during the decade and are higher than WHO stated ideal rate. Further analysis of factors contributing to higher CS rates and an effective approach to the reduction of CS rates could benefit many countries in achieving desired outcomes.

Acknowledgements. The authors declare the absence of conflict of interest.

Comparison of childbirth outcomes for resolving pregnancy with and without the use of labour induction methods

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Background. Induction of labour is a medical process that has become a frequently used procedure in Latvia for pregnant women. Based on statistical data, the number of labour inductions used in Latvia is increasing. In 2016, in 19.4% of births in the Riga Maternity Hospital labour induction was used (Miltiņa, 2017). In this research, the author made a comparison of possible risks due to the use of medical labour induction.

Aim. The aim of the study was to compare childbirth outcomes for resolving pregnancy with and without the use of labour induction methods.

Methods. The study used a retrospective descriptive study design. Two distinct samples were created: the first comprised 68 delivery histories, representing 50% of patients who underwent medically induced childbirth, and the second included 68 delivery histories as a control group, reflecting instances where childbirth occurred without induction. The study assessed childbirth outcomes and the average duration of labour as key criteria. The obtained data were analysed using *MS Excel* and *IBM SPSS 28.0* software.

Results. Labour induction demonstrated an average duration of 5.81 hours (SD, 3.8), slightly exceeding the average of 5.63 hours (SD, 3.1) observed in non-induced childbirths. Complications during childbirth were notably higher in cases involving induction, with 44% (n = 30) experiencing issues, compared to 18% (n = 12) in non-induced cases. Childbirths using induction/stimulation showed an elevated occurrence of Caesarean section procedures (12%, n = 8) and perineal tears (34%, n = 23) in contrast to those without induction.

Conclusions. The duration of childbirth varied from approximately 1.5 hours (n = 1) to 19 (n = 1) hours in the comparable study groups, depending on the specific case. The research results indicate that complications during childbirth (Caesarean section, perineal tears, vaginal tears, uterine distress) were more frequently observed when labour induction was used. The frequency of delivery outcomes in the study groups shows no statistically significant differences (p = 0.977).

Analysis of reasons for performing repeat Caesarean section in women with a history of uterine scar

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Background. The World Health Organization recommends that the rate of Caesarean section surgeries should not exceed 15%. In Latvia, the proportion of Caesarean deliveries still exceeds one-fifth of all births. Based on statistical data, in 2018 emergency Caesarean sections in Latvia accounted for over 60% of the total number of births.

Aim. This study aims to analyse the reasons for performing repeat Caesarean section in women with a history of uterine scar.

Methods. A retrospective analysis was conducted on the obstetric history of 101 deliveries at a city hospital. The study considered various criteria, including reasons for performing Caesarean section, maternal age, newborn weight, gestational age at delivery, BMI, pregnancy spacing, and the number of pregnancies. The acquired data was analysed in *MS Excel* and *IBM SPSS 28.0*.

Results. The study identified prevalent reasons for repeat Caesarean section in women with a uterine scar history, such as premature rupture of membranes (22%), other pregnancy-related pathological conditions (22%), uterine dysfunction (19%), pregnancy-induced hypertension (18%), foetal distress (16%), and scar insufficiency (3%).

Conclusions.

1. The study reveals that the most common reasons for repeat Caesarean section were premature rupture of membranes (22%) and other pregnancy-related pathological conditions (22%).

2. Scar insufficiency is the least common reason for repeat Caesarean section (3%).

3. The study suggests that Caesarean section surgeries following a uterine scar history are performed based on clear indications.

The most common gynaecological complaints and their impact on women's quality of life

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Background. Gynaecological complaints can have a profound impact on women's quality of life, affecting various aspects such as daily activities, work performance, family life, and social interactions. This is not only a personal concern but also a professional responsibility, with gynaecologists playing a crucial role in its management.

Aim. The aim of the study is to investigate the most common complaints that women present to a gynaecologist and how they affect their quality of life.

Methods. 362 women aged 18 and above, who had sought medical attention from a gynaecologist due to their specific complaints were enrolled in this study. Women were surveyed using the SF-36 questionnaire, a standardized and reliable self-assessment survey with questions designed to gather information about various aspects of physical and psychological health. Data was collected using SPSS software.

Results. From the 362 respondents, the most common gynaecological complaint was menstrual disorders (19.6%; n = 71), followed by genital pain or discomfort (13.8%; n = 50) and lower abdominal pain (12.4%; n = 45). Among respondents aged 18–29, the most frequently reported complaint was menstrual disorders (27.6%; n = 43), while in the 30–39 age group, the predominant complaint was genital pain or discomfort (17.4%; n = 26). In the 40–49 age group, the most common complaint was pelvic floor dysfunction (50.0%; n = 11), while for respondents aged 50 and above, the primary complaint was menopause-related problems (42.9%; n = 6). Although gynaecological complaints had minimal impact on regular activities for most, 49.4% (n = 179) of women reported limitations during vigorous physical activities, with 20.2% (n = 73) facing significant restrictions. 29.8% (n = 108) of respondents reported that due to their complaints, they reduced the amount of time spent on work or other activities. Emotional issues were reported by 82.0% (n = 297) and social activities were interfered with by 80.9% (n = 293) due to gynaecological complaints. Pain was experienced by 63.5% (n = 230) of respondents, with 58.8% (n = 213) stating that it interfered with their daily activities, among which 6.4% (n = 23) reported extreme interference.

Conclusion. This study demonstrates the impact of gynaecological complaints on women's physical, emotional, and social well-being, and emphasize the crucial role of gynaecologists in timely detection and personalized care to improve the quality of life for women.

Acknowledgements. The authors declare the absence of a conflict of interest.

Sexual health after oncogynaecological diseases in Latvia

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Background. The incidence of oncogynaecological diseases is increasing worldwide. Cancer is being diagnosed in younger and younger people. A cancer diagnosis changes a person's entire life. Thanks to modern medical achievements, it is possible to cure cancer or achieve a stable phase of remission. One of the indicators of quality of life is sexual health. Gynaecological cancer affects women's sexual health, as radical, often debilitating treatment methods are used. In Latvia, there is no information on the sexual health status of oncology patients in recent decades.

Aim. The aim is to investigate whether healthcare professionals have sufficient knowledge and understanding to provide professional support to women after gynaecological oncological disease treatment.

Methods. A questionnaire was developed to assess the participation of Latvian physicians and their knowledge about an important indicator of Latvian women's quality of life – sexual health after treatment of gynaecological oncological diseases. The questionnaire was completed by 50 physicians working in Latvia.

Results. Only 50% of the doctors surveyed usually ask patients about their sexual health after cancer treatment and feel comfortable speaking about it, but the patients themselves trust and tell doctors about their sexual health in 90% of cases. Most of doctors (94%) do not have sufficient knowledge and the necessary materials to provide patients with the support they need. All doctors surveyed admitted that sexual health is very important in patients' lives and they would like to receive materials that would help in their work with patients.

Conclusions. We need to continue our work to develop a questionnaire for patients and clinical recommendations for physicians to assess and improve the sexual health of women after the treatment of gynaecological diseases.

Acknowledgements. No conflicts of interest.

Efficacy of laparoscopic mesh sacrocolpopexy compared with vaginal mesh for surgical correction of pelvic organ prolapse

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Background. Pelvic organ prolapse (POP) is a common problem that affects 50% of women, can significantly reduce the quality of life and cause functional organ disorders with subsequent secondary damage. Surgical treatment is based on either a laparoscopic or vaginal approach. Both have conflicting results according to World Research data. Endoprosthesis is fixed laparoscopically to anatomical structures and provides physiological tissue stretching with promontory fixation. In the vaginal approach, a tension-free prosthesis is fixed through the vagina to the anatomical structures of the pelvis and provides physiological tissue stretching with fixation to the *ligamentum sacrospinum*.

Aim. Compare two surgical approaches for correction of POP in women with symptomatic uterine prolapse.

Methods. A retrospective study was conducted at Riga Eastern University Hospital's gynaecology department from June 2022 to December 2023. Patients aged 50–75 with symptomatic uterine prolapse grade 3–4 according to the POP-Q (Pelvic Organ Prolapse Quantification) classification and clinical stress urinary incontinence were included. Patients were divided into two groups based on the approach used for the procedure: laparoscopic or vaginal. The duration of hospitalization and surgery, amount of bleeding, and anatomical results evaluated according to POP-Q measurements were analysed. Functional results were assessed using validated questionnaires FSFI (Female Sexual Function Index) and PFDI-20 (Pelvic Floor Distress Inventory).

Results. 20 women were analysed: 10 used LS/CVS and 10 TVM. The average age in LS/CVS group 62.0 years (IQR 8) vs. TVM 68.3 years (IQR 7) ($p = 0.015$). The length of hospitalization in TVM group was 4.1 days (IQR 1) vs. 2.7 days in LS/CVS group (IQR 1) ($p = 0.001$). Longer operation duration was observed in LS/CVS group 158.1 min (IQR 20) vs. TVM group 86.6 min (IQR 16) ($p < 0.01$). Intraoperative bleeding amount was higher in TVM group 90.0 mL (IQR 63) vs. 25.5 mL in LS/CVS group (IQR 23) ($p < 0.01$). Initial POP-Q grade in both groups before surgery was 2–3 vs. 0–1 after the surgery ($p = 0.01$). POP-Q measurements observed 6 months after surgery were better in the LS/CVS group vs. TVM group: Point Ap -2.3 (IQR 1) vs. -1.8 (IQR 1) ($p = 0.035$), Point Ba -4.8 (IQR 1) vs. -3.2 (IQR 1) ($p = 0.001$), Point C -6.4 (IQR 1) vs. -4.5 (IQR 1.7) ($p < 0.001$). Functional results according to PFDI-20 were 26.18 (IQR 9.25) in LS/CVS group vs. TVM group 49.16 (IQR 21.4) ($p < 0.001$). Sexual function was higher in LS/CVS group 26.8 (IQR 1.6) vs. TVM group 21.9 (IQR 3.1) ($p = 0.001$) according to FSFI.

Conclusion. Both methods give satisfactory results within 6 months after surgery, but LS/CVS gives better functional and anatomical results, maintaining patient satisfaction in sexual function.

Acknowledgements. There is no conflict of interest.

The impact of antenatal care models on breastfeeding confidence

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Background. Breastfeeding is widely recognized as a critical component of infant nutrition and maternal-child health, offering numerous benefits to both the infant and the mother. The research indicates that providing appropriate education and support during the prenatal period can positively impact a woman's confidence and ability to breastfeed after birth. Prenatal care is a pivotal factor in preparing expectant mothers for breastfeeding. It can be primarily provided by different types of healthcare professionals, mainly midwives (MW-led) or obstetrician-gynaecologists (OB-led). Each type of care provider brings distinct approaches and philosophies to prenatal care, which can significantly impact maternal attitudes and practices towards breastfeeding.

Aim. The aim of the study was to assess the impact of different types of antenatal care on breastfeeding confidence and practices.

Methods. A prospective cohort study was conducted between September 2022 and April 2023. A total of 153 pregnant women participated in the study. Breastfeeding confidence was assessed using the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF). The survey data were analysed using the Statistical Package for Social Sciences (SPSS for Windows 29.0). The chosen level of statistical significance was set at $p < 0.05$.

Results. Among the respondents, 24.8% had their pregnancies supervised by a midwife (MW-led), 75.2% of the participants, had their pregnancies supervised by an obstetrician-gynaecologist (OB-led). A majority of the study's respondents (96.1%) expressed intentions to breastfeed their infants. There was variability in self-reported confidence levels regarding breastfeeding: 13.1% of the participants reported a lack of confidence, 31.4% expressed a moderate level of confidence, and 55.5%, reported having substantial or complete confidence in their ability to breastfeed. Women under midwifery care showed a statistically significant higher likelihood ($M = 3.26$, $SD = 1.2$) to exclusively breastfeed without resorting to formula milk, compared to those supervised by obstetrician-gynaecologists ($M = 3.05$, $SD = 1.1$) ($p < 0.05$). No statistically significant difference was observed in the overall breastfeeding confidence or agreement with related statements, based on the type of healthcare professional supervising the pregnancy ($p > 0.05$).

Conclusion. Fostering an interdisciplinary collaborative model between midwives and obstetrician-gynaecologists is essential to ensure uniformity of breastfeeding support across various prenatal care models. Additionally, the high proportion of women expressing the intention to breastfeed highlights a widespread recognition of its benefits, underscoring the importance of reinforcing this intent with effective support and education in prenatal programmes.

Acknowledgements. The authors declare no conflict of interest. This research received no external funding.

Factors influencing childbirth satisfaction: insights from primiparous and multiparous women

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Background. In contemporary medical science, maternal satisfaction with antenatal care is recognized as a complex, multidimensional concept. It encompasses the healthcare professional's competence, emotional support provided, the conditions of labour and postnatal wards, overall care quality, and the health of the mother and newborn. Patient satisfaction is increasingly vital in modern healthcare, a key indicator of health system quality. Emphasizing a holistic approach, the medical sector prioritizes this metric for continual evaluation and improvement. Focusing on factors that influence childbirth satisfaction is crucial for healthcare providers, as it directly impacts the standard of maternity care. This assessment is essential, as it reflects the quality of maternity services.

Aim. The current study aimed to analyse and compare the childbirth satisfaction levels between primiparous and multiparous women.

Methods. An anonymous, structured questionnaire survey was conducted in the Obstetrics and Gynaecology Department at Kaunas Clinics of the Lithuanian University of Health Sciences Hospital. The sample comprised 104 primiparous and 94 multiparous women. Data were analysed using IBM SPSS 26.0 software, employing descriptive statistics. Statistical significance was set at $p < 0.05$.

Results. The study revealed that multiparous women reported higher satisfaction levels compared to primiparous women across various subscales. These include 'Comfort' (primiparous: $M = 3.66$, $SD (0.95)$; multiparous: $M = 3.93$, $SD (0.90)$, $p = 0.044$), 'Hospital Environment and Services' (primiparous: $M = 4.00$, $SD (0.81)$; multiparous: $M = 4.25$, $SD (0.52)$; $p = 0.010$), 'Overall Birth Experience Satisfaction' (primiparous: $M = 3.96$, $SD (0.58)$; multiparous: $M = 4.12$, $SD (0.46)$; $p = 0.028$), 'Expectation Fulfilment' (primiparous: $M = 3.55$, $SD (0.81)$; multiparous: $M = 3.82$, $SD (0.73)$; $p = 0.013$), and 'Postnatal Care' (primiparous: $M = 3.88$, $SD (0.82)$; multiparous: $M = 4.20$, $SD (0.67)$; $p = 0.004$).

Conclusion. Both primiparous and multiparous mothers rated healthcare professional involvement as the most satisfying aspect of their childbirth experience, with the initial contact with the newborn being the least satisfying. Significantly, experienced mothers reported higher satisfaction in several areas compared to first-time mothers, including labour comfort, hospital environment, overall childbirth experience, fulfilment of expectations, and postnatal care. This suggests that previous childbirth experience influences maternal satisfaction in various aspects of the childbirth process.

Acknowledgements. The authors declare no conflict of interest. This research received no external funding.

Strengthening of pelvic floor muscles: knowledge and habits of pregnant women

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Background. The female pelvic floor is a complex functional unit. Its muscles support the internal organs of the abdomen, regulate the opening and closing of the urethra, vagina, and anus, ensure sexual function, and maintain posture. However, factors such as childbirth, aging, hormonal changes, and physical strain can lead to the weakening or injury of these muscles, potentially resulting in various pelvic floor dysfunctions. These dysfunctions can encompass a range of issues, including incontinence significantly impacting a woman's quality of life and health. Understanding and maintaining the integrity of the pelvic floor is thus of paramount importance in women's health care.

Aim. The current study aimed to analyse the knowledge and habits of pregnant women on pelvic floor muscle strengthening.

Methods. This quantitative research was conducted through an online survey administered from November 2022 to January 2023. The survey utilized a specifically designed, one-time anonymous questionnaire. The target demographic for the survey comprised groups of pregnant women, encompassing both primiparous and multiparous pregnant women. A total of 287 pregnant women participated in the study.

Results. 81.2% (n = 233) of the respondents were aware of pelvic floor muscle-strengthening exercises. Among these, 71.8% (n = 206) correctly identified the utility of these exercises in preventing and reducing urinary incontinence, while 23.0% (n = 66) lacked awareness of any specific benefits. 78.4% (n = 225) expressed a need for more comprehensive knowledge of effective techniques for strengthening pelvic floor muscles. Despite the awareness, 62.0% (n = 178) of the participants did not actively engage in these exercises. Among the reasons cited, 32.1% (n = 92) attributed this to a lack of understanding of correct exercise execution. A comparative analysis between primiparous and multiparous women revealed that a higher proportion of primiparous women, 83.4% (n = 141), were knowledgeable about pelvic floor muscle strengthening exercises compared to 78.0% (n = 92) of multiparous women. 41.4% (n = 70) of primiparous respondents reported actively performing these exercises, compared to 33.1% (n = 39) in the multiparous group.

Conclusion. The study concludes that while there is a high level of awareness about pelvic floor muscle-strengthening exercises among pregnant women, there exists a significant gap in both the comprehensive understanding of their benefits and the practical application of these exercises. Notably, this gap is more pronounced among multiparous women, suggesting a need for targeted educational interventions in maternal healthcare.

Acknowledgements. The authors declare no conflict of interest. This research received no external funding.

Hymen ruptures after sexual abuse

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Background. For long time people believe that “virginity” is associated with the hymen integrity and girls without ruptured hymen cannot be sexually active. But there is evidence that hymen does not tear at any sexual intercourse for females in different age, not only adult women.

Aim. The aim of the current study was to investigate the incidence of hymen rupture after alleged sexual abuse in year 2023.

Methods. Studied population is women who reported rape to police from different part in Latvia (Valmiera, Pļaviņas, Jelgava, Daugavpils, Liepāja, Ventspils, Rēzekne) and which were further examined in State Centre for Forensic Medical Examination in 2023. Data for this research was obtained from criminal case materials and analysed using *MS Excel* and *SPSS 22*.

Results. A total cases of 93 were included in this research and the ages of females ranged from 13 to 68 years. In three cases, no data about the condition of the hymen were reported, but in one of these cases a sample was taken for the determination of spermatozoa. In three cases fresh ruptures of hymen were found, without presence of spermatozoa. In 33 cases, old ruptures of hymen were reported, and in 40 cases the integrity of the hymen was reported. Of these 33 cases with old tears of hymen were reported, 13 cases events were from few months to years behind. In five cases of those, 40 the presence of spermatozoa were reported.

Conclusion. Almost in half of women included in this research the integrity of hymen was reported. For medical examinations, further knowledge is needed about hymen anatomy and ruptures, especially from the age of puberty, which might be connected with sexual abuse.

Acknowledgements. There is no conflict of interest.

INFECTIOUS DISEASES AND PULMONOLOGY

Exploring the diversity of serotypes and sequence types in *Neisseria meningitidis*: therapeutic importance

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Background. *Neisseria meningitidis* is a bacterium responsible for causing meningococcal disease in humans, such as meningitis and meningococcaemia. *N. meningitidis* colonizes the nasopharynx of asymptomatic carriers, but in some cases, it can invade the bloodstream and cause these severe illnesses. The mortality of this infection is relatively high; therefore, antibiotic therapy is crucial for the management of *N. meningitidis*. Unfortunately, resistance to penicillin has increased in some countries in recent years. Moreover, there are at least 12 serotypes of *N. meningitidis* and each one of the serotypes has a different severity level of impact on the illness, immune response, and susceptibility to antibiotics. Exploring these topics is essential, because serotypes, multi-locus sequence types (MLST), and fine types could correlate with minimum inhibitory concentrations of antibiotics. Better understanding of this correlation can contribute to the improvement of clinical management of meningococcal disease.

Aim. The aim of this study was to analyse variability in serotypes and MLST of clinical *N. meningitidis* strains and evaluate whether this data correlates with minimum inhibitory concentrations of penicillin and cephalosporin.

Methods. In total 245 *N. meningitidis* isolates were collected in Lithuania during the period of 2012–2021. Firstly, isolates were inoculated on chocolate agar and incubated. Antimicrobial susceptibility testing to penicillin and cefotaxime was performed on Mueller-Hinton agar with blood using gradient methods according to the EUCAST version 13.0 guidelines. Serotyping was conducted via latex agglutination tests. Data about sequence types and fine types of isolates was found in a publicly available database – PubMLST.

Results. All *N. meningitidis* strains were investigated. 65.7% (n = 161) were isolated from blood, 34.3% (n = 84) – from cerebrospinal fluid. The most common serotype was serotype B – 89.4% (n = 219). 8.98% (n = 22) of the isolates were serotype C, only three isolates were serotype W135 and one – serotype A. The most common sequence type was ST 34 (62.2% of the tested isolates). The common fine type was PorA_VR1 – 19; PorA_VR2 – 15; FetA_VR – F4–28. The antimicrobial testing revealed that 97.6% (n = 239) of the isolated strains were susceptible to penicillin. Notably, all six resistant isolates were serotype B and ST 34. Susceptibility to cefotaxime was 100%.

Conclusion. Antimicrobial susceptibility studies reveal that 97.6% of the isolates were susceptible to penicillin, but there were no resistant strains to cefotaxime. All penicillin resistant strains were serotype B and ST 34. Serotype B and ST 34 were the most prevalent.

Acknowledgements. The authors declare the absence of conflict of interest.

The dominance of multi-resistant *Acinetobacter baumannii* strains in Lithuanian hospitals and implications of last-resort antibiotic resistance

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Background. As one of the ESKAPE microorganisms, *Acinetobacter baumannii* has become increasingly important. Due to its high genomic instability, fast mutation rate, and genetic plasticity, there has been a significant rise in the prevalence of *A. baumannii* strains, resistant to all of the commercially available antibiotics. This rapidly evolving bacterium has been identified to be multiple-resistant, even to last-resort antibiotics like colistin and carbapenems.

Aim. This study aimed to investigate the prevalence of multiple-resistant *A. baumannii* strains in Vilnius hospitals and evaluate the susceptibility of isolated *A. baumannii* strains to colistin (polymyxin E), meropenem and imipenem.

Methods. Strains for *A. baumannii* resistance evaluation were collected from the beginning of 2020 to the end of 2023. All *A. baumannii* strains were isolated from hospitalized patients and identified using the MALDI-TOF MS-based VITEK MS system in the microbiology laboratories of Vilnius City Clinical Hospital and Republican Vilnius University Hospital. *A. baumannii* isolates were tested for antibiotic susceptibility using a MIC-Strip Colistin test system and the disc diffusion method for selected carbapenems, strictly adhering to the EUCAST guidelines. Data were analysed using *MS Excel* and *SPSS Statistics* software.

Results. A total of 206 strains from patients were collected during the study period. The study included 66.0% (n = 136) male and 34.0% (n = 70) female patients, with a median age of 71.0 years (IQR 65.0-79.0). Of the samples collected from ICU patients (74.8%, n = 154), 59.7% (n = 92) of isolated *A. baumannii* strains were resistant to colistin. Overall, in the pool of samples, 49.0% (n = 101) of isolated strains of *A. baumannii* showed resistance (MIC \geq 4) to colistin. All isolated *A. baumannii* strains showed full resistance to meropenem and imipenem. All included patients had a history of antibiotic use and were deemed to have other clinical characteristics associated with poor outcomes, including mechanical ventilation and central venous catheter.

Conclusion. This study reveals a concerning prevalence of multi-resistant *Acinetobacter baumannii* strains among the collected samples within Lithuanian hospitals. The high resistance to colistin and commonly used carbapenems depicts the need for effective strategies to combat the growing dominance of *A. baumannii*. The observed resistance to last-resort antibiotics, combined with other indicators of poor outcomes, could pose an increased risk to affected patients.

Acknowledgements. The authors declare that they have no conflicts of interest or funding.

Long-term outcomes and health care utilisation in sepsis survivors in Latvia: a retrospective observational study using nationwide administrative data

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Background. Sepsis is a life-threatening complex syndrome, as it is the leading cause of critical illness and hospitalisation worldwide and a major economic burden. Sepsis survivors often encounter long-term sequelae and are at increased risk of death.

Aim. The aim of the study was to assess the post-discharge care outcomes and healthcare utilisation among sepsis survivors during a one-year follow-up period in Latvia.

Methods. In a retrospective administrative data study (2015–2019), adult patients with explicit and implicit ICD-10 (International Classification of Diseases, 10th Revision) sepsis discharge codes were identified. Anonymized data were obtained from the Latvian Health Care Monitoring Datalink. In the analysis of sepsis survivors, a reference cohort was created from hospitalisations with infections without sepsis using propensity score matching. Kaplan-Meier (KM) survival curves were estimated for death and rehospitalisation after discharge outcomes for each comparison cohort.

Results. A total of 7764 unique patients who were discharged alive following their first hospitalisation for sepsis were identified and compared to a reference cohort of 20 686 patients hospitalised and discharged alive during the same period with diagnostic codes of infection who did not meet the criteria for sepsis. The mortality rate within 365 days was significantly higher in the sepsis group relative to the reference group (12% vs. 2%, $p < 0.001$), while the rehospitalisation rate between groups did not differ significantly. Substantial healthcare utilisation was detected in both groups, with notably high rehospitalisation rates, indicating a requirement for intensive medical follow-up. Sepsis survivors experienced a longer duration of hospital stays when compared to the reference group. However, sepsis survivors sought outpatient care less frequently as they had fewer primary care visits to general practitioners, specialist consultations, and less frequent non-laboratory diagnostic interventions.

Conclusion. The study emphasises the importance of comprehensive care for sepsis survivors in Latvia, revealing notable inconsistencies in post-hospitalisation outpatient services. The findings not only apprise strategies within Latvia's healthcare system but also may offer insights that could be valuable in broader global contexts.

Acknowledgements. This research has received funding from the Latvian Council of Science as part of the project 'Multidisciplinary study of community acquired sepsis survivors in Latvia' (project No. lzp-2019/1-0225).

Evaluation of abdominal sepsis management and outcomes in a clinical university hospital in Latvia: a retrospective cohort study

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Background. Sepsis and septic shock continue to be the leading causes of mortality in hospitalized patients. Patients with sepsis require precise diagnostics, appropriate and timely empirical antibiotic use and may need admission to the intensive care unit (ICU). The abdominal infections often play a crucial role as a source of sepsis and are usually associated with a poor prognosis.

Aim. The aim of this study was to evaluate mortality and empirical antimicrobial therapy for abdominal sepsis patients at Pauls Stradiņš Clinical University Hospital in Latvia.

Methods. In a retrospective cohort study, we analysed abdominal sepsis cases from January 1 to December 31, 2020. We screened patients with sepsis-related ICD-10 discharge codes (n = 444) and patients with clinically significant bacteraemia (n = 156) evaluating compliance with sepsis criteria. Altogether 44 patients with abdominal sepsis were included, data on demographics, risk factors, clinical characteristics, blood cultures, antimicrobial therapy and mortality were analysed. The appropriateness of empirical antimicrobial therapy was also evaluated in community-onset sepsis (COS) cases. Data collection and analysis were performed using *IBM SPSS Statistics version 29*.

Results: The median age of the cohort was 72 years (IQR: 64–79.5), with the majority being male (52.3%). The mortality rate was 63.6%. The origin of sepsis was community-acquired in 40.8% of cases, hospital-acquired – 38.6%, and healthcare-associated – 20.5%. Septic shock developed in 14 patients (31.8%), with a mortality rate reaching 78.6%. 14 patients (31.8%) were admitted to ICU during hospitalisation (31.8%), with a higher rate in the non-survivor group (11 vs. 3, p = 0.284). Survivors had a longer median hospital stay (18.5 vs. 6 days; p = 0.004). The median Charlson Comorbidity Index was significantly higher in non-survivors (1.5 vs. 4, p < 0.001). Blood cultures were obtained from 41 patients (93.2%). Among them, only 65.9% of cohort patients had their cultures taken before initiation of antimicrobial therapy. The median time for initiation of antibiotics in COS cases (n = 27) was 10.4 hours (IQR: 4.2–13.9), shorter in the non-survivor group (6.9 vs. 16.1, p < 0.001). Moreover, 44.4% of patients with COS received appropriate empirical antimicrobial therapy, but in 25.9% of cases, initiated therapy was considered inappropriate. Among survivors, 18.5% received adequate empirical therapy compared with 25.9% of non-survivors (p = 0.745).

Conclusions: This study observed a high mortality rate in patients with abdominal sepsis, particularly higher in those with multiple comorbidities. Early recognition of sepsis and its source is important to initiate timely and appropriate empirical antimicrobial therapy.

Acknowledgements: The authors declare no conflicts of interest.

Are modern nicotine delivery devices less harmful than traditional cigarettes? The influence of smoking on the oral immune system

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Background. The oral cavity is the first place cigarette smoke contacts the human body. The unfavourable effects of smoking cigarettes on oral health are widely documented. It has been proven that long-term tobacco use leads to the release of inflammatory mediators and cytokines which are involved in immunomodulating processes. Nowadays, there are many new substitutes to traditional smoking, such as tobacco heating devices or e-cigarettes giving their users experience similar to that of using traditional tobacco, which are marketed as less harmful to their original counterparts. However, there are few studies on how tobacco heating devices as well as e-cigarettes affect the balance of oral inflammatory mediators.

Aim. The aim of this study was to investigate and compare the influence of heat-not-burn products to traditional cigarettes and e-cigarettes on the cytokines, chemokines and growth factors in the unstimulated saliva of healthy young adults.

Methods. Altogether 100 people of similar age (< 30), BMI (18.5–25) and health (no oral inflammatory lesions, no other substance abuse) were enrolled in the study. There were a total of 75 smokers in the study, divided into three groups of 25 according to the product of their choice: traditional cigarettes, heated tobacco products and e-cigarettes. A total of 25 non-smoking people were assigned to the control group. Patients had direct recommendations to withdraw from smoking and eating 2 hours prior to the material collection. Unstimulated saliva was collected in each group using the spitting method, then was centrifuged for 20 minutes at 4°C, 10000 × g, and then the supernatant fluid was collected, frozen at –84°C and stored until the assays were performed, but not longer than 4 months. Bio-Plex[®] Multiplex System was used to analyse cytokines, chemokines and growth factors in the unstimulated saliva.

Results. It was shown that smoking cigarettes can increase salivary cytokine IFN-γ in smokers compared to the levels of heat-not-burn users, e-cigarettes users and the control group. Heated tobacco appeared to affect the immune response system of unstimulated saliva in a similar way to e-cigarettes, leading to inhibited oral local inflammatory response.

Conclusion. Using tobacco heating devices and e-cigarettes inhibits the oral inflammatory response and the immune system of unstimulated saliva. Disruption of local immune response developed in every research group. It may be concluded that smoking traditional cigarettes as well as e-cigarettes and heat-not-burn may lead to negative effects on patients' health in the future.

Acknowledgements. The authors declare the absence of a conflict of interest.

Indoor air quality dependence on the number of patients per room in the lung disease and thoracic surgery wards

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Background. Poor indoor air quality might negatively impact patients' vital signs and well-being. Especially for patients with lung diseases, it is important to receive effective therapy and to have appropriate air quality conditions.

Aim. The aim of this study was to analyse indoor air quality depending on the number of patients per room.

Methods. Temperature (°C), atmospheric pressure (hPa), relative humidity (%), CO₂ (ppm) are automatically monitored by 'Aranet4' device located in similar three four-bed rooms of lung disease and thoracic surgery ward at P. Stradiņš Clinical University hospital. 198 measurements of air monitoring during the daytime have been analysed together. Data about patient submission, vital signs (blood pressure, pulse, saturation, respiratory rate) medical history are also collected and analysed using *IBM SPSS Statistic v29.0*.

Results. The air temperature in all rooms ranges from 22.0°C to 24.2°C and humidity ranges from 22% to 41%. There is a correlation between the number of patients per room and CO₂ ($p < 0.001$), the median level of CO₂ in rooms with 4 patients is 1528 ppm, with 3 patients 1324 ppm and in rooms with 2 patients 1197 ppm. In all rooms the recommended level of CO₂ (< 1000 ppm) has exceeded for most of the time. Humidity and patient count in the room also show a correlation ($p < 0.001$) and it ranges from 36.38% (\pm SD 2.022) in the 4-patient room to 27.68% (\pm SD 4.155) in the 2-patient room. A significant correlation can be seen between patient count and temperature, but it does not change much ($p < 0.001$) as well as atmospheric pressure ($p < 0.001$) which depends on each day. Further research is needed for the indoor air quality impact on patient's well-being as it is known that change in vital signs depends on many different factors.

Conclusion. A statistically significant correlation exists between higher CO₂, relative humidity levels and larger patient count per room. The ventilation should be done more frequently as it exceeds recommended CO₂ levels in lung disease and thoracic surgery wards. Further research is needed to evaluate the correlation between patient vital signs, well-being, and air quality.

Acknowledgements. The research is supported by the Rīga Stradiņš University Vertically Integrated Project (RSU VIP). RSU VIP is implemented as a part of ESF co-financed project Improvement of Governance Processes and Modernisation of Contents of Study Programmes at Rīga Stradiņš University (No. 8.2.3.0/18/A/011).

Clinical and microbiological analysis of chronic obstructive pulmonary disease exacerbation in Riga East Clinical University Hospital 'Gailezers'

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Background. The problem is of outstanding importance since chronic obstructive pulmonary disease (COPD) is one of the leading causes of death worldwide. Tobacco smoking accounts for most COPD cases in high-income countries, whereas household air pollution is a major risk factor in low- and middle-income countries.

Aim. The aim of the current study was to analyse the clinical presentation, laboratory and functional test results, as well as in-patient treatment course of patients presenting with COPD exacerbation.

Methods. Altogether 57 patients were enrolled in the retrospective study using medical history information from Riga East Clinical University Hospital archives. Clinical presentation, laboratory and lung functional diagnostic test results and treatment data were collected and statistically analysed using *IBM SPSS Statistics* and *Microsoft Excel*.

Results. COPD exacerbation was the primary diagnosis in 66.7% ($n = 38$) of cases and as a complication in 33.3% ($n = 19$) of cases. 78.9% of patients were male and 21.1% were female. The median age of patients was 75 years (95% CI: 69.7–75.5 years). Median hospitalization duration was 9 days (95% CI: 9–13 days). 26.3% of patients had a concomitant asthma diagnosis and 57.9% had concomitant bronchiectasis. Hypoxemia was observed in 57.9% of patients. Airflow function tests were performed in 54.4% ($n = 31$) of cases. Airflow limitations were observed in all cases: 30 cases of obstructive limitation and 1 case of restrictive limitation. Positive cultures were obtained in 50.7% of cases. The most common isolated microorganisms were *P. aeruginosa* ($n = 5$), *H. influenzae* ($n = 5$) and *K. pneumoniae* ($n = 4$). Antibacterial resistance was most prevalent against penicillin ($n = 8$), trimethoprim/sulfamethoxazole ($n = 8$) and fluoroquinolone ($n = 4$) antibacterial agent groups. The mean duration of hospitalization was shorter for patients without positive antibacterial cultures: 10 days (95% CI: 8–11 days) without positive cultures versus 15 days (95% CI: 10–20 days) with positive cultures ($p = 0.02$).

Conclusion. This approach shows that COPD exacerbation is associated with hypoxemia, obstructive airflow limitations of varying degrees of severity, and changes in the respiratory tract biome, most often colonised by *P. aeruginosa*, *H. influenzae* and *K. pneumoniae*. Antibacterial resistance is most prevalent against penicillins, trimethoprim/sulfamethoxazole and fluoroquinolones. Cases without identifiable changes in the respiratory tract biome are associated with a shorter in-patient treatment course.

Acknowledgements. The authors have no conflicts of interest, funding or other acknowledgements to disclose.

Vitamin D receptor polymorphisms and bronchial asthma susceptibility across Baltic and East Asian populations

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Background. Bronchial asthma (BA) has a variable prevalence worldwide, requiring careful study of its genetic and environmental determinants. By binding to the vitamin D receptor (VDR), vitamin D is a potent immunomodulator that can reduce inflammatory signals in various cell types associated with the asthmatic response.

Aim. The present study examined the effect of VDR gene polymorphisms on BA susceptibility using population cohorts from Eastern Europe (Latvia and Lithuania) and comparing them with populations of Taiwan and Mongolia (East Asia).

Methods. The study involved the comparison of 149 Latvian (LV) and 98 Lithuanian (LT) asthma patients with their corresponding control groups, comprising 252 (LV) and 77 (LT) healthy individuals. VDR gene polymorphisms (FokI (rs2228570), TaqI (rs731236), BsmI (rs1544410) and ApaI (rs7975232) were genotyped in case/control studies in Latvia and Lithuania using restriction fragment length polymorphism (RFLP). Measurements of serum 25(OH)D were performed in both population cohorts using enzyme-linked immunoassay (25-OH-Vitamin D ELISA, IBL International GmbH, TECAN). Related data from the Taiwanese association study (Munkhbayarlakh et al., 2019) was accordingly extracted for comparative analysis.

Results. Our analysis showed a close relationship between the studied loci and the risk of developing asthma, both risk-reducing and risk-increasing effects, which are distributed differently between the populations of the Baltic and East Asian countries: in the subtropical region of Taiwan, serum vitamin D concentrations and VDR gene variants were found to be significant risk factors for the development of asthma, whereas, in the temperate highland region of Mongolia, vitamin D levels stood out as a major determinant of asthma risk. Our ongoing Baltic region study suggests that, concerning asthma, both the genetic component and vitamin D function as independent factors influencing risk or protection.

Conclusion. This study highlights the intricate interplay of genetics, vitamin D, and geographical factors in bronchial asthma, offering valuable insights for personalized therapeutic strategies. VDR genetic variations, influenced by ethnicity and geography, may mirror historical adaptations, influencing the current health landscape.

Acknowledgements. The study was funded by the Mutual Funds of Latvia-Lithuania -Taiwan Cooperation Project 'Comparative study of vitamin D and its receptor gene polymorphisms in Lithuanian, Latvian, and Taiwanese children and adults with atopic dermatitis and asthma'. We appreciate the valuable contributions of the Mongolian research group for their dedicated efforts and expertise.

INTERNAL MEDICINE

Data-driven cluster analysis of CGM data of type 1 diabetes mellitus patients

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Background. Continuous glucose monitoring (CGM) has revolutionized glycaemic control by providing real-time alerts for hypoglycaemia, hyperglycaemia, and rapid fluctuations in glucose levels. However, the complexity of CGM systems poses challenges for individuals with diabetes and healthcare professionals in interpreting the glucose level changes and further correction of insulin infusion. An improved CGM data clusterisation holds the potential to optimise individualised treatment plans and identify individuals at heightened risk of complications at the time of diagnosis.

Aim. The aim of the current study was to cluster CGM data according to interstitial glucose level (from 2 mmol/L to > 12 mmol/L) and variability.

Methods. In this study, we employed data-driven cluster analysis, utilizing 'UMAP' dimension reduction with further K-means clustering, on a cohort of patients. The clinical cohort CGM data were acquired at the Interdisciplinary Metabolic Medicine Trials Unit at the Medical University of Graz, Austria (n = 51).

Results. The mean age was 39.5 ± 14.1 years and mean HbA_{1c} 57 ± 12 mmol/mol. We identified six replicable clusters of diabetes phenotypes based solely on CGM data: 1) Normoglycaemic, normal variability, 2) Normohypoglycaemic, normal variability, 3) Hyperglycaemic, normal variability, 4) Normoglycaemic, high variability, 5) Hyperglycaemic, high variability, and 6) Hypohyperglycaemic, high variability.

Conclusion. We stratified patients into six subgroups with differing CGM data patterns. This new substratification might eventually help to correct the treatment of patients who would benefit most.

Acknowledgements. We acknowledge support from the 'State Research Programme project in biomedical, medical technologies and pharmaceuticals' (No. VPP-EM-BIOMEDICĪNA-2022/1-0001). The COVAC-DM study was supported by the Austrian Science Fund (FWF) (KLIF-1076 to HS).

Association between estimated glucose disposal rate and micro- and macrovascular complications in type 1 diabetes

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Background. Insulin resistance is common in patients with diabetes and it can also affect patients with type 1 diabetes. The main objective of this study was to evaluate the association of insulin resistance with micro and macrovascular complications by the estimated glucose disposal rate (eGDR) formula.

Aim. We studied the cross-sectional association between clinical parameters and different complications status in patients with type 1 diabetes.

Methods. Data from 128 patients with type 1 diabetes participating in the longitudinal LatDiane study who attended a baseline visit in 2013–2016 and a follow-up visit in 2018–2019 with a mean follow-up time of 4.2 (3.8–5.0) were studied. Data about chronic diabetes complications were collected from medical records. As a measure of insulin sensitivity, the eGDR formula was used, which included hypertension status, glycated haemoglobin level, waist-to-hip ratio. The lower eGDR is, the higher the insulin resistance.

Results. Mean eGDR level decreased in the participants during the follow-up: baseline 8.06 ± 2.57 ; follow-up mean rank 7.19 ± 2.56 , $p = 0.012$. We observed negative correlations between eGDR and diabetic retinopathy (1st visit: $r = -0.357$, $p < 0.001$; follow-up: $r = -0.357$, $p < 0.001$), coronary heart disease (1st visit: $r = -0.274$, $p = 0.002$; follow-up: $r = -0.357$, $p < 0.001$), diabetic nephropathy (1st visit: $r = -0.247$, $p = 0.005$; follow-up: $r = -0.385$, $p < 0.001$), peripheral vascular disease (1st visit: $r = -0.229$, $p = 0.009$; follow-up: $r = -0.220$, $p < 0.014$).

Conclusion. Patients with low insulin sensitivity had more micro and macrovascular complications. eGDR measurements can be a useful practical tool to identify patients with a higher risk of complications development.

Acknowledgements. Project No. lzp-2020/1-0138 'Association between glucose variability, intestinal disorders and progression of diabetic nephropathy in type 1 diabetes patients'. Research is being implemented thanks to the support of *Mikrotikls Ltd*, donation is administrated by the University of Latvia Foundation.

Evaluation of inflammatory markers for patients with type 1 diabetes

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Background. Diabetes is the most common disorder of carbohydrate metabolism. This chronic disease is responsible for significant morbidity, mortality and costs to the health care system by being the leading cause for treated end-stage renal disease, nontraumatic amputations and new blindness. Chronic low-grade inflammation is one of the mechanisms of the development of complications of diabetes. Indices of inflammation based on blood count parameters such as Systemic Immune-inflammation Index (SII), neutrophil-to-lymphocyte ratio (Neu/Ly), thrombocyte-to-lymphocyte ratio (Tr/Ly) and monocyte-to-lymphocyte ratio (Mon/Ly) represent a cheap, accessible and promising way to the evaluation of inflammation.

Aim. To evaluate the difference in inflammatory markers C reactive protein (CRP), erythrocyte sedimentation rate (ESR), SII, Neu/Ly, Tr/Ly, Mon/Ly and faecal calprotectin between subjects with type 1 diabetes and a control group.

Methods. Cross-sectional case-control study. This study was performed in Riga, Latvia, at the University of Latvia. The sample group consisted of 99 patients with type 1 diabetes (T1D) and 47 people without T1D as a control group. Subjects with clinical or laboratory signs of active inflammation (fever, CRP above reference range) were excluded.

Results. The mean age for the T1D group was 42.75 ± 12.52 years with an average diabetes duration of 25.42 ± 11.96 years. The mean age of the control group was 37.43 ± 8.86 years. There was a statistically significant difference between CRP (diabetes: 0.9, 0.5–2.9, control: 0.5, 0.5–0.8, $p < 0.001$) and SII (diabetes: 551.93, 390.73–804.37, control: 480.70, 342.16–619.24, $p = 0.045$) between subjects with diabetes and the control group. Additionally, there were several correlations identified in both groups. In both study groups, there were statistically significant positive correlations between CRP and ESR (diabetes: $r = 0.289$, $p = 0.011$; control: $r = 0.450$, $p = 0.014$). In the diabetes group, we found statistically significant correlations between HbA1c and ESR ($r = 0.372$, $p = 0.001$), albuminuria and ESR ($r = 0.309$, $p = 0.007$), albuminuria and Neu/Ly ($r = 0.215$, $p = 0.034$), GFR and ESR ($r = -0.460$, $p < 0.001$), age and ESR ($r = 0.277$, $p = 0.015$), age and Mon/Ly ($r = 0.221$, $p = 0.028$), diabetes length and ESR ($r = 0.282$, $p = 0.013$), diabetes length and Mon/Ly ($r = 0.261$, $p = 0.009$). In contrast, in the control group, statistically significant correlations were found between CRP and Mon/Ly ($r = 0.307$, $p = 0.036$), calprotectin and Neu/Ly ($r = 0.373$, $p = 0.014$).

Conclusion. Subjects with T1D have higher levels of CRP and SII compared to the control group. In contrast to CRP, ESR and Mon/Ly ratio correlated with diabetes duration and Neu/Ly with albuminuria in patients with T1D, indicating differences in inflammatory response in the liver (characterized by CRP) and bone marrow (characterized by blood count parameters) in low-grade inflammation. Further studies are required.

Acknowledgements. Project No. lzp-2020/1-0138.

Multidisciplinary approach analysis of systemic lupus erythematosus patients at Pauls Stradiņš Clinical University Hospital

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Background. Systemic lupus erythematosus (SLE), a complex autoimmune disease with multisystem involvement, correlates with significant morbidity and mortality. This review emphasizes the crucial role of an interprofessional team in managing unpredictable phases of SLE, highlighting recent therapeutic advancements that enhance patient survival. Early organ involvement identification is vital, but optimal timing for applying the MD approach remains uncertain due to disease duration variability in studies.

Aim. To review the multidisciplinary approach in patients with SLE at PSCUH.

Methods. This retrospective study was undertaken at PSCUH, utilizing data sourced from the PSCUH database. The analysis focused on ICD codes (M32, M32.0, M32.1, M32.1, M32.8, M32.9, N08.5, N16.4, J99.1, I32.8) of primary or secondary conditions during the period from the year 2020 to 2023. Within this annual interval, multidisciplinary specialist consultations were conducted for patients diagnosed with SLE. In total, the analysis encompassed patients with SLE identified through the relevant ICD codes. Manipulation codes (60037, 60153, 60154, 60155, 60156, 60484, 60039, 01000, 01001) were employed in the patient selection process. This involved either remote or on-site consultations provided by a specialist physician. The analysis focused on the medical histories of 258 patients during their hospitalization.

Results. At PSCUH, the multidisciplinary team varied across studies. From 2020 to 2023, Systemic Lupus Erythematosus (SLE) hospitalizations rose by 63%, day care inpatients by 66.7%, and outpatient department consultations by 31%. Among 258 inpatients, 64% did not involve specialists. Neurologists were consulted in 6%, rheumatologists in 5%, nephrologists in 4%. A comprehensive approach was used in 36% of inpatient cases. Rheumatologists played a prominent role in 84%–85.5% of primary SLE diagnoses in the outpatient department, with varied contributions from other specialists for secondary conditions.

Conclusion. SLE requires comprehensive management involving various specialties, as recommended by European guidelines. Although rheumatologists are pivotal, disciplines like dermatology, cardiology, neurology, pulmonology, ophthalmology, nephrology, gastroenterology, and gynaecology also play vital roles. Data analysis reveals a rising trend in SLE treatment demand, especially in Day Care and Inpatient Care, surpassing 60%. Outpatient department consultations surged by over 31% from 2020 to 2023. A multidisciplinary approach for inpatients is observed in only 36%, with neurologists and rheumatologists consulted in 6% and 5%, respectively. In the outpatient context, rheumatologists lead in 84%, nephrologists contribute approximately 12%, while other specialists consultations are minimal, emphasising the limited application of a multidisciplinary approach. Recommending official multidisciplinary teams is vital for successful collaboration, professional development, and enhanced healthcare outcomes for SLE patients, despite limited data supporting its effectiveness.

Diabetic foot complications in Pauls Stradiņš Clinical University Hospital Department of Endocrinology

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Background. Diabetic foot is one of the most serious late complications for diabetic patients. Diabetic foot infections such as ulcers, phlegmon and osteomyelitis are common worldwide and untreated diabetic foot can result in gangrenous changes and amputation.

Aim. Evaluation of diabetic foot infections in hospitalized type 2 diabetes mellitus (T2DM) patients and their effect on length of hospitalization.

Methods. The retrospective study was conducted, analysing patient data from the Endocrinology Department of the Pauls Stradiņš Clinical University Hospital (PSCUH) in 2023. All data were collected from the patient's medical records. Data processed using *MS Excel*.

Results. In 2023, the total number of T2DM patients hospitalized in the Department of Endocrinology with diabetic foot complications was 34. Patients were 42-94 years old (mean = 70.2 years); predominantly females (64.7%, n = 22). The mean T2DM duration was 12.3 years (min = 2, max = 30) and the mean glycated haemoglobin (HbA1c) was 9.8% (min = 5.04, max = 17.2). Poorly controlled diabetes (HbA1c > 7%) had 73.5% (n = 25) patients.

Ulcers were the most common complication – 73.5% (n = 25) of all study patients. Those with only ulcers compiled 60% (n = 15) of this group. Other patients had other pathologies in addition to ulcers: gangrenous skin changes – 16% (n = 4); phlegmon, gangrene and osteomyelitis – 8% (n = 2); gangrene, osteomyelitis and septic arthritis – 4% (n = 1); gangrene and phlegmon – 4% (n = 1); gangrene and osteomyelitis – 4% (n = 1); and phlegmon – 4% (n = 1). Of all 25 patients with diabetic ulcers, infected were 40% of them (n = 10). All of them, as well patients with phlegmon, septic arthritis and osteomyelitis were treated with at least one antibiotic. No evidence of ulcers had other 26.5% (n = 9) of all study patients. This group had mostly gangrenous skin changes – 55.6% (n = 5), less common osteomyelitis and septic arthritis, which also received antibacterial treatment.

The mean treatment duration in the hospital for patients with diabetic foot complications as the reason for hospitalization was 12.89 (min = 5, max = 29).

Conclusion. Most of the patients with diabetic foot complications have long-duration and poorly controlled T2DM, which requires the use of more medication (at least one antimicrobial substance) or amputation. The average duration of the hospitalization period for patients in the Department of Endocrinology in the PSCUH is 7.12 days. Treatment of infections prolonged the time in the hospital to 12.89 days, which leads to higher costs and more workload for the hospital.

Acknowledgements. The authors declare the absence of a conflict of interest.

Analysis of factors influencing the development of lipohypertrophy in patients with type 1 diabetes mellitus

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Background. Lipohypertrophy of subcutaneous tissue is the most common dermatological complication in insulin-treated diabetes.

Aim. To assess the correlation between elevated insulin dosage and the incidence of lipohypertrophy in patients with type 1 diabetes mellitus (T1DM).

Methods. This prospective study included 51 patients with T1DM coming for regular follow-up in the Endocrinology Centre of Pauls Stradiņš Clinical University Hospital from July to December 2023. The study was performed using a self-made questionnaire, with a primary emphasis on parameters related to insulin injection. Patient insulin treatment data, encompassing total daily doses and dose adjustments within the past 6 months, were acquired from medical records. All participants were clinically assessed for lipohypertrophy by examining and palpating the skin areas used for insulin injections. Data was processed using *IBM SPSS Statistics*.

Results. The prospective study included 51 patients of which 53% (n = 27) were women and 47% (n = 24) were men. The average patient age was 36.67, for the women – 37.26, and for the men – 36.0. The mean duration of diabetes among participants was 18.92 years.

Within patients exceeding the estimated average physiological daily basal insulin doses (72.5%, n = 37), 35.29% (n = 18) displayed lipohypertrophy on the thighs. For those with basal insulin doses below the estimated value (23.5%, n = 12), 11.76% (n = 6) had this complication on their thighs. Additionally, among all patients with an average daily insulin-to-carbohydrate ratio above 2 IU (17.65%, n = 9), lipohypertrophy was observed on the abdomen and/or upper arms. Conversely, out of patients with a ratio equal to or below 2 IU (82.35%, n = 42), 68.63% (n = 35) exhibited lipohypertrophy.

A statistically significant weak positive Spearman's correlation was found between the frequency of insulin needle change and the presence of lipohypertrophy ($\rho = -0.285$, $p = 0.042$). A weak Pearson's correlation was observed between the frequency of injection site rotation ($r = -0.182$), needle reuse ($r = -0.271$) and lipohypertrophy, as well as between body mass index and lipohypertrophic changes ($r = 0.068$). No significant correlation was found between total daily basal insulin dose and lipohypertrophy on the thighs ($r = -0.095$, $p = 0.536$; $\rho = -0.0120$, $p = 0.431$; $p > 0.05$), or between total daily bolus insulin dose and lipohypertrophy on the abdomen, upper arms ($r = -0.013$, $p = 0.931$; $\rho = -0.040$, $p = 0.789$; $p > 0.05$).

Conclusion. The occurrence of lipohypertrophy is not influenced by surpassing the estimated average daily insulin dose, as this complication is equally observed in patients with lower insulin doses. Educating patients on correct insulin injection techniques and highlighting regular needle replacement is vital for managing insulin-induced lipohypertrophy.

Clinical patterns and management of asymptomatic primary hyperparathyroidism: a comprehensive study of 3-year data

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Background. Primary hyperparathyroidism is the third most common endocrine disorder and a leading cause of hypercalcemia in the outpatient setting, with significant renal and skeletal complications over time.

Aim. To evaluate clinical patterns and management of patients with asymptomatic primary hyperparathyroidism (APHPT).

Methods. We enrolled 168 patients with APHPT at the Riga East Clinical University Hospital from January 2021 to November 2023, including surgical and non-surgical patients. Medical records, laboratory and radiology findings, and surgical and histopathology reports were retrospectively analysed using *IBM SPSS 29.0* software (Spearman's correlation coefficient, Mann–Whitney U test).

Results. 168 patients (mean age: 63.7 ± 11.8 years), 86.3% were females, and 13.7% were males. The mean preoperative maximal calcium level was 2.9 ± 0.3 mmol/L, iPTH level – 247.6 ± 224.9 pg/mL, minimal phosphorus – 1.3 ± 6.7 mmol/L and 25-OH vitamin D level 28.3 ± 14.7 ng/mL. A positive correlation was observed between preoperative calcium levels and adenoma cross-sectional area ($r_s = 0.187$, $p = 0.029$) and maximal adenoma dimension ($r_s = 0.215$, $p = 0.011$). Ultrasonography verified parathyroid adenomas in 63.9% (107/168), SPECT/CT – 68.4% (52/76), 99mTc-sestamibi scintigraphy – 65.6% (61/93), 3D-CT – 70.6% (24/34), contrast-enhanced ultrasonography (CEUS) – 84% (21/25) and MRI in 40% (2/5) cases. 12.5% ($n = 21$) of pts had unlocated parathyroid adenoma. 22.0% ($n = 37$) of patients had kidney stones, 17.3% ($n = 29$) – gallstones, 34.5% ($n = 58$) – osteoporosis, 12.5% ($n = 21$) – osteoporotic fractures and 47.6% ($n = 80$) – osteopenia. 17.9% ($n = 30$) of pts received oral bisphosphonates, 4.0% ($n = 7$) intravenous bisphosphonates, 8.0% ($n = 14$) denosumab, and 1.1% ($n = 2$) had medication holidays. 80.4% ($n = 135$) of patients had thyroid nodules, 48.2% ($n = 81$) had nontoxic goitre, 24.4% ($n = 31$) had autoimmune thyroiditis, 41.7% ($n = 70$) hypertension, 10.5% ($n = 18$) type 2 diabetes. 18.5% ($n = 31$) of patients were found to have a diagnosis of malignancy. 61.9% ($n = 104$) of patients underwent parathyroidectomy. Histopathology and radiologic imaging revealed a single parathyroid adenoma in 95.2% ($n = 99$), double parathyroid adenomas in 1.9% ($n = 2$), parathyroid hyperplasia in 2.9% ($n = 3$) and parathyroid carcinoma in 1.9% ($n = 2$) patients. The mean maximal postoperative calcium level ($n = 103$) was 2.4 ± 0.1 mmol/L, iPTH ($n = 101$) 63.5 ± 27.7 pg/mL, 25-OH vitamin D 41.5 ± 13.3 ng/mL and mean minimal phosphorus ($n = 56$) 1.1 ± 0.2 mmol/L. 3 patients developed hungry bone syndrome following parathyroidectomy. Three patients required reoperation.

Conclusion. The disease clinical characteristics have transformed over the years, shifting from symptomatic to asymptomatic presentation. APHPT is commonly encountered and frequently exhibits bone-related symptoms. Considering the varied clinical presentations and related conditions in patients with APHPT is essential.

Acknowledgements. The authors declare no conflict of interest.

Chromogranin A association with the degree of gastroenteropancreatic neuroendocrine neoplasm morphology

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Background. Gastroenteropancreatic neuroendocrine neoplasms (GEP-NENs) are divided into well-differentiated neuroendocrine tumours (NETs) and poorly differentiated neuroendocrine carcinomas (NECs). Chromogranin A (CgA) and synaptophysin (SPY) are the most commonly used immunohistochemical markers for NENs. While SPY is expressed regardless of the degree of tumour differentiation, negative chromogranin A may be observed in the case of NECs.

Aim. To detect the association between immunohistochemical CgA expression and the degree of GEP-NEN differentiation.

Methods. A retrospective study was performed at the Pauls Stradiņš Clinical University Hospital for the period 2021–2023. 37 patients with histologically confirmed GEP-NENs were enrolled. One patient had NENs arising from two organs. According to the World Health Organization (WHO) histopathological classification of GEP-NENs 2019, well-differentiated NENs include Grade 1 NETs with Ki-67 (< 3%), Grade 2 NETs with Ki-67 (3–20%) and Grade 3 NETs with Ki-67 (>20%), but poorly differentiated NENs-NECs. Expression of Cg as well as SPY was compared between well-differentiated NETs and NECs.

Results. Among 37 patients, 23 (62.2%) were women and 14 (37.8%) were men. The mean patient age was 62 years (24–86 years). GEP-NENs were localised in the following areas: pancreas (n = 15; 39.5%), colon (n = 8; 21.1%), stomach (n = 7; 18.4%), small intestine (n = 5; 13.2%), liver (n = 1; 2.6%), bile duct (n = 1; 2.6%). NEN of an unknown primary site was observed in one patient. 18 (47.4%) cases of NENs were diagnosed at stage I, 7 (18.4%) – at stage II, 4 (10.5%) – at stage III and 8 (21.1%) – at stage IV. There was one case of an unknown stage. Out of 32 cases of well-differentiated GEP-NENs, 26 (81.2%) were Grade 1 NETs and 6 (18.8%) were Grade 2 NETs and no cases of Grade 3 NETs. GEP-NECs were diagnosed in 6 patients. Immunohistochemical SYP expression was noted in all GEP-NENs except one GEP-NEC. CgA was positive in 29 out of 32 cases (90.6%) of well-differentiated GEP-NETs and in 3 out of 6 cases (50%) of GEP-NECs. A statistically significant association between the degree of GEP-NEN differentiation and CgA expression was not detected (p = 0.039).

Conclusion. Our study showed no association of positive immunohistochemical CgA staining with the degree of GEP-NEN.

Acknowledgements. The authors declare the absence of a conflict of interest.

Atrophic gastritis and gastric cancer: analysing the predictive power of Operative Link on Gastritis Assessment and Operative Link on Gastric Intestinal Metaplasia stages

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Background. Operative Link on Gastritis Assessment (OLGA) and Operative Link on Gastric Intestinal Metaplasia (OLGIM) are considered the best predictors for gastric cancer development. Stages III–IV are considered high-risk lesions while 0–II are seen as low risk.

Aim. This study aimed to evaluate the predictive roles of OLGA and OLGIM staging in gastric cancer development.

Methods. We conducted a retrospective cohort study by matching gastric adenocarcinoma cases from the Latvian Cancer Registry (2005–2022) with endoscopy pathology reports from the Academic Histology Laboratory. Only cases with antral and corpus biopsies (as the minimum) available from index endoscopy allowing OLGA/OLGIM staging were included. The presence of dysplasia in any of the previous pathology reports was considered.

Results. Altogether 47 patients were included in the analysis; 40.4% were male. The mean age was 70.6 years, range 44–90. The mean time between the index endoscopy and gastric cancer diagnosis was 1836.3 days (range 198–4885). 37 patients (78.7%) had biopsies from the incisura angularis. Altogether, 14 patients (29.8%) had dysplasia during one of the preceding endoscopies, of which 13 were low-grade and 1 was high-grade. The patient distributions according to OLGA and OLGIM stages are shown in Table 1. Only 10 patients (11.3%) who were later diagnosed with gastric cancer were in the OLGA III–IV stage, and 9 patients (19.1%) were in the OLGIM III–IV stage at the time of the index endoscopy.

Conclusions. The majority who underwent upper endoscopy before the diagnosis of gastric cancer had low OLGA/OLGIM stages. The assessment should not be solely based on OLGA or OLGIM stages, and continued research is necessary to identify the best approach for the risk stratification of gastric precancerous lesions.

Acknowledgements. The authors declare no conflict of interest.

Table 1. OLGA and OLGIM stages at the time of the index upper endoscopy in patients having developed gastric cancer thereafter

	Stage 0	Stage I	Stage II	Stage III/ Stage IV	
OLGA (all cases)	5 (10.64%)	14 (29.79%)	18 (38.29%)	6 (12.77%)	4 (8.51%)
OLGIM (all cases)	10 (21.28%)	12 (25.53%)	16 (34.04%)	5 (10.64%)	4 (8.51%)
OLGA (excluding cases with previously reported dysplasia)	5 (15.15%)	12 (36.36%)	10 (30.30%)	4 (12.12%)	2 (6.06%)
OLGIM (excluding cases with previously reported dysplasia)	10 (30.30%)	9 (27.27%)	9 (27.27%)	3 (9.09%)	2 (6.06%)

Comparison of rescue therapy in steroid refractory acute severe ulcerative colitis: a single-centre retrospective study

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Background. Acute severe ulcerative colitis (ASUC) is a life-threatening condition that requires immediate hospitalization and treatment. In steroid refractory ASUC, cyclosporine or infliximab are potential rescue treatments to avoid colectomy.

Aim. Our objective is to assess the short-term and long-term efficacy and safety of cyclosporine versus infliximab as rescue agents.

Methods. We performed a retrospective analysis of 121 patients admitted with ASUC to a single gastroenterology centre during 2010–2020. ASUC was defined by the Truelove & Witts criteria. Primary outcome was short-term colectomy-free rate, secondary outcomes were severe adverse events, re-hospitalization or need of treatment with steroids within 2 years due to flare-ups and colectomy rate at 2-year follow-up.

Results. 119 patients initially received intravenous corticosteroids, while 2 patients underwent emergency colectomy on the first day. Sixty-four (53%) were females, and the median age of all patients was 33 (IQR 27–49) years. 66 (55%) patients responded to intravenous corticosteroids (IVS), while 53 (45%) failed to respond to steroid therapy: 45 (37%) patients received second-line rescue therapy (29 with cyclosporine, 16 with infliximab). Evaluating the short-term efficacy of treatment there was no significant difference between cyclosporine and infliximab: during admission, colectomy was performed in 10.3% vs. 12.5% of patients, respectively ($p = 0.826$). In terms of long-term outcomes, the colectomy rate was higher in the infliximab group at 2-year follow-up, although the difference did not reach statistical significance (10.3% vs. 31.2%, $p = 0.079$). The need for oral steroids during follow-up was comparable in both groups (38.5% vs. 50%, $p = 0.481$). Comparing patients who did not undergo colectomy, patients in the infliximab group were more often re-hospitalized due to the need for IVS at 2-year follow-up (7.7% vs. 50%, $p = 0.002$). No severe side effects due to infliximab and cyclosporine were observed.

Conclusion. In the treatment of steroid refractory ASUC infliximab and cyclosporine were equally effective in the short-term period and there was no difference in safety, however, cyclosporine-treated patients tended to have better long-term outcomes, with significantly rarer rehospitalization. Additional analysis is needed for other factors that may have contributed to differences in long-term outcomes between the cyclosporine and infliximab groups.

Acknowledgements. No conflict of interest.

Determination of lymph node status in patients with colon cancer by using a preoperative CT scan

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Background. Colon cancer ranks fourth place in prevalence among all oncological diseases and is the third leading cause of cancer-related death. The treatment of choice is surgical removal of the tumour containing the intestinal segment and its mesentery, which includes local and regional lymph nodes.

Aim. The purpose of the study is to find out whether it is possible to predict potentially metastatic lymph nodes using certain CT criteria in colon cancer patients.

Methods. Retrospective case study which included 152 cases, 64 men and 88 women aged between 60 and 80 years who underwent operative treatment of colon cancer and had preoperative CT. Several parameters have been examined, comparing their ability to predict a positive lymph node histology result.

Results. The study included 152 cases, 64 men (42.1%), 88 women (57.9%). Positive lymph nodes in histology were in 50 cases out of 152 (32.9%) expected.

From selected CT criteria for lymph node metastases, lymph node size greater than 1 cm resulted in the best performance in sensitivity, specificity, PPV (positive predictive value) and NPV (negative predictive value) of 45%, 93%, 79% and 76%.

The presence of lymph nodes with irregular borders resulted in sensitivity, specificity, PPV and NPV of 37%, 92%, 72% and 72%. The presence of lymph nodes with heterogeneous structures resulted in sensitivity, specificity, PPV and NPV of 48%, 89%, 72 and 75%. The presence of lymph node clusters resulted in sensitivity, specificity, PPV and NPV of 46%, 89%, 69% and 75%. The presence of lymph nodes with a short-long axis ratio > 0.8 resulted in sensitivity, specificity, PPV and NPV of 63%, 64%, 52% and 74%.

However, the best results were obtained by analysing the combinations of the selected parameters, where the best result was shown by: lymph node >1 cm and clusters of lymph nodes in groups of at least 3 which resulted in a sensitivity, specificity, PPV and NPV of 34%, 97%, 85% and 75%. ROC (receiver operating characteristic) analysis was performed, where the largest AUC (area under the curve) was for the parameter – lymph node heterogeneity, as well as for lymph node size > 1 cm (0.675 and 0.673, respectively).

Conclusions. In most cases, the radiological result revealed non-metastatic lymph nodes as potentially metastatic. However, it is worth mentioning that the use of combined criteria improves the potential result.

Acknowledgements. The authors declare the absence of a conflict of interest.

MENTAL HEALTH

The impact of cognitive performance on the development of depression

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Background. Depression is a common mental health disorder affecting a significant portion of the population. It is associated with changes in brain structure and neurotransmitter activity and neurotransmitter systems, leading to cognitive dysfunction. Individuals often experience initial symptoms such as difficulties in attention, memory, executive function, and processing speed. These impairments can hinder their ability to concentrate and perform well in various activities. Understanding the role of cognitive performance in the development of depression can aid in the effective treatment and management of the condition.

Aim. The study aimed to investigate the association between cognitive functions and the risk of developing depression.

Methods. The study participants were patients from two Latvian hospitals. Participants were selected based on their willingness to participate and their availability during the study period. To achieve the aim of the study, a comprehensive questionnaire was designed encompassing various aspects of participants' lives, including lifestyle choices, habits, and medical history. Additionally, two standardized assessment tools, the Patient Health Questionnaire (PHQ-9) and the Montreal Cognitive Assessment (MOCA), were incorporated into the questionnaire to evaluate depressive symptoms and cognitive functions. The logistic regression models were performed in SPSS to explore the link between depression and cognitive performance.

Results. Out of all patients, 372 (210 males) had mild, moderate or severe depression. The median patient age was Md = 67 years [Q1–Q3: 59–73]. The logistic regression model showed that statistically significant effects on depression can be caused by such cognitive functions as: executive and visuospatial function (OR = 1.14; 95% CI: 1.03–1.26; p = 0.01); attention (OR = 1.52; 95% CI: 1.01–2.31; p = 0.047); abstraction generalization ability (OR = 1.43; 95% CI: 1.06–1.93; p = 0.02).

Conclusion. The results of logistic regression analyses consistently demonstrate that individuals with impairments in sustaining attention, abstraction generalization ability, executive function, and visuospatial function exhibit a heightened risk of developing depression. These findings underscore the crucial role of cognitive performance as a significant factor contributing to the emergence of depression.

Acknowledgements. The authors declare the absence of a conflict of interest.

Psychotherapist's attitude to the diagnosis of borderline personality disorder in outpatient psychotherapy service

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Background. Borderline personality disorder (BPD) is a complex condition with a prevalence of 0.7%–1.7% in the general population and up to 12% in outpatient mental health services. Suicidal behaviour, gestures, or threats are characteristic of BPD. Undiagnosed and untreated BPD can result in lifelong disability and premature death. Psychotherapy is the first-line treatment of BPD. The attitude of professionals influences the diagnosis and treatment process of BPD.

Aim. To identify common attitudes among psychotherapists towards patients with BPD in the Transference-Focused Psychotherapy (TFP) for BPD Latvian training group. The attitudes of the psychotherapists could be evaluated prospectively during the therapeutic process to evaluate patients' recovery from BPD.

Methods. Six experienced psychotherapists participated in a 45-minute-long focus group discussion. Five of them were physicians who specialized in psychodynamic psychotherapy (with 7–21 years of experience), mainly in private practices, and one clinical psychologist (with 20 years of experience in psychodynamic psychotherapy). All participants are members of the TFP Latvian study group. Participants were informed about the aim of focus group discussions: to share their experiences, difficulties, and doubts regarding the diagnosis of BPD, and asked about their expectations regarding improvement during TFP therapy with BPD patients. The moderator encouraged the exploration of all thoughts, especially obscure ones.

Results. A phenomenological analysis approach was used to analyse the material of focus group discussions. Characteristic symptoms as markers of BPD were defined: low impulse control, affect instability, unstable relationships, and poor reality testing. A part of the group agreed that the Diagnostic and Statistical Manual for Mental Disorders, fifth edition, is helpful. Another part of the group preferred Structured Clinical Interview for Personality Disorders (SCID-5-PD). Some other members used Structured Interview of Personality Organization (STIPO) in their clinical practice as the main diagnostic instrument. Furthermore, participants discussed the role of countertransference (physicians' emotional attitude) as a diagnostic tool, noting feelings of inadequacy, incompetence, and helplessness. Anticipated improvements during TFP therapy: better affect modulation, decrease in suicidality and splitting (as a main defence process), improvement in relationships, and changes in the presentation of patients' main problems.

Conclusions. Physicians' varied preferences for diagnostic instruments (STIPO, SCID-5-PD) in diagnosing BPD correspond to the opinion that BPD symptoms reflect general impairments in personality functioning rather than Personality Disorder. Countertransference feelings may burden BPD diagnosis. The role of in-depth countertransference themes during evaluation and the TFP process may be additional measures to evaluate changes in patients' symptoms in future research.

Acknowledgements. No conflicts of interest. No funding.

Latvian legislation needs to be amended to improve the protection of the rights of patients with reduced decision-making capacity

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Background. The regulation of patients' rights is essential for protecting patients' human rights in medical treatment settings. Patients with limited decision-making capacity are a large and particularly vulnerable group. In Latvia, the patients' rights norms do not regulate the determination of a patient's capacity to make decisions, and there are no norms regulating the approach to be taken in cases where a patient's capacity to make decisions is limited.

Aim. This paper aims to show what changes are needed in Latvian legislation to improve the system for protecting the rights of patients with limited capacity and to prevent the risk of harm.

Methods. Legal research was carried out using the doctrinal research method. International and national laws on patients' rights were studied. Empirical data collected by the Latvian Ombudsman and the CPT of the Council of Europe in Latvian psychiatric hospitals and data on involuntary treatment authorised by Latvian courts were used to highlight the practical application of the legislation.

Results. The study shows that Latvian legislation is fragmented in protecting patients with limited capacity and that the existing framework is inadequate. Latvian law does not regulate the capacity to decide (*lemtspēja*), but only the legal capacity (*rīcībspēja*). Limiting legal capacity in patients' rights is not permitted, so all patients have legal capacity, regardless of their decision-making capacity. The Law on Patients' Rights provisions regulate cases where the patient lacks capacity but not cases where the patient has limited capacity. The analysis of Latvian case law on psychiatric treatment without the patient's consent shows that decision-making capacity is not assessed by medical practitioners or the courts and is not given any legal significance.

Conclusion. To protect the rights of patients with limited capacity, it is necessary to amend the legislation. First, the decision-making capacity and its criteria must be stated. Second, health professionals' rights and obligations in treating patients with diminished capacity must be defined. Thirdly, the conduct of patient representatives and support persons should be regulated. Fourth, the law must provide a mechanism for dispute resolution if the protection of a patient with limited capacity is needed.

Acknowledgements. This paper has been prepared within the research project 'Towards a human rights approach for mental health patients with a limited capacity: A legal, ethical and clinical perspective', No. lzp-2020/1-0397.

Mental health in women using hormonal contraception

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Background. With mental health currently at risk due to many stressors affecting one's life, new stimuli impacting an individual's psychological state are identified continuously. The use of hormonal contraception has brought positive outcomes in psychiatric diagnoses like premenstrual dysphoric disorder (PMDD), yet there is still an ongoing discussion about possible mood alterations conditioned by the use of hormonal pharmacologic agents.

Aim. To assess a link between the use of hormonal contraception and the mental health state.

Methods. Study data was collected using a questionnaire form. Questions from Generalized Anxiety Disorder-7 Item (GAD-7) were included. A total of 199 respondents have filled out the form. Respondents were women aged 18–57 years. Individuals were split into 2 groups based on their hormonal contraception use status. Statistical analysis was carried out through the R-Commander programme using t-test and chi-square test.

Results. Women who admitted currently using hormonal contraception were significantly less likely to see a psychologist ($p = 0.02286$) than non-users. There was no significant association between the use of contraception and generalized anxiety disorder (GAD) ($p = 0.4087$), attending psychiatric counselling ($p = 0.178$), or having a psychiatric diagnosis ($p = 0.4148$). Only 4.5% of all respondents admitted having a GAD diagnosis, yet according to the answers of the GAD-7 around 27.7% of all respondents are likely to be suffering from the disorder.

Conclusion. Study brings attention to the alterations of mood that hormonal contraception might cause yet no significant link has been established. The clinical relevance of these findings needs to be further assessed.

Acknowledgements. The authors declare no conflict of interest. This research did not receive any external funding.

Depression risk assessment in diabetes: a comparative analysis of PHQ, HADS, and self-evaluation questionnaire results

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Background. Depression is a common and debilitating condition that can significantly impact the lives of individuals with diabetes. It has been estimated that as many as 20%–30% of people with diabetes will experience depression at some point in their lives. Depression can make it difficult to manage diabetes, leading to poor blood sugar control, increased risk of complications, and even premature death.

Aim. To determine the differences in depression risk identified by each screening tool.

Methods. A cross-sectional study included patients with cardiovascular diseases hospitalized in Riga, Latvia. Altogether 865 patients were enrolled in the study. Statistical analysis was performed using *IBM SPSS v.29*. The Mann-Whitney statistical test was utilized to evaluate whether there exists a statistically significant difference in various points between patients with and without diabetes screened using PHQ, HADS, and a self-evaluation questionnaire. A two-sided p-value of less than 0.05 was considered statistically significant.

Results. The median age of patients was 66 years (IQR 59–73). A Mann-Whitney test analysis revealed significant differences in the median self-evaluation scores for depression, sleep, and fatigue between patients with and without diabetes ($p = 0.007$; $p = 0.034$; $p < 0.001$). Specifically, patients with diabetes reported significantly lower scores for depression ($p = 0.007$), sleep quality ($p = 0.034$), and fatigue ($p < 0.001$) compared to patients without diabetes. A further analysis of the Patient Health Questionnaire (PHQ) revealed statistically significant differences in the following items: ‘interest in life’ ($p = 0.013$), ‘increased fatigue or lack of energy’ ($p < 0.001$), and ‘poor appetite or overeating’ ($p < 0.001$). Patients with diabetes reported significantly lower scores for interest in life ($p = 0.013$), increased fatigue ($p < 0.001$), and poor appetite or overeating ($p < 0.001$) compared to patients without diabetes.

Conclusion. The statistically significant differences observed in certain survey responses between patients with and without diabetes suggest the potential for developing more precise and effective strategies for early detection of depression in individuals with diabetes. This could lead to enhanced mental health outcomes within this population.

Acknowledgements. The authors declare the absence of a conflict of interest.

Comparative analysis of missing data imputation methods for patient self-report questionnaires

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Background. Missing data is a common challenge in healthcare research, particularly in studies that rely on patient self-reported questionnaires. This can introduce bias and limit the ability to draw reliable conclusions. Various imputation methods are employed to fill in these missing values, ensuring the integrity and usefulness of the data for further analysis and interpretation. While simple imputation methods like mean and median imputation are widely used, machine learning algorithms have emerged as promising alternatives, offering more sophisticated approaches to capturing patterns and relationships within the data.

Aim. The aim of this study was to compare the accuracy of different imputation methods for self-assessment questions.

Methods. In the study, missing data were created from self-assessment questions (about depression, anxiety, happiness, pain, shortness of breath, sleep, appetite, satisfaction with one's life, etc.) filled in by 456 patients and using different imputation methods (Mean, Median, Mode, Decision Tree (DT), Random Forest (RF), Recursive Partitioning and Regression Trees (RPART), Multiple Imputation by Chained Equation (MICE)) attempted to back impute the missing data to compare which of the methods is the most accurate. Intraclass correlation coefficient (ICC) was used for comparison between the true value and the imputed value.

Results. The results showed that the accuracy of data imputation depends on the patients' self-report question. The most accurate imputation was possible for the questions related to depression and anxiety, and the most accurate methods were RF, RPART, and MICE.

Conclusion. The findings of this study suggest that the choice of imputation method should be tailored to the specific type of patient self-report question.

Acknowledgements. The authors declare the absence of a conflict of interest.

Effects of nightshift work on psychological and social health and its impact on lifestyle choices

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Background. Nightshift work, as time has progressed, has become a normal part of our day-to-day lives with the way our world is evolving, and more establishments needing to work 24/7 it is now less of a choice and more of a need, which could, unfortunately, affect physical, mental, and social health.

Aim. The aim of this study is to provide an overview of the negative effects of night shift work, in young adults, on various aspects of life including sleep quality, social health, mental health, lifestyle choices, work/study/life balance.

Methods. This retrospective study of 103 workers aged 18–30 (57 night shifters, 46 daytime) was realized with the help of an anonymous survey of 32 questions separated into five Topic groups which are: Sleep Quality, Social life, Life Habits, Work/Study/Life balance, General physical and mental health and with answers based on a Likert Scale. The information was compiled into *Microsoft Excel* and then transposed into *SPSS 22* where statistical analysis was performed using the Mann-Whitney U formula and descriptive statistics.

Results. There is a positive correlation with a $p \leq 0.03$ between night shift work and poor sleep quality including interruptions like nightmares and snoring, longer time to fall asleep, daytime sleepiness and usage of over-the-counter medicine. Habitually, an increased association with $p \leq 0.05$ between night shift work and increases of alcohol, tobacco usage also a bad diet. A positive association was found with $p \leq 0.02$ between nightshift work and bad academic performance and lack of time. Direct relationship with $p \leq 0.03$ between night shift work and presence of anxiety, obsessive-compulsive disorder, depression symptoms and increase in common illness occurrence. Socially, only positive correlation with $p = 0.05$ was between nightshift work and maintaining healthy relationships with first-grade relatives and partners.

Conclusions. Night shift work had a major negative impact, showing a positive correlation with aspects of life researched in this study: sleep quality, lifestyle choices, work/life/study balance. A positive correlation was revealed between night shift work and the presence of obsessive-compulsive disorder, unspecified anxiety, and depression symptoms, as well as general decreased physical wellbeing with more common illness occurrence. Night shift workers have demonstrated with their answers increased alcohol, nicotine consumption and poorer dietary habits.

Acknowledgements. No conflict of interest.

A Latvian adaptation of Affective Neuroscience Personality Scales-Adjective Ratings

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Background. The Affective Neuroscience Personality Scales-Adjective Ratings (ANPS-AR) is an instrument designed to assess differences in primary emotional traits as derived from Jaak Panksepp's Affective Neuroscience Theory. It operationalizes six emotional systems: PLAYFULNESS, SEEKING, CARING, ANGER, FEAR and SADNESS. Disbalances of primary emotional systems are of high relevance to understanding psychiatric disorders. Each of the six affective systems is closely related to the Big Five personality factors (BFI).

Aim. Provide the Latvian version of the ANPS-AR in this study. Investigate if the mentioned associations between core emotional systems and the BFI can be extended to a Latvian sample. Test for correlations between the level of education and the dimensions of the ANPS-AR.

Methods. A sample of 169 participants (116 females, mean age = 30.92, SD = 12.16; age range: 18–76) filled in ANPS-AR and BFI. The ANPS-AR by Rozgonjuk et al. (2018) consisting of 24 items has been translated from English into the Latvian language (and back translated) by bilingual translators. According to the ANPS adaptation practice, the Big Five Inventory with 44 questions (BFI-44) was used as the second instrument. In this study the Latvian version of BFI was used (Ivars Austers, 2007; Viktorija Perepjolkina, Emīls Kālis, 2012).

Results. SPSS version 29 was used to perform statistical analyses. Cronbach's alpha for Latvian ANPS-AR is 0.58 for SEEKING and CARE, 0.66 for SADNESS, 0.68 for PLAY, 0.70 ANGER and 0.72 for FEAR. Statistically significant Cronbach's alpha coefficients are for ANGER and FEAR scales. This indicates moderate internal consistency for SEEKING and CARE, moderate to good in SADNESS and PLAY, good level of internal consistency for ANGER and FEAR. Correlations between dimensions from both inventories were computed. Associations appeared with moderate to very strong between SADNESS, ANGER, FEAR and Neuroticism. Strong associations between PLAY and Extraversion, SEEKING and Openness to Experience. Moderate to strong associations between CARE / ANGER and Agreeableness. No significant associations with level of education and the ANPS-AR were observed.

Conclusion. It is necessary to refine the translations and/or formulations of 4 scales (SEEKING, CARE, SADNESS, PLAY) of ANPS-AR to enhance the internal consistency of individual scales in the Latvian version of ANPS-AR. Associations between ANPS-AR and the BFI can be extended to a Latvian sample. Were tested correlations between level of education and primary emotional systems, no significant correlations were observed.

Acknowledgements. No conflicts of interest. No funding.

An analysis of the worst life events experienced by Ukrainian war refugees

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Background. It is important to identify the worst events to improve the mechanism for providing help, because negative life events are associated with post-traumatic and depressive symptoms.

Aim. The aim of the study was to identify the most hurtful or terrifying events faced by Ukrainian refugees.

Methods. A quantitative research method – questionnaire survey using the Harvard Trauma Questionnaire (HTQ) in Russian. The study presents the results of Part 2 of the HTQ – the most hurtful or terrifying events experienced by the participants altogether and in Lithuania. The study involved 364 respondents who had arrived in Lithuania from Ukraine on 24 February 2022 were aged over 19 and had been living in Lithuania for more than four weeks. The survey has been conducted from 28 July 2022 to 1 December 2022. The data collected were analysed using an inductive qualitative content analysis approach. The study was conducted in compliance with bioethical principles.

Results. In general the most horrific experiences were: lack of food or water, unavailable access to healthcare due the lack of health insurance, participation in military action (interrogation by the occupiers, evacuation process, decimation of hometown, living under occupation, military action), enforced isolation from family members, near-death experience, natural or unnatural death of family members or friends, sudden emotional or physical reaction to the recollection of a particularly painful or traumatic event, financial difficulties, emotional reactions (fear).

The worst events in Lithuania were related to the process of leaving Ukraine and the fear of integration in Lithuania. The most negative experiences in Lithuania were: financial difficulties due to the loss of a job after leaving the native country, searching for a job, supporting children without a source of livelihood, difficulties in intercultural adaptation (personal and child adaptation), access to healthcare because they had no health insurance, and emotional reactions such as feelings of hopelessness, a constant fear for safety, the unknown, mistrust of the environment, and a sense of loss of home.

Conclusion. Ukrainian war refugees were traumatised by the war, evacuation, and acculturation. Their traumas were experienced during pre-migration, migration, and post-migration periods. Their most horrific and painful experiences show the necessity for psychological support, as the trauma will have a long-lasting impact on their own and their children's mental health and the success of integration.

Acknowledgements. The authors are grateful to all volunteer participants of this study. This research received no external funding.

Sleep paralysis in students of higher education in Latvia

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Background. Sleep paralysis refers to the pathology in which resumption of consciousness occurs while muscle atonia of REM sleep is still maintained, leading to a variety of neurological and psychiatric symptoms.

Aim. The study aimed to obtain information on the prevalence of sleeping paralysis as well as corresponding factors in students of higher education in Latvia.

Methods. The study was designed as a quantitative questionnaire-based descriptive study and was carried out from May to June 2023. The study sample consisted of Latvian higher education students. An anonymous questionnaire was used, it consisted of demographic questions and The Unusual Sleep Experiences Questionnaire (USEQ).

Results. In total, 546 participants were enrolled in this study, of which 82% (n = 448) were females and 18% were males (n = 98). The minimum age of the respondents was 18, the maximum was 46 years. The estimated prevalence of sleep paralysis (SP) was 41% (n = 224). SP was more common in females than in males (p = 0.032). SP was more common after waking up (68%) rather than while falling asleep (32%). The SP episodes typically occurred in the supine position (50.7%) rather than in the lateral position (48%), some people reported no difference in positions (1.3%). The mean age of the first episode was 16 years. The subjects who reported any type of somatic disease had greater SP prevalence (p < 0.0001). The most common somatic diseases reported were gastritis, arthritis, psoriasis, and asthma. Participants who reported any type of psychiatric disease had greater SP prevalence (p < 0.0005). The most common pathologies were depression, anxiety, OCD, and bipolar disorder. A total of 65% (n = 335) of people reported hallucinations that occurred during their SP episode. The most common was a combination of different sensory modalities (72%). The most typical kind was tactile (51.2%), followed by auditory (49%) and visual (43%). Also, most students reported the experience of 'sensed presence' (66%). The majority of participants reported fear of death (74%), and some reported fear of losing sanity (46%). 95% of survey participants have not made an attempt to seek medical assistance.

Conclusion. Of the 546 participants, 41% (N = 224) experienced at least one SP episode during their lifetime. Factors associated with SP were female sex, regular smoking and alcohol consumption, diagnosed somatic and psychiatric diseases. Only a small amount of people tried to get professional help.

Acknowledgements. No conflict of interest, no funding.

ONCOLOGY

Incidence of transurethral bladder resection in patients with early bladder cancer at Pauls Stradiņš Clinical University Hospital from 2018 to 2020

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Background. The bladder cancer is one of the most common cancers in urology. At the beginning when the cancer has not invaded the muscle layer, patients usually undergo treatment such as transurethral bladder resection (TURB). Once it is histologically proven that the cancer has invaded the muscle layer, the patients need to undergo more radical treatments such as radical cystectomy, chemotherapy, palliative radiotherapy, or palliative symptomatic care.

Aim. The aim of the study is to analyse and collect information about the frequency of made TURB before the cancer becomes invasive and what are the frequency of chosen options for further therapy.

Methods. This retrospective study was conducted at the Oncology Centre of Pauls Stradiņš Clinical University Hospital. From 2018 to 2020, patients with histologically confirmed bladder cancer were enrolled in this study. All the patient's data was collected from urological tumour board reports including the date of diagnosis, histological analysis, and date of the surgery.

Results. The study included 349 patients. 68% (n = 236) had non-invasive cancer and 32% (n = 113) patients had invasive cancer.

In the group of patients who had non-invasive cancer 24% (n = 57) were women and 76% (n = 179) were men. The average age of this group was 70 years old. 76% (n = 179) of patients had received 1 TURB, 17% (n = 41) had received 2 TURB, 5% (n = 11) 3 TURB, < 1% (n = 3) 4 TURB and < 1% (n = 2) 5 TURB.

In the group of patients who had invasive cancer 22% (n = 25) were women and 78% (n = 88) were men. The average age in this group was 72 years old. 83% (n = 94) had received 1 TURB, 16% (n = 18) had received 2 TURB and < 1% (n = 1) had received 3 TURB. Due to the cancer invasion of muscles, for 50% (n = 57) of patients, further treatment was radical surgery – cystectomy, for 29% (n = 33) symptomatic therapy due to comorbidities, 11% (n = 12) received chemotherapy and 10% (n = 11) received palliative radiotherapy.

Conclusion. The most common treatment for patients with invasive bladder cancer is radical surgery however the choice of treatment depends on the comorbidities of the patients. For patients with non-invasive cancer most commonly only 1 TURB procedure was made.

Recurrence of tumours of the oral cavity at Riga East Clinical University Hospital, Oncology Centre of Latvia

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Background. The recurrence of tumours is a major burden for the healthcare system and patients' welfare. The treatment of oral cavity tumours includes surgical tumour resection, combined therapy (surgery combined with radiotherapy +/- chemotherapy), symptomatic treatment and radiation therapy and/or chemotherapy.

Aim. Assess the correlation between the used treatment methods for primary tumours of the oral cavity in Riga East University Hospital in 2018–2020 and the recurrence of these tumours.

Methods. The study was conducted retrospectively, analysing patient data from the years 2018–2020. 212 patients were enrolled in the study. Data used for this study was collected from the platform 'Doctor's Office'. Data was processed using *Ms Excel*.

Results. Summarizing the results, in 2018–2020, the total of patients with primary diagnosed tumours of the oral cavity in Riga East Clinical University Hospital were 212. 31.1% (n = 66) of them were tongue cancers, 27.4% (n = 58) were floor of the mouth cancers and 41.5% (n = 88) were tonsil cancers.

Used therapies for tongue cancer patients were surgery in 10.6% (n = 7), surgery and radiotherapy in 40.9% (n = 27), surgery and radio/chemotherapy in 9.09% (n = 6), radiation and/or chemotherapy in 37.9% (n = 25) and symptomatic treatment in 1.5% (n = 1) of all cases. Recurrence of the tumours was diagnosed after surgery in 28.6% (n = 2), after surgery and radiotherapy in 33.3% (n = 9), surgery and radio/chemotherapy in 16.7% (n = 1) and after radiation and/or chemotherapy in 24% (n = 6) of all cases. Used therapies for floor-of-the-mouth cancer patients were surgery in 12.07% (n = 7), surgery and radiotherapy in 44.8% (n = 26), surgery and radio/chemotherapy in 8.6% (n = 5), radiation and/or chemotherapy in 25.9% (n = 15) and symptomatic treatment in 8.6% (n = 5) of all cases. Recurrence of the tumours was diagnosed after surgery in 57.1% (n = 4), after surgery and radiotherapy in 34.6% (n = 9), surgery and radio/chemotherapy in 40% (n = 2) and after radiation and/or chemotherapy in 33.3% (n = 5) of all cases. Used therapies for tonsil cancer patients were surgery in 2.3% (n = 2), surgery and radiotherapy in 7.9% (n = 7), surgery and radio/chemotherapy in 14.9% (n = 13), radiation and/or chemotherapy in 71.6% (n = 63) and symptomatic treatment in 3.4% (n = 3) of all cases. Recurrence of the tumours was diagnosed after surgery in 50% (n = 1), after surgery and radiotherapy in 0% (n = 0), surgery and radio/chemotherapy in 23.08% (n = 3) and after radiation and/or chemotherapy in 25.4% (n = 16) of all cases.

Conclusion. Recurrence of oral cavity tumours was more common when only surgical treatment was used. Patients experienced fewer recurrences after combined therapies.

Acknowledgements. The authors declare the absence of a conflict of interest.

Assessment of neoadjuvant therapy outcomes in breast cancer patients at the Oncology Centre of Latvia

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Background. Breast cancer stands as the most prevalent malignant tumour among women worldwide, and it requires complex and personalized treatment. Neoadjuvant therapy has become an integral component of breast cancer treatment for many patients and is used for various purposes.

Aim. The aim of the study is to assess the outcomes and influencing factors of neoadjuvant therapy among breast cancer patients at the Oncology Centre of Latvia during the time period from 2022 to 2023.

Methods. A total of 139 breast cancer patients who received neoadjuvant therapy before the surgical treatment at the Oncology Centre of Latvia from 2022 to 2023 were enrolled in the study. The assessment of clinical and histopathological characteristics of breast cancer and their impact on pathological complete response (pCR) was analysed. Statistical analysis was performed using *IBM SPSS Statistics version 29*.

Results. The study involved a total of 139 patients. The age of patients ranged from 33 to 83, with an average age of 55. Among all patients, 62.6% (n = 87) had early-stage breast cancer, while 37.4% (n = 52) had locally advanced disease. A total of 46 patients (33.1%) achieved a pathological complete response (pCR). Among them, the most common subtypes were HER2-positive (12.9%; n = 18), followed by Triple negative (10.8%; n = 15), Luminal B HER2-positive (5.0%; n = 7), and Luminal B HER2-negative (4.3%; n = 6). None of the patients (n = 0) with the Luminal A subtype achieved pCR. Among patients who achieved pCR, 84.8% (n = 39) had the aggressive subtype, while 15.2% (n = 7) had the less aggressive subtype. 69.6% (n = 32) of patients with early-stage and 30.4% (n = 14) with locally advanced breast cancer achieved pCR.

Among the 32 patients with early-stage breast cancer who achieved pCR, 32.2% (n = 28) had the aggressive, and 4.6% (n = 4) had the less aggressive subtype. Of 14 patients with locally advanced disease who achieved pCR, 21.2% (n = 11) had the aggressive, while 5.8% (n = 3) had the less aggressive subtype. In patients with early-stage breast cancer, the aggressive subtype demonstrated a higher likelihood of achieving pCR (32.2%; n = 28) ($p < 0.001$). Furthermore, HER2-positive patients exhibited a higher likelihood of achieving pCR (66.7%; n = 18), especially in the early-stage group ($p < 0.001$).

Conclusion. Early-stage breast cancer, especially the HER2-positive subtype, showed better pCR results compared to locally advanced disease. The aggressive subtypes more frequently achieved pCR than less aggressive subtypes. This indicates that the stage and subtype of the cancer are significant factors influencing pCR outcomes.

Acknowledgements. The authors declare the absence of a conflict of interest.

Preoperative contralateral liver lobe augmentation after ipsilateral portal vein branch transhepatic endovascular embolization. Clinical and radiological results

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Background. Preoperative ipsilateral liver lobe transhepatic endovascular portal vein branch embolization (PVE) is one of the techniques to augment the growth of future liver remnant (FLR) volume, thus decreasing the risk of posthepatectomy liver failure. For radiologists, it is important to determine the correct volume changes of FLR preoperatively.

Aim. The purpose of this retrospective study was to evaluate FLR augmentation rate and volume after PVE, evaluate the accuracy of different volumetric programmes and demonstrate the clinical necessity to implement semi-automated volumetric measurements.

Methods. 9 patients with elective hemihepatectomy due to unilobar oncological pathology were enrolled on a retrospective case-control study from 2021–2023. All patients underwent ipsilateral PVE with 800 µm microparticles in distal target portal branches and coils + glue in proximal branches. To assess the FLR volume two different open-access postprocessing programmes (programme 1 and programme 2) were used. Total liver volume (TLV), FLR volume and FLR ratio were measured in CT or MR imaging series: less than 4 weeks prior to PVE, then on first CT/MR control study \geq 4 weeks after PVE and in following preoperative examinations if performed.

Results. Total of 25 radiological examinations were analysed and 50 segmentational volumetry measurements, including 3D measurements, were performed. The results obtained from two different post-processing programmes showed no statistically significant differences in the results (ICC 0.99; $p = 0.00$).

All 9 patients after ipsilateral liver lobe PVE had reached the necessary increase of FLR volume ratio (programme 1 mean 37.7%; programme 2 mean 37.8%) before planned hemihepatectomy. One patient developed a hepatic abscess- in this case, both transarterial chemoembolisation and PVE were performed in the ipsilateral lobe. In 5 patients the progression of the disease was observed in a median 70.6 days post PVE.

5 patients underwent additional radiological follow-ups more than 4 weeks after PVE, even though the necessary FLR ratio was already reached on primary follow-up after PVE.

6 out of 9 patients underwent right hemihepatectomy or extended hemihepatectomy. None of the 6 patients developed liver failure after surgery, in one patient kidney failure occurred.

Conclusion. PVE is a safe and effective technique to increase FLR volume. Radiologic multiplanar segmentation volumetry is an objective method to assess the increase of liver volume before hemihepatectomy and should be implemented in everyday clinical practice. The estimation of sufficient FLR volume ratio thresholds as a predictive value of postoperative liver failure should be evaluated in larger-scale studies.

Comparative pilot study of imaging and histopathological characteristics of triple-negative breast cancer

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Background: The triple-negative breast cancer (TNBC) subtype, constituting 10% of all breast cancer cases was prevalent in women aged 40–50, with up to 300,000 new cases annually. Notably, this subtype occurs in younger women and is identified as the most aggressive cancer subtype.

Aim: The aim of our study was to compare the prevalence of TNBC and histopathological, clinical and imaging characteristics of TNBC in the Latvian Centre of Oncology.

Methods: 1205 patients referred to the Latvian Centre of Oncology suspicious for breast cancer from October 2022 till November 2023 were enrolled in the study. All patients underwent mammography, breast lesion core needle biopsy with subsequent histopathological and immunohistochemical examination. The clinical, histopathological and imaging characteristics were analysed. The histopathological characteristics of breast lesions were analysed according to the current WHO classification. The immunohistochemical biomarkers expression (ER, PR, Ki-67, Her-2, E-cadherin) was assessed. The imaging characteristics of the lesions were assessed according to BIRADS classification. The study was approved by a local ethical committee. The study was confirmed by the Declaration of Helsinki and Oviedo. The statistical analysis was performed by SPSS software. The descriptive and univariate analysis was performed.

Results: 1205 patients with suspicious breast lesion were enrolled in the study. The patients' median age was 63 years (range, 33–89 years). 401 patients (33.27%) had benign breast lesions. 97 patients (8.05%) had TNBC. The average age of patients with TNBC was 40 years. The distribution of BIRADS ratings ranged from 2 to 6, with a median of 5 (56%). BIRADS 4 was observed in 546 patients, BIRADS 5 was observed in 392 patients and BIRADS 6 was found in 7 patients. A significant association between BIRADS and histopathologic characteristics were observed ($p < 0.0001$). 48% of breast tumours were observed in the right breast, 52% in the left, and 1% exhibited bilateral occurrence. The median Ki-67 index was 51.67%, ranging from 2% to 90%.

Conclusions: Our study demonstrated the prevalence of TNBC in the Latvian Centre of Oncology and its associations with clinical and imaging characteristics.

The reliability of PET/CT in the staging of non-small cell lung cancer

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Background. Accurate staging at the time of first diagnosis is the most important factor in predicting survival in NSCLC. It also determines the appropriate treatment plan. The use of [18F]FDG PET/CT is considered the standard of care of clinical lung cancer staging. This paper gives a preliminary evaluation of the practical consequences of PET/CT in the staging of lung cancer in Latvia.

Aim. The aim of this retrospective study is to focus on the value of integrated FDG PET/CT in the local tumour and nodal staging of non-small cell lung cancer during the first years of local practice.

Methods. All single-centre patients from the period between 2020 and 2021 who underwent a [18F]FDG PET/CT were included. PET imaging stage (cTNM) was compared to pathology staging (pTNM). The correlation between pathology results and PET/CT was analysed.

Results. A total of 114 patients were enrolled in the study, consisting of 83 males (72.8%) and 31 females (27.2%), with ages ranging from 45 to 84 years. In the assessment of local tumours, 50% of PET T stage matched pathological T stage. In 28% of cases, PET underestimated the size of the tumour, while in 22% of cases, it exaggerated it. 68% of patients showed agreement between nodal involvement as detected by PET and confirmed by pathology data. In 15% of cases, PET results were false-positive, whereas in 18% of cases, PET results were false-negative. The sensitivity of PET T staging was 64%, the sensitivity of N staging was 79%, and the specificity was 86%.

Conclusion. The results of our study indicate that [18F]FDG PET/CT is an effective diagnostic tool for determining the stage of lung cancer in patients, particularly for assessing the N stage. There is still a possibility of obtaining inaccurate results, particularly during the T staging process, but in our opinion, that does not change the treatment strategy. PET and diagnostic CT complementary values and factors contributing to inaccurate outcomes in our community are subjects of further investigation.

Retrospective analysis of vulvar cancer treatment with subsequent plastic reconstructive surgery at the Latvian Oncology Centre

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Background. Vulvar cancer is a rare cancer of a woman's vulva and contains 6% of all malignancies of the female genital tract (after cancer of the uterine corpus, ovary, and cervix).

The highest morbidity is in the over-64 age group. Surgical treatment is the most important step in the combined therapy of vulvar cancer. Surgery has made great progress in recent years. Currently, the focus of vulvar surgery worldwide is on the closure of large defects with tissue flaps, which offer better healing, cosmetic effects, function, and the possibility of sexual life.

Aim. The chosen topic aims to demonstrate vulvar cancer treatment in situations where a large tissue defect remains after radical cancer surgery and tissue flaps are created to close the defect.

Methods. Retrospective analysis of patients surgically treated for vulvar cancer at the Latvian Oncology Centre from January 2020 to December 2023.

Results. From January 2020 to December 2023, 85 patients had surgical treatment for vulvar cancer at the Latvian Oncology Centre. 42 vulvar cancer patients undergo radical vulvar surgery with subsequent defect closure with a non-extensible tissue flap. The average age of the vulvar cancer patients was 67.6 years. Plastic surgeons prefer a. pudenda interna perforator propeller-type flaps and m. Gracilis rotated flaps. To close the defect without the involvement of plastic surgeons, oncogynaecologists choose VY-type flaps.

Conclusions. Vulvar defect closure with non-extensible tissue flaps after radical vulvar surgery improves the healing process, function and has a good cosmetic effect.

Acknowledgements. No conflicts of interest.

Evaluation of complete pathological remission in patients with human epidermal receptor 2-positive breast cancer who received neoadjuvant chemotherapy in Stradiņš Clinical University Hospital 2018–2023

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Background. The human epidermal growth factor 2 (HER2) receptor is a protein that is present on the surface of cells in the body, including breast cells. HER2 receptor expression is associated with an aggressive tumour course and metastatic activity. These changes of tumour are detectable in the biopsy material, which is performed for each patient according to the results of the analyses (HER+). In HER2-positive breast cancer, neoadjuvant chemotherapy is combined with dual HER2-targeted therapy Phesgo.

Aim. The aim was to evaluate the frequency of complete pathological remission in patients who received neoadjuvant chemotherapy together with Phesgo during the period of 2018 and 2023. The data was collected in Pauls Stradiņš Clinical University Hospital. The information in this study can serve as a database for further research.

Methods. After using Pauls Stradiņš Clinical University Hospital Oncology Clinic multidisciplinary tumour board conclusion, 426 patients with positive HER2+ or HER3+ receptors were enrolled in the study. The 'Doctors Office' was used to determine tumour markers and patient laboratory data.

Results. Altogether 426 women between ages 23 and 91 were diagnosed with breast cancer at I, II, III and IV stages. Of those patients, 311 received neoadjuvant chemotherapy. In 30 cases, targeted therapy Phesgo (pertuzumab and trastuzumab) was used in addition to neoadjuvant chemotherapy in patients with HER2 +++. The mean age was 53 years. Most of all cases (n = 19) the Phesgo was used at stage III, the other 11 cases were treated at stage II.

Of the 30 patients receiving Phesgo, 11 patients had complete pathological remission, 12 had partial remission, and 7 had stable disease.

Conclusion. In 19 cases, the most frequent stage III, which in addition to neoadjuvant chemotherapy also received targeted therapy with Phesgo. The most common remission was partial pathological remission (n = 11). Based on the available research, it can be concluded that neoadjuvant chemotherapy with dual HER2-targeted therapy Phesgo is an effective treatment strategy for HER2-positive breast cancer. This treatment has been shown to reduce tumour dynamics and improve patient life expectancy.

Acknowledgements. Special thanks to our supervisor Dr. Hasnere for leading this research and providing much-needed guidance.

Sarcoma treatment results at the Hospital of Traumatology and Orthopaedics from 2012 to 2022

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Background. The Hospital of Traumatology and Orthopaedics is the largest hospital in Latvia where malignancies of bone tissue (sarcoma) as well as soft tissue sarcomas with or without bone involvement are treated. Historically, a collection of data analysing patient treatment outcomes and survival has not been conducted at The Hospital of Traumatology and Orthopaedics.

Aim. The aim of this research is to gather retrospective data from 2012 to 2022, analysing patients with oncological conditions, diagnosis, treatment received (adjuvant, non-adjuvant chemotherapy) recurrence, and survival.

Methods. A retrospective study was performed by highlighting the histories of 114 patients.

Results. The total number of patients' history reviewed in the study was 114 from 2012–2022. Patient diagnosis included osteosarcoma, chondrosarcoma, synovial sarcoma, Ewing sarcoma, fibrosarcoma, rhabdomyosarcoma, plasmacytoma, leiomyosarcoma, histiocytoma, gigantic cell tumour. Patient data was considered for both 5-year and 2-year survival. Before the multidisciplinary council was launched in 2020, the results for chemotherapy, radiation and biopsies performed from the time period of 2012–2019 were 23.5%, 7.58%, 68.22% respectively. And the survival rate for this time period for 2-year is 67.23% and for 5-years the survival rate is 48.85% which can be viewed only in 2015 and 2018. After the launch of the multidisciplinary council, the therapy performed in the time period of 2020–2022 was 18.52% for chemotherapy, 29.26% for radiation therapy and for biopsies performed were 80% respectively. The survival rate for this time period can only be compared for the 2-year period because 5-years have not passed. And the survival results are 72.15%. The increased percentage of these pre- and post-operative manipulations is the result of the multidisciplinary council being launched in 2020.

Conclusion. Multidisciplinary treatments play a crucial role in achieving optimal treatment outcomes. To attain the best results, it is essential for the team to collaborate cohesively.

Acknowledgements. In 2020–2022, the availability of healthcare for oncological patients significantly declined due to the COVID-19 pandemic. Since 2020, the Sarcoma Multidisciplinary Council has been established, leading to a broader application of adjuvant therapy and improved patient treatment. Patient survival rates are comparable to the median statistical indicators described in the literature.

Utilizing PET/CT to study sarcomas in Latvia. Initial experience

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Background. To effectively diagnose and treat a wide range of sarcomas, a comprehensive approach is required. This involves the use of various imaging modalities (CT, MR and PET). FDG PET/CT, a metabolic imaging modality, provides enhanced and sometimes superior diagnostic information. Multiple studies have documented the advantages of PET/CT, and it is recognized in guidelines. Molecular imaging technologies are not widely used in Latvia, and the optimal applications of FDG PET/CT are not thoroughly understood.

Aim. This analysis focuses on the present regional utilization of PET, a relatively new imaging method. The objective is to compare the imaging outcomes of PET with conventional CT and MRI imaging techniques to aid in the decision-making process for managing sarcoma patients and comprehending its significance.

Methods. A retrospective observational analysis was performed at a single facility, encompassing 40 patients in 62 multimodality imaging episodes who received one or more [18F] FDG PET/CT, CT, and/or MR scans between 2018 and 2023. After thoroughly analysing the present local applications and advantages of [18F] FDG PET/CT imaging, we have derived recommendations for its utilization in local medical practice, taking into account our findings and international guidelines.

Results. Our findings indicate that advanced imaging techniques were employed to assess a diverse range of sarcomas (20 Ewing sarcomas, 10 synovial sarcomas, 8 osteosarcomas, 8 leiomyosarcomas and a few cases per other morphologies). The majority of individuals exhibited grade 3 illness. FDG PET/CT was utilized in the following situations: 52% for detecting recurrence, 27% for therapy effectiveness and 21% for determining the stage of the disease. Improved diagnostic confidence was observed in 58% of cases where PET and CT and/or MR imaging data were consistent. The difference in the result was observed in 34%. PET downstaged the disease in 62% while in 38% upstaged it.

Conclusions. PET/CT is mostly utilized as a diagnostic tool to address unresolved issues when conventional modalities fail to provide definitive answers. Our findings indicate that more than third of patients derive significant advantages from the use of PET. Additional diagnostic certainty is obtained for the remaining. In accordance with the recommendations, high-grade sarcomas are mostly evaluated with PET scans in Latvia and should be the predominantly utilized patient cohort.

Acknowledgements. There are no conflicts of interest to disclose.

OPHTHALMOLOGY

Microcirculatory and foveal avascular zone changes in smoking patients

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Background. Smoking is one of the most common addictions that results in changes in human microcirculation. According to 2022 Eurostat data, the amount of people smoking in the European Union reaches 19.7 percent.

Aim. The aim of the study was to evaluate and compare the foveal avascular zone (FAZ) in smokers and non-smokers.

Methods. The study included 55 smoking patients who from February 1, 2023 to May 1, 2023, applied to the inpatient 'Biķernieki' Ophthalmology Department of Riga Eastern Clinical University Hospital, as well as 42 control group, non-smoking patients.

Results. The obtained results showed that the average FAZ area in the group of smokers was 0.24 mm² (std 0.142), and in the group of non-smokers 0.20 mm² (std 0.043). The average FAZ perimeter in the smoking group was 1.81 mm (std 0.306), in the non-smoking group 1.8 mm (std 0.370). The average FAZ circularity in the group of smokers was 0.72 (std 1.07), in the group of non-smokers 0.74 (std 0.088). The obtained results showed that there are statistically significant differences in the FAZ area between smokers and non-smokers ($U = 843.000$, $p = 0.023$). There is a statistically significant negative correlation between FAZ area and age group ($r_s(97) = -0.360$, $p = 0.001$). The average central perfusion density in the smoking group was 27.85% (std 4.10), in the non-smoking group 30.00% (std 5.57). The average central density of blood vessels in the smoking group was 16.65 mm/mm² (std 4.85), in the non-smoking group 15.3 mm/mm² (std 4.94).

Conclusion. It was concluded that smoking has an effect on FAZ parameters, smoking increases the area of FAZ. As the smoking period increases, the perfusion density indicators decrease. There is a statistically significant positive correlation between smoking duration and vascular density components.

Acknowledgements. The funding source had no role in the design of the study, the analysis and interpretation of the data or the writing of, nor the decision to publish the manuscript.

Changes in macular and peripapillary microvascular density after gonioscopy-assisted transluminal trabeculotomy and trabeculectomy

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Background. Studies have shown that glaucoma patients have a lower vascular area density (VAD) compared to healthy individuals. Analysis of microvascular changes may be a useful biomarker to detect vascular insufficiency, which is known to play a central role in glaucomatous changes in the eye. In addition, monitoring the structure of the vessels may be an important factor in the decision of surgical treatment of glaucoma. To the best of our knowledge, there are no studies on microvascular changes after gonioscopy-assisted transluminal trabeculotomy (GATT) surgery and their comparison with the classical filtration surgery – trabeculectomy (TE).

Aim. To analyse changes in macular and peripapillary tissue VAD after GATT and TE using optical coherence tomography angiography (OCTA).

Methods. The study included 20 patients (21 eyes) who underwent glaucoma surgery – GATT and TE. Patients were divided into two groups, depending on the type of surgery. All patients included in the study underwent optical coherence tomography (OCT) and OCTA examination before, one and three months after surgery.

Results. In the GATT group, there was a statistically significant change in the number of glaucoma medications ($p = 1.13 \times 10^{-6}$), IOP ($p = 3.30 \times 10^{-6}$), cup to disc ratio (CDR) ($p = 5.80 \times 10^{-3}$), RNFL peripapillary temporal inferior (Peri-TI) ($p = 2.16 \times 10^{-2}$) and macular VAD superficial inferior-hemi ($p = 2.99 \times 10^{-2}$). In the TE group, it was found that the number of glaucoma medications ($p = 9.12 \times 10^{-4}$), IOP ($p = 2.39 \times 10^{-3}$), RNFL peripapillary superior nasal (Peri-SN) ($p = 2.42 \times 10^{-2}$) changed statistically significant. Three indicators (number of medications, IOP, RNFL) changed statistically significantly in both groups. IOP $\Delta 3m-P$ differed statistically significantly between the groups ($p = 3.64 \times 10^{-2}$). A trend was observed for RNFL peripapillary nasal superior (Peri-NS) $\Delta 3m-P$ ($p = 0.066$), macular VAD parafoveal nasal (ParaFov-N), superficial vessels $\Delta 1m-P$ ($p = 0.055$), RPC density peripapillary temporal superior (Peri-TS), small vessels $\Delta 3m-P$ ($p = 0.062$), however, it was not statistically significant (difference at the statistical confidence limit of 0.05 to 0.09).

Conclusion. Analysing the effect of lowering IOP on the microvasculature, no significant changes in VAD were found over time in all perfusion regions, except for macular superficial vessels, lower segment in GATT patients. After significant surgical reduction of the IOP, significant detectable morphological changes in the optic nerve were observed. IOP reduction after glaucoma surgery stabilizes and improves RNFL in the long term.

Acknowledgements. The authors have no relevant financial or non-financial interests to disclose.

Microvascular changes in eye tissues among patients with different stages of cardiovascular risks

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Background. Cardiovascular diseases (CVD) are the most common cause of death in Latvia (Ērglis et al, 2020). In Latvia, the SCORE system is used for risk assessment of CVD. It is calculated taking into account a person's age, sex, smoking, total cholesterol level and systolic arterial blood pressure (Latvijas Ārstu biedrība, 2015). The coronary vascular network shares similar physiological and anatomical characteristics with the retinal microvascular system. Compared to coronary vascular network retinal microvascular plexuses and their perfusion can be visualized non-invasively to investigate the actual microvascular architecture in patients with CVD (Matulevičiūte, 2022).

Aim. The aim of this study was to evaluate and compare microvascular changes in the eye among patients with different stages of cardiovascular risk (CV) according to the SCORE classification.

Methods. The study group included 40 patients (80 eyes), an age group of 40–65 years. Patients were divided into four groups according to the SCORE classification: low, moderate, high, and very high CV risk. All patients underwent OCT and OCT-angiography examination to determine the thickness of the ganglion cell layer (GCL), the density of the superficial (SRVP) and deep (DRVP) retinal vascular plexus. The obtained data were analysed using the statistical programme *IBM SPSS Statistics version 25.0*.

Results A statistically significant difference was found between SCORE risk groups: GCL, SRVP, and DRVP. In patients with a very high CV risk, the average density of GCL was 93.2 μm (95% CI 90.20 to 96.20), while in the low-risk group – 106.83 μm ($p = 5.63 \times 10^{-9}$, 95% CI 104.05 to 109.60). SRVP in the upper and lower quadrants in the very high CV risk group was 45.85% ($p = 5.21 \times 10^{-8}$, 95% CI 44.42 to 47.27) and 45.63% ($p = 1.28 \times 10^{-8}$, 95% CI 45.02 to 46.24), respectively, and in the low-risk group – 49.27% (95% CI 48.80 to 49.73) and 49.28% (95% CI 48.65 to 49.91). DRVP density in the upper and lower quadrants in the very high CV risk group was 47.96% ($p = 4.96 \times 10^{-6}$, 95% CI 46.82 to 49.10) and 48.32% ($p = 1.69 \times 10^{-4}$, 95% CI 46.82 to 49.10), in the low-risk group – 52.13% (95% CI 51.48 to 52.78) and 50.89% (95% CI 50.16 to 51.62).

Conclusion. As the cardiovascular risk increases according to SCORE, there is a decrease in GCL, SRVP, and DRVP density.

Acknowledgements. No conflict of interest to declare.

Long-term evaluation of postoperative refractive outcomes after IOL implantation. Comparison of the accuracy of five intraocular lens power calculation formulas

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Background. The quality of surgical correction for cataracts can be assessed by the refractive outcome. In this study, the refractive results obtained from calculating the optical power of intraocular lenses (IOL) using various generations of IOL power calculation formulas were analysed.

Aim. To compare the accuracy of five IOL power calculation formulas, including two third-generation formulas (Holladay 1, SRK/T) and three fourth-generation formulas (Barrett Universal II, Barrett True K, Holladay 2), in patients who underwent cataract surgery.

Methods. Retrospective study of 79 eyes from 54 patients who underwent uneventful cataract surgery with IOL insertion, involving both normal and post-corneal refractive surgery cases. Preoperative biometric measurements were conducted using an IOL Master[®] 700. The actual refractive outcomes were assessed three months postoperatively. The study exclusively involved eyes with a normal axial length ranging from 22.00 to 25.00 mm.

Results. In the study, it was analysed the disparity between target refraction and postoperative refraction within each group. Statistical analysis involved the application of methods such as ANOVA and Kruskal-Wallis, but for more precise values, the Holm method was used for calculating the p-adjusted value. For statistical analysis and data presentation, a p-adjusted value was calculated using the Holm method. The analysis revealed that the most accurate formulas are Barrett Universal II and Barrett True K, demonstrating similar results ($p_{\text{adj}} = 1.0000000$). Following closely is the Holladay 2 formula, which showed values of $p_{\text{adj}} = 0.8265759$ in comparison with Barrett Universal II and $p_{\text{adj}} = 0.7820257$ in comparison with Barrett True K. In contrast, the SRK/t formula demonstrated lower accuracy ($p_{\text{adj}} = 0.7678041$) compared to Barrett Universal II. Notably, the Holladay 1 formula achieved the lowest result in reaching the refractive target, with a value of $p_{\text{adj}} = 0.2526958$ in comparison to Barrett Universal II.

Conclusions. Barrett Universal II was the most accurate for IOL power calculation formula in the normal axial length of eyes. Next in line was Barrett True K, followed by Holladay 2, and with a slight difference, SRK/T. Subsequently, the Holladay 1 formula exhibited the lowest result during the study.

Acknowledgements. The authors assert that they have no conflicts of interest and affirm that the study did not receive any funding.

Changes in corneal endothelium and anterior chamber angle after cataract surgery in patients with pseudoexfoliation syndrome

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Background. Pseudoexfoliative syndrome (PES) is an age-related pathology primarily affecting ocular tissues. Gradually, fibrillar material deposits onto the lens capsule, ciliary body, zonules, corneal endothelium, iris stroma, iris vasculature, iris margin, or trabecular meshwork. PES is associated with an increased risk of complications, such as intraoperative complications and corneal endothelial dysfunction, leading to corneal oedema and reduced visual acuity (Plateroti et al., 2015).

Aim. To compare changes in corneal endothelium and anterior chamber angle in patients with pseudoexfoliative syndrome and control group patients without pseudoexfoliative syndrome before and one month after cataract surgery, as well as to determine the dependence of these changes on indicators obtained during surgery.

Methods. The study included 53 patients. Participants were divided into two groups: patients with pseudoexfoliative syndrome and a control group. All patients were examined using the KONAN CellCheck20 specular microscope and ANTERION Heidelberg Engineering anterior segment optical coherence tomography. Patients were examined before surgery and one month after. The surgeries were performed by a single surgeon.

Results. The mean age of participants was 76 years. A statistically significant difference in changes in the anterior chamber angle was demonstrated between the control and study groups medians ($p = 0.0111$). Statistically significant differences were obtained in the mean endothelial cell count before and after surgery in the control group ($p < 0.0001$) and the study group ($p = 0.0002$). No correlation or weak correlation was found between endothelial cell changes and parameters obtained during cataract surgery.

Conclusion. Patients with pseudoexfoliative syndrome do not exhibit definitive changes in the anterior chamber angle or endothelial changes after cataract surgery compared to the control group, although a trend is observed. Patients with pseudoexfoliative syndrome more commonly experienced intraoperative complications.

Acknowledgements. The authors have no relevant financial or non-financial interests to disclose.

Effect of ocular pseudoexfoliative syndrome on target refraction in patients after cataract surgery

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Background. Pseudoexfoliative syndrome (PEX) is a multifactorial disorder of elastic fibre structures, which is genetically influenced, age-related, and environmentally induced. PEX is characterized by excessive production and accumulation of elastic material in intraocular and extraocular tissues. PEX also increases the risk of various complications.

Aim. Assessing the impact of pseudoexfoliative syndrome on the target refraction in patients after cataract surgery.

Materials and methods. In a prospective study, 20 patients with cataract and diagnosed with pseudoexfoliative syndrome, and 20 patients with cataract without pseudoexfoliative syndrome were included. The day before surgery, visual acuity and intraocular pressure were measured in all patients. Patients were examined 3 to 4 weeks after surgery, including visual acuity assessment, intraocular pressure measurement, and slit lamp examination to evaluate the position of the intraocular lens.

Results. The average age of the patients is 73.00 ± 6.24 years (IQR 52–92; range 62–86). The average age of female patients is 73 ± 6.7 years (IQR 52–92; range 62–86). The average age of male patients is 73.5 ± 5.69 years (IQR 52.25–91.75; range 63–83). The mean preoperative visual acuity of the patients is 0.15 ± 0.07 (IQR 0.05–0.35; range 0.08–0.40). The mean postoperative visual acuity of the patients is 0.90 ± 0.078 (IQR 0.75–1.15; range 0.7–1.0). The mean preoperative intraocular pressure (IOP) of the patients is 18 ± 3.01 (IQR 9.26–25; range 11–24). The mean postoperative IOP of the patients is 14.50 ± 2.47 (IQR 8.5–20.5; range 9–20). There was found to be a statistically insignificant correlation between visual acuity changes after surgery among patients with PEX and patients without PEX ($p = 0.32$, $r = -0.16$). Similarly, there was a statistically insignificant correlation between IOP changes after surgery among patients with PEX and patients without PEX ($p = 0.46$, $r = 0.12$).

Conclusion. The changes in visual acuity after surgery in patients with PEX and patients without PEX did not show statistically significant results. There was no statistically significant correlation found between changes in intraocular pressure (IOP) after surgery in patients with PEX and patients without PEX.

Short-term endothelial cell changes in pseudoexfoliative glaucoma patients after gonioscopy-assisted transluminal trabeculotomy with polypropylene suture

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Background. Gonioscopy-assisted transluminal trabeculotomy (GATT) is one of the angle-based minimally invasive glaucoma surgical techniques. During surgery manipulation within the anterior chamber and postoperative contact between blood and endothelium can cause endothelial cell changes.

Aim. To investigate endothelial cell changes and early complications after GATT in pseudoexfoliative glaucoma (PXG).

Methods. A prospective study included 70 eyes of 65 patients, with a mean age of 69.0 (63.0–76.0) years, who underwent GATT with 5.0 polypropylene suture performed as a standalone procedure or combined with cataract surgery by a single surgeon between November 2022 and November 2023. Visual fields, intraocular pressure (IOP), number of glaucoma medication, pachymetry, endothelial cell density and ocular adverse events were analysed. Patients were divided into two groups according to visual field defect, mild to moderate PXG mean deviation (MD) \leq 12 dB and severe PXG visual field defect MD $>$ 12 dB. The postoperative outcomes, pachymetry, endothelial cell density between advanced and mild to moderate glaucoma were compared.

Results. A total of 33 (47.1%) eyes with mild to moderate PXG and 37 (52.9%) with advanced PXG underwent 360-degree GATT with thermally blunted 5.0 polypropylene suture as standalone or combined with cataract surgery. The mean age of the study patients was 69.0 (63.0–76.0) in the mild to moderate PXG group and 71.5 (64.8–79.0) in the advanced PXG group. The patient in the former group had an endothelial cell density of 2467.0 (1903.0–2598.0) CD/mm³ preoperatively and decreased 2224 (1972–2537) CD/mm³ one month postoperatively ($p = 0.0107$). In the latter group, the mean endothelial cell density was 2254.4 (1890.8–2506.5) CD/mm³ preoperatively and 2219 (1755–2466) CD/mm³ postoperatively ($p = 0.1059$). There was no difference between the preoperative pachymetry data in the mild to moderate PXG group 513.0 (484.0–533.0) μ m group and in the advanced PXG group 510.0 (487.8–528.0) μ m group. One month after surgery there was no significant change in pachymetry 514.0 (483.0–531.0) μ m in the former group, but corneal thickness 508.5 (491.5–523.2) μ m decreased in the latter group ($p = 0.0173$). In 32 (45.7%) of patients (15 patients with mild to moderate PXG and 17 patients with advanced PXG), a hyphema of more than 3 mm was observed on the first postoperative day. No statistically significant differences in the frequency and degree of hyphema were observed between the two groups.

Conclusions. GATT with 5.0 polypropylene suture performed as a standalone procedure or combined with cataract surgery appears to be a safe procedure for the corneal endothelial cell layer in a short-term follow-up period.

Acknowledgements. No conflict of interest.

Visual performance after implantation of two different intraocular lenses for the correction of presbyopia: trifocal and extended field of vision

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Background. Presbyopia could become one of the most common diseases in ophthalmology in the 21st century amongst the population and it is predicted that by 2050 21% of the world's population of the age over 60 years old could be in the risk group.

After cataract surgery, glasses allow for increased independence because of advancements in intraocular lens (IOL) technology. These days, intraocular lenses can correct astigmatism and presbyopia in addition to spherical abnormalities, guaranteeing the return of complete visual capabilities.

Aim. The aim of the study is to compare the subjective and objective visual performance of EDOF intraocular lens and multifocal intraocular lens after femtosecond cataract surgery, as well as to compare changes in visual quality.

Methods. Results are reported for patients who underwent phacoemulsification with bilateral implantation of one of the following IOLs Trifocal and extended fields of vision. Refractive status and uncorrected and corrected near and distance visual acuity were measured. At 1 month postoperatively, patients were examined for distance 4 m, intermediate 80 cm, and near 40 cm visual acuity using logMAR, and ETDRS visual acuity charts. Questionnaire to evaluate the quality of vision.

Results. ETDRS visual acuity charts at 80 cm were significantly better in the EDOF lens group than in the trifocal lens group, while ETDRS at 40 cm was better in the EDOF lens. At a distance, all patients showed a cumulative binocular distance-corrected visual acuity of -0.2 . At near and intermediate distances, all patients showed a cumulative distance-corrected visual acuity of 0.6. Specifically, 40 cm showed the EDOF lens is 0.8, and trifocal 0. More patients in the EDOF lens group need glasses for reading.

Conclusion. EDOF lens group would be a good choice for patients aiming for an optimum near vision for distances 40 cm and 80 cm, while the trifocal lens is a good choice for patients for distances 4 m, and 80 cm.

Acknowledgements. Conflict of interest disclosures: none reported. The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data.

Association of *STAT4* gene polymorphisms (rs10181656, rs7574865, rs7601754, rs10168266) with age-related macular degeneration in relation to age

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Background. Age-related macular degeneration (AMD) is a progressive degenerative disease that affects the central part of the retina, the macula. Since AMD is one of the main causes of central vision loss in industrialised countries, affecting 10% of people over the age of 65 and more than 25% of people over the age of 75, we divided subjects into three groups according to age. The study of genetic factors that may influence the manifestation of AMD is becoming increasingly important. The *STAT4* protein is involved in the pathogenesis of numerous inflammatory processes. We have therefore decided to investigate the relationship between *STAT4* gene polymorphisms (rs10181656, rs7574865, rs7601754, rs10168266) and age-related macular degeneration according to age.

Aim. To investigate the association between *STAT4* (rs10181656, rs7574865, rs7601754, rs10168266) gene polymorphisms and patients with AMD in relation to age.

Methods. The study included 150 subjects with early AMD, 150 subjects with exudative AMD, and 200 healthy subjects. The subjects were divided into three groups: 65 years and younger, 66 to 75 years, inclusive, and older than 75 years. DNA was extracted from peripheral blood leukocytes using the DNA salting-out method. Genotyping was performed using a real-time polymerase chain reaction (RT-PCR). Statistical analysis was performed using *IBM SPSS Statistics 29.0* software.

Results. Comparison of age groups revealed no statistically significant differences in the distribution of genotypes and alleles for the *STAT4* gene polymorphisms (rs10181656, rs7574865, rs7601754 and rs10168266) between patients with AMD and the control group.

Conclusion. The study found no significant association between *STAT4* gene polymorphisms (rs10181656, rs7574865, rs7601754 and rs10168266) and age-related macular degeneration in relation to age.

Analysis of genotype and phenotype correlation in patient group with Stargardt disease

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Background. Stargardt disease is a rare autosomal recessive ocular disease caused by variants in the ABCA4 gene. Loss of central vision gradually exacerbates and leads to a decrease in visual acuity.

Aim. The aim of the current study was to analyse phenotype and genotype in patients with diagnosed Stargardt disease and find the correlation between them.

Methods. We included in the study patients diagnosed with clinical Stargardt disease who underwent genetic testing from 2020 to 2023 at LUHS Hospital Kauno Klinikos. Demographic, clinical data, fundus examination data and genetic testing information were obtained from electronic medical records.

Results. 15 (100%) patients, 9 (60%) female and 6 (40%) male have been found with a confirmed diagnosis of Stargardt disease. The median age was 25. Patients were classified into clinical groups by onset of clinical symptoms:

4 (26.67%) patients had childhood onset, all were female. Pigmentation in the central parts of both eyes, light degenerative foci and thinned marginal fibres in both eyes have been mentioned in one case. 2 childhood cases (50%) had the same variant c.1622T > C, p.(Leu541Pro) with other pathogenic variants.

8 (53.33%) patients had juvenile onset: 4 (50%) female and 4 (50%) male. In 2 patients uneven distribution of pigment, and adherent retina were present. Another patient had an adherent retina too. Moreover, “metal-like lustre” in the macula, atrophic patches and the neurosensory part of the retina being thin were noted. Half of them (4 patients) also had variant c.1622T > C, p.(Leu541Pro).

3 (20%) patients had late-onset: 2 (66.67%) male and 1 (33.33%) female. All patients were misdiagnosed with age-related macular dystrophy before. Fundus examination was available from 1 patient: hypo/hyperfluorescentic foci in the macula of both eyes, as well as decay of retinal pigment epithelium. All three patients had variant c.5882G > A, p.(Gly1961Glu), with other pathogenic variants.

Conclusion. Our cohort of patients consisted of three different clinical groups. The most common genotype was c.1622T > C, p.(Leu541Pro) with other pathogenic variant and not found in late-onset patients. This variant is the most common in Western Europe, Germany. Our results confirmed the literature’s data. We also noted that variant c.5882G > A, p.(Gly1961Glu) was found in late-onset patients.

Acknowledgements. There were no conflicts of interest.

ZNF676 rs412658 gene polymorphism and leukocyte telomere length correlations with myopia degree

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Background. The interplay of environmental and genetic factors in eye growth, influenced by vision, contributes to myopia development. Myopia, a refractive error occurring when light enters the eye parallel to the optical axis, poses a significant risk for various eye conditions (Flitcroft et al., 2019). These include cataracts, glaucoma, retinal detachment, and age-related macular degeneration (Cooper et al., 2018). Shortened telomeres below a critical threshold impact the shelterin complex's ability to bind to telomeric sequences, hindering effective chromosome end blocking (Salmón et al., 2021). *ZNF676* plays a role in telomere homeostasis (Nelson et al., 2020), emphasizing the need to understand its influence on telomere length changes.

Aim. The current study aimed to investigate the associations between the *ZNF676* rs412658 polymorphism, telomere length, and the degree of myopia.

Methods. Altogether 300 patients were enrolled in the study. DNA was extracted from peripheral venous blood by the salting-out method. Genotyping of *ZNF676* rs412658 and the measurement of relative leukocyte telomere length (relative LTL), were conducted using a real-time polymerase chain reaction method (RT-PCR).

Results. *ZNF676* rs412658 CT genotype carriers have 4-fold decreased odds of high myopia degree occurrence (OR = 0.250; CI: 0.076–0.826; $p = 0.023$). *ZNF676* rs412658 T allele was associated with similarly decreased odds of high myopia degree (OR = 0.269; 95% CI: 0.090–0.807; $p = 0.019$). The comprehensive p-value, assessing the relative LTL of subjects across the three degrees of myopia, was determined to be 0.027. This signifies a statistical difference in the relative LTL among individuals with varying degrees of myopia. Also, there was a statistically significant difference in relative LTL between mild and moderate myopia degrees ($p = 0.007$). Comparison of relative LTL and genotype distributions across different degrees of myopia did not reveal any statistically significant results, all $p > 0.05$.

Conclusion. Individuals with the CT genotype at the *ZNF676* rs412658 polymorphism are four times less likely to have a high myopia degree compared to individuals with other genotypes at this polymorphism. The *ZNF676* rs412658 T allele may protect against the high myopia degree occurrence.

Acknowledgements. None of the authors has proprietary interests or conflicts of interest related to this submission. This research received no external funding.

KDR gene variant association with exudative AMD in males

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Background. Age-related macular degeneration (AMD) stands as the primary cause of blindness affecting the central retina in developed nations. Projections indicate that by 2040, approximately 288 million individuals will experience vision impairment due to AMD. Despite ongoing research, the precise mechanisms leading to AMD development remain elusive. Widely considered a multifactorial ailment, AMD is often characterized as a complex interplay of environmental and genetic factors, categorized as a chronic inflammatory disorder.

In the pathogenesis of AMD, several pivotal themes emerge, with oxidative stress, inflammation, angiogenesis, and lipid metabolism playing significant roles. Notably, inflammatory proteins, complement by-products, and various immune-related responses are implicated in the initiation and progression of choroidal neovascularization. Although effective treatment options for AMD are currently limited, researchers are dedicated to exploring avenues that enhance our understanding of pathogenesis and enable early disease detection, potentially preventing irreversible macular changes.

In previous studies, genetic variants have demonstrated robust associations with exudative AMD. In light of this, we focused on a variant within the kinase insert domain receptor (KDR), the human gene responsible for encoding vascular endothelial growth factor receptor 2 (VEGFR-2).

Aim. To determine the association between the *KDR* rs2071550 gene variant and the exudative AMD development in males.

Methods. The study included 94 males with exudative AMD and 12 healthy control males. DNA was extracted using the salting-out method. Genotypes of the *KDR* rs2071550 polymorphism were determined by using RT-PCR. Results were statistically calculated using *IBM SPSS Statistics 29.0.1.0* software.

Results. Further analysis showed that *KDR* rs2071550 GA genotype is associated with 2-fold decreased odds of exudative AMD in men under the codominant genetic model (OR = 0.500; 95% CI: 0.266–0.940; $p = 0.031$). Also, GA and AA genotypes together are associated with similarly decreased odds of exudative AMD in men under the dominant genetic model (OR = 0.508; 95% CI: 0.279–0.925; $p = 0.027$).

Conclusion. *KDR* rs2071550 is associated with exudative AMD development in Lithuanian males.

Acknowledgements. This study was funded by the Research Council of Lithuania, agreement No. S-MIP-23-96.

PAEDIATRICS

Incidence of subclinical synovitis in juvenile idiopathic arthritis patients with different disease activity levels

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Background. Juvenile idiopathic arthritis (JIA) is a chronic inflammation of one or more joints of unknown origin that usually occurs in children under 16 years of age. Despite the importance of clinical examination in the evaluation of JIA activity, data are showing that musculoskeletal ultrasound (MSUS) could be more accurate in evaluating inflammation.

Aim: To determine the signs of inflammation and their consistency in clinical and MSUS at different levels of JIA disease activity.

Methods: JIA patients with diverse disease activity underwent 40 joint clinical and MSUS evaluations every 3 months (4 visits total: M0, M3, M6, M9). Musculoskeletal ultrasound (MSUS) B-mode and power Doppler images were scored for each of the 40 joints. Clinical evaluation included joint swelling, pain, limitation of motion (LOM), and inflammatory markers (ESR and CRP). Subclinical synovitis was defined as synovitis detected by MSUS only. Pearson's correlation coefficients (rs) were calculated to determine the difference between clinical and ultrasound examinations. A p-value < 0.05 was considered significant.

Results: 30 JIA patients (86.6% female) aged 2.9–18 years (median age 14.8 years) were enrolled in the study. At the M0 visit, 11 patients (36.6%) had oligoarthritis, 11 patients (36.6%) had polyarthritis and 8 patients (26.6%) had enthesitis-related arthritis. No correlation between standard inflammatory markers (ESR, CRP) and clinical examination and MSUS was observed in all visits ($p > 0.05$). At the M0 visit, 11% of joints had subclinical synovitis, mostly in proximal interphalangeal joints (PIPs). Subclinical synovitis persisted from 6% to 9% of joints in subsequent visits, mainly in knees and PIPs joints. A significant positive correlation existed between the right and left side joints in clinical examination and MSUS at M0, M3 and M6 visits (M0 rs = 0.678; M3 rs = 0.736; M6 rs = 0.716; $p < 0.01$). However, at the M9 visit, during clinical remission of more than 6 months, the correlation weakened (rs = 0.309; $p < 0.097$).

Conclusion: Our findings indicate that despite prolonged clinical remission, signs of subclinical inflammation persisted in MSUS. Ultrasonography appears as a valuable tool for comprehensive JIA disease activity assessment, advocating for its inclusion in routine clinical practice.

Acknowledgements. All authors declare that they have no conflicts of interest.

Epidemiology of paediatric brain tumours in Latvia

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Background. Paediatric central nervous system (CNS) tumours are the most common solid tumour, and they account till 25% of childhood cancers. Primary malignant CNS tumours are the second most common childhood malignancy after leukaemia. Recent studies indicate an increased incidence of paediatric CNS tumours.

Aim. The aim of the current study was to describe demographic characteristics and determine the incidence of CNS tumours in the Latvian children population.

Methods. This was a retrospective study carried out in Children's Clinical University Hospital that reflects all paediatric CNS tumours in Latvia. Patients with firstly diagnosed primary CNS brain tumours in 2012–2023 years, aged < 18 years were included in the study. Demographic data as well as data about tumour characteristics (grade, type and localisation) were collected from an electronic medical history data system.

Results. Within a 12 year-period, there were 172 children diagnosed with primary CNS tumour. The incidence rate of paediatric CNS tumours ranged from 2.79–6.69/100 000 children, the highest reaching in 2020. The majority of patients (41.3%, n = 71) were diagnosed in the last 4-year period. The median age of the study group was 8 years (interquartile range 4–13 years) at the time of diagnosis, there were no significant differences in age between genders. Most of the study group participants were male 59.9% (n = 103) and 40.1% (n = 69) were female. The vast majority of CNS primary tumours were gliomas, glioneuronal and neuronal tumours 68.6% (n = 118), the second most common group were embryonal tumours 22.7% (n = 39), other tumours were in only 8.7% (n = 15). Tumour grade was unknown in 14.0% (n = 24), Grade I tumours were in 36.0% (n = 62), followed by Grade IV tumours in 28.5% (n = 49) and Grade II in 15.7% (n = 27), Grade III in 5.8% (n = 10). The most common tumour localization was infratentorial 51.2% (n = 88), followed by supratentorial 41.9% (n = 72) and in spinal cord 7.0% (n = 12).

Conclusion. The incidence rate of paediatric CNS tumours in Latvia has risen in the last years and is more common than in previously published data in Europe and the United States. In the last 4-year period, there has been an increase (41.3%) in paediatric CNS tumour cases. The most common primary CNS tumours are gliomas, glioneuronal and neuronal tumours.

Left-to-right shunt congenital heart defects and their treatment in Latvia from 2019 to 2023

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Background. Congenital heart defects are one of the most common birth defects (1% births per year), and left-to-right shunt congenital heart defects have equivalent survival to the general population (95%); therefore, it is important to understand their treatment outcomes and improve them based on results.

Aim. The aim of the current study was to determine and evaluate left-to-right shunt congenital heart defects, their treatment, and complications.

Methods. 182 patients, who were born in 2019–2023, with one left-to-right shunt congenital heart defect (*patent d. arteriosus*, PDA; atrial and ventricular septal defect, ASD and VSD) were enrolled in the study. Patients were searched in the Hospital patient database by SSK-10 code by the period 2019–2023. Data was captured in Excel but analysed in *IBM SPSS Statistics 29.0*; the coherence between groups was analysed by Fisher's exact test.

Results. PDA had 48 (26.5%) patients, ASD 28 (15.5%), VSD 105 (58%). No mortalities were reported. PDA: mean age during operation was ~ 10 months (range: 16 days to 4 years and 9 months), 46 operations (95.8%): 40 (83.3%) trans-vasal and 5 (10.4%) with open surgery. Trans-vasal procedures had 6 major complications (15%). 3 of 6 complications were noticed and resolved in 24 hours. ASD: mean age during operation was ~2 years (range: 5 months to 4 years and 5 months), 17 operations (60.7%): 4 (14.3%) trans-vasal and 13 (46.4%) with open surgery, which had 2 complications (15%). VSD: mean age during the operation was ~7 months (range: 1 month to 2 years and 4 months), 59 operations (56.2%) with no complications: 1 (1%) trans-vasal and 58 (55.9%) with open surgery. There was no association between diagnoses and complications ($p = 0.250$), between type of surgery and complications within each diagnosis ($p = 1.00$ for PDA, ASD $p = 0.574$, VSD $p = 1.00$) and together ($p = 0.326$).

Conclusion. VSD is more common than ASD and PDA conforming to literature, however mortality rate is less severe. Diagnosed PDA due to symptoms almost always requires mini-invasive intervention in Latvia. Half of the patients with VSD can live free of operation, however, another half has early complicated, hemodynamically unstable VSD with necessity of open operation. Major complications after trans-catheter closure of PDA and open surgery in ASD are higher than reported in the literature, emphasising the importance of understand and preventing their outcome.

Acknowledgements. The authors have no conflict of interest.

Associations between neonatal hyperbilirubinemia in late-preterm infants and neonatal risk factors

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Background. Neonatal hyperbilirubinemia is a common condition in newborns. In term newborns, the frequency of occurrence reaches 60%, and in premature babies, it is even higher. If not diagnosed and treated in time, neurotoxic complications may occur. However, not only timely diagnosis and treatment are important, but also proper identification of risk factors.

Aim. To analyse the relationship between neonatal hyperbilirubinemia in late-preterm infants and the most important neonatal risk factors.

Methods. A retrospective study was conducted at the LUHS KC Neonatology Clinic. Medical histories of all late premature newborns (34–36 weeks) born between October 1, 2022, and October 1, 2023, were selected for the study. 110 newborns were included in the study. Statistical analysis was performed with *IBM SPSS Statistics 26.0* and *MS Excel 2016* programmes. A difference was considered statistically significant when $p \leq 0.05$.

Results. Hyperbilirubinemia was observed in 61 neonates (55%), while 49 (45%) did not develop hyperbilirubinemia. Newborns with a gestational age of 34 weeks (compared to newborns of 35 and 36 weeks) had jaundice more often than not ($p = 0.016$). Jaundice occurred in 76% of newborns with a gestational age of 34 weeks. The study found that newborns with hyperbilirubinemia had a lower birth weight ($p = 0.005$). Important data showed that the time of onset of jaundice is affected by the method of delivery. Newborns who were born vaginally developed jaundice earlier than those born by caesarean section ($p < 0.001$). ROC analysis showed 69 hours, AUC = 0.791. In vaginal births, 85% of newborns developed jaundice within 69 hours and 15% after 69 hours, while in caesarean births, jaundice developed in 35% of newborns before 69 hours and 65% after 69 hours. It should also be mentioned that jaundice appeared earlier in newborns who had hematomas ($p = 0.042$). ROC analysis showed 43 hours, AUC = 0.748. 86% of neonates who had hematomas developed jaundice within 43 hours, and 14% of subjects developed jaundice after 43 hours. In the other group that did not have hematomas, jaundice developed within 43 hours in 40% of patients and after 43 hours in 60% of patients.

Conclusion. Gestational age and birth weight are significant factors in the development of jaundice. Jaundice also develops earlier in the case of vaginal delivery or hematomas.

Acknowledgements. The authors confirm that they have no conflicts of interest.

Antimicrobial resistance genes in children's gut microbiome in the first years of life

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Background. Antimicrobial resistance is becoming a worldwide problem, especially in paediatrics. Many perinatal factors and usage of antibiotics in early life, are considered to influence the distribution of antimicrobial resistance genes (AMRs).

Aim. The study aimed to uncover AMRs profiles in children's gut microbiome in relation to different risk factors.

Methods. A cross-sectional study has been performed at primary healthcare centres. Parents of children up to 18 months were asked to fill out a questionnaire and to bring the child's faecal sample. Further, DNA from the faecal samples was isolated and the AMRs profiles were detected.

Results. Altogether 91 participants were enrolled. Out of them, 20 children were born by C-section, mothers of 13 children had consumed antibiotics during pregnancy and 28 during delivery. Besides, 18% (16/91) of children had received antibiotics. A total of 313 AMRs were identified in the gut microbiome of children, the most frequently detected were associated with glycopeptide antibiotic resistance and antibiotic target alteration resistance: vanG (in 90 children), vanT, and vanW (in 89 children). The highest diversity of AMRs was found in children, whose mothers had consumed antibiotics during delivery. Furthermore, AMRs differed depending on several factors such as perinatal and child antibiotic treatment and type of delivery (Table 1).

Table 1. The most abundant AMRs in children's gut microbiome in relation to different risk factors

	Amount of AMR genes (%; total count)	The most abundant AMR genes (%)
Antibiotic treatment during pregnancy	62% (193/313)	vanG, vanW and vanY (100%, 13/13)
Antibiotic treatment during delivery	71% (223/313)	vanG, vanW and vanY in vanM cluster (97%, 27/28); vanY in van B cluster (93%, 26/28)
Infants delivered by C-section	71% (223/313)	vanG (100%, 20/20); vanT, vanW vanY, rsmA, marA and emrR (95%, 19/20)
Antibiotic treatment till the age of 18 months	62% (195/313)	tetM (95%, 15/16), tetO, tetQ and dfrF (87%, 14/16), qacJ, rpoB, tetT and rsmA (82%, 13/16)

Conclusion. Rather high prevalence of AMRs demonstrates the importance of gut microbiome for the spread of antibiotic resistance already in early life. Furthermore, the lack of paediatric-specific data on resistance mechanisms has contributed to the misuse of antibiotics, leading to antibiotic resistance.

Acknowledgements. The authors do not have a conflict of interest. Funding: Latvian Council of Science; No. lzp-2021/1-0275.

Terminated pregnancies due to foetal anomalies, 2012–2021

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Background. Improved technology and advances in clinical testing have resulted in increased detection rates of congenital anomalies during pregnancy. Latvian legislation permits elective abortion on demand before the twelfth week of gestation and therapeutic or medical abortion until 24 gestational weeks due to medical indications.

Aim. To analyse medical abortions due to congenital anomalies over a ten-year period.

Methods. A retrospective epidemiological analysis of congenital anomalies from the database of the Register of Patients with Particular Diseases regarding Patients with congenital anomalies. Data from 2011–2022 about terminated pregnancies due to medical indications (ICD-10; Q00–Q99) were used (n = 1531). Period TOPFA for medical abortions (termination of pregnancy for a foetal anomaly) prevalence per 10,000 live and stillbirths was calculated.

Results. The 10-year TOPFA was 77.0/10,000 (95% CI 73.2–80.9). The rate increased on average 3 times – from 34.1 (95% CI 26.4–43.2) in the initial year to 98.1/10,000 (95% CI 83.9–113.9) in 2021. During the study time period, chromosomal abnormalities (Q90–Q99; n = 610) had the highest proportion in the structure of the anomalies – 39.8%, then about 15% congenital malformations and deformations of the musculoskeletal system (Q65–Q79; n = 215), circulatory system (Q20–Q28; n = 231) and nervous system (Q00–Q07; n = 226). 6.5% in other congenital anomalies (Q80–Q89; n = 100). Down syndrome (Q90; n = 352) was the most common foetal abnormality which increased from 26 cases to 93 cases in 2021 with period TOPFA – 17.7/10,000 (95% CI 15.9–19.6). Followed by Trisomy 18 and Trisomy 13 (Q91; n = 147) with TOPFA – 7.4/10,000 (95% CI 6.2–8.6) and 42 cases of Turner's syndrome (Q96). Ventricular septal defect (Q21.0; n = 68) and atrioventricular septal defect (Q21.2; n = 38) were the most frequent reasons for medical abortions from the circulatory system. An average of 13 cases of musculoskeletal system anomalies were diaphragmatic hernia (Q79.0), exomphalos (Q79.2), gastroschisis (Q79.3). More frequent from the nervous system was spina bifida (Q05; n = 67) and anencephaly (Q00.0; n = 34) and from other congenital anomalies were multiple congenital malformations (Q89.7; n = 55).

Conclusion. The number of cases of prenatally diagnosed chromosomal anomalies has increased. Strategies are needed to improve treatment services, as well as training on the importance of a supportive role for women who have had pregnancy termination due to foetal anomalies.

Acknowledgements. The study has been supported by the fundamental research grant in Biomedicine and Pharmacy 'Research of biomarkers and natural substances for acute and chronic diseases' diagnostics and personalized treatment' by the Faculty of Medicine, University of Latvia.

Acute childhood myositis: a retrospective analysis of patients presenting to PED

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Background. Acute childhood myositis is a rare and poorly known complication linked to respiratory tract infections (RTI) in children and is most often caused by influenza B infection.

Aim. The aim of this study was to investigate the incidence of myositis in a paediatric emergency department (PED) over a period of 3 years.

Methods. A retrospective analysis of children (0–18 years) who were investigated regarding myositis in PED from 24 February 2020 to 31 December 2023 was performed using an electronic database system. We collected demographic data, creatine kinase (CK) levels, treatment and outcomes. P value < 0.05 was considered significant.

Results. In total, 107093 paediatric cases were analysed of whom only 0.04% (n = 40) were diagnosed with myositis and further included into the analysis. The majority of cases were male (85%): median age – 8.1 years (3–17.4 years). Majority of referred children were in 6–10 age group (72.5%). Most of the patients presented with the first, and only 3 patients had recurrent episodes. The most common complaint was fever (n = 38, 95%), followed by muscle pain (n = 31, 77.5%; average VAS – 3.6), and inability to walk (n = 21, 52.5%). Patients with impaired gait had significantly higher VAS than the patients with pain who could walk (p < 0.05). Almost half of the patients (n = 19, 47.5%) presented with active symptoms of upper RTI. All children received CK. In 39 (97.5%), moderately increased levels were observed (1752.5 U/L (IQR 1117–3860.3 U/L)). No correlation was observed between VAS and CK levels (p > 0.05). 9 children were tested for influenza A/B and COVID-19 and only 2 children were influenza B positive. 15 (37.5%) children received symptomatic treatment, while 11 (27.5%) required hospitalisation. Notably, CK, VAS or combination were not associated with the outcomes (hospitalisation, discharge).

Conclusion. Benign acute childhood myositis typically occurs in boys, aged 6–10 years and is a mild and usually transient condition that can be diagnosed based on clinical observations and a moderate elevation of creatine kinase.

Acknowledgements. All authors declare that they have no conflicts of interest.

Diagnosis and treatment of tonsillopharyngitis compliance with Centor criteria in the paediatric population in general practitioners' offices of Pierīga region

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Background. Tonsillopharyngitis is a frequent complaint in a general practitioner's office. The most common infectious causes are viral infections, the second most common causative agent is group A streptococcus. The Centor scale is an easily available tool that can help in making decision to perform streptococcal testing and initiate empiric therapy, and potentially reduce unnecessary prescription of antibiotics.

Aim. The aim of the study was to investigate the compliance of the performed diagnosis and treatment (including antibacterial) with the Centor criteria for patients diagnosed with tonsillopharyngitis aged 3 to 18 years.

Methods. A retrospective analysis was performed based on the medical histories of the paediatric patients aged 3 to 18 years, diagnosed in the period from January 2021 to December 2022. Altogether 156 patients from two general practitioners' offices in Piņķi and Ķekava, Latvia, were enrolled in the study. Each patient was assigned a Centor score using documented symptoms. Rapid streptococcal antigen testing and antibiotic prescription rates guided by Centor criteria were compared against the actual rates prescribed by clinicians. Patients were divided into two groups: 1) with a Centor score of 0 to 3 points, 2) with a Centor score of 4 to 5 points. In cases where antibacterial therapy was prescribed, it was divided into 1st choice (Phenoxymethylpenicillinum, Amoxicillinum, Amoxicillinum/Acidum Clavulanicum), 2nd choice (Cefuroximum) and 3rd choice (other) antibiotics.

Results. In total 24.4% (n = 38) patients were assigned with a Centor score of 4 or more, of which 57.9% (n = 22) had rapid streptococcal antigen test performed and 71.1% (n = 21) were prescribed empirical antibiotics. Of all patients, 75.6% (n = 118) patients were assigned a Centor score of 0 to 3 points. In this patient group, 16.1% (n = 19) had a rapid streptococcal antigen test performed and 23.7% (n = 28) of patients were prescribed antibacterial therapy. Antibiotic prescription rates predicted by assigned Centor scores did not show a statistically significant difference in comparison to actual prescription rates made by clinicians (Fisher's exact test, p < 0.001). Also, no statistically significant difference was found in rapid streptococcal test performing rates predicted by Centor scores versus clinicians' choice (Fisher's exact test, p < 0.001). In total 35.3% (n = 55) patients received antibacterial therapy. First-choice antibiotics were prescribed to 87.3% (n = 48) of patients, second-choice – to 3.6% (n = 2) of patients, third-choice – to 9.1% (n = 5) of patients.

Conclusion. The study results show that clinicians' choice to perform rapid streptococcal antigen testing and empirically prescribe antibacterial therapy meets Centor criteria.

Acknowledgements. The authors declare the absence of a conflict of interest.

Survey on aspects affecting the health and development of children from the perspective of the 2016 United Nations Recommendations to Latvia

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Background. Latvia falls behind the EU regarding public health indicators. Early education on modifiable risk factors creates the foundation necessary for maintaining lifelong health. Since 2001 the state has received Recommendations from the United Nations (UN) on actions to be undertaken to ensure child health and development, however, their implementation is slow and must be monitored and promoted.

Aim. To investigate, whether school children receive sufficient education on modifiable risk factors to prevent morbidity and maintain health in childhood and subsequently in adult life.

Methods. Results presented in this abstract are part of a larger survey completed by students retrospectively assessing issues related to their experience as children covered by the 2016 UN Recommendations and by the UN Convention on the Rights of the Child. A total of 467 students at the University of Latvia completed the questionnaire. Questions pertaining to rights to education and health were analysed and compared by age, sex, and faculty. *Microsoft Excel* and *SPSS 29.0* were used for data processing.

Results. The vast majority of students representing 11 faculties belonged to the age group 17–25 years (87.4%); 16.8% were male.

Participants were of the opinion that the state has not done enough to protect children from using addictive substances (73.9%); the education system does not provide children with the skills and knowledge to maintain health, including education on healthy nutrition as a means to reduce the risk of noncommunicable diseases in adult life (heart attack, stroke, cancer) (41.0%), the effects of iodine deficiency on intellectual development (79.0%), sexually transmittable diseases (20.6%), recognizing signs of depression (74.4%) and on providing first aid (41.2%). Students in non-medical faculties are less likely to be ready to provide first aid (47.0%), if compared to the 1st year medicine (81.0%) and 1st year nursing students (69.9%) ($p < 0.01$).

When asked about who should deliver lectures on health-related topics at school, 87.0% responded university faculty, while 11.6% – school teachers without a medical education.

Conclusion. The results of the survey indicate that information provided at school on healthy nutrition and the prevention of non-communicable diseases is insufficient and that a large percentage of children do not receive sufficient education on first aid and are unable to provide it, which is especially important given current international affairs and the recent pandemic. A potential solution would be an interfaculty initiative in creating a digital course covering these topics for different levels of the education system.

PHARMACY

A comparative analysis of antioxidant activity in ultrasound-assisted extractions of *Artemisia annua* L. and *Artemisia vulgaris* L. utilizing diverse excipients

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Background. Flavonoids, exemplified by apigenin and luteolin, represent bioactive compounds renowned for their pronounced anti-inflammatory, antioxidant, and anticancer properties. Such compounds, alongside other polyphenols, coumarins and tannins, are prevalent within the *Artemisia* species. The inclusion of specific excipients in the extraction process has been posited to enhance polyphenol yield and antioxidant activity.

Aim. The study aimed to investigate the influence of excipient utilization in ultrasound-assisted extractions on *Artemisia annua* L. and *Artemisia vulgaris* L. and to evaluate its influence on the antioxidant activity of the extracted compounds.

Methods. The extracts of *Artemisia annua* L. and *Artemisia vulgaris* L. were prepared using 80% (V/V) ethanol as the solvent. Ultrasound-assisted extraction was employed with diverse excipients, including β -cyclodextrin, L-glutathione, titanium dioxide, propylene glycol, and a control group. The analytes were subjected to analysis via high-performance liquid chromatography (HPLC), and antioxidant activity was assessed using the HPLC-ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid)) post-column assay.

Results. The extracts prepared with the incorporation of excipients exhibited notable results compared to those without. L-Glutathione yielded the most favourable chemical profiles, indicating that *Artemisia annua* L. contained 7.268 ± 0.363 $\mu\text{g/g}$ of apigenin and 1.246 ± 0.062 mg/g of luteolin, while *Artemisia vulgaris* L. contained 5.054 ± 0.253 $\mu\text{g/g}$ of apigenin and 773.995 ± 38.699 $\mu\text{g/g}$ of luteolin. In contrast, extracts prepared using the conventional method without excipients resulted in lower concentrations: *Artemisia annua* L. exhibited 4.495 ± 0.225 $\mu\text{g/g}$ of apigenin and 775.679 ± 38.784 $\mu\text{g/g}$ of luteolin, while *Artemisia vulgaris* L. contained 3.175 ± 0.159 $\mu\text{g/g}$ of apigenin and 530.285 ± 26.514 $\mu\text{g/g}$ of luteolin. Chlorogenic acid, neochlorogenic acid, caffeic acid and luteolin displayed heightened antioxidant activity. *Artemisia annua* L. extracts prepared with titanium dioxide demonstrated heightened statistically significant antioxidant activity, exemplified by luteolin at 152.520 ± 7.626 $\mu\text{g TE/g}$ and chlorogenic acid at 251.575 ± 12.579 $\mu\text{g TE/g}$. Correspondingly, *Artemisia vulgaris* L. extracts prepared with titanium dioxide exhibited increased statistically significant antioxidant activity, including neochlorogenic acid at 29.089 ± 1.454 $\mu\text{g TE/g}$ and luteolin at 90.196 ± 4.509 $\mu\text{g TE/g}$.

Conclusion. The study reveals that extracts from both *Artemisia annua* L. and *Artemisia vulgaris* L., when prepared with titanium dioxide, displayed superior antioxidant activity. Notably, *Artemisia annua* L. extracts demonstrated heightened antioxidant activity compared to *Artemisia vulgaris* L. extracts.

Acknowledgements. The authors declare no conflict of interest. This work was supported by the Research Council of Lithuania (grant No. S-PAD-22-5).

Characterization and optimization of an *in vitro* model of hepatic steatosis

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Background. Nonalcoholic fatty liver disease (NAFLD) is a rising global burden with an estimated prevalence of about 25% in the general population. The causes of NAFLD are still difficult to understand; therefore, *in vitro* models of liver cells could be useful to simulate NAFLD. It is known that initially, fat-laden hepatocytes function normally, but increased levels of fatty acids then produce oxygen free radicals (ROS), leading to oxidative stress. Lipid peroxidation induces infiltration of inflammatory cells in the liver that causes inflammation.

Aim. To develop a reliable model of liver steatosis that corresponds to the understanding of the pathophysiological processes in the liver and offers the possibility of finding suitable drug therapy.

Methods. Oxidative stress was initiated with tert-butyl hydroperoxide (tBH) addition, lipid overload with oleic acid and palmitic acid mix 2:1 addition to the HepG2 cell media. Cell viability was monitored using CCK-8 assay whereas lipid accumulation with Oil red or Nile red staining. For enzyme (ALAT, AST, AP) and inflammation marker (IL-6, IL-8, TNF- α) studies corresponding ELISA kits were used. Silymarin and metformin were used as positive reference drugs. Absorbance or fluorescence in all experiments were recorded by Infinite 200 PRO plate reader and i-control software (Tecan Trading AG, Switzerland). Statistical analyses were performed by One-way analysis of variance (ANOVA) followed by Dunnett's Multiple Comparison test. The experimental results were statistically analysed by GraphPad Prism 7 software (GraphPad Software Inc., San Diego, CA, USA).

Results. Oxidative stress reduced cell viability by 50%. Nile red dye-stained lipid droplets more efficiently than Oil red. Lipid accumulation increased 3-4 times. The authors observed leakage of ALAT, AST and AP enzymes, along with an increase in IL-6, IL-8 and TNF- α levels in the lipid-loaded cell supernatant compared to the control cells. Silymarin and metformin reduced the elevated levels of hepatic enzymes and inflammation markers.

Conclusion. The simulating hepatic steatosis events in HepG2 cells allows for an innovative combined approach to studying ROS production and lipid accumulation in the cells. Additionally, it enables the assessment of lipid-induced enzyme and inflammation marker levels in the cell supernatants and the evaluation of different compound effects on NAFLD.

Acknowledgements. The authors declare the absence of a conflict of interest. The study was supported by *University of Latvia Foundation* grant No. 2269 and funded by *Mikrotikls Ltd.*

Development of the biomass production protocol for microalgae *Nannochloropsis* spp. and scaling up on an automated bubble column photobioreactor system to extract polyunsaturated fatty acids

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Background. Certain microalgae species exhibit the ability to produce significant levels of polyunsaturated fatty acids (PUFAs), specifically Omega-3 eicosapentaenoic (EPA) acid. This fatty acid is considered to be essential and has been used for primary and secondary prevention of cardiovascular disease. Since PUFAs are obtained from fish, demand for non-animal origin PUFAs has increased significantly. The application of automated photobioreactor systems ensures a controlled production environment, including light intensity, temperature, pH, nutrient, and CO₂ concentrations, during the production cycle. Development and validation of microalgae production protocols are essential to maintain stable microalgal biomass production required for lipid extraction.

Aim. The particular stage of the study aimed to develop a microalgal biomass production protocol starting with a 20 mL inoculum of microalgae, scaling up to 50 L, and further dividing it into three columns with a total volume of 150 L.

Methods. Microalgae *Nannochloropsis* spp. was produced from 20 mL inoculum and scaled up to three 50 L columns of bubble column photobioreactor (PBR3C). Parameters were pH 8 controlled by CO₂ injection, 16:8 photoperiod with the daily harvest of 30%, during the 7-day production cycle. The same production parameters for all cultivation cycles (N5) were applied. At the end of the exponential growth phase, 1 L samples were harvested, and algae were separated using a centrifuge (10,000g). Afterwards, the samples were freeze-dried (Lyotrap Ultra) and weighed to determine biomass concentration in grams per litre.

Results. Acquired data show that designed biomass production in a 50 L bubble column photobioreactor can lead to a 1.5–2 g/L dry microalgae biomass per day. Based on the preliminary analysis, it can be seen that EPA concentration is not less than 10% dry weight, which is an acceptable value for developing large-scale biomass production for supercritical fluid extraction with CO₂.

Conclusion. The protocol for microalgae biomass production demonstrates satisfactory yield and scalability for subsequent large-scale production. The preliminary concentration of EPA exceeds the median value reported in scientific literature. The next stage of this study will be scaling up to the industrial production level and assessment of cultivation parameters on microalgae lipid profile.

Acknowledgements. This research is funded under the project 'Extraction and enrichment of Omega-3 fatty acids derived from microalgae' (No. 5.1.1.2.i.0/1/22/A/CFLA/005) in the Competence Centre 'VMKC' Ltd. and the Central Finance and Contracting Agency. The study is conducted by JSC 'SISTĒMU INOVĀCIJAS' with support from the European Recovery Funding.

Assessment of antioxidant activity in Latvian sea buckthorn cultivars after enzymatic treatment to separate juice and oil, intended to produce functional food products

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Background. The popularity of sea buckthorn (*Hippophae rhamnoides L.*) berries and processed products has increased over the past decade due to their elevated levels of vitamins, antioxidants, and polyunsaturated fatty acids. These products have the potential as ingredients in functional food and nutraceuticals. As most of the sea buckthorn berries are exported, national policies are focused on strengthening processing capacity and fostering the development and implementation of processing technologies on an industrial scale to manufacture export-oriented, high-value-added products. Systematic studies of sea buckthorn cultivars suitable for the Baltic state region could benefit the sustainable development of the cultivation and berry processing industry.

Aim. The particular stage of the study aimed to assess sea buckthorn berry processing approaches to obtain juice and oil from berry mash, with further investigation of the nutraceutical properties.

Methods. After pulping the berries with a strainer, the mash was treated with two different pectinase enzymes, Enzyme 1 and 2. The enzymatic treatment was performed according to the recommended procedures. After enzymatic treatment, the mash was separated using a centrifuge (10000g) to obtain juice and oil phases. For the juice, the total antioxidant activity was measured. For the control, samples without enzyme exposition were accessed. Obtained samples were analysed from a global chromatographic area using HPLC-UV at 280 nm.

Results. The most abundant sea buckthorn cultivars in Latvia were assessed. In total, 18 samples were analysed (see Table 1).

Table 1. Average antioxidant activity in sea buckthorn juice after enzymatic treatment and pulp oil separation.

Sample	Enzyme 1 Average antioxidants (mAU*min)	Enzyme 2 Average antioxidants (mAU*min)	Control Average antioxidants (mAU*min)
BIO Botanicheskaja*	53.67	44.01	44.39
BIO Marija*	69.58	51.42	57.60
Botanicheskaja	51.79	44.59	44.27
Marija	52.73	41.08	47.35
Prazrachnaja	67.17	58.45	58.68
Tatjana	53.81	41.31	43.14

*organic cultivation berries

Conclusion. Enzymatic treatment before pulp oil and juice separation significantly enhances the antioxidant activity of sea buckthorn juice. These results are valid only for Enzyme 1. Comparing Enzyme 1 and 2, it becomes apparent that Enzyme 2 has no effect or even reduces the antioxidant activity.

Acknowledgements. This project, No. 22-00-A01612-000009, is co-funded by the European Agricultural Fund for Rural Development (EAFRD) under section 16.1 'Cooperation'. The leading partner for this project is JSC 'SISTĒMU INOVĀCIJAS'.

The microbiological stability assessment of sports supplements inactivated with wet and dry heat treatment

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Background. Sports nutrition and food technology have witnessed remarkable development in the last decade. The focus is on maintaining an optimal energy balance during exercise and assessing the impact of bioactive compounds on the circulatory system. Furthermore, sports nutrition is targeted to specific groups of tissues and cells. The main challenges are related to optimal carbohydrate metabolism, adenosine triphosphate (ATP) synthesis, reduction of oxidative stress, protection of cell membranes, provision of healthy calcium metabolism and normal microvasculature function. Endurance sports supplements contain mainly a mixture of carbohydrates, ensuring a higher energy intake per consumption. The microbiological inactivation of the supplements is essential to provide high-quality finished products with extended shelf life. Temperature, pressure, dry or wet heat, and exposition time affect the content of biologically active compounds in the finished product.

Aim. This stage of the study aims to assess the effect of different inactivation protocols on the microbiological stability of sports supplements in gel form.

Methods. 9 experimental batches (1000 g each) were produced in this study stage. The inactivation phases were set at 50°C, 60°C and 70°C with different dry and wet heat conditions. The exposition time for all samples was 45 minutes. 10 of 50 mL samples from each batch were collected and stored at room temperature for 3 months. Afterwards, the microbiological stability of samples (n = 90) was assessed.

Results. No microbiological contamination was observed in samples that were inactivated at 50°C, 60°C, and 70°C for 45 minutes with wet heat. However, one sample was contaminated in a batch inactivated at 50°C with dry heat.

Conclusion. These results show that using lower temperatures and wet heat is more effective in ensuring microbiological stability while not affecting the activity of bioactive compounds due to high temperatures. This could be explained by the fact that wet heat enhances the coagulation of microorganisms. The inactivation of sports supplements in gel formula at 50°C with wet heat will be assessed further in the technological development phase of the production process.

Acknowledgements. This research is funded under project No. 5.1.1.2.i.0/1/22/A/CFLA/004 (Development and implementation of functional sports supplement production technology) in the Competence Centre 'FBMTKC' Ltd. and the Central Finance and Contracting Agency. The study is conducted by JSC 'SISTEMU INOVĀCIJAS' with support from the European Recovery Funding.

Evaluation of antimicrobial properties of walnut septum

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Background. With the food industry annually growing, a significant amount of waste accumulates. In response to that, scientific studies seek to investigate the by-products of plants and determine their usage opportunities. Nowadays, there is an increasing interest in the study and the processing of English walnut (*Juglans Regia*) by-products (e.g.: walnut septum). Collected data states that septum extract shows antimicrobial activity. After reviewing the literature sources, no data was found on the studies of fruit septum of walnut trees grown in Lithuania.

Aim. This study aims to evaluate the antimicrobial activity of the septum extract of walnut trees grown in Lithuania.

Methods. *In vitro* assays were performed against Gram-positive (*S. aureus* ATCC 25923, *S. epidermidis* ATCC 12228, *E. faecalis* ATCC 29212, *B. cereus* ATCC 11778), Gram-negative (*E. coli* ATCC 25922, *K. pneumoniae* ATCC 13883, *P. aeruginosa* ATCC 27853, *P. vulgaris* ATCC 8427) strains and *C. albicans* yeast. The minimal inhibitory concentration (MIC) of *Juglans regia* L. extract was tested using the broth microdilution method. Isolated colonies on Mueller Hinton agar plates were suspended in 0.85% sodium chloride, to achieve a turbidity equivalent to 0.5 McFarland standard. The MIC was defined as the lowest concentration at which there was no visible growth following incubation at 37°C for 24 h. Each test included a positive growth and negative sterility control (culture broth without bacteria). The presented results are the mean from 3 experiments.

Results. The septum extract exhibited an antibacterial effect; however, the effect was found at varying degrees. The MIC ranged from 0.06 mL to 0.2 mL extract/1 mL medium. The extract was more effective against *S. epidermidis* (MIC = 0.06 mL ± 0.003 extract/1 mL medium).

Conclusion. The results confirm the observations of other scientists that the Gram-positive bacteria are more sensitive to extract effect than the Gram-negative. [3]

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Chemical composition, hepatoprotective, antioxidant and antiglycation effects of nettle leaf water extracts in *in vitro* assays

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Background. The stinging nettle (*Urtica dioica* L.) boasts a rich history, having served both as a wild vegetable and a natural remedy. Interest in investigating the pharmacological effects of nettle extracts and refining the methods of extraction is growing. Water extracts are favoured for their ability to eliminate the need for organic solvents in active compound extraction, offering a straightforward and cost-effective technique.

Aim. The main objective of this study was to compare the chemical composition, antioxidant, antiglycation and hepatoprotective properties of water extracts of stinging nettle leaves, obtained through maceration and sonification techniques.

Methods. Nettle extracts were prepared through maceration and sonification methods. A 5 g portion of dry leaf powder underwent extraction with 100 mL deionized water. Electrospray ionization tandem mass spectrometry (ESI-MS/MS), ultra-performance liquid chromatography-electrospray tandem mass spectrometry (UPLC ESI-MS) and inductively coupled plasma mass spectrometry (ICP-MS) methods were used for the extracts' polyphenol, vitamin, and trace element quantification, respectively. Antioxidant activities of extracts were determined using total antioxidant capacity (TAC), total polyphenol Folin-Ciocalteu colorimetric methods, 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging and superoxide dismutase (SOD) assays. Antiglycation effect was assessed as reducing advanced glycation product (AGE) formation in bovine serum albumin reaction with methylglyoxal. Oxidative stress in HepG2 cells was induced with tert-butyl hydroperoxide, and lipid overload was induced with a 2:1 mix of oleic acid and palmitic acid. Cell viability and lipid accumulation were monitored using CCK-8 assay and Nile red staining, respectively. Absorbance or fluorescence in all experiments were recorded by Infinite 200 PRO plate reader and i-control software (Tecan Trading AG).

Results. Phenolic acids and rutin dominated in nettle leaves water extracts. Among them, chlorogenic and caffeic acids were the most abundant. Nettle water extracts contained water-soluble vitamins and microelements, with a particular emphasis on their richness in iron. The sonification-extracted sample exhibited higher total polyphenol content, AGE inhibition, and TAC compared to the maceration-extracted sample. DPPH scavenging and SOD-mimicking effects were similar. The hepatoprotective activity was evident through improved survival of HepG2 cells under oxidative stress and reduced lipid accumulation in the liver steatosis assay.

Conclusion. Our investigations affirm nettle water extract positive health-enhancing effects, paving the way for future development in the form of dry extract or liquid formulations.

Acknowledgements. The authors declare the absence of conflict of interest. The study was supported by *University of Latvia Foundation* grant No. 2269 and funded by *Mikrotikls Ltd.*

Female patients with cardiovascular diseases are treated with lower statin doses when used in combination with ezetimibe in Latvia

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Background. High doses of statins are often necessary to achieve lipid goals even when used in combination with ezetimibe in patients with cardiovascular diseases (CVD).

Aim. To characterize mean prescription doses of atorvastatin and rosuvastatin for secondary prevention of CVDs in fixed-dose combinations (FDCs) with ezetimibe in gender and age subgroups.

Methods. We conducted a retrospective and longitudinal analysis of the number of statin FDCs with ezetimibe prescribed in Latvia between 2012 and 2022. We used data from the National Health Service database on all state-reimbursed prescriptions with individual patient data. The total number of dispensed units of FDCs containing a statin and ezetimibe was calculated. Statin doses were analysed in different age subgroups and for both genders. International classification of diseases (ICD) codes provided in the prescription were used to determine if the drug was prescribed for secondary prevention (for example, Z95.5. Presence of coronary angioplasty implant and graft).

Results. Atorvastatin FDCs with ezetimibe have been available in Latvia since 2020, and in total, 433.7 thousand FDC units were dispensed in 2020–2022. The mean atorvastatin dose decreased from 44.5 mg in 2020 to 30.0 mg in 2022, and for men and women, it was 47.2 vs 42.2 mg and 32.9 vs 26.6 mg in 2020 and 2022, respectively ($p < 0.001$ for both).

Rosuvastatin FDCs with ezetimibe have been available since 2018 and in total 2022, 1.5 million units were dispensed in 2018–2022. The mean dose of rosuvastatin increased from 16.7 mg in 2018 to 17.6 mg in 2022, and for men and women, it was 17.1 vs 16.3 mg and 18.0 vs 17.0 mg, in 2018 and 2022, respectively ($p < 0.001$ for both).

The gender gap was observed in all age groups (see Table for data in 2022; $p < 0.001$ for all comparisons).

	< 60 years	60–69 years	70–79 years	> 80 years
Atorvastatin, men	33.8 mg	34.5 mg	32.6 mg	27.4 mg
Atorvastatin, women	25.8 mg	27.4 mg	26.2 mg	26.9 mg
Rosuvastatin, men	18.4 mg	18.2 mg	17.8 mg	17.3 mg
Rosuvastatin, women	17.3 mg	17.2 mg	17.1 mg	16.6 mg

Conclusion. Both rosuvastatin and atorvastatin were prescribed in lower doses for women compared to men in all age groups when used in FDCs with ezetimibe.

Acknowledgements. No conflict of interests.

Innovative synthesis of modified Prussian Blue-activated carbon composites for enhanced sorption of metal ions in radioactive fallout scenarios

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Background. Contemporary geopolitical situations have underscored the imperative need for advanced materials to counteract the heightened risk of nuclear incidents and radioactive contamination. This study focuses on the green synthesis of modified Prussian Blue (PB) integrated onto activated carbon matrices, particularly relevant in scenarios involving radioactive fallout.

Aim. This study addressed the lack of accessible antidotes for Cesium (¹³⁷Cs) in Latvian pharmaceutical channels and the absence of proper water decontamination sorbents. The primary objective of this research is to establish a sustainable and effective synthesis method for creating a composite material with heightened sorption capacity for radioactive metal ions, including cesium (Cs⁺). The goal is to contribute to advancements in water purification and to enhance personal protection measures, particularly in scenarios involving exposure to various metal ions. The objective is to advance water purification methods and augment personal protection measures, especially in situations of metal ion exposure where access to safe drinking water is critical.

Methods. The synthesis process involves a green method to treat the surface of activated carbon, facilitating the synthesis of active pharmaceutical ingredients and their simultaneous adsorption on the sorbent surface. This technique ensures controlled synthesis, forestalling agglomeration, and formation of a point-like locus for the close association of the active substance with the adsorbent.

Results. The modified synthesis yielded an active substance with altered properties of activated carbon, significantly enhancing the non-selective sorption of various metal ions and the selective sorption of Cs⁺ ions. The unique structure obtained through controlled synthesis improved the characteristics of the composite material. Notably, experiments conducted over a 24-hour period using an orbital shaker demonstrated that no desorption occurred after sorption within this timeframe. Furthermore, a series of experiments confirmed that water contaminated with Cs⁺ ions (1 ppm/L) became safe for use within 24 hours in the presence of PB and carbon sorbent.

Conclusion. This study provides valuable insights into the development of materials critical for addressing challenges associated with radioactive contamination. The modified composite material demonstrated enhanced sorption capabilities, particularly the selective sorption of various metal ions, which holds promise for applications in water purification and personal protection measures. The obtained results underscore the importance of continued research in this direction.

Acknowledgements. This study was made possible through the generous sharing of knowledge by esteemed professors and researchers affiliated with the University of Latvia. Financial support was provided by *Mikrotīkls Ltd* scholarship administered by the *University of Latvia Foundation*.

Does directional hemispherical reflectance distinguish between cefuroxime tablets stored under different conditions?

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Background. Due to the fact that all substances absorb, transmit, or reflect radiation to varying degrees, directional-hemispherical reflection can be useful in obtaining new data about these substances. So far, reflectance has been used in fields of science such as geology, the food industry, and space research, but recently it has also been increasingly used in biomedical and pharmaceutical research, e.g. to assess the originality of a drug or to assess the stability of a drug during storage.

Aim. The present study aimed to evaluate the total hemispherical reflectance (THR) of tablets containing cefuroxime stored in opposite conditions.

Methods. During the experiment, we analysed 1) unexpired tablets stored under manufacturer's recommendations (ambient conditions), 2) expired tablets stored under manufacturer's recommendations (ambient conditions) for a long time but out of expiration date, and 3) stressed tablets stored under stressful conditions for accelerated ageing (i.e. elevated temperature of 45°C and UV radiation) for 7 days. Total hemispherical reflectance (THR) was measured with a SOC 410 reflectometer (USA). Each measure was performed within seven spectral bands i.e. 335–380 nm, 400–540 nm, 480–600 nm, 590–720 nm, 700–1100 nm, 1000–1700 nm, 1700–2500 nm. Data were analysed with Statistica 13 (USA).

Results. There were significant differences in THR values in all wavelength ranges tested when comparisons between all the tablets analysed were made ($p < 0.001$ for each wavelength). Significantly lower reflectance was observed for stressed tablets after 7 days of treatment with a temperature of 45°C and UV radiation. In a post-hoc analysis, the mean value of THR in unexpired tablets was comparable to THR in expired tablets within the wavelength ranges of UV light and infrared, i.e. 335–380 nm, 700–1100 nm, 1000–1700 nm, and 1700–2500 nm.

Conclusion. In conclusion, tablets with cefuroxime stored under various conditions differ in terms of reflectance. In tablets stressed with elevated temperature and UV radiation, more light was transferred into the tablets than for unexpired and expired tablets with cefuroxime.

Acknowledgements. The study was funded within the projects BNW-1-062/N/3/F and BNW-2-042/N/3/Z by the Medical University of Silesia in Katowice, Poland.

High molecular weight polysaccharides and heteropolysaccharides as a source of new prebiotics isolated from mushrooms of the genus *Cantharellaceae*

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Background. Mushroom polysaccharides or glucan derivatives exert by modulating the gastrointestinal microbiota. Despite the simplicity of their monosaccharide composition, large diversity can be found in their respective position and sequence of units along a chain, branching degree and molecular mass. Extra digestible long-chain gluconates from mushrooms acquire valuable qualities characteristic of prebiotics through fermentation by bifidobacteria and lactobacilli in the digestive tract, releasing various forms of short-chain saccharides.

Aim. The aim of the current study was a sequential fractionation and detailed structural characterization of polysaccharides from the wild mushroom species *Cantharellus cibarius*.

Methods. Three polysaccharidic fractions were obtained by subsequent extraction with hot water (F1), 1 M NaOH (F2), and neutralisation of the extract supernatant (F3). The last fraction is desalted using a dialysis membrane with a cut-off of 100 kDa. Deproteinization of precipitate was performed by the Sevag method. Methylation of non-carbohydrate components was carried out in DMSO with sodium hydride. Methylation products were extracted with dichloromethane and the solvent was evaporated. The depolymerization process of permethylated residues was performed with 85% formic acid solution and further hydrolysed with 2.5 M TFA. Acetylation of partially methylated residues was performed with acetic anhydride and pyridine. Detailed compositional analysis was carried out by FTIR, TGA, GC-MS, NMR, CHNS analyser.

Results. Crude polysaccharides in yields of 4.6% (F1), 7.6% (F2) and 3.2% (F3) were isolated from *C. cibarius*. After removal of proteins, elemental analysis of purified polysaccharides revealed the presence of only 1.1%–1.5% nitrogen. Methylation, hydrolysis, and acetylation results indicated that polysaccharide of the primary fraction consists of mainly Glcp-(→1), Galp-(→1), Galp-(1→3), Manp-(1→4), Galp-(1→6), Manp-(1→6), and Manp-(1→3,6) linked glycosyl bonds at a molar ratio of 14:25:9:11:17:14:6. Linkage positions of secondary fraction gave the ratio 6:65:7:7:2 for Glcp-(→1), Galp-(1→3), Galp-(1→3,4), Galp-(1→3,6), and Galp-(1→3,4,6) respectively. The subfraction (F3) contains both linear and branched structures with a set of glucosamine units. The heteropolysaccharide structure of the subfractions shows the vibrational bands of amide I (1647 cm⁻¹) and amide II (1540 cm⁻¹) in the FTIR spectrum. The results indicate that the major chain is made up of 1,4-linked mannose residues by 1,6 glycosidic bonds at branch point.

Conclusion. The results obtained confirm the possibility that at least three new types of glucans from *Cantharellaceae* can be isolated. A distinctive feature of the basic structure of polysaccharides is the construction of monosaccharide units that contain galactose (d-Galp) instead of the commonly found glucose (d-Glcp) units.

PUBLIC HEALTH AND EPIDEMIOLOGY

Ethical issues in translational research for Alzheimer's disease

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Background. Translational research involves the process of taking scientific discoveries from the laboratory and applying them to the development of new treatments and therapies for patients. This type of research can be particularly challenging when it comes to neurodegenerative diseases, which are often complex and difficult to treat. A transparent and efficient ethical approach is necessary for the successful development of new innovative treatments, ensuring minimising risks, maximising benefits and protecting of rights of participants of early human studies.

Aim. This study undertook a state-of-the-art comprehensive review to examine ethical issues in biomedical translational research from basic research into early human studies for neurodegenerative diseases. It is part of a broader study aiming at continuous analysis of ethical issues and challenges in the translational R&D process from the point of view of different stakeholders.

Methods. We searched articles highlighting ethical issues in the translational process from nonclinical evidence to clinical studies in humans. A search of Web of Science, Scopus and PubMed databases returned 1237 articles for abstract screening by two independent reviewers. Of these, 90 articles were selected for full-text review of which 29 articles were included in the final review and were subsequently coded and analysed by applying qualitative content analysis in Atlas.ti programme.

Results. The central themes on ethical issues in the translational process were related to quality and reliability of non-clinical evidence, risk/benefit assessment for starting human studies, risk perception of various stakeholders, transparency and communication of uncertainties and risks to clinical trial participants. Various authors highlighted the challenge of identifying minimal preclinical evidence and risk acceptance to move to human research for innovative treatment approaches. By some, risk aversion was seen as a potentially hindering factor to medical progress. Only marginally discussed but an important issue was raised that decision makers who are weighing risk/benefit ratio and approving early human studies are also prone to biases that essentially undermine the rights of participants.

Conclusion. In translational research for Alzheimer's disease, there is a lack of in-depth ethical reflection in the scientific literature from the point of view of different stakeholders. To address this problem, the identification of new ethical problems, the development of guidelines and support tools for decision-making is advisable.

Acknowledgements. This study is part of the project 'Mechanisms of focused ultrasound mediated Brain Cell Activity Coupled with enhanced mechanosensation' (REBALANCE) project funded by the EU Joint Programme – Neurodegenerative Disease Research, contract No. ZD2023/21528.

Dermatology outpatient clinic appointment attendance rate by gender and age: a single-centre experience

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Background. Recently, studies have shown that public healthcare is becoming more inaccessible, and the waiting lists are growing rapidly worldwide. In general, the belief is that an increase in public healthcare utilisation exists due to population ageing and increased patient load. In addition, the lack of healthcare professionals is another rising challenge. However, the opposite aspect of the matter is the appointment attendance rate. This is what society controls and can change.

Aim. The aim of this study was to assess the appointment attendance rate by gender and age among Latvian patients.

Methods. The retrospective study enrolled 1075 patients presenting to a dermatology outpatient clinic between October 2022 and May 2023. The month and the day of the visit, gender, age and attendance or non-attendance were recorded. The results were collected and statistically analysed using *Microsoft Excel*.

Results. In total, 1265 appointments were scheduled. Of these, 56.8% (n = 719) were scheduled by women and 43.2% (n = 546) by men. Overall, from the 1265 appointments scheduled, only 85.0% (n = 1075) were attended. Therefore, a remarkable 15.0% (n = 190) of the 1265 appointments were unattended. Furthermore, women attended the appointments better on average: 719 appointments, 85.5% (n = 615) attendees and 14.5% (n = 104) non-attendees. Meanwhile, men attended the appointments slightly worse on average: 546 appointments, 84.2% (n = 460) attendees and 15.8% (n = 86) non-attendees. In addition, the patients were further divided by age groups: 0–17; 18–24; 25–34; 35–44; 45–54; 55–64; 65+ and each group was analysed separately. Consequently, the best attendance rates were registered for both sexes over the age of 65, respectively an attendance rate of 89.1% for women and 89.2% for men. In contrast, the worst attendance rate for women was 82.0% in the age group of 0–17 years old, while for men it was 72.7% in the age group of 18–24 years old.

Conclusion. The study shows that a remarkable 15.0% of Latvian patients do not show up for appointment in the public healthcare sector. Consequently, the waiting lists get longer because of it as well. Furthermore, society lacks self-awareness on the issue. Therefore, we should invest more in developing systems and algorithms that remind the patient of the upcoming appointment. In addition, we should promote campaigns to improve the general population's attitude towards committing to an appointment that has been made or cancelling it beforehand if need be.

Acknowledgements. The authors declare no conflict of interest and have not received any funding from a third party regarding the current study.

Evaluating the reliability of AI-generated answers to data science questions

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Background. As artificial intelligence (AI) becomes increasingly sophisticated, there is growing interest in its potential to assist human data scientists in answering complex questions about data. However, the ability of AI to correctly interpret and apply statistical concepts, such as tests, p-values, and confidence intervals, remains an open question. This study investigates the performance of large language models (LLMs) on a variety of data science question-answering tasks.

Aim. To evaluate the capabilities of four different large language models in answering questions about data science concepts.

Methods. Specifically, we evaluate the performance of LLMs on a dataset of 70 questions. The dataset covers a wide range of topics, including statistical tests, p-values, confidence intervals, hypothesis testing, and statistical significance.

Results. The results demonstrate that AIs have the potential to provide accurate and informative responses to data science-related inquiries. On average, AIs answered 77.1% of questions correctly, with the highest accuracy of 87.1% and the lowest accuracy of 74.3%. The remaining 22.9% of questions were either answered incorrectly (12.9%) or not answered at all (10.0%).

Conclusion. Our results show that LLMs can provide accurate answers to a significant fraction of data science questions. However, they also make several errors, including errors in interpreting statistical concepts, and errors in making inferences from data. These errors suggest that LLMs are not yet ready to replace human data scientists in all aspects of data analysis.

Acknowledgements. The authors declare the absence of a conflict of interest.

Traffic injury mortality trends in children and young people aged 0 to 19 years by road users from 1998 to 2020 in Lithuania

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Background. Deaths from external causes are one of the three main causes of mortality in Lithuania. Road traffic injury is one of the most numerous groups of external causes of death worldwide, in the European continent, and the Baltic countries. Traffic crashes and traffic injuries are a heavy socio-economic burden for society and the state. It hurts the most when children, teenagers and young people are injured in traffic.

Aim. The aim of the current study was to analyse the traffic injury mortality trends in children and young people aged 0 to 19 years by road users from 1998 to 2020 in Lithuania.

Methods. A longitudinal study was performed and regression analysis was conducted. The coefficient of determination (R^2) was applied in the study. The significance level $p \leq 0.05$ was considered statistically significant.

Results. Over the 1998–2020, 1,495 children and young people aged 0 to 19 years died from road traffic injuries in Lithuania: 1,071 male (72%) and 424 female (28%). Dividing by road users, we lost 55% of them traveling inside the car, 24% as pedestrians, 9% as motorcyclists, 7% as cyclists, and 5% as others.

In 1998–2020, there was a statistically significant decrease of road traffic fatal injuries in all categories of road users in Lithuanian inhabitants, aged 0–19 years. In males' subgroup, the mortality of pedestrians, passengers, cyclists and motorcyclists decreased statistically significantly. In girls, the mortality of pedestrians and passengers decreased significantly, while no significant changes revealed in the categories of cyclists and motorcyclists. There were no significant changes in these categories, possibly due to the small number of cases. There have not been female cyclists and motorcyclists killed in the last five years. The number of road traffic deaths increased in the category called 'Other road user' possibly due to the increased usage of electric scooters.

Conclusion. There was a significant decrease in road traffic mortalities in children and young people over two decades in Lithuania. Despite the decreasing mortality rate trends, road traffic injuries remain an important public health problem regionally, and need continuous attention and road safety activities focused to vulnerable road users.

Acknowledgements. The authors declare the absence of conflict of interest.

Timely assessment of cognitive functions for patients with multimorbidity in the primary health care settings

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Background. Misdiagnosis rates for dementia are high in primary health care (PHC) all over the world. Timely assessment of cognitive impairment (CI) in patients with multimorbidity is essential for delivering patient-centred care and holistic approach, optimizing treatment outcomes, and enhancing the overall quality of life for individuals managing multiple chronic conditions.

Aim. To assess cognitive functions in patients with multimorbidity without cognitive complaints according to different chronic conditions in PHC settings.

Methods. Study involved participants of the 'TELELISPA' project (n = 796), which was conducted at seven Lithuanian PHC (four urban, three rural) in year 2021–2022. The participants were 40 to 85 years of age and were diagnosed with arterial hypertension (ICD-10-AM codes I10, I11) and at least one other disease from the following ICD-10-AM codes: I50, I20, I25, I48, E11, E06, E89, J44, J45, M05, M06, M15–M19, M80, M81. The study lasted 15 months, during which all participants, regardless of the assigned group, underwent assessment using Mini Mental State Examination (MMSE) and other questionnaires.

Results. CI evaluated with MMSE instrument was suspected in 38 individuals (4.6%). CI was statistically significantly more frequently suspected in patients with chronic obstructive pulmonary disease (COPD) (n = 5; 13.2%; p = 0.008) and chronic kidney insufficiency (CKI) (n = 7; 18.4%; p = .004). COPD increased the likelihood of having CI by 4.993 times (p = 0.002), and having CKI by 4.246 times (p = 0.001). When evaluating the intervention group separately, CI was statistically significantly more frequently suspected in individuals with CKI (n = 3; 25%; p = 0.023); CKI increased the likelihood of having CI by 6.537 times (p = 0.008). No such data were found in COPD individuals (n = 1; 8.3%; p = 0.299). In the control group, CI impairment was statistically significantly more frequently suspected in individuals with COPD (n = 4; 15.4%; p = 0.016) and CKI (n = 4; 15.4%; p = 0.060). The respective increases in CI likelihood were 5.471 times for COPD (p = 0.006), 3.273 times for CKI (p = 0.046).

Conclusion. These findings suggest the importance of cognitive screening in patients with multiple diseases, even in the absence of reported cognitive complaints, highlighting potential associations with specific comorbidities such as COPD and chronic kidney insufficiency.

Acknowledgements. The study was financed by the funds of the 'TELELISPA' project 'Improved Healthcare Quality for Patients with Multimorbidity in Lithuania' (Project No. 08.4.2-ESFA-K-616-01-0003).

Leveraging artificial intelligence for optimal research type selection in medicine

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Background. The landscape of medical research is complex, with diverse research types ranging from clinical trials to epidemiological studies, each playing a crucial role in advancing our understanding of health and disease. Traditional approaches to choosing research types often rely on manual literature reviews, expert opinions, and historical trends. However, these methods may be time-consuming and challenged by the sheer volume of available data.

Aim. Evaluate whether AI can be helpful in the process of research type selection.

Methods. A set of 30 questions was developed to assist researchers in selecting appropriate research types in medicine. Two distinct AI platforms were selected to evaluate the questions' effectiveness. The platforms were chosen due to their advanced natural language processing capabilities and their potential to guide research type selection. Each AI platform was presented with 30 questions separately, and the responses generated were analysed for relevance and specificity.

Results. In research on the ability of artificial intelligence to answer questions about the better-suited research type, was found out a remarkable 80% match in responses between two AI tools. One AI displayed a 73% accuracy in providing a single, definitive research type, while the other achieved a 70% success rate in this regard. In other instances, both AI tools offered multiple potential research types.

Conclusion. In conclusion, artificial intelligence holds significant potential to enhance research methodologies in medicine by supporting informed research type selection. However, it is essential to acknowledge that AI serves as a valuable tool that complements, rather than supersedes, the critical expertise and judgment of human researchers.

Acknowledgements. The authors declare the absence of a conflict of interest.

Participation of young Lithuanian citizens in preventive health care

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Background. Participation in preventive health care examinations is one of the most important factors of self-health care and wellbeing especially in the younger age. To evaluate the population health status among EU citizens, the European Health Interview Survey was carried out in all EU countries.

Aim. The aim of the study is to evaluate the participation of young (aged 20–39 years old) Lithuanian citizens in health care preventive examinations.

Methods. In the study, secondary data analysis was applied, and the open data from the 2019 Lithuanian Population Health Statistical Survey was used. Out of the full sample of respondents from the dataset only the aged 20–39 years old were selected – containing 1157 participants: 496 (43%) aged 20–29 years old and 661 (57%) aged 30–39 years old. The statistical analysis was performed using the *IBM SPSS Statistics 29*. The chi-square test with Yates continuity correction was used to evaluate the differences between categorical variables, a p-value < 0.05 was considered statistically significant.

Results. Results show that statistically significantly more respondents aged 30–39 years old have at least one chronic disease (207 (31.3%) vs 126 (25.4%), p = 0.033) and have long-term complaints (139 (21%) vs. 80 (16.1%), p = 0.042). The most popular health care examinations were blood pressure, glucose and cholesterol level measurements performed by respectfully 1124 (97.5%), 1004 (87.1%) and 931 (80.7%) of all respondents aged 20–39 years old. The main preventive care examinations were compared between two age groups (Table 1).

Table 1. Comparison of preventive care examinations

Preventive examination	20–29 years old n (%)	30–39 years old n (%)	p-value
Flu vaccination	166 (33.6%)	168 (25.5%)	0.03
Blood pressure measurement	476 (96.4%)	648 (98.3%)	0.34
Cholesterol level measurement	383 (77.5%)	548 (83.2%)	0.02

Other preventive examinations – glucose level measurement, occult blood detection test, colonoscopy procedure – were not significant between analysed age groups.

Conclusion. The 30–39 years old persons were more likely to participate in mostly all preventive care examinations. This may be due to having more health issues. However, having at least one chronic disease and long-term complaints were not a reason for these respondents to get a flu vaccine.

Acknowledgements. All co-authors have seen and agree with the contents of the manuscript and there is no conflict of interest to report.

Patients' perspective and attitude on sexual health history taking in family physician office

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Background. Sexual health is an integral aspect of anyone's health. Primary care is an appropriate stage of healthcare to adequately collect the anamnesis of patients' sexual health. However, because of patients' and physicians' discomfort, sexual health topics may be overlooked or avoided. Therefore, to successfully improve physician-patient communication, it would be important to assess patients' attitudes and perspectives towards taking sexual health history in the family physician's office.

Aim. The aim of the study was to assess patients' beliefs, attitudes, and perspectives towards sexual health history taking in primary care offices.

Methods. Altogether, 144 (123 female, 21 male) respondents aged 17–68 were enrolled in the study. Data was collected using an anonymous questionnaire that was held on the web. The data were analysed using *IMB SPSS*. Descriptive statistical methods were used, Pearson (χ^2) chi-square test was used to compare variables.

Results. The mean age of respondents was 32.3 ± 9.3 . Respondents defined themselves as heterosexuals – 95.1%, homosexuals – 2.1%, and bisexuals – 2.8%. Only 17.4% said that the physician has addressed sexual health topics/concerns, of those, most claimed it was about contraceptive methods. Asked whether family physicians should ask patients about sexual health concerns – 50% said – yes, should ask everyone; 48.6% said – yes, but only if the patient initiates the conversation. There was a statistically significant association between sex and the belief that family physicians should ask patients about sexual satisfaction/dysfunction ($\chi^2 = 9.356$, $p < 0.025$). As the main barriers to initiating sexual health conversations, respondents state that they consider family physicians incompetent in these topics or unable to help (24.3%), and embarrassment (15.3%). There was a statistically significant association between sexual orientation and identifying 'feeling scared to be discriminated' as a barrier ($\chi^2 = 36.561$, $p < 0.001$). Respondents noted that it would encourage them to discuss sexual health topics if physicians would initiate conversation (50.7%) if there was a form to fill out about their concerns (37.5%).

Conclusion. The majority of respondents indicate that physicians should address sexual health concerns. Females are more likely to consider that physicians should not ask patients about their sexual satisfaction/dysfunction. Embarrassment and incompetence of family physicians regarding sexual health topics are indicated as the main barriers. There are factors that could encourage patients to discuss sexual health with their family physician. This study has its limitations, which could be improved: sample size, female/male distribution, and more homosexual/bisexual participation.

Acknowledgements. No funding was received.

Navigating the complexity of sarcomas: a retrospective study from Latvia

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Background. In the Republic of Latvia, more than 12,000 new oncological cases are registered annually, among which sarcomas account for less than 1% of diagnoses. Despite their relatively low incidence rate, sarcomas pose a significant challenge in the healthcare sector. This is due to their exceptional heterogeneity, encompassing over fifty different histological subtypes, which makes it challenging to accumulate the specialized expertise and knowledge required for their effective diagnosis and treatment. Sarcomas can mimic other, more common pathological processes, increasing the risk of misdiagnosis and delays in initiating appropriate treatment, leading to significantly worse prognostic outcomes. Considering that timely detection and accurate treatment can significantly improve sarcoma prognosis, the importance of raising awareness about this type of disease remains critical. Due to the limited availability of statistical data, the primary goal of this research is to enhance understanding of the diverse forms of sarcomas, aiming to facilitate more effective prevention, diagnosis, and treatment strategies for these diseases.

Aim. To investigate the demographic and histopathological characteristics of sarcomas.

Methods. A retrospective study was conducted to analyse the demographic and histopathological characteristics of sarcomas diagnosed at the Hospital of Traumatology and Orthopaedics from 2012 to 2022.

Results. A total of 146 patients with sarcoma were included, comprising 74 males with an age range of 14 to 87 years. The most common sarcoma types were osteosarcoma (30.8%, n = 45), chondrosarcoma (36.3%, n = 53), and synovial sarcoma (11%, n = 16). Other sarcoma subtypes included fibrosarcoma (6.2%, n = 9), rhabdomyosarcoma (8.2%, n = 12), leiomyosarcoma (3.4%, n = 5), and liposarcoma (4.1%, n = 6). The majority of patients (79.0%) presented with localized disease, while 12.3% had regional metastases and 8.7% had distant metastases.

Conclusion. The study underlines the critical need for continued efforts in sarcoma research. Given the rarity and diversity of sarcomas, every piece of data is valuable for improving understanding, diagnosis, treatment, and ultimately patient outcomes.

Acknowledgements. The authors declare the absence of a conflict of interest.

Histopathological comparison of salivary gland tumours

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Background. The salivary glands are the site of origin of a wide variety of neoplasms and are also relatively uncommon. The histopathology of these tumours is said to be the most complex and diverse of any organ in the body. Histopathological diagnosis plays a major role in the diagnosis of these neoplasms because the treatment of these tumours depends on it.

Aim. To collect data on the incidence of salivary gland tumours in Latvia from 2020 to 2023. To determine whether there is a difference in the incidence of salivary gland tumours among women and men, and to examine whether there are differences in the incidence of salivary gland tumours depending on where the patient lives.

Methods. A retrospective study was conducted in the period from 2020–2023. The study analyzed patients who underwent resection of salivary gland tumours. Data from 163 patients were initially collected in the study. During the data processing, it was concluded that the age of one patient was not specified, it was decided to exclude this patient from the total data. Descriptive statistics and inductive statistics were calculated based on the collected data of 162 patients.

Results. The study collected clinical cases of 88 women and 77 men in the period from 2020 to 2023. For the year, the ratio between women and men was 1.14:1. Average patient age was 61 years, the standard deviation (SD) 14.88 years, age ratio between women and men: 1.04:1. The youngest patient was 23 years old at the time of consultation, and the oldest – 92 years old. Patients were divided into age groups in order to make calculations that allow drawing conclusions about the accepted research hypothesis.

Conclusion. This study shows a distribution of salivary gland tumours that there are no different from that of Western countries and aligns with other authors, strengthening the hypothesis.

Acknowledgements. No conflict of interest, no funding. Thanks to Tatjana Zablocka, the research assistant at the UL Faculty of Medicine.

Associations between lifestyle, oral hygiene status and circulatory system

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Background. Research from the former studies brought the evidence about inflammatory origin of cardiovascular diseases and their possible connections with oral hygiene status. The possibility of addressing this problem as well as the inclusion of lifestyle habits into the study led to this research, seeking to fulfil these tasks: to assess lifestyle characteristics of the study subjects (diet, smoking, alcohol consumption, physical activity, sleep, oral care habits), perceived stress, to determine their oral hygiene status, to evaluate their subjective health and diagnoses, indicative of the risk of cardiovascular diseases (CVD) with the possibility to determine associations between the subjects' lifestyle characteristics, oral hygiene, subjective health status, and indicators of circulatory diseases.

Aim. The aim of this research was to investigate the lifestyle peculiarities of the residents of suburban districts in the Kaunas region and to assess the associations with oral hygiene status and indicators of circulatory system diseases.

Methods. This cross-sectional study was carried out in Kaunas district dental clinics in 2023. Adult patients ($n = 172$) completed an anonymous questionnaire consisting of questions on lifestyle, perceived stress, subjective evaluation of health and diagnosed CVD. Oral hygiene was assessed using the Silness-Loe Oral Hygiene Index (PLI) and the Periodontal Health Index (CPITN). For each respondent, the number of decayed (K), filled (P) and erupted (I) teeth were summed to give an individual KPI index. The chi-square (χ^2) test, paired Z-tests with Bonferroni correction, and Spearman's correlation coefficient were used for statistical analysis.

Results. The research detected that worse PLI was significantly associated with smoking ($r = -0.183$, $p < 0.05$), shorter sleep duration ($r = -0.172$, $p < 0.05$), consumption of alcoholic beverages ($r = -0.157$, $p < 0.05$). Greater need for dental treatment was significantly associated with longer sitting time ($r = -0.244$, $p < 0.05$), shorter sleep duration ($r = -0.184$; $p < 0.05$), consumption of alcoholic beverages ($r = -0.165$, $p < 0.05$), smoking ($r = -0.152$, $p < 0.05$). Diagnosed arterial hypertension was associated with higher KPI ($r = -0.306$, $p < 0.05$), PLI ($r = -0.303$, $p < 0.05$), and CPITN ($r = -0.328$, $p < 0.05$) indicators. Higher cholesterol levels were significantly related to a higher KPI index ($r = -0.343$, $p < 0.05$). The presence of chronic non-communicable diseases demonstrated associations with higher CPITN ($r = -0.169$, $p < 0.05$).

Higher stress levels were not significantly associated with KPI ($r = 0.065$, $p > 0.05$), PLI ($r = -0.039$, $p > 0.05$) and CPITN ($r = -0.060$, $p > 0.05$).

Conclusions. Worse dental health indicators were associated with worse lifestyle and CVD health indicators (arterial hypertension and higher cholesterol levels). Perceived stress levels showed no correlation with oral health indicators.

SURGERY, TRAUMATOLOGY AND ORTHOPAEDICS

A comparison of patient satisfaction and quality of life after transabdominal preperitoneal inguinal hernioplasty with self-gripping mesh and Lichtenstein hernioplasty

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Background. Inguinal hernioplasty is a common operation in elective surgery, but there is a lack of evidence about patient complaints and satisfaction with the operation results over a long-term period when compared to transabdominal preperitoneal (TAPP) technique with self-gripping mesh and Lichtenstein (LIHT) hernioplasty.

Aim. The aim of this study is to compare TAPP with self-fixating mesh and Lichtenstein hernioplasty outcomes and patient overall satisfaction with the operation result at a 3-year follow-up.

Methods. A prospective comparative study was performed in Riga East Clinical University Hospital from 2016 to 2021. The patients' demographics and hernia variables were recorded prospectively. A follow-up was done 3 years after hernioplasty. The patients were examined and interviewed using a form based on the European hernia society quality of life (QoL) form. The data was analysed using the Shapiro-Wilk test, Student's t test, Mann-Whitney U-test, Fisher test, and χ^2 test. Continuity correction (Yate's) was applied when appropriate.

Results. A total of 99 patients were analysed (48 in the LIHT group and 51 in the TAPP group). When comparing, LIHT to the TAPP group, discomfort during activities (37.5% to 13.7%, $p = 0.013$), discomfort domain (43.7% to 19.6%, $p = 0.0096$) and restriction domains (47.9% to 29.4%, $p = 0.058$) were more prevalent. Although patients in the TAPP group were more satisfied with the operation result (86.3% to 54.2%, $p = 0.001$) and cosmetic result (78.4% to 33.3%, $p = 0.007$) compared to the LIHT group.

Conclusion. Inguinal herniorrhaphy by TAPP with self-fixating mesh or the Lichtenstein method has similar acceptable long-term results, however, the laparoscopic method with self-fixating mesh is preferable for inguinal hernioplasty because of the better overall results of the surgical procedure in the long-term follow-up.

Acknowledgements. The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. The authors received no financial support for the research, authorship, and/or publication of this article.

Use of artificial intelligence in liver transplantation for prediction of graft survival: Vilnius University Santaros Clinics experience

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Background. Liver transplantation is the only treatment for a patient's life-limiting liver disease, which may present in the form of acute liver failure, end-stage chronic liver disease, primary hepatic cancers, or inborn metabolic disorders. As demand for liver transplantation grows, it remains a challenge to predict short- and long-term survival of the liver graft, as existing risk scoring models, such as the Balance of Risk (BAR) score and the Survival Outcomes Following Liver Transplantation (SOFT) score, fail to predict the mortality after liver transplantation with sufficient accuracy. Therefore, machine learning and other artificial intelligence models are applied in transplantology to guide objective clinical decision-making.

Aim. The aim of the current study was to use artificial intelligence algorithms to create a model which could help surgeons and transplantologists estimate the survival of the liver graft after liver transplantation.

Methods. We collected clinical information about 54 liver transplantation recipients who have received liver transplants in Vilnius University Santaros Clinics in the years 2015–2023. Then we reviewed the data using box plots and violin plots and picked out the most important liver transplantation characteristics. Those characteristics were used to create decision trees using gini and entropy criteria.

Results. 6 of 54 liver graft recipients died within three months after the transplantation. The most important liver transplantation characteristics that defined patient outcome were creatinine, alanine aminotransferase, aspartate aminotransferase, bilirubin, and lactate levels in the patient's serum, as well as the recipient's age, and the presence of multiple organ failure or surgical complications after the transplantation. Four different decision trees that we created proved to be clinically relevant and showed which values of liver transplantation characteristics indicate poor patient prognosis.

Conclusion. Decision trees could serve as an accurate method to assess preoperative and postoperative mortality risk of liver transplantation recipients, especially in small populations, where there are not enough recipient data to create machine learning models for this matter.

Acknowledgements. This research has received funding from the Research Council of Lithuania (LMTLT), agreement No. P-PD-22-099.

Comparison of diagnostic methods for lower limb arterial blood supply

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Background. Peripheral arterial disease (PAD) represents a significant global health concern, contributing to morbidity and mortality associated with cardiovascular disorders. The accurate assessment of lower limb arterial blood supply is crucial for timely diagnosis and intervention, preventing complications such as ischemia and tissue damage. While computed tomography angiography (CTA) stands as the gold standard for PAD diagnosis due to its high resolution and comprehensive visualization, its immediate availability can be limited in certain clinical settings.

Aim. This study aims to systematically evaluate and compare the performance of different diagnostic methods, emphasizing palpation of leg artery pulses, Pole test, Buerger's test, and ankle-brachial index (ABI) measurements. By analysing these techniques, the goal is to identify the most reliable and practical approach for the assessment of lower limb arterial blood supply.

Methods. A prospective study of comparative accuracy was performed at the Riga East Clinical University Hospital in Riga, Latvia between October 2023 and January 2024. The study includes a total of 100 randomly selected patients, with 41 presenting symptoms suggestive of peripheral arterial disease and 59 participants exhibiting no clinical signs of PAD. Diagnostic tests as palpation of leg artery pulses, Pole and Buerger's tests, and ABI measurements were performed to assess the lower limb arterial blood supply. Statistical analysis, covering sensitivity, specificity, positive/negative predictive values, and diagnostic accuracy, was applied to the collected data. Subgroup analyses, considering demographics and comorbidities, were conducted to explore potential variations in diagnostic performance.

Results. Pulse palpation, while a traditional diagnostic method, exhibited limited specificity, with results not always correlating with other methods due to individual anatomical variations. Buerger's test, while informative in critically compromised patients, showed limited positivity in symptomatic cases. The Pole test emerges as promising for diagnosing PAD in diabetic patients. ABI measurements revealed diverse findings, with notable instances of calcified arteries and measurement limitations in specific cases.

Conclusion. This study reveals limitations in traditional PAD diagnostic methods like pulse palpation and Buerger's test. The Pole test shows promise for diabetic PAD diagnosis. Despite diverse ABI findings, including calcified arteries, our results stress the need for refined, multifaceted diagnostics to improve accuracy in PAD assessments. Future strategies must address these complexities to enhance clinical applicability across diverse healthcare settings.

Acknowledgements. The authors declare the absence of a conflict of interest. The study received no funding.

Laparoscopic vs. open gastric resections. The first-time experience at Riga East Clinical University Hospital

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Background: Gastric cancer's main treatment is radical gastric resection. Laparoscopic gastrectomies have proven to be safe and equally effective as open gastrectomies.

Objectives: Laparoscopic gastric resections. First time experience in Riga East University Hospital. In this study, we wanted to evaluate the laparoscopic gastric resection efficacy.

Methods: In a retrospective study we analysed patients with gastric tumours stage I or II who underwent laparoscopic (Lap-group) or open (Open-group) gastric resections. Sixty-two patient cases from 2017–2023 who underwent gastric resections for gastric cancer at Riga East University Hospital. Thirty-one of them had laparoscopic gastric resections and thirty-one of them had open gastric resections. We analysed clinico-pathological factors, postoperative hospital stay, operation time and when patients started peroral feeding.

Results: Most common gastric resection in Lap-group 67% (n = 21) were marginal gastric resection, and 29% (n = 9) subtotal distal gastrectomy, less common 3.2% (n = 1) was total gastrectomy. In open group most common gastric resection, 59.4% (n = 19) was marginal gastric resection and 25% (n = 8) total gastrectomies, less common 15.6% (n = 5) subtotal distal gastrectomies. In Lap-group the median of total dissected lymph nodes was 29 lymph nodes, however in open-group the median of total dissected lymph nodes was 25 lymph nodes. The median size of the tumour in Lap-group was 17 mm. In the open group median size of the tumour was 13 mm. It was found that lap-groups operation times were shorter median = 90, IQR [67.50–125.00] than open gastric resections for marginal gastric resections, median 133.5, IQR [120.00–145.00], p = 0.001. It was also found lap-groups operation times were longer median = 297, IQR [248.75–395.00] than open gastric resections for total and subtotal distal gastrectomies, median 182.5, IQR [157.5–240]. Using the Mann-Whitney U test it was found that patients in lap-group had shorter hospital stay median = 7, IQR [5.00–8.00] than in the open group median = 13, IQR [11.00–14.00], p = 0.001. Using the Mann-Whitney U test it was found that laparoscopically patients start to intake food much earlier median 2, IQR [3.00–2.00] than in open gastric resection median 3, IQR [3.00–3.00], p = 0.001. Both groups did not have any complications.

Conclusions: Laparoscopic gastric resections have shorter hospital stays, shorter operation lengths for marginal gastric resections and patients' intake of food much earlier. In the future, we would like to increase laparoscopic gastric resection rates and considering the low complication rates and good results we could start operating on more advanced-stage gastric cancers.

Assessment of quality of life before and after bariatric surgery

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Background. Obesity has a negative impact on quality of life, therefore bariatric surgery aims not only to reduce obesity but also to improve the quality of life of patients and reduce the manifestations of obesity-related comorbidities as well as their risk factors. Bariatric surgery is frequently used worldwide and is increasing in Latvia. In Latvia, no studies have been conducted on changes in the quality of life of bariatric surgery patients.

Aim. The aim of this prospective study was to assess the quality of life before and six months after bariatric surgery and to analyse the process of weight loss, reduction of risk factors for cardiometabolic and other obesity-related diseases, reduction of obesity-related comorbidities, as well as patient-reported postoperative adverse events.

Methods. The study included data on 17 bariatric surgery patients, residents of Latvia, who underwent surgery between March 2021 and December 2021. They completed the Bariatric Quality of Life (BQL) questionnaire before and six months after surgery. Anthropometric data, obesity-related comorbidities and information on medication use were also recorded.

Results. The median age (Me) was 54 (IQR: 46–55) years and 13 of the 17 participants were female. Six months after bariatric surgery, body mass index (BMI) decreased from Me 39.68 (IQR: 36.29–44.62) kg/m² to Me 31.62 (IQR: 27.56–33.91) kg/m² ($p < 0.0001$), the percentage of total weight loss (%TWL) was Me 23.31 (IQR: 19.84–27.25)% and the percentage of excess weight loss (%EWL) was Me 60.65 (IQR: 51.87–82.01)% and waist circumference decreased from Me 125.5 (IQR: 107.75–134.25) cm to Me 103 (IQR: 93.5–114) cm ($p < 0.001$). Preoperatively, the BQL total score was Me 44.50 (IQR: 39–52) points but increased to Me 52 (IQR: 49.25–62.75) points six months after surgery ($p = 0.004$). Postoperatively, there was an improvement in obesity-related comorbidities and resolution of gastroesophageal reflux disease symptoms in all study participants who reported them preoperatively, but an increase in the number of patients complaining of increased hair loss.

Conclusion. Bariatric surgery is an effective method to reduce weight, reduce the risk factors of developing cardiometabolic and other obesity-related comorbidities and has a positive impact on improving the overall quality of life of bariatric patients, but it also has negative side effects.

A comprehensive assessment protocol for evaluating anterior cruciate ligament reconstruction outcomes and return-to-sport in comparison to a control cohort

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Background. Anterior cruciate ligament (ACL) injuries, occurring with notable frequency in the athlete population, pose significant challenges, impacting their performance and potential long-term joint health. Despite advancements in surgical techniques, the return-to-sport process remains complex and variable among athletes undergoing ACL reconstruction (ACLR), usually taking more than a year to recover.

Aim. This research aims to systematically assess and compare the outcomes of ACLR in athletes against a control group, focusing on muscle strength and activity, proprioception of the knee joint, balance and functional recovery, as well as psychological factors.

Methods. This comprehensive protocol includes standardised assessments of muscle strength with isokinetic dynamometer Physiomed CON-TREX (Physiomed, Germany), muscle activity recordings with electromyograph BTS FREEEMG (BTS Bioengineering, Garbagnate Milanese, Italy) while performing proprioception assessment, static and dynamic balance tests with Technobody Prokin 252 (TecnoBody, Dalmine, Italy), various functional tests, such as single-leg countermovement jump utilising Optojump (Microgate, Bolzano, Italy) and BTS P-6000 (BTS Bioengineering, Garbagnate Milanese, Italy) force plates and other evidence-based functional and mobility tests, and psychological factors in athletes post-ACLR. A matched control group without ACL injury will undergo similar evaluations. All methods used adhere to international standards for accuracy and reliability.

Results. Anticipated results include a detailed understanding of the multifaceted factors influencing the return-to-sport process post-ACLR. Insights into differences between athletes and controls will inform tailored rehabilitation strategies and help adjust and modify assessment protocols that are being used.

Conclusion. By assessing these neuromuscular parameters and psychological factors, this protocol seeks to provide an effective assessment, that would help to adapt effective rehabilitation strategies and optimise athletes' return-to-sport after ACLR by taking into account the complex interaction of leg muscle strength, muscle activity, proprioception, static and dynamic balance and functional tests, as well as psychological readiness.

Acknowledgements. There is no conflict of interest or funding for this research paper at the moment.

Comparison of in-hospital complications in total hip arthroplasty depending on the type of femoral component's fixation in elderly patients with osteoarthritis

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Background. Due to osteoarthritis of the hip joint, patients often reduce the load on their legs, therefore, in combination with age, osteoporosis may develop secondary to this. The use of cementless total hip arthroplasty (THA) in elderly patients is debated because of the increased risk of early periprosthetic femoral fractures. However, cemented femoral components carry a risk of bone cement implantation syndrome.

Aim. To compare in-hospital complications between hybrid vs. cementless THA in elderly patients with osteoarthritis.

Methods. A retrospective study on patients ≥ 70 years old, who underwent unilateral total cementless or hybrid arthroplasty of the hip joint due to osteoarthritis from February 2012 to the end of June 2023 was conducted in the Hospital of Traumatology and Orthopaedics (HTO). Exclusion criteria – other reasons for total hip arthroplasty, application of revision components or BHR system or short femoral component. Patients were selected from the HTO arthroplasty register and the data on complications was added from their case histories.

Results. In total 540 patients met the inclusion criteria.

Table 1. Complications in different types of fixation.

Complications	Type of fixations		P
	Hybrid (cemented stem) 497 (92.03%)	Cementless (cementless stem) 43 (7.97%)	
Hemodynamic reaction during femoral stem implantation	146 (29.37%)	17 (39.57%)	0.164
Dislocation	19 (3.82%)	1 (2.32%)	-
Hematoma	14 (2.81%)	0	-

Only 1 case of periprosthetic infection was found after hybrid vs. 0 after cementless THA, 2 vs. 0 cases of pneumonia, 1 vs. 0 cases of ileus and 1 vs. 0 cases of pulmonary embolism.

Conclusion. No statistically significant differences were found between groups as well as Chi-square test could not be used in many cases due to a small number of complications (less than 5). The study should be expanded to have enough complications to perform statistical tests.

Acromioclavicular joint related quality of life and outcome after acromioclavicular joint stabilization with Hook plate

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Background. Acromioclavicular (AC) joint injuries are common, and their management is crucial for restoring shoulder function and patient quality of life. This study investigates the outcomes and AC joint-related quality of life following AC joint stabilization using a Hook plate.

Aim. The aim of the present investigation was to study patient-reported long-term outcomes after AC joint stabilization using a Hook plate.

Methods. In the Hospital of Traumatology and Orthopaedics in the year 2020–2022, a prospective cohort study was conducted, involving 60 patients with AC joint instability who underwent stabilization with a hook plate. 13–45 months (mean time, 29 months) after the AC joint stabilization patients were asked to answer questionnaires including patient-reported outcomes (PROM), Shoulder Pain and Disability (SPADI) score and our-made questionnaire.

Results. 60 patients were analysed. The median age in patients was 40 years (19–69), mean follow-up duration was 29 months. The median duration from trauma until surgical AC joint stabilization was 5 days. ~70% of patients indicated pain or discomfort while they had Hook plate. The median SPADI score was 18, a significantly higher SPADI score was registered in elderly patients (> 60 years). Notably, 90% of patients reported a return to their pre-injury level of physical activity, emphasizing the successful restoration of shoulder function and overall satisfaction with the Hook plate stabilization procedure.

Conclusion. The significant improvements in PROMs, specifically the SPADI score, highlight the positive impact on patients' quality of life and functionality. These findings support the use of the Hook plate as a reliable option for the management of AC joint instability, offering favourable results in both objective measures and patient-reported assessments.

Acknowledgements. Special thanks to the Hospital of Traumatology and Orthopaedics for providing resources. Gratitude to the participants for their crucial involvement. Thanks also to my family, friends, and colleagues for their support.

The expression of collagen neopeptide C2C in the articular cartilage and its relation with joint tissue damage in patients with knee osteoarthritis

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Background. Osteoarthritis (OA) is the most prevalent form of arthritis, resulting in joint pain and disability. Despite comprehensive research, molecular mechanisms leading to the development of OA are largely unknown. Many biochemical markers have been proposed as candidate prognostic markers of rapid progression of OA. As cartilage extracellular matrix mainly consists of type II collagen (Col2), therefore pathological cleavage of collagen type II (Col2) and generation of Col2 neopeptides can be good molecular markers of progression of OA. One such potential biomarker is collagen type II neopeptide C2C.

Aim. The aim of this study was to correlate the degree of articular cartilage damage in OA patients with C2C expression in histological samples of tissues removed during total knee replacement.

Methods. Cartilage samples were obtained from 27 patients aged from 55 to 66 years. In each patient, medial and lateral tibia plateau samples were analysed according to the OARSI histopathology grading system. C2C expression was evaluated on histological slides by semi-quantitative analysis using ImageJ Fiji software.

Results. The C2C expression was found in all the regions of the articular cartilage (i.e. the superficial zone, mid zone, deep zone and tidemark area and the zone of calcified cartilage). Spearman's rank correlation analysis showed a significant positive correlation ($\rho = 0.289$, $p = 0.0356$) between the histological grade of tissue damage and the percentage of C2C staining. In addition, a highly significant positive correlation ($\rho = 0.388$, $p = 0.0041$) was found between the osteoarthritis score (combining the histological grade of damage with the OA macroscopic stage) and the percentage of C2C staining in the samples.

Conclusion. Our study suggests that local expression of C2C correlates with cartilage damage in the knee affected by OA. This further assures that C2C can be a perspective marker for the evaluation of pathological processes in OA course and OA clinical trials.

Acknowledgements. The authors declare no conflict of interest. This research received no external funding. The research project was approved by the Ethics Review Committee on Human Research of the University of Tartu (Protocol no. 265T-22, 19.12.2016). Informed consent was obtained from all subjects involved in the study.

Poster presentations

ANAESTHESIOLOGY, REANIMATOLOGY AND INTENSIVE CARE

Comparing Remimazolam-Propofol combination and Propofol alone in upper endoscopy sedation

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Background. Recent advances in sedation for endoscopic procedures have focused on improving patient safety and comfort. This study seeks to validate the optimal 1:7 remimazolam-propofol synergy ratio identified by Song Lyu and Qingchung Deng, through clinical application.

Aim. To assess the efficacy, optimal dosage, and safety of a 1:7 remimazolam-propofol combination versus propofol alone for sedation in upper endoscopy procedures.

Methods. In this randomized study, 40 patients scheduled for fibrogastroduodenoscopy were divided into two groups. Group RP (n = 20) received a Remimazolam and Propofol combination, with initial dosages of 0.1 mg/kg Remimazolam and 0.7 mg/kg Propofol, adhering to a 1:7 ratio. Group P (n = 20) was administered Propofol only, starting at 1.5-2 mg/kg. Additional doses were given as necessary to maintain deep sedation (MOAA/S < 1). The study monitored and recorded the sedation's effectiveness, patients' recovery time, side effects, and satisfaction levels of patients, endoscopists, and anaesthesiologists, using a 4-level satisfaction score.

Results. In the RP group, the average Propofol dose was significantly lower, at 0.86 mg/kg, compared to 2.47 mg/kg in the P group. The total doses in the RP group were 0.11 mg/kg for Remimazolam and 0.86 mg/kg for Propofol, maintaining a 1:7.5 ratio.

Initial sedation (within the first 10 minutes) was deeper in the RP group, as evidenced by 80% of RP patients achieving MOAA/S scores < 1 at 10 minutes, compared to 44.8% in the P group (p-value p = 0.020).

The time to achieve MOAA/S < 1 was the same in both groups, averaging 1 minute after administering the full drug dose.

Statistically significant heart rate increases were noted at 5 minutes in the RP group, alongside trends towards greater overall hemodynamic stability. Endoscopists and anaesthesiologists showed a higher preference for the sedation quality in the RP group, with 85% of anaesthesiologists in this group reporting very high satisfaction, compared to 62% in the P group.

Conclusion. Combining Remimazolam with Propofol enhances the safety and effectiveness of sedation in endoscopic procedures. This method effectively balances deep sedation with high satisfaction rates from endoscopists and anaesthesiologists, without causing major hemodynamic shifts.

Acknowledgements. No conflicts of interest.

Benefits of the ERAS programme in terms of patients' quality of life due to elective total hip arthroplasty

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Background. A combination of measures described in the aspects of the ERAS can improve clinical outcomes, reduce patients' length of stay, discomfort, and pain levels.

Aim. Investigate the effects of the ERAS programme on patient mobilization, postoperative pain, and length of stay.

Methods. A prospective, randomized study is conducted at the Hospital of Traumatology and Orthopaedics from March 2023. Currently, 58 patients are enrolled.

Study group (SG) patients before surgery are trained to walk with crutches and a frame. Patients receive carbohydrate drinks. Patients are warmed 30 minutes before surgery and urinary catheters are not inserted. Spinal anaesthesia with *hyperbaric Prilocaine* is performed. Before closing the wound, the joint is rinsed with antibacterial saline solutions. In the evening after the surgery, patients are verticalized and are trying to walk. Patients receive LMWH continuing with *Aspirin* orally.

Patients in the control group (CG) receive spinal anaesthesia with *Bupivacaine*. Saline is used for rinsing the joint. Patients receive LMWH continuing with *Rivaroxaban* orally.

Patients' pain threshold is evaluated with a Numerical Rating Scale (NRS) before surgery, the first day after surgery, on the day of discharge and 6 weeks after surgery.

Patients are discharged on the day they can move on a flat surface and upstairs.

Results. Results show statistically significant differences between the groups in pain intensity 4 hours after surgery and on the day at discharge (Table 1). Total morphine consumption after the operation CG/SG median 20 (IQR = 20)/10 (IQR = 20), $p = 0.185$. Length of stay between groups CG/SG M. 4.17 (SD = 1.07)/3.94 (SD = 1.349), $p = 0.365$.

	Study group	Control group	p-value
Pain intensity 4 h after surgery (NRS), mean (SD)	5.61 (2.14)	3.68 (2.36)	0.012
Pain intensity at discharge (NRS), mean (SD)	1.5 (1.24)	0.63 (0.76)	0.01

Conclusion. Currently, less pain severity is observed in the study group 4 hours after surgery and on the day of discharge from the hospital. There are features with positive dynamics of other data of the study group patients.

Acknowledgements. No conflict of interest regarding topic of the study.

Self-administered pre-anaesthetic questionnaire versus personal interview. Do patient responses to preoperative health questions differ?

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Background. Preoperative assessments by anaesthetists are integral to evaluating surgical risks and clinical optimization.

Aim. This study examines the reliability of patient-administered questionnaires for ASA physical status, data accuracy, and patient acceptability in comparison to traditional face-to-face assessments at the Hospital of Traumatology and Orthopaedics.

Methods. The study was conducted at the outpatient department of the Hospital of Traumatology and Orthopaedics between September and November 2023. We utilized a newly developed Pre-Anaesthetic Questionnaire, created by the Ministry of Health of the Republic of Latvia in 2023. We enrolled 165 patients, aged 18 and older, scheduled for elective surgery. After questionnaire completion, patients were assessed by an anaesthetist. Data included accuracy in identifying key medical conditions (antihypertensive medication use, anticoagulants, and diabetes history) through test-retest analysis, ASA physical status inter-rater comparison and patient value and burden assessment.

Results. 91% of patients found the questions easily answerable, with 14% experiencing difficulties due to language barrier or visual impairment. Key question reliability, as measured by Cronbach's alpha (0.85), demonstrated strong internal consistency when evaluating antihypertensive medication use, anticoagulants use and diabetes history, compared to face-to-face assessments. Among patients assessed, 13% (n = 22) were ASA-1, 65% (n = 107) ASA-2 and 22% (n = 36) ASA-3. In 65% (n = 108) cases, agreement was found between questionnaire-derived ASA scores and anaesthetist assessments. However, in 11% of instances (n = 18), the questionnaire underestimated ASA scores, mainly due to diabetes history. For patients categorized as ASA-3 by anaesthetists, the questionnaire accurately identified 50%, while achieving a 92% accuracy in excluding non-ASA-3 patients.

Conclusion. Our findings suggest that the self-administered Pre-Anaesthetic Questionnaire, while reliable and consistent, may benefit from refinement, particularly in cases where it underestimates ASA scores.

Acknowledgements. All authors declare no conflict of interest associated with this research, and no external funding has been received for the study.

Diagnostic accuracy in acute abdominal pain: an analysis of emergency medical services and emergency room evaluation disparities

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Background. Acute abdominal pain (AAP) – pain of a nontraumatic origin lasting from several hours to 5–7 days, represents one of the foremost reasons patients seek urgent medical help – literature suggests ~10% of all cases. Precise evaluation is challenging with literature indicating misdiagnosis rates of about 31% for AAP in the prehospital setting and 7.1% in the ER, raising concerns about the AAP diagnoses accuracy in Latvia.

Aim. The aim of this study was to compare the accuracy of diagnoses for AAP in the prehospital stage and in the ER and seek for most misdiagnosed conditions.

Methods. This retrospective cohort study, conducted in October 2023, summarizes data about all patients admitted to the Pauls Stradiņš Clinical University Hospital by EMS. We compared diagnoses provided by EMS medical professionals and EM doctors with discharge diagnoses. Microsoft Excel was used for data storage. Statistical analysis was performed using *IBM SPSS*.

Results. During October 2023 a total of 1195 patients were admitted to the PSCUH ER. 13.3% of patients (n = 159), aged from 19 to 95 years, presented with AAP, 40.3% (n = 64) were male. The median hospital stay time was 96 hours. EMS diagnoses in 48% of all AAP cases corresponded to discharge diagnoses, ER diagnoses – 78%. This difference was found to be statistically significant (p < 0.001). Age significantly affects diagnosis accuracy only in the EMS (p < 0.003). Chronic pancreatitis and UTI were the most commonly misdiagnosed conditions, with correct diagnoses in 20% and 42% of cases respectively. The most common discharge diagnosis was acute appendicitis – 13.2% (n = 21): accuracy in EMS – 70%, in ER – 95%.

Conclusion. AAP is a common reason for seeking medical assistance among Latvian citizens, frequently leading to prolonged hospitalization. EMS professionals demonstrated significantly lower accuracy in interpreting AAP, emphasizing the need for further investigation for an in-depth examination of the underlying reasons.

Acknowledgements. All authors declare no conflict of interest associated with this research, and no external funding has been received for the study.

Symptom checkers, artificial intelligence, and clinicians in emergency medical diagnosis: a prospective comparative study

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Background. Literature data suggests that about 89% of diagnostic errors are related to a human factor. To address this issue, specialized applications are designed to improve accurate patient complaint interpretation. The remaining question is whether it is reasonable to rely on these tools?

Aim. The primary objective of this study was to compare diagnostic accuracy among Symptom Checkers (SCs), Artificial Intelligence (AI) and medical professionals in Emergency Medical Service (EMS) and Emergency Room (ER).

Methods. This prospective cohort study, conducted in December 2023 at Pauls Stradiņš Clinical University Hospital, involved 50 randomly selected ER-admitted patients. 3 applications were used to evaluate patients' symptoms – 'Medical SC', 'Symptomate' and ChatGPT 3.5. If the patient underwent an imaging study, "ChatGPT+R" additionally analysed imaging reports. Suggested diagnoses matching discharge diagnoses were considered correct. Additionally, we requested AI's imaging study suggestions, comparing them with studies performed in ER. *Microsoft Excel* was used to store the data, and *IBM SPSS* – to conduct statistical analysis.

Results. From 50 patients aged 20–90 years, 50% were male. EM clinicians demonstrated an 88% (n = 44) diagnostic alignment with discharge diagnoses, with no statistically significant difference observed when compared to other results (p > 0.05). 'Medical SC', 'ChatGPT' and 'ChatGPT+R' diagnostic accuracy compared to EMS professionals was 60% (n = 30; p = 0.035), 66% (n = 33, p < 0.01) and 78% (n = 39, p = 0.036) respectively compared to 58% (n = 29). 'Symptomate' diagnoses were correct in 56% of cases (n = 26). There were no statistically significant links between age, gender, reported symptoms, and diagnostic accuracy. Discharge diagnoses were considerably variable – the most common were atrial fibrillation, nephrolithiasis, acute cholecystitis. ChatGPT accurately suggested required imaging studies in 72% of cases.

Conclusion. The study revealed no statistically significant differences in diagnostic accuracy between ER professionals and artificial programmes. In the prehospital stage, AI proved to be slightly more accurate than EMS professionals. Results emphasize the potential of AI as a supplementary tool to assist medical professionals.

Acknowledgements. All authors declare no conflict of interest associated with this research, and no external funding has been received for the study.

Knowledge and perception of medical students about the speciality of anaesthesiology in Latvia

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Background The development of medical students' perceptions of different medical specialities is based on many factors and influences their career choices. It is essential that medical students are well informed and understand the importance, opportunities and potential impact of the speciality of anaesthesiology on patients and the healthcare system in Latvia.

Aim. The aim of this study is to investigate the knowledge, attitude and perception of medical students about the speciality of anaesthesiology in Latvia. The results of the research will make it possible to understand what are the current views of students about the speciality of anaesthesiology, whether there are any intellectual or emotional barriers that limit students' interest in this speciality, as well as what steps can be taken to promote better understanding and awareness of anaesthesiology.

Methods. Cross-sectional, quantitative, non-experimental. Research instrument: survey questionnaire. The questionnaire can be filled out in Latvian, online on the Facebook page via Google Forms. Sixty medical students were surveyed. All participants received the same survey instrument, which employed a 5-point Rating Scale to rate the appropriateness of several descriptive terms as they apply to anaesthesiology.

Results. The primary source of information about anaesthesiology for the students was their university course. The basic knowledge of where anaesthesiologists work in Latvia varied significantly, ranging from being highly accurate in certain areas to notably lacking in others. Overall, 86.3% of the students expressed an interest in learning more about anaesthesiology (17.6% were very interested, and 68.6% were somewhat interested), while 13.7% either did not respond or reported no interest. When asked in which year they would be most interested in learning about anaesthesiology, the most common response was the fourth year. Mandatory rotations and practical classes were the preferred methods for learning more about anaesthesiology.

Conclusion. Our survey reveals that medical students in Latvia possess a reasonable general knowledge of anaesthesiology. They also hold overall positive perceptions of anaesthesiologists' financial compensation and relative workload. The majority of the students reported an interest in learning more about anaesthesiology.

Influence of blood pressure, localization, and volume on outcomes in spontaneous intracerebral haemorrhage

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Background. Spontaneous intracerebral haemorrhage (ICH), presents a significant health challenge globally. The outcomes of patients with ICH are influenced by factors such as the location of the haemorrhage, volume, and blood pressure (BP) control. By examining these factors, we seek to gain an understanding of their influence on patient prognosis.

Aim. To analyse the relationship between BP, the localization and volume of ICH in patients, and its impact on outcomes.

Methods. We conducted a retrospective study at the Hospital of LUHS, Kaunas Clinics, of patient records treated in the Neurosurgery intensive care unit due to ICH between January 2019 and January 2020. The data from 101 patients who met the inclusion criteria were used for further analysis. We analysed demographics, BP and Glasgow Coma Scale (GCS) scores after admission to the intensive care unit (ICU), location and volume of ICH, days spent in the ICU and Glasgow Outcome Scale (GOS). Quantitative variables were described as mean with standard deviation (SD) or median and interquartile range (IQR). χ^2 , Spearman correlation and Mann-Whitney U tests were used for the comparison of data. Results were considered statistically significant when $p < 0.05$.

Results. The study involved 101 patients, 50 of them were males (49.5%) and 51 were females (50.5%). The age mean was 65.91 (SD = 13.19) years. The median volume of ICH was 19.00 (IQR = 37.70) mL. The ICH localizations were: superficial lobar 7 (6.9%), deep lobar 33 (32.7%), basal ganglia 38 (37.6%), ventricular 4 (4%), pons 5 (5%), cerebellum 7 (6.9%), multiple localizations 7 (6.9%). 38 patients (37.6%) did not survive, while 63 patients (62.4%) did. We observed a statistically higher ICH volume in non-survivors 26.50 (IQR = 43.68) mL vs. survivors 19.00 (IQR = 37.70) mL ($p = 0.042$). There was no significant difference in BP after admission to the ICU between non-survivors (176.00 (IQR = 29) mmHg) and survivors (162.00 (IQR = 26) mmHg) ($p = 0.130$). The study showed a significantly lower GCS score after admission to ICU in the non-survivors group 4.00 (IQR = 2) and in comparison, in the survivors group 10.00 (IQR = 6) ($p = 0.001$). Survivors spent significantly longer time in ICU (5.00 (IQR = 5) days) than non-survivors (3.00 (IQR = 4) days) ($p = 0.018$). A statistically significant negative correlation was observed between ICH volume and GOS ($p = 0.002$, $r_s = -0.303$).

Conclusion. Greater haemorrhage volume and lower GCS scores are associated with worse patient outcomes.

Acknowledgements. We declare no conflicts of interest related to this research. This study was conducted without external funding.

Functional parameters change among pneumonia patients treated with breathing exercises and vibration therapy in the Intensive Care Unit

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Background. In recent years, there has been increasing interest from both the clinical and scientific communities in the early mobilization and rehabilitation of patients in the intensive care unit (ICU). Physiotherapy is employed to treat and prevent the side effects of extended immobility or sedation and to enhance respiratory function.

Aim. The aim of the current study was to evaluate the changes of functional conditions of patients with pneumonia in the acute stage using different physiotherapy methods.

Methods. In the research, 42 subjects (22 men and 20 women) were involved. A total of 180 physiotherapy procedures were performed. In the first group, breathing exercises and chest wall oscillation were applied, in the second group – only chest wall oscillation, in the third group was with breathing exercises. The study included patients who were hospitalized with bilateral pneumonia in the ICU at the Hospital of Lithuanian University of Health Sciences Kaunas Clinics. Before and after each procedure, the following were recorded: 1) ventilation parameters: FiO_2 – fraction of inspired oxygen (%), flow of oxygen (l/min); 2) heart rate (BPM); 3) arterial blood pressure (mmHg); 4) saturation – a clinical measure of the amount of oxygen in a patient's blood (%); 5) cough nature and productivity (dry cough or cough with secretion).

Results. In the group employing breathing exercises and chest wall oscillation, there was a decrease in the inspired oxygen gas mixture and oxygen flow, accompanied by an increase in saturation. In the chest wall oscillation group, oxygen flow decreased, and saturation increased. The number of individuals experiencing coughing with secretions decreased, while dry cough instances increased, along with an increase in those not exhibiting coughing. The group solely practising breathing exercises showed a transition from dry to wet cough during treatment, coupled with an increase in saturation. After treatment in all groups, the cough may disappear completely.

Conclusion. Respiratory physiotherapy, specifically breathing exercises, plays an important role in reducing and preventing respiratory complications for pneumonia patients treated in ICU. Observable changes in outcome measures were noted across all three groups, with the most significant improvements seen in the group that combined chest wall oscillation with breathing exercises.

Acknowledgements. No sources of funding were used to assist in the preparation of this abstract.

Effect of prone positioning's characteristics on oxygenation in mechanically ventilated COVID-19 patients with moderate and severe ARDS

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Background. Prone positioning is a well-known method for the reduction of ventilation-perfusion mismatch in patients with acute respiratory distress syndrome (ARDS). During the last four years SARS-CoV-2 induced ARDS was one of the most common causes of intensive care unit (ICU) patient mortality. Prone positioning of patients with severe ARDS was widely implemented, however, there still are debates on recommended parameters for it.

Aim. The aim of the study was to identify clinically the most beneficial characteristics of prone positioning in mechanically ventilated COVID-19 patients with moderate and severe ARDS and its effect on oxygenation.

Methods. The retrospective study was conducted in Pauls Stradiņš Clinical University Hospital analysing data of COVID-19 patients admitted to ICU from September 1st to December 31st, 2021. The time between intubation and first prone positioning, duration and number of prone positioning as well as the interval between those were evaluated. PaO₂ was measured prior to and after each prone. Dose-response relationship curve was used as a method to describe a relation between ΔPaO₂ and time in prone. *IBM SPSS* and *OriginPro* were used for statistical analysis.

Results. 123 patients were admitted to ICU, out of those 98 (79.6%) had moderate or severe ARDS and were prone positioned after intubation. The average time interval between intubation and first prone positioning was 13.7 h; however, no correlation was found between that time interval and 28-day mortality (correlation coefficient, $\rho = 0.02$). According to binned data, the dose-response relationship curve (adjusted $R^2 = 0.73$) 90% effectiveness of the first prone was achieved in 15 h. By performing the same analysis of ΔPaO₂ measured between 1st and 2nd prone as a function of time between those, it was concluded that the significant decline started after 12 h, although data is inconsistent. Due to the insufficient amount of data of 2nd and 3rd prone and pauses in between them, results are not considered to be relevant.

Conclusion. From our study, the minimal effective time for first prone positioning was 15 hours, after which the additional benefits were not observed. The decision to apply second prone positioning should be made during the first 12 hours, however, for correct analysis of the effects of prone positioning robust and controlled study is necessary.

Acknowledgements. The authors declare the absence of a conflict of interest.

Assessment of PEEP values by electrical impedance tomography and its effect on oxygenation in mechanically ventilated ARDS patients: a pilot study

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Background. Acute respiratory distress syndrome (ARDS) remains an important mortality and morbidity cause for patients receiving mechanical lung ventilation. A lung protective ventilation strategy with low tidal volume and higher positive end-expiratory pressure (PEEP) is implemented worldwide in intensive care units (ICU). However, the concept of 'higher PEEP' is still uncertain. The demand for new technologies for optimizing ventilation parameters is increasing. Electrical bioimpedance tomography (EIT) is one of the non-invasive, radiation-free methods providing optimisation of ventilation parameters in ARDS patients.

Aim. The aim of the pilot study was to identify the optimal PEEP values using EIT in ARDS patients, to identify the effect of these values on oxygenation and to compare the measured PEEP with empirically set PEEP values by clinicians.

Methods. PEEP titration was provided using EIT Timpel[®] and the optimal PEEP causing the lowest possible hyperdistention and collapse of lung alveoli was chosen. That value was then compared with the PEEP value set by the clinician. The change of PaO₂/FiO₂ relationship before and 2 h after manoeuvre was measured. The statistical data analysis was performed using *IBM SPSS* software.

Results. 11 patients of Pauls Stradiņš Clinical University's hospital Intensive Care Unit with mild to severe ARDS receiving mechanical ventilation were admitted to this pilot study. The median PEEP value set by the clinician was lower (8 cmH₂O) compared to the PEEP value determined by EIT (9.5 cmH₂O), which appeared to be statistically significant ($p = 0.012$). The average PaO₂/FiO₂ relationship prior to PEEP titration was 120, which improved by 38.33% 2 h after PEEP titration resulting in 167 and showing a statistically significant increase compared to initial PaO₂/FiO₂ levels ($p = 0.016$).

Conclusion. This pilot study shows that clinicians tend to choose lower PEEP values compared to PEEP values determined by EIT, which are associated with higher PaO₂/FiO₂ ratios. Method should be implemented in clinical practice, however for more accurate results larger study is necessary.

Acknowledgements. There is no conflict of interest, no funding was received for this study.

BASIC MEDICAL SCIENCE

Development of *in vitro* assay for comparing wound dressings in their ability to limit bacterial growth and ensure sterility

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Background. Human skin wounds are easily exposed to bacteria and are often contaminated, which can lead to an infection, especially if the bacteria can form a biofilm. The immune system's attack against bacteria will damage also the surrounding tissue, which prolongs the wound healing time. While the administration of systemic antibiotics has been widely used to prevent or treat wound infections, the rise of antimicrobial resistance forces to look for alternatives like advanced wound dressings with auxiliary antimicrobial properties.

Aim. The overall aim was to predict the capacity of different wound dressings to limit the number of infecting (free and viable) bacteria in the wound site. The objectives of the current study were two-fold: i) to develop an *in vitro* assay for assessing the antibacterial activity of wound dressings and ii) to compare existing and novel wound dressings in their ability to limit bacterial growth in wound-site mimicking assay.

Methods. Novel wound dressings with auxiliary antibacterial activity were prepared by electrospinning hydrophobic polymer solutions with selected antimicrobial agent (antibiotic or antimicrobial peptide). For comparison the existing antibacterial wound dressings were used: Bactigras (0.5% chlorhexidine); Suprasorb X+PHMB (0.3% polyhexamethylene biguanide); Sorbact Compress (activity through binding of pathogens); Aquacel Ag extra (ionic silver, benzethonium chloride, EDTA); Atrauman Ag (silver). In the developed assay bacteria were inoculated into 24-well plates at different initial concentrations (CFU/mL). Wound dressings (cut in 1 × 1 cm²) were placed into the wells with bacteria and incubated for 24 h at 37 °C. The growth inhibition and/or killing of bacteria was assessed. In addition, wound dressings were rinsed and placed into new growth media to assess the preserved sterility.

Results. When comparing the sterility of the dressings after exposure to bacteria Suprasorb and Bactigras dressings performed the best. Furthermore, Suprasorb dressing was capable of killing more than 10⁸ CFU/mL, while some tested commercial dressings were not able to control even the lowest tested contamination level (10³ CFU/mL). Novel wound dressings performed well and were able to limit the contamination (10⁵–10⁷ CFU/mL) and remained sterile.

Conclusion. The developed assay allows fast and resource-economic comparison of different wound dressings. It revealed drastic differences that can guide clinicians in choosing between them in the clinical setting.

Acknowledgements. Research has been funded by the Estonian Research Council project PRG1507. The authors of the study have co-founded the University of Tartu spin-off company EsaDres which is developing wound dressings preparation technology for hospital use.

Effect of resveratrol on the function of rat heart mitochondria

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Background. Resveratrol is a bioactive compound that directly or indirectly affects mitochondrial functions. It can both stimulate and inhibit mitochondrial functions. The hormetic (cytoprotective or cytotoxic) effects of resveratrol are due to the different concentrations of resveratrol used in *in vitro* and *in vivo* experiments.

Aim. To evaluate the effect of resveratrol on the function of rat heart mitochondria.

Methods. Mitochondria from rat hearts were isolated by differential centrifugation. Protein quantity was determined by the biuret method. The mitochondrial respiration (oxygen consumption) rates were measured using the high-resolution respirometry system Oxygraph-2k.

Results. Resveratrol in the concentration range of 10–150 μM had no effect on the leak state of mitochondria oxidizing NAD-dependent substrate pyruvate + malate. However, higher concentrations of resveratrol (200–300 μM) resulted in a statistically significant increase in the rate of the leak state. Moreover, the effect of resveratrol (50 μM to 150 μM) on the rate of oxidative phosphorylation (State3) was investigated. In mitochondria oxidizing pyruvate + malate 50 μM of resveratrol inhibited the State3 rate by 53%, 100 μM – by 63%, and 150 – by 73% respectively.

Conclusions.

1. Resveratrol (10–150 μM) had no statistically significant effect on the leak state respiration rate of rat heart mitochondria oxidizing the substrates of complex C(I). Higher concentrations of resveratrol (200–300 μM) had a statistically significant increase in the leak state respiration rate.

2. The effect of resveratrol on the rate of the State3 was concentration-dependent. Resveratrol (10 μM and 25 μM) had no statistically significant effect on the rate of the State3 with either the C(I) substrates. Resveratrol (50 μM to 150 μM) statistically significantly inhibited the State 3 respiration rate (oxidative phosphorylation) in rat heart mitochondria oxidizing the substrates of complex C(I).

High endothelial venules in allergic and non-allergic inflammation

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Background. High endothelial venules (HEVs) are specialized blood vessels that support the migration of lymphocytes from the bloodstream into lymph nodes. FasL expressing ectopic HEVs, can be formed in mammalian organs affected by inflammation and cancer. It is known that Fas induces apoptosis through a complex caspase cascade. Dermal filler-related granulomas are non-allergic reactions and occur 3–24 months after filling injections. Eosinophilic appendicitis is linked to local allergic reactions in the appendix.

Aim. The aim of the current study was to investigate the formation of the HEVs during allergic and non-allergic inflammatory disorders.

Methods. Six female patients with palpable subcutaneous nodules were recruited retrospectively for this study. They had visited the Clinic of Aesthetic Medicine complaining of nodules in the orofacial region for 3 to 6 months after facial cosmetic procedures by injections of autologous fat. In all cases, the nodules were excised and sent for histopathological examination. Likewise, this study included 4 patients who underwent an appendectomy procedure and eosinophilic appendicitis was confirmed by histopathology. Samples of tissues were stained with haematoxylin-eosin, PAS stain and immunostained with antibodies against CD68, CD4 and CD31.

Results. In eosinophilic appendicitis, histopathologic examination revealed intense eosinophilic infiltration and oedema in the serosa and muscular layer of the appendix. Apoptotic lymphocytes were often seen inside HEV cells. Moreover, not only macrophages, antigen-presenting cells, and trafficking B-lymphocytes, but also activated CD4-positive T-lymphocytes populate the marginal zone of the lymphatic nodules. Data collected from patients with subcutaneous nodules showed granulomatous inflammatory infiltrate formed by recruitment of CD68 foamy macrophages, surrounding microcysts, and less abundant CD4 positive T-lymphocytes. HEV cells are almost devoid of apoptotic bodies. At the same time, histologic examination of the infiltrate has revealed interstitial apoptotic CD4-positive T-lymphocytes.

Conclusion. CD4+ T-cells play a central role in the initiation and maintenance of the allergic reaction. We hypothesize that despite the fact, that HEVs with Fas-L expression form a selective border that restricts the entrance of circulating activated lymphocytes (CAL), the allergen-driven T-cell activation occurs mostly in the lymphoid organs by the IgE-mediated allergen presentation with the involvement of B cells as antigen-presenting cells. This results in the release of inflammatory mediators and in high levels of CAL with their increased immigration through HEVs and apoptosis. Granulomatous inflammation is a local immune response to tissue injury with low levels of CAL, which rarely undergo apoptosis during HEV transmigration.

Acknowledgements. Authors have no conflict of interest to declare.

Does mutation in the signal transducer and activator of the transcription 4 gene affect LSCC tumour size?

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Background. Laryngeal squamous cell carcinoma (LSCC) is one of the most common head and neck cancers with a low survival rate (overall 5-year survival of 50%–80%) due to late diagnosis and frequent recurrence. The exact pathogenesis of LSCC is not yet clear, studies have shown that alcohol consumption, smoking, and tobacco chewing increase the risk of developing this illness. Common genetic alterations occur in LSCC, such as inactivating tumour suppressor genes and activating proto-oncogenes, point mutations, promoter methylation, and gene amplifications. During the multistep process of tumorigenesis, cells lose their ability to repair DNA damage, regulate the cell cycle, and apoptosis. The signal transducer and activator of transcription 4 (STAT4) contribute to tumorigenesis by closely associating with growth factor signalling, apoptosis, and angiogenesis. Since the protein produced by *STAT4* plays a central role in the immune response, mutations in the *STAT4* can lead to improper signalling, which can result in LSCC development. Given all these considerations, we investigated the potential association between *STAT4* gene polymorphism and tumour size of the LSCC patients.

Aim. To determine the connection between *STAT4* rs10181656 gene polymorphism and the tumour size of the laryngeal squamous cell carcinoma.

Methods. The study included 120 patients with the LSCC and 220 healthy individuals. DNA was extracted using the salting-out method. Genotypes of the *STAT4* rs10181656 polymorphism were determined by using RT-PCR. Results were statistically calculated using *IBM SPSS Statistics 29.0.1.0* software.

Results. The group of LSCC patients was divided into four subgroups according to tumour size: T1, T2, T3, and T4. The *STAT4* rs10181656 G allele was statistically significantly more frequent in the T4 subgroup than in the control group (36.4% vs. 20.9%, $p = 0.019$, respectively). Moreover, the *STAT4* rs10181656 GG genotype is associated with 4.6-fold increased odds of developing LSCC T4 under the codominant model (OR = 4.600, 95% CI: 1.073–19.724, $p = 0.040$). Each *STAT4* rs10181656 G allele increases the odds of developing the LSCC T4 by 2.1-fold under the additive model (OR = 2.140, 95% CI: 1.106–4.142, $p = 0.024$).

Conclusion. *STAT4* rs10181656 is related to extended tumour size in laryngeal squamous cell carcinoma.

Acknowledgements. This study was funded by the Research Council of Lithuania, agreement No P-SV-23-147.

Exploring the impact of tooth brushing frequency on saliva microbiota composition

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Background. The composition and diversity of the oral microbiota are influenced by various factors, among which is oral hygiene, including the frequency of tooth brushing. Exploring the connection between the microbiota in saliva and the frequency of tooth brushing can provide valuable insights into the influence of oral hygiene habits on oral health.

Aim. The objective of this study was to examine the relationship between the frequency of tooth brushing and the composition of saliva microbiota.

Methods. Saliva samples and survey data were collected from 35 patients with salivary flow disorders. The human oral metagenomic DNA from saliva samples was isolated and the metagenome sequencing of the V3–V4 regions of 16S rRNA was conducted by Novogene Company (UK).

Results. This study involved 35 participants, the majority being females 85.7% (n = 30). The mean age was 61 (SD 15.31) years. Patients were assigned into two groups based on tooth brushing frequency: once per day (abbr. OPD) and twice per day (TPD). The majority (n = 25; 71.4%) brushed twice daily, while a smaller portion (n = 10; 28.6%) brushed once daily. Metagenome sequencing data revealed that the saliva microbiota composition in the study subjects was predominantly characterised by the phyla *Firmicutes*, *Bacteroidota*, *Proteobacteria* and *Actinobacteria*. The abundance of phyla *Firmicutes* was relatively higher in the OPD group (49.82%) compared to the TPD group (37.56%), whereas *Bacteroidota* and *Proteobacteria* were relatively more abundant in the TPD group. The saliva microbiota of the research participants was dominated by the genera *Streptococcus*, *Prevotella_7* and *Rothia*. At the genera level, *Streptococcus* was prevalent across both groups, with the OPD group showing particularly high dominance. The genera *Rothia* and *Neisseria* were relatively more abundant in the OPD group, while *Prevotella_7*, *Veillonella*, *Haemophilus* were associated with the TPD group.

Conclusion. In summary, this study suggests that the frequency of tooth brushing may influence the proportional composition of saliva microbiota. The abundance of *Streptococcus* in saliva was increased among participants who brushed their teeth once per day.

A β -related hexapeptides can be used for aggregate dissolution therapy in Alzheimer's disease

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Background. Alzheimer's disease (AD) is a widespread neurodegenerative disease that affects more than 50 million people. Currently, there is no effective treatment that delays the onset or stops the progress of AD. The abnormal extracellular accumulation of amyloid- β peptides (A β), in the form of oligomers or senile plaques is a key neuropathological hallmark of AD. It has been discovered that the removal of toxic peptide oligomers could be an innovative option for the treatment of dementia. Furthermore, it was first found in Italian and Islandic families that N-terminal mutations of A β at position 2 lead to protection of heterozygote carriers by reducing the aggregation propensity.

Aim. To investigate the efficiency of A β -related short hexa-D-peptides to influence the accumulation of human A β in an APP-transgenic mouse model.

Methods. The models used in this study were male APPPS1-21 mice (n = 48). We used the six D-hexamer-peptides: ¹⁻⁶mA β ^{A2V}, ¹⁻⁶hA β ^{A2V}, ¹⁻⁶mA β ^{A2T}, ¹⁻⁶hA β ^{A2T}, mouse and human ¹⁻⁶A β . Intracerebroventricular surgery with mini-osmotic pumps was performed, to infuse the peptides for 42 days (16 nmol/day) and artificial cerebrospinal fluid (control). At the age of 100 days, brains were collected for immunohistological analysis. The quantification of immunohistochemical data was performed using the AxioVision software with systematic protocols according to our previously published method (Upīte J *et al.* 2021).

Results. We analysed the total number of cortical A β plaques in three size-related groups comparing the hemispheres (reference point RP distance approach). Detailed size distribution analyses revealed that ¹⁻⁶mA β ^{A2V} peptide significantly decreased the mean number of plaques by size small (p = 0.02) and medium (p = 0.02) in the ipsilateral hemisphere according to category approach RP in distance group 5. A significant difference was observed in the same category approach, in distance group 1 comparing ¹⁻⁶hA β ^{A2T} treatment vs. control group in the contralateral hemisphere regarding the number of plaques by medium size group (p = 0.02). Moreover, no significant differences were observed between groups of large-sized plaques according to the category approach RP in any of the distances.

Conclusion. The obtained results indicate the positive impact of administered peptides (¹⁻⁶mA β ^{A2V} and ¹⁻⁶hA β ^{A2T}) in reducing the number of plaques in specific size groups in APPPS1-21 mice. This could have potentially beneficial effects on some symptoms in early stages of AD.

Acknowledgements. This work was supported by the Joint Programme in Neurodegenerative Diseases (JPND) consortium project PETABC (Latvia funding LZP - ES RTD/2020/26).

Sensitization profiles to house dust mite and storage dust mite allergens in atopic airway diseases: a pilot study

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Background. The problem is of outstanding importance since the properties of house dust mite (HDM) sensitization profile in atopic airway diseases have not been entirely understood yet. HDM are one of the most common sources of inhalable allergens relevant to atopic airway diseases (allergic asthma (AA) and allergic rhinitis (AR)). Although Der p 1, Der p 2 and Der f 1, Der f 2, mainly cause sensitization, recent studies show that the Der p 23 component is clinically relevant in asthmatic patients. Incidentally, sensitization to the storage dust mite (SDM) may also induce asthma and rhinitis symptoms in sensitized individuals.

Aim. The aim of the current study was to assess the molecular profiles of HDM and SDM allergens in sensitized patients with atopic airway diseases.

Methods. 44 adult patients aged 20 to 56 years with AR and/or AA were enrolled in the study. They were tested for sIgE in blood serum using the *in vitro* diagnostic system 'Alex2' (Macro Array Diagnostics GmbH, Austria).

Results. 67% of the studied subjects, regardless of their disease, were sensitized to *D. pteronyssinus* and 60% to *D. farinae* allergens. In most cases, patients were sensitized to the main components: Der f 2 (59%), Der p 2 (56%), Der p 1 (42%), Der f 1 (39%). 38% of subjects were sensitized to the Der p 23 component, more often in patients with AR than AA+AR. On the other hand, the average of sIgE values against Der p 23 was higher in patients with AA+AR than in patients with AR. Additionally, Der p 23-sensitized patients reported a higher prevalence of double-sensitization to Der p 1 and Der p 2 than patients with missing sensitization to Der p 23. sIgE against Lep d 2 was found in 73% of subjects sensitized to HMD allergens. The sIgE values determined against this allergen correlated strongly with the sIgE values determined against components of Der f 2 and Der p 2 ($r = 0.935; 0.882; p < 0.001$).

Conclusion. More than 65% of subjects with atopic airway diseases are sensitized to HDM allergens, mostly Der f 2 and Der p 2; most of them are also sensitized to the SDM allergen Lep d 2. This suggests that when assessing sensitization to HDM, choosing palettes with a broader spectrum of the HDM and SDM allergen components is appropriate.

Acknowledgements. We thank the manufacturer for kindly providing free 'Alex2' test kits.

Genomic insights into pituitary adenomas: examining the Ki-67 labelling index and the role of *SSTR2*, *SSTR5*, *AIP* polymorphisms

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Background. Pituitary adenomas (PA) represent primary tumours occurring in the pituitary gland and stand as one of the most prevalent intracranial neoplasms (Herman et al., 1990). The pathogenesis of PA is still not sufficiently understood. Although many PAs are considered benign monoclonal proliferation (Molitch et al., 2017), their clinical spectrum is diverse, including hormone hypersecretion and varying degrees of invasiveness, suggesting multiple steps and mechanisms as well as molecular abnormalities in PA tumourigenesis and gene regulation (Trouillas et al., 2020; Vandeva et al., 2010). In this study, our focus extended to unravelling the complexities of PA tumourigenesis and gene regulation.

Aim. The aim of the current study was to examine Ki-67 labelling index alongside with the associations between *SSTR2* rs2236750, *SSTR5* rs34037914, and *AIP* rs267606574 polymorphisms with PA.

Methods. The study involved 128 patients with PA and 272 healthy controls. DNA samples were extracted from peripheral blood leukocytes and purified. Genotyping was performed in real-time using a polymerase chain reaction. The results were analysed using binary logistic regression. The data obtained were systematized using the computer programme *IBM SPSS Statistics*.

Results. Binary logistic regression analysis revealed that the *SSTR2* rs2236750 AG genotype was associated with an approximately 1.6-fold increased odds of pituitary adenoma (PA) occurrence in both the codominant and overdominant genetic models (OR = 1.602; 95% CI: 1.015–2.527; p = 0.043; OR = 1.550; 95% CI: 1.013–2.373; p = 0.044, respectively). Nevertheless, no statistically significant associations were observed between the Ki-67 labelling index, *SSTR5* rs34037914, *AIP* rs267606574, and PA.

Conclusion. In conclusion, our study highlights the significant association between the *SSTR2* rs2236750 AG genotype and an elevated risk of pituitary adenomas. This underscores the relevance of genetic factors, particularly *SSTR2* polymorphisms, in the susceptibility to PA. These findings contribute to a better understanding of the genetic landscape influencing PA development, with potential implications for future diagnostic and therapeutic approaches.

IL-1 β rs1143623 associations with multiple sclerosis occurrence in Lithuania

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Background. Multiple sclerosis (MS) is a chronic inflammatory autoimmune disease that damages the central nervous system (CNS). MS is the most common CNS disorder in young adults, with symptoms appearing between the ages of 20 and 40. Although the aetiology and pathogenesis of the disease are not precisely known, MS is a multifactorial disorder that depends on genetic and environmental factors.

Leukocyte invasion of the CNS parenchyma and disruption of the blood-brain barrier integrity are hallmarks of multiple sclerosis. Lymphocytes and myeloid cells are key mediators of tissue damage, delivering cytokines and thereby inciting the inflammatory cascade. *IL-1 β* is the primary mediator of the inflammatory process in the CNS and increases synaptic transmission which causes neuronal damage (Figure 1). However, the molecular mechanisms of inflammation-induced neurodegeneration are still largely unclear.

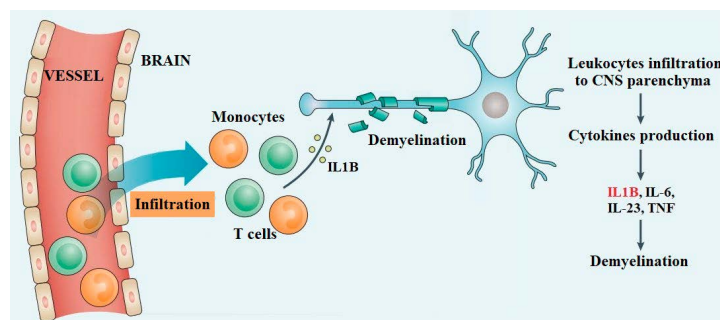


Figure 1. Neuroinflammation process and IL1B associations with MS

Aim. The current study aimed to determine whether rs1143623 polymorphism of *IL-1 β* confers susceptibility to MS in the Lithuanian population.

Methods. Altogether, 500 patients were enrolled in the study (250 patients with MS and 250 healthy controls as a reference group). The 2017 diagnostic criteria, which included positive oligoclonal bands, typical demyelinating lesions found in brain/spinal cord MRI scans (per the MAGNIMS criteria), and clinical symptoms/relapse, have been used to confirm the results of MS assessments for the patients. Blood samples were collected, and the DNA salting-out method was used for DNA extraction from peripheral venous blood. Genotyping of *IL-1 β* rs1143623 was performed using real-time polymerase chain reaction.

Results. The analysis showed no statistically significant differences in the distribution of *IL-1 β* rs1143623 genotypes and alleles between patients with MS and the reference group. The binary logistic regression analysis also revealed no statistically significant results.

Conclusion. The *IL-1 β* rs1143623 was not associated with MS occurrence in the Lithuanian population.

Acknowledgment. I would like to express my sincerest gratitude to my supervisor Rasa Liutkeviciene for her invaluable guidance and support throughout the process of writing this paper. I would also like to acknowledge the valuable contributions of my co-authors, whose collaborative efforts and input greatly enhanced the content of this paper.

The expression of Na⁺-dependent glucose co-transporters in the epithelial cells of duodenum and terminal ileum in ostriches' chicken

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Background. In all living organisms the main energy source is glucose. Along intestine glucose absorption primarily occurs through sodium-dependent glucose co-transporters, where it is known that glucose is transported across the intestine's enterocytes membrane via a sodium-glucose co-transporter (SGLT1) located on the apical side of enterocytes, while on the basolateral membrane glucose transporter 2 (SGLT2) moves glucose out of the cell via facilitated diffusion. Besides these two transporters, the presence of small quantities of SGLT2 has been only recently detected in mammals' intestine, however up to now there is a lack of information about the presence of SGLT2 in avian intestine.

Aim. The aim of the present study was to study comparatively the expression of Na⁺-dependent glucose co-transporters SGLT1 and SGLT2 in duodenal and ileal epithelial cells of ostriches' chicken of different ages.

Methods. In the study 15 female African ostriches (*Struthio camelus var. domesticus*) were divided equally into three age groups – 1, 14 and 28 days old – five ostriches in each group. Samples were collected from the chicken' duodenum and terminal zone of ileum. Specimens 0.5–1.0 cm in diameter were fixed in 10% neutral buffered formalin solution for 48 hours at room temperature, dehydrated in tissue processor and embedded into paraffin according to standardized tissue histological procedure. 7 μm thick slices were cut, floated on Poly-L-Lysine-coated slides, deparaffinized with xylene and rehydrated in a graded series of ethanol. Immunohistochemical staining was carried out using polyclonal primary antibodies Rabbit anti-SGLT1 and Rabbit anti-SGLT2 (Abcam, UK) and the corresponding Immunohistochemistry kit (Abcam, UK) according to the manufacturer's guidelines.

Results. In all age groups staining for SGLT1 was detected in the brush border of enterocytes, being stronger in 28-day-old ostriches' intestinal epithelial cells. Additionally, in 14-day-old ostriches' moderate staining and in 28-day-old chicken' intestinal epithelium strong staining of goblet cells for SGLT1 was noted with stronger stained cells located in the terminal zone of ileum. Staining for SGLT2 was noted in the brush border of intestinal enterocytes, besides that the enterocyte cytoplasm and some of the goblet cells of 28-day-old chicken' intestinal epithelium occurred to be weakly stained.

Conclusion. Expression of both studied antibodies was noted to increase with chicken age. In the study novel finding about the expression of SGLT2 in ostriches' intestinal epithelium was presented.

Acknowledgements. The study was financed on basis of EEC performance agreement. The authors wish to thank Mrs. Mare Tamm for laboratory assistance.

CARDIOVASCULAR MEDICINE

Advanced feature set and classification model for heart sound signal analysis

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Background. Congenital heart defects are the important morbidity and mortality factors for several severe clinical conditions. This birth defect is detected and evaluated by experts using heart auscultation. However, despite the reported quite good agreement between the experts about the general diagnosis, there are no clearly described features or quantitative parameters which can be used for classification. Cardiologists are ‘looking for’ and subjectively grading the audibility of whooshing or swishing sounds heard during the heartbeat. The sought sounds indicate that blood is flowing abnormally across heart valves due to structural heart problems. Machine learning models trained with optimal feature sets should be capable of classifying phonocardiogram signals into ‘reflecting heart defect’ and ‘normal’ ones. By implementing such a classification model into mobile devices or cloud-based systems, we can realize rapid and robust screening of disorders of the mechanical function of the heart in the paediatric population could be realized.

Aim. To elaborate optimal phonocardiogram feature set and classification model to detect disorders of the mechanical function of the heart.

Methods. We used annotated phonocardiogram recordings of 1568 patients collected from paediatric population screening campaigns conducted in Northeast Brazil in July–August 2014 and June–July 2015, provided by Physionet’s open clinical database.

Convolutional neural network elaboration strategy, usually used for image classification or recognition, was applied for the classification of 2-dimensional arrays of time–frequency estimates of signal recording excerpts, constructed by means of continuous wavelet transform and special data pre-processing.

Results. 5-fold cross-validation of elaborated algorithm performance showed an accuracy of 0.777 ± 0.03 . The accuracy of the algorithm tested with ‘never seen’ data was 0.671. The algorithm was evaluated in the Physionet 2022 challenge and ranked in 23rd place out of 44 participants by classification performance. At the same time, the algorithm required comparatively low computational resources.

Conclusion. Due to comparatively low required computational resources and good classification accuracy, the elaborated algorithm is suitable for deployment into mobile diagnostic devices or cloud-based systems for paediatric populational screening.

Increased risk of acute myocardial infarction after SARS-CoV-19 infection

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Background. SARS-CoV-2 is associated with an increased risk of arterial and venous thrombotic complications. The risk of developing myocardial infarction doubles after recovering from COVID-19 within 7 days.

Aim. The aim of this study is to establish a connection between the development of acute myocardial infarction after recovering from SARS-CoV-19.

Methods. An analysis of the medical histories of 34 patients who had experienced SARS-CoV-19-associated pneumonia in 2020 was conducted. These patients were divided into two groups: those without complications and those who developed acute myocardial infarction after recovering from SARS-CoV-19-associated COVID-19 pneumonia. The medical history data were analysed using the *EasyMedStat* system. Correlation analysis was performed between risk factors and the development of myocardial infarction after recovering from SARS-CoV-19-associated pneumonia.

Results. A total of 34 patients were examined, with a median age of 65.5 years. Acute myocardial infarction developed in 20% of those examined who had experienced SARS-CoV-2-associated pneumonia. The median time to the development of acute myocardial infarction was 18 months. In the group of patients who developed acute myocardial infarction after recovering from SARS-CoV-19-associated pneumonia, males predominated (71.43% vs. 28.57%). Correlation analysis revealed a connection between gender differences and acute myocardial infarction. A correlation was found between the percentage of lung involvement and the development of acute myocardial infarction. The median d-dimer level was 347.15 (IQR 694.93) in patients with acute myocardial infarction and 1.01 (IQR 353.44) in patients without complications. The median fibrinogen level in the acute myocardial infarction group was significantly higher than in the group without complications (4.93 vs. 3.95). Arterial hypertension was detected in 100% of patients with acute myocardial infarction, while in the group without complications, arterial hypertension was detected in 52%.

Conclusion. Recovering from SARS-CoV-19-associated pneumonia increases the risk of developing acute myocardial infarction. Advanced age and male gender are predictors of complications following SARS-CoV-19-associated pneumonia. Coexisting arterial hypertension increases the risk for developing acute myocardial infarction in patients with SARS-CoV-19-associated pneumonia. Elevated levels of D-dimer and CRP are predictors of acute myocardial infarction after recovering from SARS-CoV-19 pneumonia. A relationship between the percentage of lung involvement and the development of acute myocardial infarction has been identified.

Factors influencing the health literacy of patients with arterial hypertension

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Background. Arterial hypertension (AH) is the leading cause of cardiovascular disease and premature death worldwide. According to the World Health Organization, 1.28 billion adults in the world between the ages of 30 and 79 have high blood pressure. With the prevalence of non-communicable diseases, health literacy is considered particularly important, emphasizing the necessity for people to take greater responsibility for managing their health. Insufficient health literacy is associated with difficulties in understanding health information, limited knowledge of the disease and lower adherence to the use of medicines which ultimately worsens health, increases the risk of mortality, contributes to inadequate and inefficient use of health care, rising costs and health disparities.

Aim. To find out the health literacy of patients with arterial hypertension and factors affecting it – socio-demographic factors; factors related to the disease; to medication therapy; to knowledge of AH.

Methods. The study involved 115 patients with arterial hypertension between 01.11.2023 and 01.01.2024. Patients' health literacy was ascertained through a structured questionnaire containing a total of 60 questions. Of these, 16 questions consist of a translated Health Literacy Questionnaire (*HLS-EU-Q16, 16 items European Health Literacy Survey Questionnaire*) and 22 questions taken from the Hypertension Knowledge Level Scale. The obtained data was processed in the *MS Excel* programme.

Results. 54.3% of participants found sufficient health literacy, 26.7% experienced problematic and 19.0% – insufficient health literacy. Sufficient health literacy was observed more frequently in women (38.8%), patients with higher levels of education (24.1%), those living with a family (40.5%), patients suffering from AH from 11 to 20 years (16.4%) and patients with self-monitoring of arterial blood pressure at home (48.3%). Insufficient health literacy was more common in patients with a secondary level of special/ professional education (8.6%), and patients with an elevated daily blood pressure (stage 1 and stage 2 hypertension). Of all patients, 48.6% have a good knowledge of AH, 45.9% have an average knowledge and only 5.5% have poor knowledge of AH. Patients with sufficient health literacy were more likely to have a good knowledge about the disease (30.2%), while patients with insufficient health literacy were more likely to experience moderate (9.5%) or poor knowledge of hypertension (2.6%).

Conclusions. Most of the patients surveyed have sufficient health literacy. Significant factors that influence patients' health literacy are the level of education and self-control of arterial blood pressure at home.

Changes of mitochondrial respiratory pathways in immature rat heart tissue using Custodiol HTK, St. Thomas and del Nido cardioplegic solutions

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Background. Relatively subtle defects in the mitochondrial ATP-generating apparatus and oxidative phosphorylation affect cardiac function after cardioplegia.

Aim. The aim of this study was to investigate the mitochondrial respiratory pathway using Custodiol HTK, St. Thomas and del Nido cardioplegic solutions at moderate (1 h) and long ischemic period (3 h) time using immature rats' heart tissue.

Methods. 33 male Wistar albino rats (up to 1 month age) were used. A median sternotomy was performed. Cardioplegic solutions approximately 10 mL, were infused into the aorta. At the end of a 1-h and 3-h incubation period, the hearts were cut into small pieces, and transferred to homogenized solution. The homogenate was centrifuged two times: firstly for 5 min 1000g and secondly for 10 min 6800g. 3 experiments were performed without cardioplegic solution (CP0 group). For evaluation of moderate and long ischemic period 5 experiments were performed in each group: CP1 (St. Thomas), CP2 (Custodiol HTK), CP3 (del Nido).

Results. After 1 hour the highest mitochondrial oxygen consumption rate (OCR) was observed in CP3. A statistically significant difference was found between CP1 and CP3 groups ($p = 0.006$). Following the addition of the FCCP substrate, a statistically significant difference was found between CP1 and CP3 groups ($p = 0.001$), as well as between CP1 and CP0 ($p = 0.037$).

After 3 h, the highest mitochondrial OCR was observed in CP2. A statistically significant difference was found between CP1 and CP3 groups ($p = 0.020$) and CP1 and CP2 groups ($p = 0.003$). Following the addition of the FCCP substrate, statistically significant difference was found between CP1 and CP3 groups ($p = 0.027$). After evaluating the ratio between mitochondrial respiration OCR ATP-production coupled and basal respiration, significant differences were found between CP1 and CP3 ($p = 0.035$).

	CP0	CP1	CP2	CP3
1 hour				
Mit	20.76 [18.97–23.26]	8.48 [7.73–14.60]	17.18 [9.98–20.25]	27.81 [17.34–34.54]
FCCP	139.78 [67.24–252.70]	71.10 [49.67–84.42]	103.80 [81.25–149.81]	173.35 [145.96–252.84]
Ratio between ADP/Mit	4.84 [3.22–7.69]	6.49 [1.61–7.73]	3.58 [3.04–5.99]	4.64 [2.35–7.05]
3 hours				
Mit	20.76 [18.97–23.26]	11.50 [9.62–19.60]	30.79 [20.96–37.68]	24.03 [21.10–26.65]
FCCP	139.78 [67.24–252.70]	74.20 [38.25–83.15]	127.16 [39.69–173.65]	182.44 [92.58–212.03]
Ratio between ADP/Mit	4.84 [3.22–7.69]	1.26 [1.09–3.87]	2.82 [1.46–4.38]	5.22 [3.12–6.32]

Mit – mitochondrial basal respiration, FCCP – for maximal respiration, ADP/Mit – ratio between ATP-production coupled mitochondrial respiration and basal respiration.

Conclusion. Del Nido cardioplegic solution showed the best mitochondrial protection results under the conditions of short and long myocardial ischemia.

Acknowledgements. The author(s) declared no potential conflicts of interest.

Impact of oral whey protein nutritional supplement, rich in main minerals and vitamins, on nutritional status and physical performance of frail geriatric patients before elective cardiosurgery

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Background. Malnutrition in older age is an important risk factor for sarcopenia, frailty, morbidity and even mortality. Frail patients have higher surgical risk, especially in major surgical procedures, such as cardiosurgery.

Aim. The objective of this study was to evaluate the impact of oral protein supplements on nutritional status and physical performance before elective cardiac surgery in frail geriatric patients.

Methods. Patients undergoing elective cardiac surgery at Kauno Klinikos (Hospital of Lithuanian University of Health Sciences) who were 65 years old and over, frail (> 5 points on Edmonton's Frailty Scale), and malnourished (< 12 points on the MNA-SF Scale) were involved in the study. Approval of Lithuanian Bioethics Committee (approval N^oP1-BE-2-4/2020). Vitamin and mineral-rich oral whey protein supplement (created at LUHS together with commercial partner 'Kelmės pieninė', project No. 01.2.1-LVPA-K-856-02-0037) was given to the patients before the surgery. The dosage was 2 g/kg for ideal body mass. The changes in body composition, prealbumin level, homocysteine, vitamins B₁₂ and D, and physical performance were evaluated before and after supplement consumption. ANOVA, Wilcoxon test, and Spearman correlation were used for statistical analysis.

Results. 32 participants were included in the study (12 women), with a mean age of 70.5 (5.0) years. The supplement was used for ~6.5 days until surgery. Body composition results, as measured by BIA, showed that the sarcopenia index remained unchanged. Change in prealbumin level was correlated with duration of product use ($r = 0.439$, $p = 0.017$). Homocysteine concentration decreased from 19.3 (6.7) to 18.8 (6.7) $\mu\text{mol/L}$ ($p = 0.001$). Vitamin B₁₂ concentration increased from 393.69 (197.07) to 420.50 (196.8) pmol/L , and vitamin D – from 60.7 (26.8) to 65.5 (26.1) nmol/L ($p = 0.003$). Vitamin D concentration after product use was correlated with handgrip strength change ($r = 0.421$; $p = 0.026$). Physical performance was significantly improved after product use: handgrip strength increased from 30.9 (9.8) to 33.0 (10.2) kg ($p = 0.005$), 'Stand up and go' test time decreased from 12.9 (4.3) to 12.2 (5.0) s ($p = 0.006$), and gait speed increased from 0.509 (1.562) to 0.539 (1.303) m/s ($p = 0.002$).

Conclusion. Oral whey protein supplement, when used ~6.5 days before elective cardiac surgery, improved the nutritional status and physical performance of frail geriatric patients.

Acknowledgements. The study was partially funded by the Innovation agency project 'Development of an innovative food supplement for the elderly to prevent geriatric frailty syndrome and malnutrition (No. 01.2.1-LVPA-K-856-02-0037)' 2020–2023.

INTERNAL MEDICINE

Association of diet with faecal and serum inflammatory markers in patients with type 1 diabetes in Latvia

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Background. One of the environmental factors influencing the development of diabetes was identified as the microbiome, specifically the intestinal microbiota. Dysbiosis of the gut microbiota and systemic low-grade inflammation have been reported in T1D and are associated with the severity of the disease. Nutrition might play a role in maintaining intestinal health and reducing inflammation in T1D.

Aim. Our aim was to evaluate the relationship between dietary factors and inflammatory markers in faeces and serum in patients with T1D.

Methods. Patients with T1D and subjects without diabetes (control group) were included. They completed a food frequency questionnaire, 24-hour diet record and 3-day food diary. Participants had to mark the approximate frequency (times a day, week, month, year) of consumption of various products (different types of meat, vegetables, grains, fast food, drinks etc.). In a 24-hour record and 3-day diet diary, food weighting and evaluation of consumed amount with the help of a validated food portion size picture book was used. Serum C-reactive protein (CRP) and faecal calprotectin were measured in a certified clinical lab.

Results. 74 patients with T1D (38% (n = 28) male, 62% (n = 46) female) and 32 control subjects (41% (n = 13) male, 59% (n = 19) female) were included. The mean age was 45 (34.90–52.28) years in T1D; in the control group, 37 (31.65–44.56) years. Compared to recommendations, participants consumed insufficient amounts of complex carbohydrates, fibre, vegetables, fruits and fish in both groups. Consumption of fat was on average 10% higher than recommended. Median serum CRP level was higher in T1D group 0.90 (0.50–2.90) mg/L compared to control 0.50 (0.50–0.50) mg/L (p < 0.001). In patients with T1D, CRP levels were negatively correlated with total energy intake (rs = -0.29; p = 0.01), carbohydrate intake (rs = -0.29; p = 0.01), fat intake (rs = -0.29; p = 0.01), water intake (rs = -0.25; p = 0.03), intake of nuts and seeds (rs = -0.25; p = 0.03). Faecal calprotectin was inversely correlated with protein intake (r = -0.27; p = 0.03). In logistic regression analysis, the greatest effects on serum CRP were observed for the food group mushrooms (β = 0.24, p = 0.043), carbohydrates (β = -1.07, p = 0.025). Faecal calprotectin was affected by protein intake (β = 0.34, p = 0.005).

Conclusion. In T1D, lower energy, carbohydrate, fat and water intake is associated with higher serum CRP. This might be a consequence of insufficient nutrition due to the disease burden. Higher faecal calprotectin is associated with higher protein intake in the T1D group.

Acknowledgements. Project No. lzp-2020/1-0138 'Association between glucose variability, intestinal disorders and progression of diabetic nephropathy in type 1 diabetes patients'.

Predictive factors for the recurrence of *Clostridium difficile* infection

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Background. *Clostridium difficile* infection (CDI) is one of the most frequently identified health care-associated infection worldwide, causing numerous challenges in terms of patient and economic consequences.

Aim. The intent of this research is to assess possible risk factors contributing to the recurrence of CDI.

Methods. We retrospectively analysed a cohort of 71 adults diagnosed with CDI between 2018 and 2019, focusing on variables including demographics, comorbidities, clinical features, and history of prior antibiotic and glucocorticoid treatments. For data analysis used *SPSS Statistics 25.0*.

Results. In this study were included 39 (54.9%) females, with a median age of all patients of 75.5 (IQR 66.5–82) years. The cohort comprised a diverse array of comorbid conditions: Crohn's disease (1.4%), diabetes mellitus (7%), oncological diseases (19.7%), and chronic kidney disease (CKD) (14.1%), with 5.6% requiring haemodialysis. Obesity/overweight was noted in 19 patients (26.8%), and a history of stroke was present in 9 (12.7%). Nursing care was required for 29 individuals (40.8%), and dementia symptoms were reported in 17 cases (23.9%). There was common prior hospitalization (73.2%), glucocorticoids were used by 7 patients (9.9%), proton pump inhibitors (PPI) by 12 subjects (16.9%), and 12 patients (12.9%) had surgeries within 6 months before hospitalization. Antibiotics were administered to 50.7% of patients before the onset of CDI. Comparative analysis between patients with a first-time CDI diagnosis ($n = 36$), who all remained recurrence-free over a two-year follow-up, and those with recurrences ($n = 35$) revealed a significant age difference ($p = 0.014$), with median ages of 74.5 (IQR 61.25–81.75) and 80 (IQR 76–85), respectively.

Recurrence was more prevalent in females (56.4%), although not statistically significant ($p = 0.139$). Neither surgical history ($p = 0.397$) nor PPI usage ($p = 0.581$) demonstrated a significant influence on CDI recurrence. Moreover, diabetes, oncological history, and CKD did not significantly impact CDI recurrence rates ($p = 0.187$, $p = 0.202$, and $p = 0.386$) either. In contrast, a significant correlation was found between dementia and increased CDI recurrence: 76.5% of patients with dementia experienced recurrence versus 40.7% without dementia ($p = 0.010$). While patients with a history of stroke and those requiring nursing care had higher rates of recurrence, these trends were not statistically significant ($p = 0.069$ and $p = 0.192$, respectively).

Conclusion. While many clinical and demographic factors were assessed, only age and dementia showed a significant influence on CDI recurrence. These findings suggest that among the array of potential risk factors, cognitive impairment presents a unique challenge in the management and prevention of CDI recurrence.

Acknowledgements. No conflict of interest.

Laboratory findings and treatment outcomes in patients with *Clostridium difficile* infection: a single-centre retrospective study

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Background. Understanding the factors that contribute to *Clostridium difficile* infection (CDI) is crucial for effective treatment and management.

Aim. This study aims to evaluate the clinical characteristics, comorbid conditions, treatment and treatment outcomes of patients with CDI.

Methods. This study entailed a retrospective analysis of adult patients diagnosed with CDI from 2018 to 2019. Data was collected on medication history, received treatment and laboratory results obtained during hospitalization. *SPSS Statistics 25.0* was employed for statistical analysis.

Results. In our retrospective cohort study, 82 cases of 71 patients with CDI were evaluated. Of these, 45.1% (n = 32) were male, and the median age of patients was 75.5 years (IQR 66.5–82). All patients received treatment with vancomycin and/or metronidazole. In 25 (30.5%) recurrence-free was achieved after antibiotic therapy. The recurrence mean was 2.01 (SD = 1.27), and 53.7% (n = 44) required faecal microbiota transplantation. During hospitalization, 2.8% (n = 2) of patients died (both had oncology history: one experienced progressive heart failure, the other underwent a colon resection a month ago, with worsening condition following chemotherapy). Prior to CDI diagnosis, 50.7% (n = 36) of patients were treated with other antibiotics, categorized as oral (9.9%), intravenous (26.8%), or unspecified (14.1%). Fever was present in 28.2% (n = 20) of patients, with an equal distribution of subfebrile and febrile temperatures. Chest X-rays conducted on 36.6% (n = 26) of the cohort revealed infiltrative changes in 4.2% (n = 3), and urinary analysis showed leucocytosis in 57.1% (n = 13) of the tested patients (n = 23). Obesity/overweight was observed in 19 patients (26.8%). Albumin levels fluctuated, with a median maximum of 30 (IQR 25–33) and a minimum of 29 (IQR 22.25–32). Creatinine maximum median was 106.5 (IQR 78.25–158) and fell to a median minimum of 81 (IQR 65.5–118.25). At the onset of symptoms, median CRP levels were 61.4 (IQR 19.25–155.63), with a maximum median of 71.8 (IQR 47.46–182) and a minimum of 8.5 (IQR 6.5–20.8). Leukocyte counts reached a median maximum of 10.8 (IQR 7.17–15.9) and a minimum of 6 (IQR 4.875–7.475), while haemoglobin levels varied, with a median maximum of 109 (IQR 103.25–124.75) and a median minimum of 97 (IQR 82.5–110.25).

Conclusion. The data indicated a low rate of recurrence-free success when employing solely antibiotic therapy. Key findings include a high prevalence of antibiotic use prior to CDI diagnosis, older age, poor nutritional status, a high prevalence of hypoalbuminemia, even among obese/overweight patients.

Acknowledgements. No conflict of interest.

Gender-specific aspects of gastroesophageal reflux disease

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Background. Gastroesophageal reflux disease (GERD) is a recurring condition caused by reflux.

Aim. The aim of this study is to identify gender differences in the course of GERD.

Methods. 98 patients with gastroesophageal reflux disease were examined. The diagnosis of GERD was confirmed by endoscopy. Data from medical histories and clinical-endoscopic features were analysed using the <http://easymedstat.com> programme.

Results. 98 patients with GERD were examined, with a median age of 63 years. In this sample, GERD was more frequently diagnosed in women (69.39%) than in men (30.61%). Men more often complained of heartburn (60% vs. 54%) and regurgitation (100% vs. 89%). Endoscopically, erosive form of GERD was more frequently diagnosed in men (46.6%) compared to women (17.65%). Non-erosive GERD predominated in women (82.35%). Correlation analysis of dietary habits and GERD revealed correlations with the consumption of coffee (0.149), carbonated beverages (0.228), chocolate (0.467), and citrus fruits (0.23). A correlation was found between GERD and male gender (1), alcohol consumption (0.55), and smoking (0.199).

Conclusion. The conducted study confirmed gender differences in the course of GERD. GERD is more frequently detected in women over 60 years of age, during the menopausal period, suggesting that a decrease in oestrogen may play a role in the development of the disease. Men more often reported symptoms caused by acid stimulation of the lower oesophageal mucosa layers. Erosive reflux disease is more frequently diagnosed in men, while non-erosive reflux disease is more frequently diagnosed in women. A strong positive correlation was found between frequent consumption of coffee, fatty foods, chocolate, citrus fruits, carbonated beverages, smoking, and alcohol consumption.

Acknowledgments. The authors declare no conflicts of interest. There was no funding.

Skin allergic reactions to iodinated contrast media in individuals with and without allergies

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Background. Iodinated contrast media (ICM) highlights anatomical boundaries and normal and pathological findings during radiological examinations. According to various studies, these substances are considered safe; however, allergic hypersensitivity reactions (HR) occur in 1 in 170,000 reactions. The manifestation of HR may depend on the patient's age, gender, comorbidities, previous HR, other allergies, and some medications used.

Aim. The current study aimed to assess positive skin allergic reactions to ICM in individuals with and without allergies.

Methods. A retrospective analysis of medical records from the Hospital of Lithuanian University of Health Sciences Kauno klinikos data register was made. The study cohort comprised 117 patients, of whom 37 were subjects with allergies (range of age: 41–84, median – 67) and 80 subjects without allergies (range of age: 34–85, median – 63). All subjects underwent skin prick tests and intradermal testing for ICM with the culprit (when known) and with the ICM commonly used in our hospital nonionic dimers (iodixanol) and nonionic monomers (iohexol, iopromide) between 2019 and 2023.

Results. Among the individuals with allergies, three tested positive for a reaction to ICM (2.6% of all individuals), while the remaining individuals tested negative (91.9% in the group of people with allergies). Additionally, five individuals without any history of allergic reactions showed a positive response to ICM (4.3% of all individuals) ($p = 0.752$).

Conclusion. There is no significant difference in skin test positivity to ICM between individuals with allergies and those without. Past reactions to any contrast media may increase the likelihood of experiencing hypersensitivity reactions in the future.

Acknowledgements. Lina Gatelytė, Julija Usytė, Edita Gasiūnienė declare that there is no conflict of interest regarding this research.

Diagnostic imaging approach to steatotic liver disease – the new MASLD

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Background. In June 2023 a new, more specific nomenclature for steatotic liver disease was introduced taking in regard its various aetiology. Metabolic dysfunction-associated steatotic liver disease (MASLD), previously known as NAFLD, has a strong association with metabolic syndrome, obesity and type 2 diabetes mellitus. MASLD includes patients with hepatic steatosis and at least one of five cardiometabolic risk factors. MRI PDFF is one of the basic MASLD diagnostic criteria.

Aim. To evaluate the association of metabolic comorbidity to hepatic steatosis using new MASLD Diagnostic Criteria.

Methods. In this retrospective study medical records of a total of 200 patients undergoing abdominal MRI scan with CSE-MR sequence between May 2023 and December 2023 were analysed. Measurements of fat fraction (%) in various ROI were selected. Additional data obtained included: (1) CT scan; (2) US B-mode findings; (3) clinical parameters (BMI, history of diabetes) and blood test results (Gly, HbA1c, AST, ALT). Patients with diagnoses of hepatitis B, C and malignancy were excluded.

Results. The mean age and BMI were 60 ± 64 years and 27.6 kg/m^2 , respectively. MRI-PDFF measurements of liver fat ranged from 1.1% to 61.0%, with 33.3% (66 of 198) of the participants having a PDFF greater than 5%. Mild, moderate, and severe steatosis was observed in 24.7%, 3.5%, and 5.1% of participants. The mean liver fat content by PDFF was $M = 6.4$; with a median of 3.7%. Elevated ALT levels were calculated in 38.2% of total where 20.4%, and 17.7% female and male respectively. There were 10.1% with AST/ALT ratio > 1.5 . And 23 (11.6%) patients were diagnosed with MASLD. Pearson's χ^2 test between BMI and PDFF grading showed no significant association ($p = 0.18$).

Conclusion. A wide spectrum of clinical manifestations emphasize the complexity of this disease, especially coexisting risk factors. The new nomenclature of SLD and MASLD is more suitable for identifying significant steatosis than NAFLD.

Acknowledgements. There is no conflict of interest to declare.

***Sambucus nigra* L. extracts inhibit SARS-CoV-2 induced cytopathic effect in Calu3 cells**

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Background. The global pursuit of alternative and supplementary treatments to conventional antiviral drugs has led to an increased interest in plant-derived compounds. Elderberry *Sambucus nigra* L. extract, a traditional remedy for common cold symptoms, has emerged as a potential candidate for combating several different viral infections *e.g.* influenza *etc.* Previously we have also found that elderberry extract demonstrates inhibitory effects against the SARS-CoV-2 S1 protein receptor binding domain (RBD) binding to the human angiotensin-converting enzyme 2 (ACE2) receptor.

The aim of the current study was to investigate the direct antiviral activity of elderberry extract against the SARS-CoV-2 in an *in vitro* setting.

Methods. The effect of elderberry extract on SARS-CoV-2 was assessed using the human lung adenocarcinoma cell line Calu3. Cytotoxicity of the extract itself on Calu3 cells was determined by the Cell Counting Kit-8 (CCK8). Afterwards, cells were grown to a monolayer in 96-well plates and infected with SARS-CoV-2 at a multiplicity of infection (MOI) of 0.3. Immediately post-infection elderberry extract ranging from 3 to 12 mg/mL was added to the cells. After 72 hours, virus-induced cytopathic effect (CPE) inhibition was assessed using 0.25% Crystal Violet solution. Remdesivir, a known SARS-CoV-2 inhibitor, served as a positive control in this study.

Results. The half-maximal cytotoxic concentration of elderberry extract in Calu3 cells was 12 mg/mL. In the presence of elderberry extract, an inhibition of virus-induced CPE was observed, revealing a direct correlation with the concentration of the extract, where higher concentrations demonstrated a more pronounced inhibitory effect and an enhanced antiviral efficacy.

Conclusion. Elderberry extract exhibits a direct inhibitory effect on SARS-CoV-2 *in vitro*, providing promising insights into its potential as a natural antiviral agent. Further exploration and clinical investigations of the elderberry extract are needed to explore its therapeutic implications and potential in the context of COVID-19 and other viral infections.

Acknowledgements. The present study was supported by the Latvian Council of Science as fundamental and applied research project No. lzp-2022/1-0179.

Temporal trends in sepsis incidence and outcomes in Latvia (2015–2019): a retrospective administrative data study

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Background. Sepsis, defined as a life-threatening organ dysfunction caused by a dysregulated host response to infection, is a complex syndrome associated with an increasing incidence, long-term morbidity, and major economic burden.

Aim. The aim of the study was to analyse sepsis incidence trends in Latvia.

Methods In a retrospective administrative data study (2015–2020), adult (age \geq 18 years) patients with explicit and implicit ICD-10 (International Classification of Diseases, 10th Revision) sepsis discharge codes were enrolled. Anonymized data were obtained from a specialised research database (datalink) maintained by the Latvian Centre for Disease Prevention and Control to analyse patient and hospitalisation characteristics and outcomes.

Results. In a six-year period from 2015 to 2020, 17,837 admissions in Latvian hospitals were identified with sepsis discharge codes. The one-year readmission rate decreased from an average of 5.8% in 2015–2017 to 5.0% in 2018–2020. The total age- and sex-standardised incidence of sepsis admissions increased by 51.9% from 2015 to 2018, reaching 166.5 cases per 100,000 population, and remained stable until 2020. The increase in sepsis admissions was predominantly due to a rise in sepsis cases detected among older patients: 3.4% for those aged below 40, 17.9% for the 40–59 age group, 20.3% and 33.3% for the age groups 60–79 and 80+, respectively. The non-adjusted case fatality rate (CFR) increased from 34.7% to 43.8% during a six-year study period. However, the age- and sex-standardised CFR increase was less prominent – 34.7% and 40.5% in 2015 and 2020, respectively. Furthermore, an increase in age- and sex-standardised CFR rose for the first three years of observation but was considered stable for the rest of the study period. The same pattern also characterises the age- and sex-standardised death rate per 100,000 population. Diseases of the respiratory system were the leading principal diagnosis upon discharge. The one-year readmission rate remained relatively stable over the study period.

Conclusion. Administrative merged databases may serve as valuable tools in enhancing the detection of sepsis cases, thus providing better insights into the policies needed to improve healthcare for sepsis patients.

Acknowledgements. This research has received funding from the Latvian Council of Science as part of the project ‘Multidisciplinary study of community acquired sepsis survivors in Latvia’ (project No. lzp-2019/1-0225).

Clinical symptoms of tonsillopharyngitis caused by group A β -streptococcus infection and the use of Centor scale on a paediatric population for general practitioners

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Background. European Centre for Disease Prevention and Control (ECDC) and World Health Organization (WHO) data from 2022–2023 implies that there is an increase in type A streptococcus infection in the paediatric population in Europe, including an increase in mortality. In the daily work of a general practitioner, if a patient has typical symptoms of a Group A β -streptococcus infection (GA β S), the Centor scale is the main tool of diagnosis. Since symptoms are more varied in a paediatric population, the use of the Centor scale could not be sufficient to determine streptococcus infection on its own.

Aim. The study with GA β S confirmed paediatric patients would allow determining if the use of the Centor scale would have been an adequate tool to determine if the patient has streptococcus infection in a general practice.

Methods. Between January 1st, 2022 and December 31st, 2023 data was gathered from patient medical histories (n = 70, age 2–18) with confirmed GA β S using rapid antigen tests. Objective data and clinical symptoms were analysed to determine if the use of the Centor scale by itself is a sufficient tool to recommend an adequate therapeutic course of action in case rapid testing is not available. Patients were grouped by criteria that define Centor scale point calculations to display how many patients would fall into which Centor category despite all patients being positive for streptococcus infection.

Results. All 70 infection-positive patients were adequately evaluated using the Centor scale (at least 2 points), which resulted in a recommendation to use a rapid antigen test to determine a positive infection.

Part of the patient symptoms were not matching typical, initial streptococcus infection symptoms (e.i. 10% coughing, 10% rhinorrhoea, 14% sub-febrile temperature, 16% vomiting and 19% stomach pain), which are not part of the Centor scale and could result in an incorrect diagnosis and treatment without the use of a rapid antigen test.

Conclusion. The Centor scale is an adequate tool to determine streptococcus infection if the patient exhibits typical infection symptoms.

The variety of symptoms atypical of streptococcus infection in paediatric patients shows the need to include rapid antigen testing into the routine of general practitioner paediatric patient examination when a symptomatic febrile temperature is measured.

Predictive model evaluation for glucose prognosis in type 1 diabetes: exploring logistic regression model performance stability

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Background. The integration of advanced predictive models is crucial for refining insulin dosing, daily routines, and holds particular significance for the future evolution of fully closed-loop systems. However, CGM systems pose challenges requiring the interpretation of swift changes, sensor delays, and malfunctions. Especially challenging is to adapt to diverse patient groups. Improved prediction models are essential for optimising insulin dosing, daily activities, and particularly for future fully closed-loop systems.

Aim. The aim of this study was to investigate the stability of a logistic regression model for glucose responses in predicting glucose levels after 15 minutes and one hour using a broader patient cohort (n = 43).

Methods. We compared and evaluated the stability of the logistic regression model in predicting hypoglycaemia (< 70 mg/dL), euglycaemia (70–180 mg/dL), and hyperglycaemia (> 180 mg/dL). Precision, recall and F1-score were used to evaluate the quality of glucose level prediction by logistic regression model trained over two patient cohorts – 11 and 43 patients (referred to as LR11 and LR43). The CGM data were acquired within the COVAC-DM study at the Interdisciplinary Metabolic Medicine Trials Unit at the Medical University of Graz, Austria.

Results. For the 15-minute forecast horizon, the overall accuracy of LR43 was higher in comparison to LR11, increasing from 93% to 95%. And for 1 h forecast horizon, the LR43 model turned out to have 73% accuracy as compared to 69% for LR11. LR43 was additionally validated using a leave-one-out approach and showed an insignificant difference in accuracy. A slight decrease of recall was observed for 15-minute interval, but 1-hour recall increased from 75% to 83% for hypoglycaemia. Overall, the model proved to be robust.

Conclusion. The results imply that training models for a wider patient group exhibit different capabilities and limitations in forecasting glucose levels for longer periods. Validation on a larger patient cohort proved model robustness and assures model validity on a much broader audience.

Acknowledgements. We acknowledge support from the 'State Research Programme project in biomedical, medical technologies and pharmaceuticals' (No. VPP-EM-BIOMEDICĪNA-2022/1-0001). The COVAC-DM study was supported by the Austrian Science Fund (FWF) (KLIF-1076 to HS).

Is it time to alter the recommendations? Radioiodine therapy of patients with subclinical hyperthyroidism after five years

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Background. Potential complications of untreated subclinical hyperthyroidism (SCH) include weight loss, osteoporosis, atrial fibrillation, embolic events and altered cognition. Moreover, it is proven that SCH promotes oxidant imbalance, which may contribute to immunological changes. Although this condition can be treated with a high success rate if detected early, official guidelines are poorly defined and patients are usually recommended to wait and monitor hormone levels, which creates problems as not all of them are aware of the fact that their condition may proceed.

Aim. The aim of our study was to investigate a five-year effect of radioiodine therapy on achievement of euthyroidism and the prevention of evolution to overt hyperthyroidism in patients with subclinical hyperthyroidism.

Methods. We treated 1000 patients, aged 30–70. 66% of them presented multinodular goitre (MNG) and 44% had an autonomous nodule (ATN). Malignant changes were excluded by fine needle aspiration biopsy. All the patients had serum TSH levels < 0.1 mU/L and effective half-life measured at T24 and T48 of more than 3 days. The activity dose was calculated by Marinelli's formula and ranged between 200 and 600 MBq. The absorbed dose for MNG ranged between 150–260 Gy and for ATN 200–300 Gy. Follow-up control visits were done every 6 weeks in the first year. Then every 6 months for 4 years.

Results. After 1 year 98% of patients with ATN and 89% of patients with MNG succeeded in therapy and achieved euthyroidism. 2% of patients with ATN and 8% of patients with MNG developed hypothyroidism. 3% of the MNG-patients had persistent hyperthyroidism and received a second dose of radioiodine therapy. After 3 years 3% of patients with ATN and 9% of patients with MNG develop hypothyroidism. After 5 years 3% of patients with ATN and 9% of patients with MNG develop hypothyroidism. Symptoms of SCH and goitres disappeared and quality of life improved in all patients.

Conclusion. Early diagnosis and treatment may not only cease the progression of subclinical hyperthyroidism but also lead to full recovery. As a single dose of radioiodine can be beneficial to patients, we would like to emphasize the need to include this method of treatment in guidelines for all patients.

Acknowledgements. The authors declare that there is no conflict of interest. This research did not receive any specific grant from any funding agency in the public, commercial or not-for-profit sector.

MENTAL HEALTH

Frequency of depression among working medical students in Latvia

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Background. Medical studies are one of the most challenging study programmes emotionally and academically. Studies contain a large amount of information that must be studied in a short period of time which leads to long study hours and affects the quality of sleep. Students start to experience fatigue, stress, and panic, leading to a decrease in work performance. Other factors such as the lack of financial support from the family can also negatively impact a student's mental health, requiring them to seek employment alongside their studies, which adds additional pressure and stress.

Aim. To determine the prevalence of depression symptoms among working medical students and test whether working medical students have a higher level of depression compared to those who are not employed during the studies.

Methods. A cross-sectional study. Anonymous online surveys in Latvian were used to collect research data from April 26, 2023, to June 1, 2023. The Patient Health Questionnaire-9 (PHQ-9) was applied to identify symptoms of depression. Data processing was conducted using *Microsoft Excel 2010* and *IBM SPSS Statistics version 29*.

Results. In the study, 140 respondents participated, including 117 (83.6%) female, 21 (15%) male and 2.1% identifying as transgender. Among the respondents, 77 (55%) were students at Rīga Stradiņš University, while 63 (45%) were at the University of Latvia. 108 (77.1%) respondents indicated that they work part-time while studying medicine. Among them, 52 respondents (27.1%) work more than 0.5 working-time equivalent (FTE) per month, and 86 (61.4%) respondents work at a single workplace. According to the results of the PHQ-9 scale, 85 respondents showed significant symptoms of depression. The Mann-Whitney U test ($p = 0.020$) confirmed statistically significant differences in the average PHQ-9 scores between employed and non-employed students. Comparing the monthly workload and depression indicators, the Kruskal-Wallis test results showed that there were no significant differences in the distribution of PHQ-9 scale results based on the amount of the workload ($H = 6.842$, $df = 3$, $p = 0.077$).

Conclusion. Medical students who work during their studies exhibit a higher prevalence of depression compared to non-employed students.

Recovery and social inclusion of addicted persons

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Background. The growing rates of addicted persons are fuelling scientists and healthcare professionals to search for effective treatments for addiction. Addicted people who are undergoing treatment or rehabilitation programmes and stay sober for a period of time are called in medical anthropology recovering addicted persons. As research shows (Garcia 2010, Meyers 2013, Hansen 2018) recovering addicted persons often face difficulties in continuing the recovery process after completing rehabilitation programmes and also some of them experience relapses.

Aim. The aim of this report is, firstly, to discuss how useful and practical are the skills developed during rehabilitation for recovering addicted persons after the end of the rehabilitation programme; secondly, to describe social inclusion strategies for recovering addicted persons chosen after rehabilitation.

Methods. Empirical data were collected using an ethnographic field research approach. The fieldwork was conducted in 2023 in one of the Lithuanian rehabilitation institutions. The research included participant observation in the rehabilitation institution, in open self-help groups and events, which took about four hundred and fifty hours. Fourteen semi-structured interviews and informal conversations were also conducted during the fieldwork.

Results. The empirical findings of the study indicate rehabilitation institutions have two overlapping goals. Firstly, to develop a deeper and more comprehensive understanding of addiction as a disease for rehabilitants. Secondly, to prepare recovering addicted persons for the next stage of recovery, which follows rehabilitation in a formal institution. According to the research data, the main way used by institutions to achieve these goals is the enactment of bio and symbolic power (Foucault 1998; Bourdieu 1991). Through the control of forms of activities, time schedules, social networks inside and outside of the rehabilitation institution and other basic areas of life the possible behavioural problems during rehabilitation are prevented and the quality of the recovery process is ensured. The rehabilitation institution provides guidelines for sober living and the skills needed for successful next-stage recovery for rehabilitants. As research data revealed recovering addicted persons in the first stage of self-social inclusion often strictly follow the recovery practices and social inclusion strategies (change, avoidance, hiding and revealing addiction) passed on by rehabilitation institutions.

Conclusion. Although recovering addicted persons are trained in social inclusion strategies during rehabilitation, their personal life situations often present them with challenges after leaving rehabilitation. To make the social inclusion process more successful and easier, recovering addictive persons should continue to receive professional support and personalized help after completing rehabilitation.

Analysis of insomnia symptoms – comparison of subjective sleep perception and objective parameters, its correlation with symptoms of anxiety and depression

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Background. Insomnia includes symptoms of sleep quality and quantity, such as difficulty falling asleep, staying asleep during the night, and waking up too early without the capability to fall asleep again. The prevalence of chronic insomnia is 30% among the population. Insomnia increases the risk of developing depression in the future. The subjective perception of sleep is relevant in assessing insomnia.

Aim. The aim of the current study was to analyse patients' data regarding the symptoms of insomnia and compare it with the data from polysomnography. To determine if there is any correlation with depression or anxiety symptoms or some identifiable specific factor.

Methods. The study included patients with complaints of sleep disturbances who did a polysomnography and filled out the questionnaire and the sleep diary. Sleep was objectively measured using polysomnography. The questionnaire included biographic data, medications, chronic diseases, alcohol and caffeine use, the Generalised Anxiety Disorder Scale (GAD-7), and the Patient Health Questionnaire (PHQ9). Patients were instructed to use the polysomnography device 'Sleep Profiler PSG2' at home. Simultaneously with the device use, patients filled out a sleep diary. The data were analysed using IBM SPSS v29.0 and Microsoft Excel.

Results. Altogether, 112 patients' data were analysed. The mean age was 42 years (SD ± 13), 53.6% were female (n = 60), and 46.4% were male (n = 52). Results show that subjective perception of sleep in all parameters (time until falling asleep, time staying awake after sleep onset, number of awakenings, total sleep time) has a statistically significant difference from objective data (p < 0.05). Spearman correlation analysis revealed a positive correlation between subjective and objective sleep parameters (p < 0.05). Only the subjective perception of sleep as difficulty falling asleep (p < 0.002) and difficulty staying asleep (p < 0.037) correlates with depression symptoms, but anxiety symptoms correlate only with the difficulty falling asleep (p < 0.042). None of the objective sleep data correlates with depression and anxiety symptoms. There was no correlation between symptoms of depression and anxiety and specific factors such as gender, age, or body mass index.

Conclusion. The results showed that subjective perceptions of sleep quality significantly differ from real sleep quality. Besides, it differs in both ways, showing that some patients feel more severe symptoms of insomnia, but some feel weaker. Only subjective complaints of sleep disturbances correlate with anxiety and depression symptoms.

Acknowledgements. The authors declare the absence of conflicts of interest or funding.

Electroconvulsive therapy in patients with questioned decision-making capacity – clinical and ethical challenges

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Background. According to ethics, electroconvulsive therapy (ECT) can be administered to patients who consent to it only. Contrarily, ECT is indicated for conditions that markedly affect the decision-making capacity. ECT without consent can be given as a life-saving procedure.

In Latvia, ECT was reintroduced in 2019 (as modified ECT, mECT).

Traditionally, in Latvia, the decision-making capacity of mental inpatients is not evaluated or questioned. The psychiatric admission without consent shall be justified by a court, though, the court shall not justify the planned medical procedures. The patient's ability to stand the trial is not adequately assessed.

Normally, patients should be protected from excessive and futile treatment, but the concept of futility has been rarely addressed in psychiatry.

Aim. To identify the bias in the application of mECT for inpatients with decision-making capacity issues and to make a proposal to improve the current practice and regulation.

Methods. Data on mECT statistics have been obtained from The Centre for Disease Prevention and Control of Latvia; the informed consent templates were obtained from The Strenči mental hospital and The Riga Centre of Psychiatry and Addiction Medicine; the clinical case study method was used to describe two catatonic patients' cases; the information on the patient's behaviour during the court hearings was obtained from the national court decisions. Analysis of data, corresponding legislative documents, and medical and ethical principles was performed.

Results. The research reveals a number of clinical and legal challenges and shortcomings in the application mECT on mental inpatients with catatonia.

Conclusion. To overcome the systematic insufficiencies in safeguarding the rights of mental inpatients with decision-making capacity issues, a range of improvements in clinical practice and legal regulation shall be made.

Acknowledgements.

- University of Latvia, Faculty of Medicine, Riga, Latvia, Research project 'Towards a human rights approach for mental health patients with a limited capacity: A legal, ethical and clinical perspective', No. lzp-2020/1-0397.
- The Centre for Disease Prevention and Control of Latvia.

Involuntary admissions due to inability to care of oneself – the case law of Latvia, conclusions *de lege lata* and postulates *de lege ferenda*

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Background. In Latvia, there are two exclusions from the principle of voluntary mental health treatment – if a) the person poses a danger to others or self and b) the person is unable to care for him or herself or those under his or her guardianship and the prognosis of an unavoidable and serious health condition due to mental illness is made.

It is essential for a psychiatrist to detect the abovementioned criteria and to initiate a psychiatric hold and for a judge – to justify the involuntary admission.

While the concept of the former criterion is clear, the latter appears to be the least studied medico-legal phenomenon (general clause), as well as the methodology of making the prognosis.

Aim. This study aims to identify and describe the behavioural signs and medical conditions that comprise the concept of ‘inability to care’, and lead to an unfavourable prognosis; to identify the shortcomings in the current legal and medical practice, and to make proposals for improvement.

Methods. A retrospective case series study method was applied to perform an analysis of the court’s decisions in cases on involuntary psychiatric admissions since 2018. Additionally, a scoping literature review was performed to contextualize the study findings within the ethical and legal standards.

Results. The concept of ‘inability to care’ is displayed from the perspective of civil law, forensic psychiatry, and social care.

The content of the ‘inability to care’ and methodology of prognosis-making are described, based on the psychiatrists’ council decisions, the facts established by the court, and the person’s speech during the court hearings.

Conclusions. The general clausula ‘inability to care for oneself’ possesses medical and social components, shares similarities with the impaired medical mental decision-making capacity and correlates with the inability to care for a person under guardianship.

The assessment of the ‘inability to care’ and making the medical prognosis calls for the application of objective measurements.

The national courts’ and medical institutions’ practice differs significantly from the principles of ethics and law. The amendments to the legal regulation and medical practice quality improvement have to be introduced.

Acknowledgements. This paper has been prepared within the research project ‘Towards a human rights approach for mental health patients with a limited capacity: A legal, ethical and clinical perspective’, No. lzp-2020/1-0397.

Depression and anxiety association with other risk factors in Lithuanian patients after myocardial infarction

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Background. Anxiety and depression symptoms are common conditions in cardiac patients, potentially impacting the attainment of guideline-recommended goals and affecting recovery after myocardial infarction (MI).

Aim. This study aims to evaluate anxiety and depression symptoms within 3 to 12 months after MI and to assess the relation between cardiovascular disease risk factors and emotional disorders.

Methods. This cross-sectional study included 565 patients after MI examined in the Vilnius University Hospital Santaros Klinikos. Participants provided information on their cardiovascular disease risk factors and completed a Hospital Anxiety and Depression Scale (HADS). Data was collected between the years 2016 and 2023.

Results. HADS responses were received from 340 out of 565 patients included in the study; a response rate was 60.2%. Among respondents, 74 (21.8%; N = 340) were women and 266 (78.2%; N = 340) were men, with a mean age of 58.6 ± 9.7 years. Anxiety symptoms (HADS-A score ≥ 8) were observed in 104 (30.6%; N = 340) patients and were significantly higher in women (43.2%) vs. men (27.1%) ($p = 0.007561$). Depression symptoms (HADS-D score ≥ 8) were seen in 77 (22.7%; N = 340) participants and were distributed evenly across both genders (19 (25.7%; n = 74) women and 58 (21.8%; n = 266) men). While no statistically significant age differences were associated with emotional disorders, there was a tendency for depression in older and anxiety in younger age group. The prevalence of low-density cholesterol levels above 1.8 mmol/L was significantly higher in the patient group with depression symptoms ($p = 0.04725$). Participants with psychological distress symptoms were less likely to attain the recommended LDL-C goal of LDL-C ≤ 1.4 mmol/L, according to the 2019 ESC/EAS guidelines. Among the 60 participants (17.7%; N = 340) who achieved the LDL-C goal, the majority (68.3%; n = 41), did not have symptoms of depression or anxiety. Depression and anxiety were not associated with other risk factors, including current smoking, obesity, diabetes mellitus.

Conclusion. More patients after myocardial infarction had anxiety symptoms rather than depression symptoms. Anxiety was more common in women. Higher low-density cholesterol levels were associated with depression symptoms. Psychological distress affected the achievement of guideline recommended LDL-C goals. Therefore, these findings emphasize the importance of emotional care for better patient outcomes.

Acknowledgements. We declare no conflicts of interest.

NEUROLOGY AND ONCOLOGY

Oncomarker correlation with tumour grade

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Background. Tumour antigen 15-3 (CA 15-3) is produced by normal breast cells. CA15-3 production is markedly increased in women with breast cancer. It can help determine whether the therapy is effective or to start treatment for recurrence. Tumour antigen 125 (CA 125) is found on most ovarian cell surfaces, but other tumours (such as breast cancer) can secrete it as well. It can be used to predict poor outcomes and prognoses of breast cancer patients. Carcinoembryonic antigen (CEA) is a tumour marker for breast cancer and other cancers, it can help determine whether the therapy is effective or to start treatment for recurrence. In pathology, grading is a measure of the cell appearance in tumours and other neoplasms. It shows the aggressiveness of the tumour – how fast it grows and spreads.

Aim. The aim of the study was to determine if there is a statistically significant correlation between tumour grade and three types of oncomarkers – CEA, CA125, CA15-3.

Methods. After patient selection from 692 patients altogether 127 patients with stage III or stage IV breast cancer were enrolled in the study. The selection of patients was carried out using Pauls Stradiņš Clinical University Hospital Oncology Clinic multi-disciplinary tumour board conclusions in 2022. Then, using the laboratory data of the selected patients and the *DataMed* system, tumour markers and their numbers were determined. After selecting the necessary data, the *SPSS* programme and chi-square test were used to determine the correlation of oncomarkers with tumour grade.

Results. The results showed no statistically significant correlation ($p = 0.617$) between cancer grade and the oncomarker CA15-3. Evaluating the correlation between the tumour grade and the oncomarker CEA, it can be noted that there is no statistically significant correlation ($p = 0.109$). However, CA125 oncomarker and tumour grade showed a correlation ($p = 0.041$).

Conclusions. In general, two of three oncomarkers (CA15-3, CEA) showed no correlation between tumour oncomarker and grade. This indicates that the hypothesis – the higher the grade, the higher the oncomarkers – is false. This could be due to the small number of patients. However, CA125 showed a correlation with tumour grade and indicates that – the higher the grade, the higher the CA125.

Acknowledgements. The authors declare the absence of a conflict of interest. The first author thanks Dr. Sigita Hasnere and Pauls Stradiņš Clinical University Hospital for the opportunity to do the research.

Melanoma in young adults: evaluation of the characteristics, treatment strategies, and prognostic factors in a monocentric retrospective study (2019–2022)

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Background. Among young adults, melanoma is rare but rising in incidence. Little is known about the natural history, distribution of subtypes, and disease-related mortality of melanoma among young adults.

Aim. The aim of this study was to describe the characteristics, surgical treatment, and prognosis of melanoma in young adults to contribute to the investigation of this malignancy and provide better patient care.

Methods. A retrospective study of patients who were diagnosed and/or treated for melanoma of the skin between 2019 and 2022. Data were collected from the Riga East Clinical University Hospital (REUH) Oncology Centre of Latvia. Statistical analysis was performed using Microsoft Excel and SPSS programmes. Depending on their age, participants of this study were divided into the following groups: group I, 18–27 years; group II, 28–37 years; and group III, ≥ 38 years.

Results. From 2019–2022, a total of 656 individuals were diagnosed with primary invasive or *in situ* melanomas, 63 cases (9.6%) were diagnosed in persons younger than 40 years. The study included 60 patients aged 18 to 40 years, involving 30 (50%) women and 30 (50%) men. The average age of the participants was 32.83 ± 4.95 years. The median age was 34 years. Across age groups, 8 patients were 18–27 years (13.3%); 42 between 28–37 years (70%) and 10 ≥ 38 years (16.7%). The most common subtype of melanoma was superficial spreading melanoma (53.3%). 8 (13%) patients had BRAF testing. 8% ($n = 5$) had BRAF mutations (BRAF+). 72% had stage I disease (AJCC 8th Edition), 18% with stage II, 7% with stage III and one patient had stage IV. One patient had melanoma *in situ*. All patients underwent wide excision, while sentinel lymph node biopsy (SLNBx) was performed in 36 (60%) patients. Out of these 36 patients, 4/36 (7%) had a positive SLNBx. The mean Breslow depth was 1.41 ± 1.34 mm. 3 (5%) patients (2 stage III and 1 stage IV) received BRAF/MEK inhibitors and one patient (stage IV) received immunotherapy. The 5-year overall survival is 91.7%. This study did not find a statistically significant difference between age groups and primary tumour location ($p = 0.920$), ulceration ($p = 0.720$), disease stage ($p = 0.877$) or subtypes of melanoma ($p = 0.498$).

Conclusions: In our study melanoma in young patients was diagnosed most common in stage I. Potentially this could be a good long-term indicator, although melanoma in young adults accounts for only 9.6% of all primary cutaneous melanomas.

The epidemiological, clinical and histopathological pilot study of soft tissue sarcoma in Latvia

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Background. Soft tissue sarcomas are a rare (1.5–3.0 patients per 100,000 population/year) but aggressive form of malignant tumours that arises in soft tissue. Soft tissue sarcomas with particularly high grades of malignancy have a poor prognosis and limited treatment options. The current standard of care involves radical surgery, sometimes combined with adjuvant therapy, including chemotherapy or radiotherapy. In Latvia the prevalence and histopathological characteristics of soft tissue sarcomas has not been previously investigated.

Aim. The aim of the current study was to compare the prevalence, clinical and histopathological characteristics of soft tissue sarcomas in Riga East Clinical University Hospital during 2020–2022.

Methods. 84 patients were enrolled in the study. Clinical, histopathological, immunohistochemistry data were analysed, using descriptive statistical methods.

Results. 84 patients were enrolled in the study. The median patient was 63 years old (ranged from 19 to 93). 38 patients (45.24%) were males, and 46 patients (54.76%) were females. The most common soft tissue sarcoma histopathological subtypes were leiomyosarcoma (19.05%), liposarcoma (15.48%), undifferentiated pleomorphic sarcoma (13.09%). The most common histologic tumour grade was Grade 3 (32.14%), but in 33.33% of cases histologic tumour grade was not determined. All patients underwent surgical treatment, in 28.57% in was combined with radiotherapy and in 15.48% with chemotherapy.

Conclusion. Our study for the first time demonstrated the prevalence, clinical and histopathological characteristics of soft tissue sarcoma in Latvia. Our study showed that median patients' age with soft tissue sarcoma in Latvia was 63 years (ranged from 19 to 93). In addition, there were slight female prevalence. The most common histopathological soft tissue sarcoma subtypes were leiomyosarcoma, liposarcoma and undifferentiated pleomorphic sarcoma. There was still low prevalence of radiotherapy and chemotherapy treatment for soft tissue sarcoma in Latvia.

Acknowledgements. The authors have no conflict of interest and funding for this study.

Correlation of artificial intelligence percentage probability of malignancy and tumour size in mammography examination

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Background. Artificial intelligence (AI) is increasingly used in medicine, especially in mammography screening. As breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death in females worldwide, screening plays a critical role in the effective management of breast cancer and mammography is used as the primary method for breast cancer screening and diagnosis. LUNIT is an AI programme that analyses mammography images by calculating the probability of malignancy as a percentage.

Aim. The aim of the current study was to analyse whether tumour size correlates with AI percentage probability of malignancy.

Methods. This retrospective study was conducted at the Oncology Centre of Riga East University Hospital from January 1, 2023, to October 31, 2023. Were reviewed all breast ultrasonography descriptions in AIRIS (radiology information system) of which were selected for those patients who had mammography examinations performed using the artificial intelligence function (LUNIT). Were collected data on tumour size and AI percentage probability of malignancy. Data was processed using *IBM SPSS Statistics 22*.

Results. The study included 160 patients. Of which 39% (n = 62) did not have tumours and 61% (n = 98) had tumours on mammography examination.

In the group of patients who did not have a tumour in mammography 90% (n = 56) of patients AI showed the possibility of malignancy.

Spearman's rank correlation was computed to assess the relationship between AI percentage probability and tumour size. There was a positive correlation between the two variables, $r(160) = 0.56$, $p \leq 0.001$.

Conclusion. As the size of the tumour increases, the AI percentage probability of malignancy also increases, however, there are many false positive cases when the tumour does not appear in the mammography examination, but the percentage probability of AI is positive.

Acknowledgements. The authors declare no conflicts of interest.

Treatment outcomes with Durvalumab after chemoradiotherapy in stage III non-small cell lung cancer in Pauls Stradiņš Clinical University Hospital. PD-L1 receptor prevalence in tumour cells

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Background. Lung cancer is the leading cause of death and ranks third in terms of newly diagnosed cases among oncological diseases in Latvia. A significant number of cases in Latvia are diagnosed at late stages, with approximately 40%–50% in stage IV and around 20% in stage III. The management of stage III non-small cell lung cancer is multidisciplinary, involving radiological and histological examinations to accurately determine tumour staging and identify specific genetic mutations and biomarkers unique to cancer. Treatment is personalized, and depending on the tumour, may include chemotherapy, radiotherapy, and immunotherapy with Durvalumab. Durvalumab consolidation therapy after chemotherapy and radiotherapy has been shown to reduce disease progression and increase overall survival. The criteria for selecting patients for immunotherapy are still being refined; it is crucial to identify biomarkers and evaluate other factors to enhance patient selection and improve overall survival.

Aim. To perform a retrospective data analysis of patients with stage III non-small cell lung cancer who received chemoradiotherapy and immunotherapy with Durvalumab. Examine the cancer progression after treatment by determining the changes in control computer tomography according to RECIST criteria. To determine the prevalence of side effects of Durvalumab and PD-L1: TPS receptor prevalence to treatment outcomes.

Methods. A retrospective study of 18 patient medical histories with Stage III non-small cell lung cancer patients who have received chemoradiotherapy and Durvalumab immunotherapy at Pauls Stradiņš Clinical University Hospital.

Results. PD-L1: TPS in 8 tumours was > 50% and in 10 tumours it was 1%–49%. 4 patients discontinued the treatment because of drug side effects: 1 patient had pneumonitis, 1 patient had autoimmune hepatitis, 1 had pneumonia and 1 had pleuritis. After the first control computer tomography, 4 patients had a partial response, 6 had stable disease, 2 had progressive disease, and 3 had a complete response. After the second control computer tomography, 3 patients had a partial response, 4 had stable disease, 2 had progressive disease, and 3 had a complete response.

Conclusion. Patient evaluation before therapy is still important because 4 patients discontinued the treatment because of drug side effects, which is 22% of patients. PD-L1: TPS was not a determinant of disease response to treatment. A complete response was only achieved with the combination of chemoradiotherapy, immunotherapy, and surgery. The variability in treatment responses suggests that individual patients may respond differently to the treatment, and monitoring over multiple assessments is important.

Acknowledgements. The authors declare the absence of a conflict of interest.

Lung adenocarcinoma and squamous cell carcinoma: epidemiological, morphological and immunohistochemical characteristics in 379 primary cases

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Background. Lung cancer is one of the most common cancers diagnosed as well as the leading cause of cancer death worldwide and in Latvia (Barta et al, 2019). The most common histological types, adenocarcinoma and squamous cell carcinoma have different diagnostic immunohistochemical profiles. Specific treatment modalities based on predictive immunohistochemical marker expression (ALK, PDL1) are currently available for both.

Aim. The aim of the study was to assess the expression of diagnostic markers CK7, CK20, TTF1, p40, p63 and predictive markers ALK and PDL1 (22C3) with its Tumour Proportion Score (TPS) in lung adenocarcinoma and squamous cell carcinoma.

Methods. We retrospectively evaluated anonymized patient data, histology and immunohistochemistry of 379 cases from Pauls Stradiņš Clinical University Hospital diagnosed in 2022–2023, including 265 (69.9%) biopsies and 114 (30.1%) surgery specimens. Data analysis was performed with Excel 2019.

Results. Mean age was 68.5 ± 8.69 years, in males 68.1 ± 8.4 , in females 69.5 ± 9.3 ; M:F ratio was 2.4:1. Adenocarcinoma was diagnosed in 196 patients (51.7%), including grade I in 5 (2.5%); II in 124 (63.3%); III in 67 (34.2%). Squamous cell carcinoma was diagnosed in 183 patients (48.3%), including grade I in 1 (0.5%); II in 137 (74.9%), III in 45 (24.6%). Adenocarcinoma showed positivity for CK7 in 156/156 (100%), TTF1 in 144/169 (85.2%), but was negative for CK20 in 26/26 (100%), p40 in 39/39 (100%), p63 in 68/78 (87.2%) cases. Squamous cell carcinoma showed positivity for p40 in 58/66 (87.9%) and p63 in 107/111 (96.4%) cases, and was negative for CK7 in 64/119 (53.8%), TTF1 in 114/115 (99.1%) and CK20 in 4/4(100%) cases. ALK was positive in 22/373 (5.8%) cases, adenocarcinoma was more often ALK-positive (9.4%) than squamous cell carcinoma (2.2%). Overall PD-L1 TPS categories were: < 1%, 109/376 (28.9%); 1%–49%, 44.9%; and $\geq 50\%$, 26.2%. PD-L1 TPS categories in adenocarcinoma were: < 1%, 68/194 (35.1%); 1%–49%, 41.7%; and $\geq 50\%$, 23.2%, and TPS categories in squamous cell carcinoma: < 1%, 41/182 (22.5%); 1%–49%, 48.4%; and $\geq 50\%$, 29.1%.

Conclusion. Results are not contradictory to international data, confirming high male prevalence and incidence peak in the 70th decade. Results confirm phenotypical differences between adenocarcinoma and squamous cell carcinoma, particularly in p40 and CK7 expression; this difference could be useful for differential diagnosis. Squamous cell carcinoma was more often positive for PDL1 and adenocarcinoma for ALK, this fact could be taken into account while considering immunotherapy.

Acknowledgements. The authors declare the absence of a conflict of interest.

Impact of gut microbiota and peristalsis on the levodopa treatment outcome of patients with Parkinson's disease

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Background. The GI microbiota performs essential functions to maintain metabolic homeostasis, such as inhibiting the overgrowth of pathogenic microorganisms. In this work, we would like to study the influence of intestinal microbiota and peristalsis on the results of treatment with levodopa in PD patients.

Aim. To assess the influence of intestinal microbiota changes on the levodopa treatment outcome of PD.

Methods. We examined 40 patients with PD who were undergoing examination and treatment at the Centre for Patients with Parkinson's Disease in Poltava Clinical Hospital, Ukraine. Inclusion criteria were clinically confirmed PD with Hoehn and Yahr stage ≤ 3 , duration of disease more than 1 year, age from 45 to 80 years, treatment with levodopa drugs. The control group consisted of 15 patients without signs of neurodegeneration.

Diagnosis of PD was established according to British Brain Bank criteria. The severity of disease – according to Hoehn and Yahr scales, the severity of motor symptoms – by UPDRS scale, non-motor symptoms – using NMSS scale, Schwabe and England daily activity scales. The composition of intestinal microbiota was evaluated based on the results of microbiological stool examination for dysbiosis. Distribution normality was assessed by the Shapiro-Wilk test. Student's T-test was used to compare the means between the two groups. Data with distribution deviated from normal were analysed by Mann-Whitney U, Kruskal-Wallis and Dunn's tests.

Results. All PD patients were divided into two groups: 1 (n = 20) – akinetic-rigid-tremorous form (ART); 2 (n = 20) – akinetic-rigid (AR) form. AR patients had a higher frequency of non-motor symptoms on subscales of gastrointestinal disturbances (p < 0.001), mood/cognition (p < 0.001) and NMSS total score (p < 0.001) compared to ART and controls. From the side of motor symptoms, in the AR form, the scores for I and IV parts of the UPDRS were higher compared to ART (p = 0.004 and p < 0.001, respectively). Statistically significant decrease in the number of *Escherichia coli* (p < 0.001) and *Enterococcus faecalis*, an increase of *Candida albicans* and *Proteus* microorganisms, and a violation of enzymatic function were diagnosed in patients with AR form compared to ART form and control group.

Conclusions. The akinetic-rigid form of PD is characterized by a more severe clinical course and a response to drug therapy, which is probably related to a decrease in normal intestinal microbiota.

Pentatricopeptide repeat domain-3 pathogenic variants in ataxia neuropathy spectrum patients: a new phenotype

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Background. The product of the pentatricopeptide repeat domain 3 (*PTCD3*) gene contributes to the function of the small mitochondrial small ribosomal subunit. *PTCD3* forms the entry channel of the mitoribosome and binds to single-stranded mRNA. Currently, three family cases with Leigh-like syndrome are reported due to loss-of-function variants of the *PTCD3* gene, which cause reduced expression of the protein *PTCD3* and altered mitochondrial respiration.

Aim. Here we present a new phenomenon on the clinical manifestation of the pathogenic variants of *PTCD3* by describing two patients within the ataxia neuropathy spectrum.

Methods and Results. A 34-year-old man and his 33-year-old sister both have horizontal nystagmus, pronounced rough tremor, truncal ataxia, dysmetria, spasticity, and hyperreflexia. They had normal early development until the age of two years. The oxygen consumption rate was measured with the XF96 extracellular flux analyser, the basal respiration rate decreased significantly for the patient and the unaffected mother ($p < 0.0001$) compared to the controls. The whole genome sequencing analysis revealed two heterozygous variants in the *PTCD3* gene c.1182T>A, p.(Tyr394Ter) and c.805C>T, p.(His269Tyr). The variant c.1182T>A, p.(Tyr394Ter) ablates the C-terminal half of the protein, including a significant portion of the central fold; therefore, proteins harbouring this variant cannot adopt a native fold and cannot be correctly incorporated into the mitochondrial ribosome.

Conclusion. The results demonstrate that the two *PTCD3* variants affect protein functions.

Acknowledgements. Work was supported by grant ERAF Nr. 1.1.1.1/18/A/096.

The etiologic spectrum of polyneuropathies and polyradiculoneuritis in the Riga East University Hospital 'Gailezers' in 2022

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Background. Polyneuropathies and polyradiculoneuritis belong to the group of peripheral neuropathies. This group of diseases is characterized by motor and sensory disturbances in the hands and feet and also affects the autonomic nervous system. Depending on the course of the disease, it can significantly affect the patient's quality of life. The prevalence of peripheral neuropathy in the general population can reach 2.4 percent and polyneuropathy is the most common type. In order to establish an accurate diagnosis and the necessary treatment, a thorough clinical assessment, reasonable laboratory examination and electrodiagnostic studies are required.

Aim. To describe the spectrum of polyneuropathies and polyradiculoneuritis in hospitalized patients.

Methods. A retrospective study in which information was obtained from medical records of patients diagnosed with polyneuropathy or polyradiculoneuritis at the Department of Neurology in Riga East Clinical University Hospital from January 1, 2022, to January 1, 2023. Data was analysed using *IBM SPSS Statistics 22*.

Results. We analysed medical records of patients with confirmed polyradiculoneuritis or polyneuropathy (n = 50), among whom 36% (n = 18) were women and 64% (n = 32) were men. The average age was 56 years (SD = 17). Depending upon the aetiology of the polyneuropathy and polyradiculoneuritis was as follows: the majority of the patients had neuropathy of unspecified cause – 28% (n = 14); immune genesis neuropathy (Guillen-Barré syndrome) was diagnosed in 22% (n = 11), toxic genesis (alcohol or medication use) in 18% (n = 9), metabolic neuropathy caused by vitamin deficiency in 10% (n = 5), infectious neuropathy in 10% (n = 5); endocrine pathology in 6% (n = 3) of patients; paraneoplastic neuropathy in 2% (n = 1) and hereditary neuropathy in 4% (n = 2) of cases. Most of the patients received specific treatment: plasmapheresis 26% (n = 13), intravenous immunoglobulin 20% (n = 10), vitamin B replacement therapy 12% (n = 6) or folic acid replacement therapy 8% (n = 4) of cases. Antiepileptic drugs (Gabapentin, Pregabalin) were used for the treatment of neuropathic pain in 52% (n = 26) of analysed patients, also tricyclic antidepressants (Amitriptyline) were prescribed in 8% (n = 4) of patients. The average length of stay in hospital was 13 (SD = 9.75) days.

Conclusion. Determining the underlying aetiology and systematic examination of potentially treatable causes and comorbidities are important for accurate diagnosis. Despite a careful clinical evaluation, judicious laboratory testing, and electrodiagnostic studies, the aetiology of polyneuropathy or polyradiculoneuritis in most cases remains unclear, as well as the prognosis of the disease. Immune, toxic, metabolic and infectious neuropathies need to be established to select the most appropriate treatment for each patient.

Associations of catalase enzymatic activity and distribution of some trace elements in the blood of patients with glioblastoma

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Background. Glioblastoma (GBM) is the most malignant brain tumour, and its resistance to radiation and chemotherapy has been attributed to a variety of mechanisms, including radioresistance, glioma stem cells, enhanced DNA repair mechanisms, and altered antioxidant enzyme expression. This resistance results in poor patient survival.

Catalase (CAT) is an enzyme localized predominantly in peroxisomes and protected against oxidative stress by preventing the accumulation of H₂O₂. Meanwhile, elevated expression levels of CAT have been reported in cancer tissues compared to normal counterparts. In gliomas, catalase appears to be constitutively overexpressed compared with astrocytes. Nevertheless, the molecular mechanism regulating the expression of CAT in GBM has not been fully elucidated.

Metal homeostasis is critical for the proper functioning of the brain, which is a target organ for toxic environmental pollutants. The balance of metals within the brain is regulated through the blood-brain barrier (BBB) and blood-cerebrospinal fluid barrier. Based on metals' abilities to pass through the BBB, it was hypothesized that prolonged exposure to metals could increase the risk of brain cancers, although no association between metal exposure and brain cancer was found.

Aim. This study aimed to evaluate the dynamics of changes in catalase activity in erythrocytes, as well as the concentration of trace elements in the blood.

Methods. The essay material is the blood of patients diagnosed with glioblastoma. Catalase activity was determined based on the formation of an ammonium molybdate complex with non-decomposed hydrogen peroxide. The concentration of the compound was estimated spectrophotometrically at a wavelength of 410 nm. Concentrations of trace elements were determined using inductively coupled plasma mass spectrometry.

Results. Experiments showed that the activity of CAT 7 days after the surgical operation of the tumour significantly increased by 12%. The concentration of lead decreased by 18%, cadmium concentration decreased by 20% and the concentration of metallothionein decreased by 14% in comparison to the concentrations of the corresponding analytes 1 day before surgery. No statistically significant differences were found in the study of copper, zinc, and selenium concentrations during the mentioned period.

Conclusions. Our studies showed that the activity of the CAT increased, concentrations of the metallothionein and the trace elements lead and cadmium decreased in the blood after the surgical operation of glioblastoma. Tracking the dynamics of the aforementioned biomarkers can become significant to contribute to the determination of the stages of glioblastoma development and become one of the diagnostic factors in the future.

Insights into multiple sclerosis pathogenesis: focus on *TRADD* rs868213

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Background. Multiple sclerosis (MS), a chronic and unpredictable condition affecting the central nervous system (CNS), is defined by the appearance of local inflammatory lesions in the CNS, leading to a range of neurological dysfunctions that often present in early adulthood [1]. The exact cause of multiple sclerosis is unknown. It is thought to be a combination of genetic and environmental factors, such as gender, age, and others, initiating immune responses that result in nerve damage and dysfunction [2]. *TRADD*, the TNFR1-associated death domain protein, plays an important role in signalling pathways associated with both cell death and inflammation [3]. Although the specific mechanisms of *TRADD* in the pathogenesis of MS are not fully understood and are controversial, it is hypothesized that *TRADD* dysregulation may have an impact on the development and progression of MS. Understanding the specific role of *TRADD* genetic polymorphisms in MS could provide insights into disease mechanisms and potentially offer opportunities for individualized treatments targeting the modulation of immune responses in individuals living with MS.

Aim. The purpose of this work was to investigate the prevalence of *TRADD* rs868213 single nucleotide polymorphism and multiple sclerosis in the Lithuanian population.

Methods. The study enrolled 150 patients with MS, and 150 healthy controls. DNA was extracted from peripheral blood leukocytes using the DNA salting-out method. Genotyping was carried out using the real-time polymerase chain reaction (RT-PCR) method. Statistical analysis was performed with *SPSS version 29.0*.

Results. The research revealed no statistically significant differences in the occurrence of genotypes and alleles for *TRADD* rs868213 in relation to multiple sclerosis ($p = 0.082$). The logistic regression also did not show any significant results.

Conclusion. We did not find any associations between *TRADD* rs868213 and multiple sclerosis development in the Lithuanian population. Larger population studies are needed for further associations.

Acknowledgements. The first author expresses gratitude to the scientific supervisor Rasa Liutkeviciene for her guidance and support while doing this study as well as appreciates the co-authors' valuable contributions that greatly improved the study's content.

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Genetic epilepsy landscape in paediatric patients in Latvia

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Background. Epilepsy is the most frequent chronic neurologic condition in childhood, and genetic diseases are estimated to cause up to 30% of childhood epilepsy cases. Although several studies have reported genetic causes detected in epilepsy patients, analysis based on epilepsy as the indication for genetic testing misses many patients, who have reached their genetic diagnosis due to different presenting symptoms before the onset of seizures.

Aim. To analyse the landscape of different genetic epilepsies encountered in Latvian paediatric epilepsy patients, including patients with different presenting symptoms.

Methods. The retrospective analysis was applied to data from paediatric patients consulted in Children's Clinical University Hospital during the years 2019-2022 who met the criteria of having both a diagnosis of epilepsy and a genetic diagnosis, regardless of the presenting symptoms or the time of reaching the diagnosis.

Results. 1345 epilepsy patients were consulted during the selected time period, and we identified 195 patients (188 probands and 7 siblings) who had a genetic diagnosis. In these, we have identified 103 different genetic diagnoses. Most (79, 77%) are unique (occurred in one family), but 24 (23%) are recurrent and encountered on at least two occasions. Recurrent genetic causes account for the majority of cases – 109 families (58%), still, non-recurrent diagnoses, 79 families (42%), comprise a considerable part of our patients. The 10 most frequently encountered genetic epilepsies are listed in the table. Genetic diagnosis was established before the start of seizures in 48 patients (24.6%), 18 (37.5%) of them presented with developmental delay.

	Diagnosis	Families, n (%)	
1.	Tuberous sclerosis complex	25	13.3
2.	SCN1A related epilepsy	19	10.1
3.	Angelman syndrome	9	4.8
4.	PRRT2 related BFIS	5	2.7
5.	Proximal 16p11.2 deletion syndrome	5	2.7
6.	KCNQ2 related epilepsy	4	2.1
7.	Down syndrome	4	2.1
8.	15q11.2 microdeletion syndrome	4	2.1
9.	Neurofibromatosis 1	3	1.6
10.	SYNGAP1 related DEE	3	1.6

Conclusions. Our study is the first to aggregate data on the causes of heritable epilepsies in Latvia. Tuberous sclerosis is a recognized cause of genetic epilepsy but does not appear among the most prevalent in other studies, our frequency could possibly be attributed to the existence of clinical diagnostic criteria allowing the diagnosis to be made even in the absence of molecular confirmation.

Acknowledgements. ERAF Nr. 1.1.1.1/18/A/096

Immunochemical detection of BMP-2 and Shh in the human embryo developing spinal cord

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Background. Development, regional specification and morphogenesis of the human nervous system seem to be controlled by several families of signalling molecules. Studies conducted on experimental animals have identified two of the best-known morphogenetic proteins. Sonic hedgehog (Shh) signalling produced by the floor plate induces ventral cell types in a concentration-dependent manner, while Bone morphogenetic proteins (BMP-s) produced by the floor plate promote dorsal identities. Simultaneous to their specification, neural progenitors proliferate, facilitating the growth of the spinal cord. Both BMP-s and Shh either induce or repress the expression of homeodomain proteins, creating a unique expression pattern of transcription factors in each progenitor domain of the developing spinal cord.

Aim. Despite of numerous investigations and experiments in animals, especially rats, mice and chickens, only limited results exist about the developmental role of these regulators in the human nervous system formation. In our studies, we investigated BMP-2 and Shh expression in human embryos and we determined spatial and temporal expression of these signalling molecules during the early stages of the spinal cord development.

Methods. 23 human embryos of Carnegie stages (CS) 14 to 20 were obtained by medical abortions from Tartu University Hospital. The study was approved by the Ethics Committee of Human Research of the University of Tartu. The embryos were fixed in 4% paraformaldehyde and embedded in paraffin according to standard methods. The tissue blocks were serially cut in a transversal direction with a microtome and mounted on Poly-L-lysine or Super-Frost slides. For the detection of the expression of BMP-2 and Shh, the method of immunohistochemistry was used.

Results. Our data demonstrate spatial and temporal expression of BMP-2 and Shh in the spinal cord of CS 14 to 20 of human embryos. In the dorsal part, we detected higher expression of BMP-2 and weaker expression of Shh. However, variations seem to exist in immunostaining intensity at different developmental stages. Shh expression in the roof plate was noticed to decrease throughout the later stages. Our results demonstrated higher expression of Shh and weaker expression of BMP-2 in the ventral part of the developing spinal cord. In the case of both studied proteins, there was a tendency for the expressions to decline in the later stages of development.

Conclusions. Our findings support the theory about the important role of BMP-2 and Shh in the regulation of the cellular proliferation and patterning of the developing spinal cord of human embryos.

OPHTHALMOLOGY

Assessing computerized vision screening tests effectiveness for primary school-aged children's eye vergence

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Background. Non-strabismic binocular vision anomalies, including accommodative and vergence dysfunctions, affect 39% of school-age children. These abnormalities can hinder the normal development of reading and writing skills, leading to poor academic performance. Given that children under the age of 12–13 years may not be aware of their vision problems, it becomes crucial to incorporate tests detecting vergence disorders in vision screening for primary school-aged children.

Aim. The aim of the study was to assess the repeatability and reliability of the vergence facility (VF) test, and the negative and positive fusional vergence amplitude (FVA) tests conducted using a computerised vision screening device developed by our department, among primary school-age children.

Methods. The study involved 83 children aged 6 to 11 years from Riga's Baltmuiža Primary School. Repeatability of the computerized VF and FVA screening tests was evaluated by three consecutive test repetitions. Reliability assessment involved comparing the results of computerized VF and FVA tests with those obtained from standard optometric tests.

Results. The computerized VF test showed no statistically significant difference between the 2nd and 3rd measurements ($F(1.140) = 2.76$, $p = 0.09$), but differences were observed between the 1st and 2nd, and 1st and 3rd measurements ($p < 0.001$). The computerized FVA test demonstrated good repeatability, with no significant difference among the three measurements for both negative FVA ($F(2.195) = 0.04$, $p = 0.96$) and positive FVA ($F(2.195) = 1.78$, $p = 0.17$). Comparison between computerized and standard tests revealed no statistically significant difference in VF mean values (computerized: $M = 8.1$, $SD = 4.7$; standard: $M = 14.1$, $SD = 4.2$), $t(50) = 7.32$, $p < 0.001$. However, significant differences were found in negative FVA (computerized: $M = 5.9$, $SD = 4.2$; standard: $M = 15.6$, $SD = 6.7$) $t(66) = 10.93$, $p < 0.001$, and positive FVA (computerized: $M = 19.2$, $SD = 9.0$; standard: $M = 28.3$, $SD = 13.1$), $t(66) = 5.64$, $p < 0.001$. Nonetheless, a correlation was identified between computerized negative FVA ($r(66) = 0.37$, $p < 0.01$) and positive FVA ($r(66) = 0.29$, $p < 0.01$) and standard optometric tests.

Conclusion. For a reliable result in primary school-aged children, the VF screening test should be performed twice, with analysis focused on the 2nd measurement. The norm for the computerized VF test may align with the standard optometric test. In primary school-aged children, the computerized FVA test can be conducted once, but the establishment of specific cut-off norms for the computerized FVA tests is essential.

Acknowledgements. The vision screening device was developed through funding from project No. KC-PI-2020/10 'Development of vision screening and training device'. Thanks to the Department of Optometry and Vision Science students Nikola Tinkeviča and Sandis Gunārs Smilga for data collection.

PAEDIATRICS

Juvenile idiopathic arthritis disease activity documentation irregularities on routine outpatient appointments

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Background. Juvenile idiopathic arthritis (JIA) is the predominant rheumatic disease in paediatric patients. Regular assessment of disease activity is a cornerstone for patient management. Documentation of standard parameters leads to consistent patient evaluation.

Aim. This study aimed to determine how often clinical indicators of JIA activity are documented during visits to paediatric rheumatologists.

Methods. A retrospective analysis of JIA patients (any type) with at least two visits during a one-year period from December 2022 to December 2023 was performed using an electronic hospital database. Demographic data, joint assessment parameters such as swelling (SWL), limited range of motion (LOM), active joint count (AJC), joint pain (JP), and disease activity evaluation according to clinical juvenile arthritis disease activity scale (cJADAS) was analysed during four consecutive visits. P value < 0.05 was considered significant.

Results. In total, 112 patients with a median age of 13.1 years (range 3–17 y) were included; of whom 75% (n = 84) were female. The most frequent JIA subtype was oligoarthritis (oligoJIA) (41.1%, n = 46), followed by RF-negative polyarthritis (28.6%, n = 32), enthesitis-related JIA (10.7%, n = 12) and RF-positive polyarthritis (8%, n = 9). The majority of patients (67%, n = 75) were positive for antinuclear antibodies (ANA), and 21.4% (n = 24) were positive for HLA-B27. All patients had at least two visits during the one-year selected study period, although not all patients had a third or fourth visit (76.8% of patients, n = 86 and 52.7%, n = 59, respectively). Among all assessment parameters, the most documented were LOM in at least 90.7% of the patients and JP (82.5%). At least 81.3% of the patients had their joint SWL reported and for 74.4% of children active joint count was recorded at each visit. Interestingly, SWL and LOM were noted more frequently for oligoJIA compared to polyarthritis patients in the first two visits (p < 0.05). Joint stiffness documentation increased with time, reaching 77.9% on the fourth visit. From all of the parameters analysed cJADAS was documented least in all visits (11.9%). Furthermore, it was observed that there was no overall disease activity evaluation mentioned in more than half of all visits (59.89%).

Conclusion. This study revealed inconsistent and insufficient JIA disease activity documentation in the electronic hospital database during routine patient visits. Identifying the reasons behind this phenomenon could help to establish new methods for recording JIA activity and enhance the quality of patients' follow-up.

Acknowledgements. All authors declare that they have no conflicts of interest.

The dominating taxonomic composition of the human breast milk microbiota and its association with milk macronutrient content

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Background. The uniqueness of human breast milk (HBM) is characterized by its ideal suitability for the infant. The microbial and macronutrient composition in HBM differs among mothers and could be influenced by several factors. However, it is not clear yet, how these two factors interact.

Aim. Analyse HBM microbial and macronutrient content, determine the interaction between them and how each is influenced by different maternal and infant factors.

Methods. Breastfeeding mothers were asked to donate two milk samples and fill out a questionnaire (pregnancy/delivery, anthropometric data, feeding type etc.). Macronutrient analysis and detection of bacterial taxonomic units (isolation of DNA followed by 16S gene sequencing) were performed. The correlation between macronutrient contents, milk density and pH, Shannon index (SI) and the relative abundance of bacterial taxa was analysed. The average relative abundance (RA) of bacterial taxa was compared to different factors. Statistical analysis: Spearman correlation (coefficient ρ), Pearson correlation (coefficient r), Mann–Whitney (U) test.

Results. In total, 38 mothers (mean age 28 years; SD \pm 3.54) provided milk samples; the mean age of their infants – 4.7 months (SD \pm 1.45); 53% (20/38) – boys. The mean concentration of macronutrients in samples was the following: lactose 6.97% (SD \pm 1.2), protein 1.11% (SD \pm 0.25), fat 2.9% (SD \pm 1.58); while mean density was 1019 kg/m³ (948 kg/m³ to 1041 kg/m³) and mean pH – 6.56 (6.30 to 7.71).

The ten most abundant bacterial phyla in milk samples were *Proteobacteria*, *Actinobacteria*, *Pseudomonadales*, *Corynebacteriales*, *Firmicutes*, *Micrococcales*, *Lactobacillales*, *Streptococcaceae*, *Caulobacteriales*, *Staphylococcaceae*; the mean SI 2.12 (SD \pm 1.5). A positive correlation was found between milk protein concentration and the abundance of *Lactobacillales* ($r = 0.32$; $p = 0.04$), *Streptococcaceae spp.* ($r = 0.32$; $p = 0.05$) and *Micrococcales* ($r = 0.31$; $p = 0.06$). Also, there was a positive correlation between milk fat concentration and abundance of *Caulobacteriales spp.* ($r = 0.50$; $p = 0.002$) and SI ($p = 0.07$). Mean pH correlated with *Staphylococcaceae* ($r = 0.50$; $p = 0.002$) and SI ($r = 0.33$; $p = 0.04$).

Conclusion. Similar to other studies *Proteobacteria*, *Actinobacteria* and *Pseudomonadales* were found to be predominant in HBM microbiota, although *Corynebacteriales spp.* were also found among the most abundant taxa. The concentration of macronutrients in milk is likely to affect the composition and diversity of the microbiota since protein and fat content are correlated with the abundance of particular bacterial taxonomic units.

The observed HBM microbial and macronutrient content correlations show indirect evidence about the importance of maternal diet in shaping an infant's gut microbiota.

Acknowledgements. The authors do not have any conflict of interest. The study was supported by the Latvian State Research Programme 'Biomedicine'.

The feeding characteristics of late preterm infants in the first year of life

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Background and Aim. This study aims to identify factors associated with successful breastfeeding in late preterm infants (LPIs) and explore the initiation of solid food feeding in the first year. The goal is to promote optimal development and mitigate risks associated with prematurity.

Methods. A prospective cohort study was conducted of all infants born at 34⁺⁰ to 36⁺⁶ weeks gestational age in Lithuanian University of Health Sciences hospital Kaunas Clinics during 2020–2021. Families were followed up until the infants reached 12 months of age. Participants were divided into 3 sub-groups according to gestational age: 34⁺⁰⁺⁶, 35⁺⁰⁺⁶, 36⁺⁰⁺⁶. Average breastfeeding initial time, average breastfeeding duration time, average solid foods feeding initiation time and prevalence of breastfeeding at 1, 3, 6 and 12 months were examined. The correlation among factors that might affect breastfeeding rates was calculated using the chi-square test ($p < 0.05$).

Results. 222 participants were eligible for analysis. The average breastfeeding initiation time was: 34⁺⁰⁺⁶ – 5.76 days (SD 4.36), 35⁺⁰⁺⁶ – 2.39 days (SD 2.15), 36⁺⁰⁺⁶ – 1.57 days (SD 2.08). Breastfeeding initiation of 34⁺⁰⁺⁶ group was statistically significantly delayed ($p < 0.001$). The rates of exclusive or partial breastfeeding were: 34⁺⁰⁺⁶ – 93.4% ($n = 57$), 35⁺⁰⁺⁶ – 86.1% ($n = 53$) and 36⁺⁰⁺⁶ – 88.7% ($n = 94$) at discharge, respectively. Group 36⁺⁰⁺⁶ had a statistically significant higher exclusive breastfeeding rate ($p < 0.001$). The rates of exclusive and partial breastfeeding at 1, 3, 6 and 12 months were: 34⁺⁰⁺⁶ – 83% ($n = 48$), 62.7% ($n = 36$), 49.2% ($n = 28$) and 27.6% ($n = 16$), 35⁺⁰⁺⁶ – 85.7% ($n = 51$), 76.8% ($n = 46$), 56.4% ($n = 35$) and 35.9% ($n = 19$), 36⁺⁰⁺⁶ – 83.5% ($n = 88$), 65.1% ($n = 69$), 50.5% ($n = 54$) and 33% ($n = 36$), respectively. The average duration of breastfeeding was: 34⁺⁰⁺⁶ – 5.89 months (SD 4.72), 35⁺⁰⁺⁶ – 6.87 months (SD 4.55), 36⁺⁰⁺⁶ – 6.51 months (SD 4.91). No correlation was found between the duration of exclusive breastfeeding rate and gestational age. The average time of solid food introduction was 5.48 months (SD 0.84) with vegetables being introduced as the first solid meal. No statistically significant difference between groups was observed.

Conclusions. Vaginal delivery, skin-to-skin contact after birth, early rooming-in, breastfeeding within 2 hours after birth and successful prior breastfeeding statistically significant cause earlier breastfeeding initiation and longer duration of breastfeeding in LPIs. All infants began solid food feeding at an average age of 5 months, with vegetables being the primary food choice.

Changes in the composition of gut microbiota after the introduction of complementary feeding in infants

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Background. The biodiversity of the intestinal tract begins to form in infancy and is influenced by various factors – including patterns of complementary feeding (further: CF). Understanding microbiota drifts after the introduction of new food products could help to develop recommendations about CF to maintain healthy microbiota.

Aim. To find out, how dietary patterns of CF affect the composition of gut microbiota.

Methods. A prospective study was performed at primary healthcare centres in Latvia. Faecal samples of healthy infants and filled questionnaires from their parents were obtained twice – at the age of 1–6 months (group I) and 7–12 months (group II). The 16S rRNA gene sequencing was performed to identify the bacterial taxonomic units in faecal samples and the relative abundance of phyla level was counted. The composition of gut microbiota was analysed in relation to the type of CF (fish, gluten-containing products, eggs, soy). Statistics: T-tests.

Results. The participant sample included 18 infants and 36 faecal samples were analysed. The median age in group I was 4 months, group II – 11 months. At the age of 4–6 months, several complementary foods were introduced in infants' nutrition: eggs (11%, 2/18), gluten (22%, 4/18), soy (11%, 2/18), cow's milk (11%, 2/18) and fish (16%, 3/18). The following products were introduced at the age 7–12 months: eggs (66%, 12/18), gluten (72%, 13/18), soy (16%, 3/18), cow's milk (50%, 9/18), fish (55%, 10/18). The most abundant phyla detected in faecal samples were *Actinobacteria*, *Bacteroidetes* and *Firmicutes*, all tended to increase with age. While phylum *Proteobacteria* significantly decreased with age (group I vs. group II: 11.3 (SD 14.4) vs. 1.4 (SD 4.2), $p = 0.009$). Further, a higher abundance of phylum *Proteobacteria* was detected in children whose diet had not yet contained eggs (0.4 (SD 0.8) vs. 5.0 (SD 8.7), $p = 0.05$). Besides, in children whose diet was supplemented by soy phylum *Bacteroidetes* was detected in a higher amount, but phylum *Firmicutes* in a smaller amount: 31.2 (SD 41.3) vs. 1.7 (SD 3.5); $p = 0.02$ and 19.2 (SD 14.4) vs. 56.2 (SD 13.8); $p = 0.0001$, respectively. The abundance of phyla did not differ significantly regarding the introduction of fish or cow milk.

Conclusion. After the introduction of CF, the modification of infant gut microbiota is reflected in the phyla level, the most significant changes being observed in diet with eggs and soy. However, more detailed changes in the other taxonomic levels and the functional capacity of the microbiome in response to the introduction of CF should be analysed further.

Acknowledgements. The authors do not have a conflict of interest. Funding: Latvian Council of Science; No. lzp-2021/1-0275.

Pain in adolescents: prevalence, association with age and gender

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Background. Pain is a global public health problem that has been steadily increasing in recent decades. Living without pain is one of the fundamental human rights. The pain has impact on physical and psychological health, it affects educational attainment as well. The underappreciation of pain affects the health of adolescents, leading to physical disability and psychological distress in adulthood.

Aim. The aims of the study were to study the prevalence of pain, its association with age and gender.

Methods. A retrospective, comparative study, with a descriptive, exploratory design. Data were collected with a structured self-report, anonymous questionnaire based on The Lübeck Pain-Screening Questionnaire.

Results. In total, 191 teenagers (aged 13–18 years) participated in the study. Among the teenagers were 69.6% (n = 133) of the girls. The average age of the adolescents was 15.67 years (± 1.69 SD). During the last 3 months 86.9% (n = 166) of teenagers noted pain, 91.7% (122/133) of girls and 75.9% (44/58) of boys, $p = 0.003$. The prevalence of pain in adolescents over the past 6 months was 90.1% (n = 172), 94% (125/133) of girls and 81% (47/58) of boys, $p = 0.006$. Pain was experienced daily by 57.1% (n = 109) of adolescents, $p = 0.053$. Pain was most common in girls aged 15 years (24.6%) and 18 years (23.0%), boys aged 15 years (27.3%) and 16 years (25.0%), pain was more common in girls than boys $p = 0.016$. The mean pain after visual analogue scale (hereinafter VAS) experienced by adolescents was 5.24 points (± 2.21 SD), respectively 4.37 points (± 2.62 SD) in boys and 5.61 points (± 1.89 SD) in girls. The most severe pain after VAS averaged 7.37 points (± 2.53 SD), 6.16 points (± 3.22 SD) in boys and 7.9 points (± 1.96 SD) in girls, comparing the strongest pain experienced between boys and girls $p = 0.001$. Adolescents who felt the presence of pain on a daily basis were 57.1% (n = 109), 61.7% (82/133) of girls and 46.6% (27/58) of boys. Pain experienced by adolescents on a daily basis after VAS averaged 2.53 points (± 2.56), respectively 1.83 points (± 2.34 SD) for boys, 2.84 points (± 2.59 SD) for girls.

Conclusion. Pain is a common problem among adolescents, and the prevalence of pain increases with age, peaking in both sexes at age 15. Pain is more common in girls. More than half of adolescents experience pain daily. In general, 20.4%–27.6% of young people indicated chronic pain.

Acknowledgements. I have nothing to disclose.

Importance of multisensory therapy for children with speech disorders

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Background. The problem has been of outstanding importance since the 1960s when studies on behaviour correction methods for children with speech disorders began in the United States of America. The newest data about the USA shows that the post-pandemic number of newly diagnosed speech disorder patients increased by 110%. A 2016 year study showed that 71% of children with autism spectrum disorders and 9% of children without diagnosis have speech disorders. After different types of therapy speech abilities have improved. Some children without therapy showed degradation. In 6 months, development was improved only in 40% of study participants. 16% of healthy children had development problems and only 9% showed results better than age norms.

Aim. The aim of the current study was to improve the role of multisensory therapy in speech disorders correction.

Methods. Retrospective quantitative research. Analysed: patient's parents' questionnaires and conclusions from psychiatrists. 2–5 years old children: 72 with autism spectrum disorders, 28 healthy.

Results. Multisensory therapy improves speech abilities for 17%–54%, depending on therapy methods. Montessori training shows only 20% positive results.

Conclusion. Multisensory therapy is practically helping with development correction. It is important to provide specialized and Montessori education for children with speech disorders.

Acknowledgements. There is no conflict of interest. Results are part of another study: 'Development measurement for children with speech disorders'.

Comparative assessment of newborn condition via APGAR scores in relation to labour pain management: nitrous oxide vs. epidural anaesthesia

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Background. The term ‘trial of labour after caesarean’ (TOLAC) is a medical strategy in which a woman who has had a caesarean section in the past tries to deliver her baby vaginally during a future pregnancy as opposed to having another caesarean section. During childbirth, pain relief is important, so epidural anaesthesia and nitrous oxide are often used.

Aim. To determine if the evaluation of a newborn using APGAR scores is associated with the method of analgesia during the Trial of Labour After Caesarean (TOLAC).

Methods. A retrospective study was conducted at the Obstetrics and Gynaecology Clinic of Kaunas Clinics. Patients who had a successful trial of labour after a caesarean (TOLAC) section from September 1, 2020, to September 1, 2022, were selected from the clinic’s registry. Women were divided into two groups based on the anaesthesia used for managing labour pain: Group I consisted of 147 women who received epidural anaesthesia, while Group II comprised 38 women who were administered nitrous oxide. The newborn’s condition according to the Apgar score was compared between two groups. Data was analysed using *IBM Statistics SPSS* for frequencies, T and χ^2 tests. Results with values of $p < 0.05$ are considered statistically significant.

Results. There were no statistically significant differences observed in the assessment of newborns’ APGAR scores at 1 and 5 minutes after birth between infants born to mothers who received epidural analgesia for labour pain relief and those born to mothers who did not receive this analgesia (χ^2 test = 3.228, $p = 0.665$) (χ^2 test = 3.794, $p = 0.285$). At 1 and 5 minutes after birth, when evaluating the APGAR scores of newborns whose mothers received nitric oxide for pain relief during labour versus those whose mothers did not receive this analgesia, no statistically significant differences were determined (χ^2 test = 3.794, $p = 0.285$) (χ^2 tests = 1.609, $p = 0.657$). At 1 and 5 minutes after birth, when assessing the APGAR scores of newborns whose mothers received epidural analgesia for pain relief during labour compared to those whose mothers received nitric oxide for pain relief, no statistically significant differences were observed (χ^2 test = 2.652, $p = 0.618$) (χ^2 test = 1.243, $p = 0.537$).

Conclusion. The condition of the newborn after a successful trial of labour after caesarean (TOLAC) is not affected by the administration of either epidural or nitric oxide analgesia.

Acknowledgements. The authors declare the absence of a conflict of interest.

P-selectin as a predictive biomarker in juvenile idiopathic arthritis differential

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Background. Several chemokines have been described as responsible for inflammatory cell activation and migration to the inflammation site in JIA. However, data about their significance in disease diagnosis is scarce.

Aim. Analyse different inflammatory cytokine changes in the serum of JIA patients in active disease and after 9-months of follow-up.

Methods. A prospective single-centre study was conducted, including 12 JIA patients (excluding systemic JIA) and 16 healthy controls (HC) with no signs of inflammation or chronic diseases. Multiplex immunoassay (Luminex) was used for the detection of 5 cytokines (P-selectin, EGF, eotaxin, osteopontin, VEGF-A) in serum samples of active disease (acJIA) and after 9 months of treatment (REM). Additionally, erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) levels were analysed. JIA disease activity was evaluated using JADAS10. P value < 0.05 was considered significant.

Results. 83.3% (10/12) JIA patients were female; median age was 13.2 years (3–17 years). At baseline visit, all patients had high disease activity according to JADAS10 and reached clinical remission (REM) after 9 months. While higher inflammation marker (ESR, CRP) levels were observed in active disease compared to follow-up visit and HC group, differences were not significant ($p > 0.05$). From 5 cytokines, only P-selectin showed a significant elevation in acJIA compared to HC ($p = 0.008$). Interestingly, there was no significant difference in P-selectin concentration between the first and follow-up visits. However, P-selectin with a cut-off of 617.602 ng/mL could predict acJIA with 83.3% sensitivity and 80% specificity (AUC = 0.83; LR 4.2; $p = 0.03$) in the first visit with suspicion of JIA.

Conclusion. The findings of the study suggest that P-selectin may serve as a valuable diagnostic marker for JIA where conventional nonspecific inflammation markers like ESR and CRP may lack reliability. Further research is needed to validate these findings and explore the potential clinical applications of P-selectin in JIA diagnosis and management.

Acknowledgements. All authors declare that they have no conflicts of interest.

Paediatric chest computed tomography exposure: current performance of a single Lithuanian paediatric centre

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Background. The number of computed tomography (CT) examinations has been significantly increasing in the last two decades, leading to increased radiation exposure among patients. Children in particular are more susceptible to ionizing radiation, resulting in an increased lifetime risk of cancer. Diagnostic reference levels (DRLs) are an invaluable tool for monitoring and optimizing patient radiation exposure to reduce the risks of potential adverse events.

Aim. This study aimed to evaluate local radiation exposure doses in children undergoing chest CT investigations, set up local DRLs and compare them with the currently standing European Guidelines on DRLs for Paediatric Imaging.

Methods. Retrospective data from chest CT examination scan series performed on children aged 0–17 years in Vilnius University Hospital Santaros Klinikos Children's Hospital between 2020 and 2021 was collected and analysed. Patients were grouped by weight in intervals of 5–< 15 kg, 15–< 30 kg, 30–< 50 kg and 50–< 80 kg. For each group, the minimum, first-quartile, median, third quartile and maximum dose-length product (DLP) values were calculated. The Shapiro-Wilk test was applied to assess the distribution of variables. Spearman's rank correlation and a linear regression model were used to assess the relationship between patient weight and DLP received. Local DRLs were defined as the third quartile values of DLP and CTDI. The results were evaluated and compared with DRLs proposed by the European Guidelines on DRLs for Paediatric Imaging. Statistical analysis was performed using RStudio.

Results. 144 entries of chest CT examinations were selected and grouped. Median values of DLP by weight group were 34.65 mGy*cm for 5–< 15 kg (n = 13), 44.50 mGy*cm for 15–< 30 kg (n = 36), 91.65 mGy*cm for 30–< 50 kg (n = 51) and 137.27 mGy*cm for 50–< 80 kg (n = 44). The determined local DRL values were 39, 59, 110, and 151 mGy*cm, respectively. Local DRLs based on DLP were 4.3% to 24.6% lower compared to European DRLs. Spearman's rank correlation showed a statistically significant positive correlation of medium strength ($\rho = 0.47$, $p < 0.001$) between body weight in kilograms and DLP received. The linear regression model was also statistically significant ($F p < 0.001$) with the resulting regression line of $y = 5.78 + 2.37 * x$, where y is DLP received, and x is patient weight in kilograms.

Conclusions. Radiation exposure values obtained through currently used local CT imaging practices adhere to standing European DRLs and are potentially up to 25% lower. The linear regression model provides a tool for individual patient radiation exposure and risk assessment.

Prevalence of celiac disease histology in duodenal biopsies from children

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Background. The problem is of paramount importance as celiac disease is a major public health challenge worldwide and the exact global prevalence of this disease remains unclear. Celiac disease (CD) is an autoimmune disorder that occurs in people with a genetic predisposition and causes sensitivity to gluten and related proteins. Celiac disease results from an atypical reaction to gluten that leads to damage to the small intestine and subsequent malabsorption of nutrients. The primary approach to the diagnosis of celiac disease involves consideration of clinical features in addition to serologic testing and histologic findings. Endoscopy with a biopsy of the small intestine is considered the gold standard test. Celiac disease lesions can be divided into five stages depending on histology, originally defined by Marsh and later modified by Oberhuber.

Aim. The aim of the current study was to determine the most common stage within the Marsh classification system in duodenal biopsies performed over a two-year period in patients newly diagnosed with a particular disease.

Methods. A total of 3813 patients were included in the study. The respective histologic slides were examined to determine the presence and type of Marsh classification.

Results. 2%, n = 80 (95% confidence interval (CI) 1.7–2.6) were newly diagnosed with celiac disease. Of all patients, 11% n = 9 (95% CI 5.3–20.3) were classified as Marsh type 1, with an increase in intraepithelial lymphocytes without hyperplasia of the crypt and normal villi. There were no patients with Marsh type 2. 28% n = 22 (95% CI 18.1–38.6) patients with Marsh type 3a with mild villous atrophy. 38% n = 30 (95% CI 26.9–49.0) patients with Marsh type 3b with partial villous atrophy and 24% n = 19 (95% CI 15.0–34.6) patients with Marsh type 3c with subtotal villous atrophy.

Conclusion. The prevalence of celiac disease based on duodenal biopsies is 2%. This study has shown that Marsh classification type 3 is most common in newly histologically diagnosed celiac disease cases.

Acknowledgements. The author has no conflict of interest to declare.

Parents' knowledge about child constipation

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Background. Constipation among children is a common problem, with prevalence of 3%–30% worldwide. In 95% of cases, constipation is functional type and not related to any organic pathology. The most common cause of constipation is a lack of proper diet, dietary changes, and various psychological factors such as toilet training. With a sufficient level of parental knowledge, these causative factors would be potentially preventable.

Aim. Determine parents' knowledge about normal bowel movements in different child age groups, knowledge about constipation-induced complaints, risk and dietary factors.

Methods. Analytic quantitative cross-section research. Primary data for the test was obtained by electronic questionnaire targeting Latvian-speaking parents, who live in Latvia, with at least one underage child. For statistical data comparison, the chi-square test was used.

Results. The current study included 288 mothers and 6 fathers. Data for mothers was analysed further. Knowledge level of constipated-looking bowel movement was weak in 8% (n = 23), average – 39.9% (n = 115) and good in 52.1% (n = 150) of cases. Knowledge level for constipation-induced symptoms was weak in 7.6% (n = 22), average – 47.6% (n = 137) and good in 44.8% (n = 129) of cases. Knowledge level for constipation-inducing risk factors was weak in 15.3% (n = 44), average – 33.3% (n = 96) and good in 51.4% (n = 148) of cases. Knowledge level for nutritional products, which could evoke constipation were weak in 11.1% (n = 32), average – 64.2% (n = 185) and good in 24.7% (n = 71) of cases. By analysing knowledge level about nutritional products, respondents with 1 to 2 children in a family were more likely to have weak results than families with 3 or more children (p = 0.04). Similarly, weak results were more common for respondents in the age group 21–29 than older individuals (p = 0.008). Regular bowel movements were not recognized for breastfed children in 45.1% (n = 130), in baby-formula-fed children in 50.3% (n = 145), for baby-fed children in 39.2% (n = 113) and for children fully fed by adult food in 52.1% (n = 150) of cases.

Conclusion. Parent knowledge about constipation in most cases was good or average, weak knowledge was only in 7.6%–11.1% of cases. The worst results were about constipation-inducing nutritional products, where only 24.7% of respondents showed a good level of knowledge. The number of children in a family and the age of the mother affect the level of knowledge about constipation-inducing nutritional products.

Acknowledgements. The first author expresses gratitude to the research supervisor Dr. Jānis Blumfelds.

Effect of mode of delivery on electrocortical activity of premature infants

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Background. Brain function monitoring of preterm infants is gaining importance due to the perinatal factors that may injure their central nervous system, especially during the first days of life.

Aim. The aim of this study was to evaluate whether the mode of delivery may affect the amplitude-integrated encephalography (aEEG) of premature newborns.

Methods. We prospectively included infants born between 22–31 weeks of gestation between June 2020 and July 2022. Serial aEEG recordings were performed at five time points of age (days 1–3, 6–8, 13–15, 20–22, and 27–29). Recordings were analysed for background pattern, onset and appearance of cyclicity, and lower amplitude border and bandwidth, which were used to derive a composite Burdjalov score. Results were compared between the two groups of infants according to mode of delivery. For descriptive statistics, the means and standard deviations (SD) were calculated. The group comparisons were estimated using the Mann-Whitney U test with a significance level set at $p < 0.05$.

Results. In total, 140 premature infants were included: 62 born by caesarean section (mean gestational age 28 weeks, SD 2.0; mean birth weight 1187 grams, SD 362.8) and 78 by vaginal delivery (median gestational age 27 weeks, SD 2.5; median birth weight 1117 g, SD 382.9). Better results were observed in the group of newborns born by caesarean section. This group had higher mean ranks of all dimension scores at each time point. Mean ranks of cycling scores were significantly higher in the caesarean section group at 6–8 days of age ($p < 0.05$), at other time points in all dimensions the difference was non-significant.

Conclusion. Factors such as mode of delivery are associated with electroencephalographic tracing characteristics in the first month of life. This may be a consequence of increased central venous pressure and changes in cerebral blood flow during vaginal delivery. Fluctuation of cerebral blood flow is one of the mechanisms involved in the pathophysiology of intraventricular haemorrhage in preterm infants. Changes in cerebral blood flow may lead to changes in brain electrical activity.

Acknowledgements. There is no conflict of interest. The authors received no financial support for the research.

PHARMACY

Impaired neurological outcomes in mice at multiple time points following transient ischemia

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Background. Over 40% of stroke patients have chronic hemiparesis of the contralateral upper limb, which makes it difficult to reach, pick up, and grasp onto objects. This impairment is the most prevalent one that follows a stroke and leads to a reduced quality of life overall (Bleyenheuft and Gordon, 2014). A repeated and long-term evaluation of the upper limbs' functional capacity after an ischemic event can be obtained using the rodent motor task performance.

Aim. To evaluate the long-term motor functionality of the mice upper limbs by using a single-pellet reaching task following the experimental ischemic stroke induction in mice.

Methods. Filamentous middle cerebral artery occlusion (fMCAo) was induced in male C57BL/6J mice aged 12 weeks. Mice were randomly assigned to 3 groups: naïve, sham and fMCAo (9-10 mice/group). Reaching task was performed on experimental days (D) 14, 28, 60, 120 and 180 after fMCAo to quantify the neurological deficit induced by this procedure. The amount of successful grasping of the food pellet from the total amount of tries was calculated for both front paws and right paw only. Data was analysed using two-way ANOVA with Holm-Sidak's post-hoc test.

Results. The number of successful pellet reaching with both paws was significantly lower in fMCAo group mice compared to naïve mice on D60 and D180. Successful grasping of the pellet with the right paw was significantly lower in fMCAo group on D28, D60 and D120 (in comparison to Naive group mice). Right paw grasping was also lower in fMCAo mice when compared to Sham group on D60 and D180.

Conclusions. Our findings show that focal ischemic stroke has a direct impact on upper extremity recovery and leads to prolonged, permanent impairment of upper limb motor function. This demonstrates the importance of maintaining a therapeutic approach for a long enough period of time after an ischemic stroke to address the motor impairments affecting the upper limbs.

Acknowledgements. This study has been supported by UL funding for 'Biomedicine and pharmacy' and ERA-NET project 'Multi-scale investigation of synaptic dysfunction after stroke (MISST)' No. ES RTD/2018/29.

Assortment of dietary supplement capsules containing liposomal iron in Lithuania: analysis of excipients and origin countries

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Background. Iron supplements are commonly used for the prevention and treatment of iron deficiency and certain types of anaemia. However, the limits of oral iron supplementation are poor absorption, metallic flavour, stomach upset, diarrhoea or constipation. Studies have shown that liposomal iron supplementation has higher bioavailability than non-liposomal supplementation and prevents common side effects such as constipation and gastrointestinal discomfort. Capsules are one of the dosage forms used for oral liposomal iron delivery.

Aim. The aim of the current study was to find out the excipient content and origin countries of dietary supplement capsules with liposomal iron in the Lithuanian market.

Methods. In this work, 9 Lithuanian market dietary supplement capsules containing liposomal iron were analysed. As information sources websites including vet.lt and eurovaistine.lt were used. Data were analysed by *Microsoft Excel 2019*.

Results. Excipient content was analysed for 9 dietary supplement capsules with liposomal iron. There were 6 different categories of excipients. Those categories were: fillers, colorants, coat-forming agents, solvents, emulsifiers and anticaking agents. For emulsifiers, the most common was lecithin, which was used in all analysed dietary supplement capsules. Lecithin is a source of phospholipids which are important in liposome formulation. Lecithin phospholipids are amphipathic molecules encapsulating hydrophilic substances in the inner water compartment and hydrophobic molecules in the bilayer of phospholipids. Lecithin is also regarded as a non-toxic emulsifier. Cornstarch was used in 89% of analysed capsules as a coating material for liposomes to increase their stability. Magnesium stearate as an anti-caking agent was present in all analysed dietary supplement capsule formulations. The amount of iron in analysed capsules was between 14 mg to 30 mg per capsule. The recommended daily iron intake for adults 19–50 years is 8 mg for men and 18 mg for women. Ferric pyrophosphate was used as the form of iron for liposomal delivery in all analysed supplement capsules. According to the country of manufacturer, the major group of liposomal capsules were distributed from Switzerland (3), Lithuania (2) and Italy (2).

Conclusion. From the data presented it can be concluded that dietary supplement capsules containing liposomal iron are common in Lithuanian drugstores. All excipients play an important role in capsule content. This study helps to understand the properties and benefits of dietary supplement capsules formulated with liposomal iron.

The effects of commonly used non-opioid analgesics on the formation of advanced glycation end products

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Background. Advanced glycation end products (AGEs) are glycotoxins that are formed by non-enzymatic reaction of free reducing sugars or reactive α -oxoaldehydes with biological macromolecules. Aging, physiologic and pathologic metabolic reactions are responsible for producing the vast majority of endogenously formed AGEs. AGEs are associated with the development of several pathologies such as retinopathy, nephropathy, impaired wound healing, atherosclerosis. Suppression of glycation reactions and inhibition of AGE formation is a potential mechanism for delaying AGE-related conditions. Drug repurposing for looking compounds that inhibit inflammation and prevent free radical formation, which is an important factor contributing to increased AGE formation in the body, is actual.

Aim. The aim of the current study is to evaluate the effects of frequently used non-opioid analgesics (nimesulide, diclofenac, ibuprofen, paracetamol, celecoxib) on the formation of AGEs in *in vitro* protein glycation models.

Methods. Two tests, which are widely used to determine the efficacy of potential AGE inhibitors, were applied: glycation of proteins with methylglyoxal (MGO) and with glucose. Bovine serum albumin (10 mg/mL) with 5 mM MGO or 100 mM glucose and tested substances at 3 concentrations (0.25, 0.5 and 1 mg/mL) were used and incubated at 37°C for 7 days. The intensity of AGE formation was measured by fluorescence. Additionally, the flavonoid rutin and aminoguanidine, known AGE formation inhibitors, also were tested.

Results. Nimesulide possesses the most significant anti-AGE effects as it substantially inhibited AGE formation at all three concentrations tested, both in the MGO assay and in the reaction with glucose, like the flavonoid rutin. Ibuprofen and diclofenac facilitated a reduction in AGE formation only in the reaction with glucose which indicates a lack of glycation inhibiting activity of both drugs under dicarbonyl-stress conditions (MGO). Paracetamol and potent COX-2 inhibitor celecoxib did not prevent AGE formation in any of the glycation reactions. Standard AGE inhibitor aminoguanidine inhibited the formation of AGE only in a test with MGO, showing slightly weaker activity than nimesulide, while the reaction with glucose showed no antiglycation activity.

Conclusions. Nonsteroidal anti-inflammatory agent nimesulide showed the most promising properties as an anti-glycation agent. Further studies are necessary for a more practical use of nimesulide and other anti-inflammatory drugs for treatment of AGE related complications and diseases.

Acknowledgements. This study was supported by the UL fundamental research grant 'Research of biomarkers and natural substances for acute and chronic diseases' diagnostics and personalized treatment'.

Analysis of antibiotic consumption at the paediatric tertiary-care hospital

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Background. Antibiotic usage analysis is an important step in the improvement of prescription practices in hospitals taking into account the growing resistance to antibiotics, which is one of the major threats to public health.

Aim. This study aimed to investigate current patterns of systemic antibiotic consumption in the tertiary-care paediatric hospital in order to improve antibiotic usage practices.

Methods. The study was conducted by using retrospective and observational analysis and the WHO standardized methodology and AWaRe classification. Data were extracted from patients' electronic records for the period of 1/01–31/12/2022 and were entered into the Excel form for analysis. Inclusion criteria: hospitalized patients less than 18 years old with prescribed antibiotics. The collected data included patients' demographic information, antibiotics prescribed to the patient (ATC classes J01 and P01AB), doses, route of administration, diagnosis, and empirical or targeted prescription. Exclusion criteria: day-centre patients and emergency patients. All data were collected by the clinical pharmacist and later discussed with other specialists. Patients' characteristics were analysed using descriptive statistics. The proportions of antimicrobial use were calculated in percentages. Local ethics committee accepted the study protocol.

Results. In 2022 5477/15127 (36.2%) patients were treated with antimicrobials and had 10697 antibiotic prescriptions. Empirical prescriptions were 7952 (74.3%), definitive 373 (3.5%) and surgical prophylaxis 2372 (22.2%). There was predominant use of parenteral antibiotics: 8422 (78.7%) prescriptions, 2272 (21.2%) oral and 3 (0.1%) intravenous and/or inhalation prescriptions. Thirty-five different antibiotics were used and the most commonly used antibiotic class was ATC J01CA group – 2343 (21.9%) prescriptions. There were 2372 (22.2%) prescriptions for surgical prophylaxis. The most often prescribed antibiotics were cefazoline (1391; 58.6%), cefuroxime (461; 19.4%) and metronidazole (112; 4.7%)

The patient group which received the most antibiotic prescriptions (3198; 29.9%) were patients from 1–5 years. Antibiotics were most often used for the treatment of upper and lower respiratory tract infections (2547; 23.8%).

In 2022 14 (58.2%) antibiotics belonged to the Access group, 16 (41%) to the Watch group and 4 (0.8%) to the Reserve group.

Conclusion. This study identified some positive trends in antibiotic usage, e.g., the most prescribed antibiotic group was J01CA, cefazolin and cefuroxime used for surgical prophylaxis. However, there are still problem areas for improvement, i.e., the predominant use of parenteral antibiotics and empirical treatment.

Acknowledgements. There is no conflict of interest. This study was supported by the UL fundamental research grant 'Research of biomarkers and natural substances for acute and chronic diseases' diagnostics and personalized treatment'.

Evaluation of the efficacy of magnesium as a component of preservative fluid in preserving graft function in an isolated porcine kidney model

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Background. Next to potassium, magnesium is the body's main intracellular cation. It is involved in the metabolic processes of carbohydrates, proteins, and fats. It participates in the synthesis of the high-energy bonds ATP and GTP and the stabilization of DNA structure. It shows the ability to form compounds with phospholipids and is therefore an integral part of cell membranes.

Aim. The aim of this study was to evaluate the effect of magnesium added to Biolasol fluid at different concentrations on the function of isolated pig kidneys.

Methods. Thirty isolated kidneys of Great White Polish pigs were used in the study. All experimental procedures were carried out under the approval of II Local Ethics Commission for Animal Experiments in Cracow, Poland (No. 1046/2013). Biolasol fluid was supplemented with Mg²⁺ at concentrations of 2.5 mg/L and 5 mg/L. Three study groups were formed: Biolasol (A, n = 10), Biolasol + Mg²⁺/2.5 mg/L (B, n = 10), Biolasol + Mg²⁺/5 mg/L (C, n = 10). Kidneys were washed and stored by simple hypothermia (4°C) for 24 hours. Renal function parameters were analysed in the collected perfusates.

Results. After 24 h of kidney storage, creatinine concentration decreased by 25% in group B vs group A and by 75% in group C vs group A. Urea concentration decreased by 59% in group B vs group A and by 65% in group C vs group A. The [Na⁺] concentration was 131 mmol/L in group B and 145 mmol/L in group C. The results were statistically significant at p < 0.05.

Conclusion. Supplementing the composition of Biolasol fluid with additional magnesium had a beneficial effect on renal function during perfusion and preservation. It is likely that EDTA contained in the fluid enters into chelating reactions with Mg²⁺ ions of the mitochondrial membrane, which increases its permeability to monovalent cations. Magnesium added to the fluid in concentrations greater than the EDTA concentration counteracts mitochondrial swelling and associated changes.

Acknowledgements. The research was financed by the Medical University of Silesia in Katowice: No. BNW-1-030/K/3/F.

Observational study of the prevalence of medication omissions at the time of hospital admission

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Background. Obtaining medication history from hospitalized patients upon admission is a process fraught with potential errors. Faulty medication history may result in failure to identify potential or relevant drug-related problems or lead to inappropriate pharmacotherapy at the time of hospitalization. One of the most commonly observed errors in medication history is drug omission, where medication is not documented in the patient's medical records. Clinical pharmacists globally practice medication review and reconciliation, reducing patient risks. This service is not established in Lithuania currently. To our knowledge there is no current data concerning medication omissions in Lithuania.

Aim. The aim of the study was to evaluate the prevalence of medication omissions at the time of hospital admission and to identify the categories of medications associated with omissions.

Methods. A prospective, observational study, included 187 patients, hospitalized in the cardiology department. A pharmacist conducted patient interviews and compared the information in patients' medical records with the information obtained from the patients' interviews.

Results. The average number of medications used by the patients, as obtained through the interviews with the pharmacist was 7.95 (SD = 3.07). Medical records documented an average of 5.60 (SD = 2.64) medications. The mean number of medications omitted per patient was calculated at 2.34 (SD = 2.09). A higher incidence rate of medication omissions was observed in medication categories, less frequently used by the patients. 75% or more medications unrecorded in medical records fell within categories, including gastrointestinal medications, vasoprotectives, musculoskeletal system medications, dermatologicals, sensory organs medications, psychoanaleptics, other analgesics and antipyretics, antiepileptics, homoeopathic medications.

Conclusion. This is the first research ever conducted in Lithuania regarding medication omissions from patients' medical records, so it provides robust local data. The study confirmed the relevance of the problem in Lithuania: our results show a higher prevalence of medication omissions than those reported by other authors. According to scientific literature, nearly half of hospitalized patients have a least one of their medications omitted from their records. The current study revealed that 85.79% of patients had one or more medication omissions in their medical records. Nevertheless, the differences in results underscore the nature of the problem. Conducting similar research in other departments would further emphasize the issue and the necessity of developing a plan of measures to reduce patient risks. In conclusion, medication omissions are prevalent, with a higher incidence rate of omissions observed in drug classes unrelated to the main diagnosis within the analysed sample.

Intranasal metformin promotes AMPK and Akt signalling in rats with sporadic Alzheimer's disease

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Background. Metformin is a first-line treatment of type 2 diabetes mellitus, where it suppresses gluconeogenesis and reduces blood sugar by activating adenosine monophosphate-activated protein kinase (AMPK) in the liver. Decreased activities of brain AMPK and Akt are implicated in sporadic Alzheimer's disease (sAD), the most common form of dementia. Correspondingly, metformin may exert neuroprotective effects via boosting AMPK and Akt signalling pathways in the sAD brain. Moreover, intranasal administration of brain-penetrating metformin could further improve its central efficacy and allow for a safer dosage regimen.

Aim. We aimed to investigate whether low-dose intranasal metformin could improve AMPK and Akt signalling in sAD model rats.

Methods. Wistar male rats, aged 11–12 weeks, were used to model sAD-type changes. Animals were assigned randomly to control, metformin control, lesion and treated group (n = 10–12 animals/group). After the intranasal treatments and behavioural tests, rats were euthanized, and the left brain hemispheres were collected for Western blot analysis. Hippocampal protein lysate samples of 20 µg were separated by 10% SDS PAGE and transferred onto PVDF membranes. These were then blocked in 3% BSA-PBST and incubated with primary antibodies against AMPK, Akt, phospho-AMPK and phospho-Akt and subsequently with goat anti-rabbit immunoglobulins. Using enhanced chemiluminescence and UVP apparatus, images of target protein bands were obtained for analysis. The ratio of phosphorylated protein/total protein was calculated for each group and analysed using one-way ANOVA followed by the Bonferroni post-hoc test.

Results. In comparison to healthy animals, sAD-type rats demonstrated a significantly lower ratio of phospho-AMPK/total AMPK and phospho-Akt/total Akt. In stark contrast, sAD animals that were previously treated with intranasal metformin had significantly higher expression ratios of phosphorylated AMPK/total AMPK and phosphorylated Akt/total Akt. Healthy rats that were treated with metformin did not demonstrate any changes in the expression of AMPK or Akt when compared to control group animals.

Conclusion. Intranasal administration of metformin improves the signalling of AMPK and Akt pathways in sAD-type rats. Modulation of these pathways by metformin could be essential for halting the progression of sAD in experimental animals and would explain the observed improved cognitive outcomes in these animals.

Acknowledgements. Experiments were performed as part of a study supported by the University of Latvia Foundation project No 2261, funded by *Mikrotikls Ltd.*

PUBLIC HEALTH AND NURSING

Awareness of uric acid significance in family medicine in Latvia

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Background. Uric acid (UA) is a by-product of excessive purine metabolism in patients with metabolic syndrome (MS) resulting in hyperuricemia and gout. Emerging evidence shows that UA might be a causal factor in the development of MS including primary hypertension (PAH), chronic kidney disease (CKD), non-alcoholic fatty liver disease (NAFLD), insulin resistance (IR), dyslipidaemia and cardiovascular diseases. UA is an easy and cheap test to order at family doctors' (FD) practices. Early screening and possible lifestyle and medical interventions could improve patient outcomes.

Aim. The aim of the current study was to assess the awareness of FD in Latvia about the effects of increased UA on health and compare the rate of UA detection and the level of UA in blood tests in patients with and without MS components.

Methods. This cross-sectional study was done in two parts according to the declared aims. 75 FD answered the questionnaire at medical conferences, FD practices and health centres in Riga and Vidzeme. The questionnaire included 3 demographical and 8 close-ended questions on doctors' awareness of the effects of UA on sustaining normotension, role in the progression of diseases like PAH, diabetes mellitus 2 (DM2), CKD, NAFLD, atrial fibrillation (AF) and dyslipidaemia. In the second part of the study, 233 patients' medical history records were evaluated from 6 different FD practices. Assessed parameters were age, BMI, UA level and the presence of MS components listed above. Consent to use data from patient records was received from the accountable FD. Data was analysed using chi-Square tests and Spearman correlation in *IBM-SPSS-29* software.

Results. Survey results showed that 64 (85.3%) of doctors screen their patients for UA and 49 (65.3%) are informed about the effects of UA on IR and obesity. However, only 14 (18.7%) are informed of Allopurinolum's effects on blood pressure. Out of 233 patients, 147(63.1%) had established UA in the last 5 years and 86 (36.9%) had not. Patients with established UA had higher BMI (30.5 ± 8 vs 27 ± 5 ; $p \leq 0.05$) and on average had more MS components (1.87 ± 1 vs 1.1 ± 1 , $p \leq 0.05$). Pearson correlation showed that a higher UA level is positively associated with a higher incidence of MS components ($r = 0.418$; $p \leq 0.05$)

Conclusion. Our results from medical records support the emerging studies. The UA test could be used as a screening of patients in FD practices. FD in Latvia are not aware enough of new data and more guidance is required.

Acknowledgements. The authors declare the absence of a conflict of interest.

Prescribing pre-exposure prophylaxis for HIV prevention: 2-year experience and follow-up results

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Background. Pre-exposure prophylaxis (PrEP) is HIV medicine taken to reduce the chances of getting HIV infection. PrEP is used by people who are HIV-negative but are at high risk of being exposed to HIV through intercourse or injection drug use. The most common form of PrEP used worldwide is a combination of Emtricitabine 200 mg and Tenofovir disoproxil 245 mg, which are taken once daily orally at the same hour every day. When taken as prescribed, PrEP is highly effective and more importantly cost efficient for preventing HIV infection.

Aim. The aim of this study was to assess the efficacy of PrEP for HIV prevention. In addition, efforts were made to analyse the use of protection during intercourse among patients who take PrEP to avoid other sexually transmitted infections (STIs).

Methods. The retrospective study included a total of 52 patients who were prescribed and continuously took PrEP between August 2021 and July 2023. The results were collected and statistically analysed using *Microsoft Excel*.

Results. In total, 52 homosexual men with an average age of 41.40 years were prescribed PrEP according to the guidelines and were closely monitored every three months. During the period an astonishing 0% (n = 0) contracted HIV. Nevertheless, 73% (n = 38) contracted one or multiple bacterial STIs. Consequently, only 27% (n = 14) remained STI-free during the two-year period. Of the 73% (n = 38) patients who contracted at least one bacterial STI, 26 had one infection episodes, 6 had two, 2 had three, 1 had four and 3 had five episodes during the two-year period. The most common bacteria causing the STIs were: 31 *Neisseria gonorrhoeae*, 20 *Chlamydia trachomatis*, 13 *Treponema pallidum*, 9 *Mycoplasma genitalium*, 6 *Lymphogranuloma venereum*, 2 *Haemophilus parainfluenzae*.

Conclusion. The study shows that PrEP effectiveness against contracting HIV was 100%. However, the small sample size (n = 52) must be considered. In addition, an overwhelming 73% (n = 38) contracted one or multiple bacterial STIs while being on PrEP. Consequently, it means that the patients taking PrEP feel overprotected and lack self-awareness. Furthermore, patients taking PrEP feel protected against HIV, meanwhile, all bacterial STIs are treatable with antibiotics. Therefore, using protection during intercourse becomes less appealing. In conclusion, many PrEP users do not take protection seriously during intercourse or underestimate the potential risks of other STIs.

Acknowledgements. The authors declare no conflict of interest and have not received any funding from a third party regarding the current study.

An analysis of the allergens prevalent in the population of Kosovo: characteristics and clinical presentations

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Background. Allergies have a substantial prevalence among the population and exert a considerable influence on quality of life. Kosovo/a has poor data regarding the frequency, progression, and treatment of allergy issues.

Aim. Our objective was to provide a comprehensive analysis of the prevalent features and clinical presentations of allergies in the population of Kosova.

Methods. A cross-sectional population-based study was done to examine individuals with positive allergies, encompassing a range of ages and genders. The study employed face-to-face surveys and questionnaires administered collaboratively. Data regarding children aged 10 years and younger was collected from their parents. Data regarding patients was gathered from 2018 to 2021 at the allergy clinics.

Results. The survey included 400 participants, out of which 295 reported having allergies. A comprehensive examination was conducted on a total of 295 patients of different age groups who had proven positive allergies. Out of the patients examined, 36.6% exhibited pollen allergies, 25.4% had dust allergies, 15.6% had food allergies, 11.9% had mould allergies, and 9.8% had allergies to domestic animals. Primarily, patients exhibited hypersensitivity to a specific set of allergens, although manifested this sensitivity through various clinical manifestations. Among the entire cohort of participants examined, 63.7% experienced symptoms related to the upper respiratory tract, and within this group, 18.01% reported sneezing. Breathing difficulties were the most common symptom of lower airway manifestation, accounting for 46.7% of cases. Fatigue was the most frequent symptom for other reactions, with a prevalence of 49.3%.

Conclusion. Our analysis presents community-based clinical symptoms of allergy-related data for the population of Kosova. These statistics facilitate the comparison of allergy characteristics in Kosova with those in other countries.

IMMUNA project: from vaccination policy to the determinants of vaccination services in Lithuania

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Background. There is well-recorded evidence that organization of vaccination services has a direct impact on vaccination rates varying from country to country. Moreover, there are more and more countries legally allowing pharmacists to conduct vaccination for certain vaccines, as well as for patients of certain age and risk groups. Since 2021 vaccination of four vaccines, for adults only, has been legally introduced into the pharmacies of the Republic of Lithuania. This study is a part of the larger ongoing project IMMUNA (Survey of immunization extent and acceptance of immunization services providers (including public pharmacies); grant number SK 3001)), which consists of several phases, including qualitative research and observational cross-sectional study types, that will help to gain a better understanding of how organization of vaccination services might impact vaccination coverage. We believe that the selected research approach will help to better understand how different vaccination services (in pharmacies and in primary health care centres) are impacting the vaccine coverage in Lithuania and, furthermore, how policymakers could improve it through legislation.

Aim. The aim of this part of the study is to investigate the vaccination policy in the context of Lithuania and the peculiarities of the organization of vaccination services in public pharmacies.

Methods. The first phase of the project was conducted in 2023, which included an investigation of the vaccination policy aspects in Lithuania and qualitative research with two groups of experts from primary healthcare institutions and public pharmacies. Interviews focused on the current country policies on vaccination and about the readiness or willingness to adopt them in practice. This part of the study will discuss the results of the qualitative research of the focus group of pharmacy representatives.

Results. There were 12 pharmacy representatives in the focus group interview. The study results have shown, that even though public pharmacies are legally allowed to implement vaccination services, the impediments to positive outcomes still lay at organizational and individual levels.

Conclusion. Enhanced focus on the organizational aspects of vaccination in pharmacies is necessary. Furthermore, special emphasis should be placed on designing specific measures to enhance collaboration between primary health care providers and pharmacy staff regarding organisation of the vaccination. A deeper legislative systemic approach regarding full integration of pharmacist's competencies is necessary.

Acknowledgements. No conflicts of interest are among the survey team. This research would not be available to conduct without the State Public Health Fund grant.

Development of palliative care in Latvia: Palliative Care Department at Pauls Stradiņš Clinical University Hospital (2019–2023)

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Background. Research in the history of medicine allows us to understand the events and decisions that have shaped the current situation and identify perspectives in various medical fields. Palliative care, introduced in Latvia in 1993, addresses critical issues related to end-of-life care. The inception of the Palliative Care Department at the Latvian Oncology Centre in 1997 and the establishment of a similar department at Pauls Stradiņš Clinical University Hospital in 2019 marked milestones in this evolving field, with the subsequent challenge of adapting to the COVID-19 pandemic. Starting in 2024, mobile palliative care is accessible to patients at their residences throughout Latvia.

Aim. To analyse patient data from the Palliative Care Department of Pauls Stradiņš Clinical University Hospital (2019–2023) to discern trends in both inpatient and home-based palliative care.

Methods. Palliative Care Department of Pauls Stradiņš Clinical University Hospital using the programme 'Ārstu birojs' from 2019 to 2023. The time frame was divided into three periods considering the COVID-19 pandemic: period 1 (04.2019–03.2020), period 2 (11.2020–10.2021), and period 3 (09.2022–08.2023). Data processing was done using the *SPSS* programme.

Results. Patients with malignant tumours are the most common group treated in the palliative care department, and these patients are on average younger (by about 10 years) and in-hospital mortality is higher compared to palliative care patients with cardiovascular or other diseases ($p < 0.01$; $p < 0.05$). After the COVID-19 pandemic, the proportion of malignant patients increased even further (from 46% in period 1, to 70% in period 3). In the post-pandemic period, the hospitalisation duration for patients has extended, manifesting a notable augmentation in the percentage of palliative cases characterised by chronic bed profiles. This escalation is evident, progressing from 4.5% during period 1 to 29.4% in period 3, encompassing the entire patient cohort. Significantly more women are admitted to the department in all analysed periods ($p < 0.05$).

Conclusion. The prevalence of patients with malignant tumour in the Palliative Care Department indicates an increasing trend, with younger patients and higher in-hospital mortality compared to other conditions. This underscores the need for intensified mobile palliative care at home for patients with malignant tumours. The COVID-19 pandemic has altered the patient demographic, amplifying the number of malignant cases and extending hospital stays. The findings emphasise the growing demand for regular medical care and surveillance. Due to the higher representation of women in palliative care, care providers should allocate services more effectively.

Evaluation of sexual health among patients with multimorbidity

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Background. A healthy sex life is an essential component of life and helps to improve an individual's quality of life.

Aim. To determine how patients with multimorbidity assess their quality of sexual life, and to identify the factors that affect their well-being.

Methods. The study was carried out at seven Lithuanian primary healthcare facilities centres (5 urban and 2 rural) in Kaunas, Šiauliai and Tauragė. The study involved participants (n = 498) of the TELELISPA Project 'Improved Healthcare Quality for Patients with Multimorbidity in Lithuania' (Project number 08.4.2-ESFA-K-616). The patients were between 40 and 85 years old and had at least two or more long-term health conditions. The respondents completed quality of life (EQ-5D-5L) and treatment burden (MTBQ) questionnaires.

Results. Of the patients who answered about their sexual activity (35.5%, n = 178), one hundred and seven (60.1%) reported having sexual relations, and thirty-four (19.1%) answered that chronic diseases interfered with their sexual activity. Only four (2.2%) respondents reported they took medication to improve sexual intercourse. Most sexually active participants were found to have 3–4 comorbidities, while those with 5 or more diseases reported they were mostly sexually inactive. A decrease in sexual activity was found among the patients of older age. The highest number of people who did not have sexual activity was among respondents with the following comorbidities: type 2 diabetes, heart failure, angina pectoris, atrial fibrillation, and flutter. The quality of life was found to be related to sexual health, as respondents with anxiety/depression, pain/discomfort, limitations in regular activities, self-care, or mobility most frequently evaluated their health quality more poorly than patients who did not report having psychological disorders or limitations in their daily activity.

Conclusions. Our study demonstrates a link between the quality of life and sexual health among Lithuanian patients with multiple chronic diseases, which has been studied little so far. The determinants of sexual health in most patients are age, comorbidities, number of comorbidities, and the burden of treatment.

Acknowledgements. The authors wish to thank the patient and public involvement group for their time and participation, as well as the colleagues from our partnering primary healthcare facilities for their valuable contributions.

Rate of oncological diseases among the youth population

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Background. The definition of the youth population encompasses individuals aged 15 to 24, allowing for a more targeted examination of prevalent psychosocial factors such as fragility, immaturity, social and sexual experimentation, and the absence of established careers or economic independence. This specific age range is chosen to emphasize common issues faced by young people. It is important to note that the most common cancer types affecting young people within this age range include leukaemia and lymphoma. As well as testicular cancer, bone cancer and brain cancer.

Aim. The aim of the current study was to create a base on which it is possible to conduct further research and conclusions about oncological diseases in the population of young people in Latvia, at Pauls Stradiņš Clinical University Hospital Oncology Clinic.

Methods. All patients between the ages 15 to 24 who have histologically confirmed oncological disease and have received care in Pauls Stradiņš Clinical University Hospital Oncology Clinic during the time period of 2018 and 2023 were enrolled in the study.

Results. Altogether 59 young people between ages 15 and 24 ($M = 19.3$, $SD = 2.5$) were diagnosed with an oncological disease. Out of which men were slightly more prevalent ($n = 31$) than women ($n = 28$). Most histological diagnoses were made for brain cancer ($n = 12$). Other notable histological diagnosis was made for lymphatic cancer ($n = 9$), lung cancer ($n = 8$), breast cancer ($n = 6$), testicular cancer ($n = 6$) and urinary tract tumours ($n = 5$), bone cancer ($n = 5$), gastrointestinal cancer ($n = 3$) and others ($n = 3$). Most diagnoses were made in 2021 ($n = 14$).

Conclusion. Within the patient cohort receiving diagnoses and undergoing treatments at the Oncology Clinic of Pauls Stradiņš Clinical University Hospital, a significant majority had their diagnostic assessments done in the year 2021. Significant rates of histological diagnoses within identified cases of oncological diseases were associated with brain cancer. The mean age of participants in this research study was 19.3 ± 2.5 years, and a marginal male predominance was observed, indicating a slightly higher prevalence compared to the female demographic within the study population.

Acknowledgements. Special thanks to our supervisor Dr. Sigita Hasnere for leading this research and providing much-needed guidance.

Enhancing prehospital emergency care standards in Lithuania: a randomized simulation-based study

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Background. Effective prehospital emergency care faces numerous challenges influenced by various factors. Decision-support tools are recognized for their valuable role in improving provider performance and patient outcomes during clinical emergencies. While cognitive aids have shown promise, the exploration of electronic field protocols in prehospital care settings has been limited. Additionally, the use of standardized field protocols is not a common practice in prehospital settings in Lithuania.

Aim. This study aimed to assess the impact of newly developed electronic field protocols on the performance of prehospital care providers within a simulated environment.

Methods. Conducted at the Lithuanian University of Health Sciences from October 17 to November 18, 2022, this randomized simulation-based study employed a specially designed simulation course. The course encompassed twelve distinct scenarios representing various acute conditions: adult resuscitation, paediatric resuscitation, delivery and postpartum care, seizures in pregnancy, stroke, anaphylaxis, acute chest pain, acute abdominal pain, respiratory distress in children, severe trauma, severe infection and sepsis, and initial neonatal evaluation and resuscitation. Standardized checklists were used for evaluation. Sixteen prehospital providers, each with a minimum of three years of clinical experience, were randomly assigned to either utilize the newly developed electronic field protocols or rely solely on their memory during simulated scenarios. Participant performance scores between the two modes of operation were then compared.

Results. A total of 190 simulation sessions were carried out. The use of electronic field protocols resulted in a statistically significant improvement in participant performance scores across 10 out of the 12 simulated scenarios when compared to relying on memory alone. Compliance with standardized checklists increased from 60% to 85% ($p < 0.001$) when the electronic field protocols were employed. Post-course survey responses indicated that participants found the electronic field protocols user-friendly and directly applicable to prehospital clinical practice.

Conclusion. The outcomes of this study suggest that newly developed electronic field protocols, functioning as cognitive aids, effectively enhance prehospital care providers' performance in simulated scenarios. These findings highlight the potential of standardized electronic field protocols to elevate the quality of prehospital care in Lithuania, indicating a promising avenue for further development and implementation in healthcare settings.

Acknowledgements. The authors declare that they have no conflict of interest.

Migration of health workforce: results from Lithuanian survey of medicine students, residents and physicians

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Background. Physicians' number in Lithuania is amongst the highest in the European Union (EU). However, there are significant concerns that the future supply of health professionals will not meet the needs of society. This will affect accessibility to health care services. Especially this problem can be severe in regions. In order to tackle this challenge, we have to understand the career plans (especially related to migration) of present and future medical doctors.

Aim. To evaluate the opinion of Lithuanian medicine students, residents and physicians about their plans and motives to emigrate to other countries.

Methods. The survey was carried out from November 2022 to November 2023. We interviewed 497 medicine students (5–6 year), 199 residents and 671 physicians. Total sample size $n = 1367$. An anonymous questionnaire was used in this survey. Statistical analysis was done by *Microsoft Excel*.

Results. It was found that 42.6% of 5–6 year medical students were considering leaving Lithuania. Residents and practising doctors were less interested in emigration (24.1% and 11.5% respectively). Among those who were planning to leave, the most considered to emigrate in the next 2–3 years (48.1% students, 40.7% residents, and 34.3% physicians). However, in all investigated groups most were planning to leave temporarily. A permanent migration was considered by one-third of respondents (31.2% students, 25.9% residents, 35.3% physicians). The main reasons for emigration were the following: higher salary (78.5% students, 67.2% residents, 46.0% physicians), better living conditions (7.2% students, 11.5% residents, 13.8% physicians) and more professional opportunities (7.6% students, 14.8% residents, 13.8% physicians). The most popular destinations for students and residents were Germany (respectively 38.8% and 18.1%) and Switzerland (22.4% and 19.0%). Physicians were more interested in moving to Norway (13.7%) or Sweden (11.6%).

Conclusion. Our study has revealed, that intentions of migration are highly prevalent among present and future physicians. If these plans are realized, the Lithuanian healthcare system will face significant challenges. Therefore, there is an urgent need for dialogue between health policymakers and representatives of the health workforce to minimize the outflow of physicians in Lithuania. In order to observe the possible migration to the EU or other countries, a similar survey should be run every two to three years.

Acknowledgements. The authors have no relevant financial or non-financial interests to disclose.

Alcohol intoxication in road traffic accident fatalities

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Background. There is strong evidence found that fatal road traffic accidents result from alcohol consumption. It is estimated that the number of alcohol-related road accidents is increasing in the past years in Lithuania.

Aim. To examine the prevalence of alcohol in blood samples collected from the autopsy results of road traffic victims.

Methods. A retrospective study of 136 road traffic accident victims was performed in the State Forensic Medicine Service between 2013 and 2023. We analysed blood alcohol concentration (BAC) in relation to sex, age, road user type, place of death, time of the day and season.

Results. 31% (n = 42) of the victims were under the influence of alcohol at the time of death, BAC $1.99 \pm 0.92\%$. Male victims were more likely to be diagnosed with a more severe BAC (n = 35, 83% of all victims under influence of alcohol), than women (n = 7). The mean BAC was $2.16 \pm 0.8\%$ in men and $1.18 \pm 1.12\%$ in women, with significantly different median concentrations, $p = 0.03427$. 44% of the individuals who died at the scene of accident were under the influence of alcohol, with a mean BAC $2.03 \pm 0.95\%$. 6% of individuals who died in hospital consumed alcohol, with a mean BAC of $1.91 \pm 0.35\%$. By the type of road users, 23% (n = 13) of the pedestrians (mean BAC $2.45 \pm 0.71\%$), 32% (n = 11) of car drivers (mean BAC $2.13 \pm 0.75\%$), 41% (n = 11) of vehicle passengers (mean BAC of $1.73 \pm 1.19\%$), 37% (n = 3) of the motorcycle riders (mean BAC of $1.28 \pm 0.53\%$), 37% (n = 3) of the cyclists (mean BAC of $1.15 \pm 0.75\%$) were found to be intoxicated during the time of accident. Higher prevalence of alcohol was found during the dark period of the day (mean BAC of 2.28%), comparing to the light period of the day (mean BAC 1.86%). The average BAC in road accidents during summer was $1.48 \pm 0.71\%$, spring $2.25 \pm 0.76\%$, autumn $2.12 \pm 1\%$, winter $2.42 \pm 1\%$.

Conclusion. Alcohol consumption by the road users takes a significant part in road traffic accidents and their outcomes in Lithuania.

Acknowledgements. The authors have no conflict of interest to declare.

Principle of publicity in civil procedure and cases regarding claims arising from personal injuries that have resulted in mutilation or other damage to health

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Background. Article No 11 of Latvian Civil Procedure Law (thereinafter – Article No 11) declares that all civil cases shall be examined in an open court, except cases regarding certain matters (e.g. “confirmation and revocation of adoption” etc.). Cases regarding claims arising from personal injuries that have resulted in mutilation or other damage to health are not included in the exemptions mentioned above. Section 3 of Article No 11 sets, that in other cases the participant should make a reasoned request in the name of achieving several legal goals (e.g. “if it is necessary to protect the private life of persons” etc.). This means, that plaintiffs in cases regarding claims arising from personal injuries should make reasoned request based on necessity to protect personal life, interests of minors or court trial to achieve a closed court hearing. Thus, the legislator has protected some personal rights and interests more than others, and in relation to cases of bodily injury or mutilation, such an approach is at least to be criticized.

Aim. The aim of this study is to disclose the coverage of Article No 11 from perspective of protecting the persons’ rights of privacy regarding its health.

Methods. Author has used analytical, descriptive and comparative method for interpretation of Article No 11, Author analysed legal literature, regulation of other countries, and court practice as well.

Results. Understanding, that: 1) Article No 11 mechanically prioritizes certain rights and interests according to their importance; 2) efforts to exhaustively list the categories of cases to be heard in closed court session, especially leaving out cases regarding damage to personal health or mutilation, are unsuccessful.

Conclusion. Either the entire catalogue of cases that must be viewed in closed court hearings must be reassessed, or systemic changes must be made, providing that in all cases the court must assess the need for a closed court hearing (e.g. Estonia §38).

Possible improvements of Article No. 4 of the Latvian Law on the Rights of Patients

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Background. Article No 4 of the Latvian Law on the Rights of Patients (thereinafter – Article No 4) declares patients' right to the information. Section 1 of Article No 4 inter alia determines patient's rights to the information regarding procedures for the payment for health care services. Generally, patients are obliged to pay for health care services (see Article No 15, section 5) accordingly to the regulation and this understandable. Notwithstanding the above Article No 4 and Latvian Law on the Rights of Patients in general do not provide direct obligations to provide information for patients of health care costs in an appropriate degree of detail. It is important also because Article 17 of Consumer Rights Protection Law, which grants rights for the consumer to the information regarding costs in great detail, is not applicable in health care (see Article 4.1, section No 3, subsection No 12). Such an approach by legislator is at least to be criticized.

Aim. The aim of this study is to analyse the Article No 4 in context of the rights to the information of consumers regarding costs of the services received, and to find ways for improvement of the existing regulation.

Methods. Author has used analytical, descriptive, and comparative method for interpretation of Article No 4. Author analysed legal literature, Latvian regulation, and court practice as well.

Results. Understanding of Article No 4, its lack of detail regarding information of health care costs and necessity for improvement.

Conclusion. Article No 4 as well as the Latvian Law on the Rights of Patients in general poorly regulates rights to the patients to detailed information regarding costs of health care services, its constituent elements, and related aspects. It is to be mentioned that the existing regulations do not provide sufficient clarity about the boundaries of freedom of contract form and content, as well as necessity of written agreement between patients and providers of health care services as such.

Nursing students' challenges in clinical practice: a qualitative study

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Background. Nursing mentoring in students' clinical practice is important for the development of professional skills of future professionals. Good student–mentor relationships have a significant impact on student experience. Mentor support helps students deepen their knowledge and improve it. However, relationships with mentors often lack communication and a closer connection, with a lack of feedback and fear of sharing problems that arise in practice (Weurlander et al., 2018; Žilionytė et al., 2023). Therefore, lack of support and assistance from mentors can have a negative impact on the quality of practice.

Aim. The current study aimed to identify the challenges faced by nursing students during clinical practice.

Methods. The study was based on a qualitative research paradigm, semi-structured interviews were used to collect data, and the data were processed using inductive qualitative research analysis. The research sample was based on a snowball sampling approach using purposive sampling of different cases (Patton, 2001). Twenty-two undergraduate and postgraduate nursing students participated in this study. Participants were senior-year students who had completed clinical placements of varying lengths of time in different settings.

Results. The results showed that students faced different challenges during their placement. One of the key challenges in clinical practice is the lack of a mentor, where students do not have assigned mentors to support and care for them during placement, or the lack of mentorship, where assigned mentors do not spend enough time communicating during placement. Another challenge is the quality of mentoring. The students mentioned that the tasks assigned by the mentor did not allow them to apply theoretical knowledge and acquire new skills in practice. It was also mentioned that there was a lack of feedback from the mentor and progress monitoring during placement. In addition, some students noted that during the internship, they experienced difficulty fitting in with the staff and even experienced humiliation or underestimation.

Conclusion. The difficulties and challenges experienced in the internship have a negative impact on the effectiveness of the internship and the personal well-being of students. In addition, negative experiences during internships can have a negative impact not only on the development of professional skills but also on students' self-esteem and the formation of professional identity.

Acknowledgements. The researchers would like to express their sincere gratitude to all the participants who agreed to share their experiences.

Palliative care in neonatal intensive care unit: nurses' attitudes

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Background. Healthcare professionals working in neonatal intensive care units indicate that there is inconsistency and an ununified attitude toward the care of the newborn that faces life-limiting and threatening conditions.

Aim. To reveal the attitudes of nurses towards neonatal palliative care in the Neonatal intensive care unit.

Methods. The quantitative, cross-sectional study was conducted in a one of Lithuanian hospital, Neonatal Intensive Care Unit (NICU), 39 nurses participated in the study. The V. Kain questionnaire 'The Neonatal Palliative Care Attitude Scale' was used to conduct the study. The questionnaire statements consist of four statement categories: 'Institution', 'Resources', 'Practice', and 'Work experience and beliefs'. Differences in indicators were considered statistically significant when $p \leq 0.05$.

Results. The mean score for the 'Institution' subscale was 3.39 (± 0.76) and the mean score for the 'Work experience and beliefs' subscale was 3.53 (± 0.33). A positive score on these subscales indicates that healthcare professionals often face neonatal deaths in intensive care environments and confirms palliative care is a very important aspect of neonatology.

The mean score for the 'Resources' subscale is 2.71 (± 0.57) and the mean score for the 'Practice' subscale is 2.71 (± 0.74). The more negative result of the 'Resources' subscale indicated that the main barriers to palliative care were lack of time, lack of palliative care guidelines and recommendations, and unavailability of psychological support after neonatal death. The more negative result of the 'Practice' subscale showed that most nurses have doubts about the use of artificial life support in dying neonates.

Conclusions. The internal environment of the institution, as well as the work experience and beliefs of nurses, facilitates the provision of neonatal palliative care. Improper department resources and attitudes toward technological life support have been identified as a barrier to neonatal palliative care in nursing practice.

Acknowledgements. There is no conflict of interest and there was no funding to conduct the study. The researchers sincerely thank the staff of NICU nurses who participated in the study and shared their views.

The relationship between nurses' emotional intelligence and professional stress experience at work

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Background. Emotional intelligence is the ability to recognize, understand, use, and manage your emotions. Research, analysing the stress experienced by nurses at work, shows that there is a strong relationship between a nurse's emotional intelligence and the stress experienced at work. High emotional intelligence enables people to control and manage stressful situations due to their ability to think logically and rationally and to view situations more tolerantly.

Aim. To assess the relationship between nurses' emotional intelligence and professional stress experience at work.

Methods. The quantitative, cross-sectional study was provided in one of the Lithuanian hospitals. In total 131 nurses were enrolled in this study: 62 from the Surgical Department and 69 from the Therapeutic Department. The questionnaires N.S. Shuttlesworth's 'The Assessing Emotions Scale' and J. G. Anderson, P. Grey-Toft 'The Nursing Stress Scale' were used in this study. A statistically significant difference in characteristics between study groups is considered when $p < 0.05$.

Results. Most nurses working in surgery and therapy departments have high emotional intelligence and can manage their emotions in different situations. Nurses with the shortest work experience (1–5 years) and younger age (20–35 years) exhibited the highest emotional intelligence scores (120.0 ± 14.8 and 117.5 ± 15.1 respectively). Most of the surgery and therapy department nurses experienced moderate stress levels at work. Nurses with more years of work experience (16–25 years) in their current unit and older age nurses (51+ years) experienced higher levels of stress at work, with scores of 51.1 ± 19.7 and 56.1 ± 18.6 , respectively.

Nurses' stress at work due to patient deaths and dying; concerns about the patient's future treatment; conflicts with doctors and nurses; high workload; and inadequate professional training were associated with lower emotional intelligence. Nurses' stress at work due to lack of support was associated with a lower perception of their own emotions. It also affected their control of both their own and others' emotions, resulting in lower overall emotional intelligence among nurses.

Conclusions. Nurses working in surgical and therapeutic wards have high emotional intelligence and experience moderate levels of stress at work. Nurses' stress at work is associated with lower emotional intelligence.

Acknowledgements. There is no conflict of interest and there was no funding to conduct the study.

Effects of music listening on anxiety, stress and physiological parameters after myocardial infarction

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Background. Listening to music is one of the non-medication methods that can be used effectively to reduce anxiety and stress in critically ill patients. Studies show that the combination of medication and music listening is more effective in reducing physiological parameters, and relieves post-operative pain, anxiety and stress in Intensive Care Unit (ICU) patients.

Aim. To determine the effects of music on anxiety, stress, pain and physiological parameters in patients after myocardial infarction.

Methods. The research was carried out in one of the Lithuanian hospitals. The research method is a prospective, quota sample survey. The study included patients who were hospitalized in the ICU under emergency care with a diagnosis of myocardial infarction and coronary angiography. The study included 150 patients and was randomly divided into three groups: Study Group I listened to classical music; Study group II listened to relaxing music; The control group did not listen to music. We used questionnaires: The Brief Resilience Scale; Spielberger C.D. Stait Trait Anxiety Scale, J.J. Kiselev's ten-point stress scale; the Numerical Pain Rating Scale; a protocol for monitoring physiological parameters and additional questions. Results are considered statistically significant if $p < 0.05$.

Results. In most patients after myocardial infarction, the psychological resistance to stress before the music issue was normal. Prior to listening to music, high-level anxiety and moderate pain were found in the classical and control groups, and moderate-intensity anxiety and mild pain in the relaxation group. Prior to the study, respondents in all groups felt moderate levels of stress. Anxiety, stress, and pain were significantly reduced in the intervention group after listening to music, and subjects in the control group still experienced high anxiety, moderate stress, and moderate pain at the end of the study. Prior to listening to music, the mean heart rate, systolic, and diastolic blood pressures were similar in all groups of respondents. After listening to music in the intervention groups, mean heart rate, systolic, and diastolic blood pressure decreased significantly, while controls remained unchanged. Prior to the study, oxygen saturation was 95% in all groups. After the study, only the oxygen saturation of classical music increased significantly.

Conclusions. Listening to classical and relaxing music helps to reduce pain, anxiety, stress, arterial blood pressure and oxygen saturation felt by patients after myocardial infarction and coronary angiography in the ICU.

Acknowledgements. There is no conflict of interest and there was no funding to conduct the study.

Evaluation of stress experienced by nursing students and its impact on sleep quality

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Background. Experiencing stress negatively affects both the mental and physical health of a person, and long-term stress can cause various health problems. At different stages of a person's life, there are common and specific stressors that are associated with that stage of life and activities. Students are a group in society that also does not avoid stressors in their environment. Frequent stress causes mood swings, irritability, and poor sleep quality, which disrupts the learning process and worsens general well-being. In order to avoid serious health disorders and to improve the quality of life of students, it is important to assess the stress experienced and its influence on sleep.

Aim. The aim of the current study was to assess the stress experienced by nursing students and its effect on sleep quality.

Methods. Altogether 227 1st- to 4th-year undergraduate nursing students of one Lithuanian university were enrolled in the study. The instrument is a questionnaire consisting of: Reeder's stress assessment scale, the Pittsburgh sleep quality index questionnaire and questions about the socio-demographic data of the respondents. The analysis of research data was carried out using statistical analyses in *SPSS Windows 28.0.1* and *Microsoft Excel 2016* programmes.

Results. More than a third of the subjects (35.24%) were diagnosed with a stressful state and a half (50.22%) with nervous tension. The stressful state was more often found in subjects who smoked and used sleeping pills ($p = 0.004$) and other psychoactive substances ($p = 0.018$). In their opinion, the most common causes of stress for students are lack of sleep (61.23%), high study load (55.95%) and lack of time for rest (59.03%). 82.38% and more often first- and fourth-year students who work, smoke and report poor financial status have poor sleep quality. According to students, the quality of their sleep is usually impaired due to stress (81.94%), personal reasons, study load and depends on health assessment.

Conclusion. Stress and nervous tension appear in most students. This is influenced by: study load, lifestyle, lack of time for rest, and lack of sleep. The vast majority, and more often first- and fourth-year students, working, smoking, and who claimed to have a poor financial situation, were found to have poor sleep quality. The quality of students' sleep depends on the stress experienced.

Acknowledgements. No conflicts of interest to declare.

The care needs of people with dementia

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Background. Dementia is one of the most common diseases of the elderly worldwide. Some of the most important physiological needs that terminal patients must meet are feeding, personal hygiene, partial or full assistance with bathing, shaving and brushing teeth. Regular defecation and urination are also important. It also highlights the need for chronic pain relief, which is a very important factor in ensuring a better quality of life.

Aim. The aim of the current study was to explore the care needs of people with dementia from the nurses' experiences.

Methods. A qualitative semi-structured interview study was conducted in March 2023, after obtaining permission from the Ethics Committee of the Institute of Health Sciences of Vilnius University, Faculty of Medicine. A total of 9 nurses who worked in palliative care hospitals participated in the study. The interview questions were divided into two groups: 1) questions aimed at analysing the nursing needs of people with dementia; 2) sociodemographic questions. The interviews were conducted individually at an agreed time with each respondent, either face-to-face or using the Zoom platform.

Results. Of the 9 study participants stated that patients who are able to express their needs always emphasise that they want to eat and drink: '< ...> it is only after they have eaten that they say they want to eat: is there anything I can eat, or can you give me something to eat?' (S8). Several nurses also indicated that pain is one of the most frequently expressed problems: '< ...> they tell me something is wrong, something hurts, I can react faster and act' (S2), which is difficult to address because pain is only named and the localisation and spread of pain is unknown. People with dementia are very sociable: 'Communication is very important: people with dementia are without masks, they are very simple, very honest...' (S1), '< ...> they want to communicate very much: when I come to the ward they say to me: 'oh my mummy is here...' (S7).

Conclusion. The needs of the dementia patient that were most emphasised by the nurses in the study depended on the patient's condition. The patient's needs, when able to verbalize, are eating and drinking, self-care of personal hygiene, absence of pain, communication with nurses and other patients and activities. When people with dementia are unable to verbalize: eating and drinking, personal hygiene, no pain.

Acknowledgements. No conflicts of interest to declare.

Dietary habits and nutritional knowledge of people with type 2 diabetes

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Background. Diabetes mellitus is a major public health problem worldwide. Diet is one of the factors that can be adjusted to manage type 2 diabetes, control blood glucose levels and prevent future complications. Obesity and inadequate nutrition are not only significant risk factors for the development of type 2 diabetes but also have a major impact on its management. Patients with diabetes are often analysed from 3 perspectives: their knowledge, attitudes and habits.

Aim. To analyse the nutritional knowledge, attitudes and eating habits of people with type 2 diabetes.

Method. The study involved 71 patients with type 2 diabetes aged 18 years and older, hospitalized at the Hospital of Lithuanian University of Health Sciences Kauno Klinikos Endocrinology Department. An anonymous questionnaire developed by the authors was used for the quantitative study. Statistical data analysis was performed using SPSS version 29. The χ^2 test, z-test with Bonferroni correction and univariate Mann-Whitney test were used to test the distribution of data. Data were considered significant at $p < 0.05$.

Results. Of all the subjects, 54.9% were obese. While buying food, patients with type 2 diabetes usually choose products, regarding their sugar content but one-fifth do not pay attention. Most patients usually eat home-cooked meals, buy fresh products and do not sweeten their food and drinks. One-fifth of the patients often skip main meals and the majority choose oil as a source of fat for cooking. Most patients consume fruits and vegetables often enough but not enough nuts. The majority avoid pasta, potatoes and dishes and limit the consumption of processed meat products but almost a third consume red meat too often. Butter consumption is too frequent for the majority of the patients. Most patients try to avoid sweetened and alcoholic beverages, sweets and salty snacks or do not consume them at all.

Conclusions. The nutritional knowledge of patients with type 2 CD is satisfactory, but the subjects subjectively assessed their knowledge as better. Patients' attitudes towards dietary requirements are quite positive, as most of them understand the importance of diet and its impact on their disease and are able to acknowledge that they are experiencing difficulties.

Acknowledgements. The authors declare that there is no conflict of interest and there was no funding to conduct the study.

Nurses' attitude on evidence-based nursing practice: evidence from Lithuania

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Background. Evidence-based practice (EBP) in nursing refers to the process of integrating the best available research evidence, clinical expertise, and patient preferences to make informed and effective healthcare decisions. EBP aims to enhance the quality of patient care by ensuring that nursing interventions and practices are based on sound scientific research and tailored to individual patient needs. By aligning interventions and practices with rigorous scientific research, nurses can enhance the effectiveness of their care delivery and contribute to positive patient outcomes. EBP also promotes a culture of continuous learning and improvement within the nursing profession.

Aim. The aim of the current study was to identify the attitude of registered nurses towards EBP in the municipality hospitals in Lithuania.

Methods. The quantitative study was carried out in seven municipality hospitals in Lithuania. Nurses working in adult inpatient units of all profiles were included (n = 923; response rate – 74%). The Evidence-Based Practice Attitude Scale (EBPAS-50) was used to conduct the research.

Results. The findings indicated that most nurses expressed that if they were provided with training in a new therapy or intervention, it is likely that they would integrate these practices into their clinical care, 69.1% were satisfied with their skills as a nurses/case manager and more than a half stated that receiving feedback on work performance is deemed highly important and beneficial. However, 67.7% of respondents stated that clinical experience is more important than using manualized nursing, 57.5% indicated that EBP increases the amount of documentation and 60.5% expressed a preference not to work independently without oversight.

Conclusion. Nurses play a pivotal role in the successful implementation of EBP in nursing, showcasing a generally positive attitude toward incorporating research findings into their clinical decision-making. Despite the overall positive inclination, ongoing efforts are essential to address potential barriers and promote a consistent and widespread adoption of EBP in nursing across healthcare settings. Therefore, ongoing support, education, and integration of evidence-based principles into clinical workflows are imperative to foster a sustained and widespread adoption of these practices among nurses, ensuring continuous improvement in patient care.

Acknowledgements. The authors declare no conflict of interest. This research received no external funding.