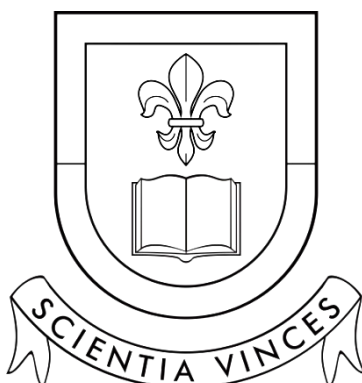


DAUGAVPILS UNIVERSITĀTE
DAUGAVPILS UNIVERSITY



DAUGAVPILS UNIVERSITĀTES
66. STARPTAUTISKĀS
ZINĀTNISKĀS KONFERENCES
TĒZES
ABSTRACTS OF
THE 66th INTERNATIONAL SCIENTIFIC
CONFERENCE OF DAUGAVPILS
UNIVERSITY

DAUGAVPILS UNIVERSITĀTES
AKADĒMISKAIS APGĀDS „SAULE”

2024

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Daugavpils Universitātē docētāju un studējošo zinātniskās konferences notiek kopš 1958. gada. Konferencēm ir starpdisciplinārs raksturs, tajās piedalās gan studējošie, gan arī ievērojami zinātnieki no dažādām pasaules valstīm. Daugavpils Universitātes 66. starptautiskās zinātniskās konferences pētījumu tematika ir ļoti plaša – eksaktajās, humanitārajās, izglītības, mākslas un sociālo zinātņu jomās.

Krājumā Daugavpils Universitātes 66. starptautiskās zinātniskās konferences tēzes = Abstracts of the 66th International Scientific Conference of Daugavpils University apkopoti materiāli, kas tiks prezentēti konferences darba grupās 2024. gada 18.-19. aprīlī un kas atbilst konferences formālajām prasībām.

Krājuma veidotāji saglabā autoru iesniegto tēžu lingvistisko un gramatisko struktūru.

Par norādītajiem faktiem, izteiktajiem viedokļiem un lietoto terminoloģiju atbild tēžu autori.

The annual scientific conferences at Daugavpils University have been organized since 1958. The themes of research presented at the conferences cover all spheres of life. Due to the facts that the conference was of interdisciplinary character and that its participants were students and outstanding scientists from different countries, the subjects of scientific investigations were very varied – in the domains of exact sciences, the humanities, education, art and social sciences.

The Collection of Abstracts of the 66th Scientific Conference of Daugavpils University contains the abstracts on researches, which will be presented in the corresponding work groups organized within the framework of the conference in April, 18-19, 2024. In the abstracts published in Daugavpils Universitātes 66. starptautiskās zinātniskās konferences tēzes = Abstracts of the 66th International Scientific Conference of Daugavpils University we have preserved the authors' style (linguistic and grammatical structures), and the authors themselves are responsible for the facts and opinions reflected and the terminology used in their abstracts.

MĀKSLA

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ART

Silvija Ozola

MEDIEVAL AGGLOMERATIONS IN CITIES FOUNDED BY THE TEUTONIC ORDER

The Teutonic Order founded the State of the Teutonic Order (Latin: *Civitas Ordinis Theutonicici*; 1230–1525), and an agreement for the founding of new cities was signed. During seven years, five towns in German traditions were founded instead of Prussian settlements in strategically important places. Trade contributed to the development of towns. The layout of the built-up areas included fortified areas. The location of houses and the creation of defense systems were influenced by the terrain, land highways, and waterways, marking the beginning of the early medieval town-building traditions. In medieval cities, agglomerations were formed, and they included independent spatial structures. **Research object:** urban space in the 13th and 14th centuries. **Research problem:** the layout and urban space of medieval agglomerations have not been studied enough to preserve their identity in the course of modern urban development. **Research goal:** analysis of medieval urban space, where settlements of residents and merchants were structurally and functionally unrelated. **Novelty:** analysis of urban space and the structural evolution of medieval agglomeration in cities during the 13th and 14th centuries. **Research methods:** analysis of archive documents, projects, cartographic materials, studies of published literature, inspection of objects in nature, and photo fixation.

Ivanda Osīte¹, Zeltīte Barševska²

¹ *Daugavpils University, Str. Vienības 13, Daugavpils, ivanda.osite@gmail.com*

NARRATIVES IN LATVIAN CONTEMPORARY PAINTING

In contemporary art, the creation of "open space", metaphor as a language, the "state of ignorance", a departure from reality, an independent point of view on current and historical events are considered to be valuable. The medium of visual art - painting - has traditionally been dominated by narratives in a large-scale social, historical and existential context, which imaginatively visualise, preserve and transmit the human experience to the future. Contemporary painting can be seen as a language that interprets and articulates the events of the time, responding to issues that are relevant to society and to individual human life.

The aim of the research is to identify and analyse the narrative context of Latvian contemporary painting, highlighting several aspects of research: experimentation with unconventional techniques and materials; "transgression" of traditional artistic boundaries; the use of light, colour and form to represent the essence of an object; the artist's sense of emotional and psychological state. The research methodology is based on a contingent analysis of scientific art literature, a review of interviews published in the media by Latvian contemporary painters (Ēriks Apaļais, Inga Meldere, Edgars Gluhovs, Daiga Grantiņa) and the development of criteria for the analysis of their artworks.

Keywords: *contemporary painting, narratives, artwork analysis, mimesis, experiments.*

Dāvis Greļevskis, Zeltīte Barševska

Daugavpils University, Vienības street 13, Daugavpils, Latvia, LV-5401, grelevskis@gmail.com, zeltite.barsevska@du.lv

THE IMPACT OF CONTEMPORARY ART IN TRADITIONAL CULTURE PROJECTS

Keywords: *traditional culture, contemporary art, intangible heritage, cultural projects.*

The Constitution of the Republic of Latvia, as the fundamental law of the state, was adopted to guarantee the existence and development of the Latvian nation, including Latvian culture, throughout the centuries. A century later, one of Latvia's greatest asset still is its carefully nurtured and protected traditional cultural heritage. Despite

the traditions and customs inherited over generations, traditional cultural values transform and adapt to the trends of the time, making the preservation of traditions a complex set of activities that, in today's digital age, change not just over decades, but every year. Professionals in the cultural sector and creative industries are finding and implementing new solutions for the successful integration of traditional culture into contemporary society, often using contemporary art paradigms, thus creating a successful interaction between the contemporary and the traditional and at the same time without making it an alternative. The aim of the research: to analyse the influence of contemporary art in traditional culture and paradigm shifts in culture by analysing the cultural offer and the creative performance of cultural workers. Research methods: theoretical – research and study of scientific literature and internet resources, empirical – questionnaire survey.

BIOLOĢIJA

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BIOLOGY

Sergejs Popovs¹, Māris Munkevics^{1,2}, Tatjana Krama^{1,3}, Ronalds Krams¹, Ēriks Sļedevis¹, Giedrius Trakimas^{1,5}, Kristis Zants², Tatjana Grigorjeva¹, Valdis Mizers¹, Vadims Kolbjonoks¹, Priit Jõers⁶, Colton B. Adams^{2,7}, Indriķis Krams^{1,2,6,8}

¹Daugavpils University, Parādes street 1A, Daugavpils, sergey.p@email.com, tatjana.krama@du.lv, ronalds.krams@du.lv, eriks.sļedevskis@du.lv, tatjana.grigorjeva@du.lv, valdis.mizers@du.lv, vadims.kolbjonoks@du.lv, indrikis.krams@du.lv

²University of Latvia, Jelgavas street 1, Rīga, marismunkevics@gmail.com, kristis.42@inbox.lv, indrikis.krams@lu.lv

³Estonian University of Life Sciences, Friedrich Reinhold Kreutzwaldi street 5, Tartu, Estonia, tatjana.krama@emu.ee

⁵Vilnius University, Saulėtekio street 7, Vilnius, Lithuania, giedrius.trakimas@gf.vu.lt

⁶University of Tartu, Ülikooli street 18, Tartu, Estonia, priit.joers@ut.ee, indrikis.krams@ut.ee

⁷University of Tennessee, TN 37996, Knoxville, United States of America, cadams54@vols.utk.edu

⁸Latvian Biomedical Research and Study Centre, Rīga, Rātsupītes street 1, indrikis.krams@biomed.lu.lv

ALTERED WALKING PATTERNS ARE LINKED WITH IMPROVED ADULT SURVIVAL IN *DROSOPHILA MELANOGASTER* GROWN WITH PREDATORS DURING LARVAL DEVELOPMENT

Predator-induced stress can evoke behavioral, physiological, stoichiometric, and biochemical adaptations in prey. Previous studies indicate that development under predation stress can induce a diabetes-like biochemical phenotype in fruit flies (*Drosophila melanogaster*). Larval exposure to predator risk can reduce adult locomotor activity, potentially enhancing antipredator strategies. However, the specific components of this altered locomotion that confer protection remain unknown.

This study demonstrates that adult fruit flies reared in the presence of spiders exhibit shorter walking distances, increased acceleration, and more frequent episodes of stomping behavior compared to control flies. We observed enhanced survival of adult flies developed under predation risk when directly challenged by predators. We hypothesize that stomping in place may mimic sickness behavior, deterring predation, and thus represent a primary mechanism of improved survival.

Kristis Zants^{1,2}, Sergejs Popovs³, Māris Munkevics^{2,3}, Tatjana Krama^{3,4}, Ronalds Krams³, Giedrius Trakimas^{3,5}, Tatjana Grigorjeva³, Priit Jõers⁶, Colton B. Adams^{2,7}, Indriķis Krams^{1,2,3,6}

¹Latvian Biomedical Research and Study Centre, Rīga, Rātsupītes street 1, kristis.42@inbox.lv, kristis.zants@biomed.lu.lv, indrikis.krams@biomed.lu.lv

²University of Latvia, Jelgavas street 1, Rīga, marismunkevics@gmail.com, indrikis.krams@lu.lv

³Daugavpils University, Parādes street 1A, Daugavpils, sergey.p@email.com, tatjana.krama@du.lv, ronalds.krams@du.lv, tatjana.grigorjeva@du.lv, indrikis.krams@du.lv

⁴Estonian University of Life Sciences, Friedrich Reinhold Kreutzwaldi street 5, Tartu, Estonia, tatjana.krama@emu.ee

⁵Vilnius University, Saulėtekio street 7, Vilnius, Lithuania, giedrius.trakimas@gf.vu.lt

⁶University of Tartu, Ülikooli street 18, Tartu, Estonia, priit.joers@ut.ee, indrikis.krams@ut.ee

⁷University of Tennessee, TN 37996, Knoxville, United States of America, cadams54@vols.utk.edu

ASSOCIATION BETWEEN AGGRESSIVE BEHAVIOUR AND YEAST AMOUNT IN THE FOOD OF MALE FRUIT FLIES *DROSOPHILA MELANOGASTER*

Aggressive behaviour is important for individual survival and reproductive success, as more aggressive individuals are able to gain most of the limited food, territory and mating partners. However, factors that could affect individual's aggressive behaviour are not fully determined.

Therefore, in this study we tested if added yeast – protein source, which is known to play a key role in development of the brain and its functions, would cause an increase in male fruit fly *Drosophila melanogaster* aggressive encounters, predicting that increased amount of protein would positively correlate with

aggressiveness. The study was done by analysing video recordings of one-on-one encounters of male fruit flies in standardized fighting arena and measuring total number of encounters, total time of encounters in seconds and latency of the first encounter.

It was found that total encounters and total encounter time was significantly larger in group with added yeast compared to control group, as well as time up to the first encounter was significantly shorter. The study group with enriched feed was deemed more aggressive.

Tatjana Grigorjeva¹, Vita Viktorija Čimirina², Annija Kotova², Tatjana Krama^{1,3}, Sergejs Popovs¹, Māris Munkevics^{1,2}, Kristis Zants², Ronalds Krams¹, Priit Jõers⁴, Giedrius Trakimas^{1,5}, Colton B. Adams^{2,6}, Indriķis Krams^{1,2,4}

¹Daugavpils University, Parādes street 1A, Daugavpils, tatjana.grigorjeva@du.lv, tatjana.krama@du.lv, sergey.p@email.com, ronalds.krams@du.lv, indriķis.krams@du.lv

²University of Latvia, Jelgavas street 1, Rīga, cimirina.viktorija@gmail.com, ananija32@gmail.com, marismunkevics@gmail.com, kristis.42@inbox.lv, indriķis.krams@lu.lv

³Estonian University of Life Sciences, Friedrich Reinhold Kreutzwaldi street 5, Tartu, Estonia, tatjana.krama@emu.ee

⁴University of Tartu, Ülikooli street 18, Tartu, Estonia, priit.joers@ut.ee, indriķis.krams@ut.ee

⁵Vilnius University, Saulėtekio street 7, Vilnius, Lithuania, giedrius.trakimas@gf.vu.lt

⁶University of Tennessee, TN 37996, Knoxville, United States of America, cadams54@vols.utk.edu

AUTOMATED SYSTEMS APPLICATION IN BEHAVIOURAL STUDIES OF FRUIT FLIES (*DROSOPHILA MELANOGASTER* MEIGEN, 1830)

Basic chemical reactions in fruit flies (*Drosophila melanogaster*) are similar in humans. In flies' brain serotonin is responsible for regulation of locomotion, sleep, light or shadow selection, intestinal tract and aggressiveness.

We added Escitalopram (ESC), Tryptophan and Alpha-methyltryptophan (AMT) to *Drosophila* food. ESC is serotonin reuptake inhibitor that reduces release of serotonin in the brain. Tryptophan is essential amino acid and serotonin precursor, which stimulates serotonin concentration increase. AMT is inhibitor of serotonin synthesis from tryptophan. AMT delays, slows down or prevents serotonin synthesis and body serotonin concentration decreases.

First, we determined effect of supplements on fruit fly light and dark preferences. We predicted that antidepressant ESC and AMT will increase variability of phototactic behaviour in flies and make their motions to light or dark less predictable. High-throughput real-time automatic phototactic behaviour assay device "FlyVac" was used to record and register flies phototactic choices.

Second, we aimed to analyse effect of ESC and tryptophan on lateral movement variability in fruit flies. We used Y-maze labyrinth method that is used to determine age, hormones, medicine, nutritional supplements and stress factors effects on spatial memory of the study object. HD video camera with infrared sensor above the Y-maze labyrinth plate recorded fruit fly motions and turns. Noldus "EthoVision XT" video tracking software registered all the turn coordinates.

We didn't find any effect of ESC or AMT on flies, because the phototactic variability of *Drosophila* didn't increase in comparison to Tryptophan group flies. It may mean that ESC and AMT have similar effect on serotonin concentration.

Lateral movement variability increased in ESC group flies. Difference wasn't significant between tryptophan and control group flies. Y-maze is another effective method to study fruit fly depressive behaviour.

Natalja Škute¹, Anastsija Karnilova², Aleksandrs Petjukevičs³, Anna Batjuka⁴

¹Daugavpils University, Parādes iela 1, natalja.skute@du.lv

²Daugavpils University, Parādes iela 1, nastja.k2@inbox.lv

³Daugavpils University, Parādes iela 1, aleksandrs.petjukevics@du.lv

⁴Daugavpils University, Parādes iela 1, anna.batjuka@du.lv

CHANGES OF DYNAMICS OF PHOTOCHEMICAL ACTIVITY OF PHOTOSYSTEM II UNDER SHORT-TERM THERMAL SHOCKS IN DIFFERENT WHEAT CULTIVARS

Chlorophyll fluorescence kinetics is an extremely important for the non-invasive study of photosynthetic dynamics in intact plants, which can gain detailed information on the state of photosystem II (PSII) at a relatively low cost, which has a major role in understanding the fundamental mechanisms of photosynthesis, the responses

of plants to environmental change. Climate changes and high temperatures pose a serious threat to crop production inducing severe photodamage to chloroplasts and destruction of pigments, consequently causing a decrease in the yield capacity of plants.

The present study aimed to study the changes of dynamics of photochemical activity of photosystem II under short-term high temperature (42°C, 1 h) in three winter wheat seedlings (Latvian cultivars "Galerist", "Creator", and "Skagen"). The wheat seedling were kept under controlled conditions of 26±1°C, 16 h lightness, and 8 h darkness, with 80% humidity, and were used as the control. After 4 days the part of wheat seedlings were exposed to 42°C for 1 h. The degree of photoinhibition was determined by the ratio of variable to maximum chlorophyll (Chl) fluorescence (Fv/Fm). maximum fluorescence in dark-adapted state and during light adaptation (Fv/Fm Ln) and others parametr, for example, the PSII quantum yield induced in light and relaxing in dark, PSII quantum yield in light-adapted state and empiric parameter used to assess plant vitality.

The results showed that photosystem efficiency (Fv/Fm) under short-term high temperature (42°C, 1 h) reduced significantly compared to the control. The maximal photochemical efficiency (Fv/Fm) of photosystem II (PSII) decreased insignificantly in the 'Skagen' wheat cultivars. This results indicate, that changes of dynamics of photochemical activity can be used to know the sensitivity of various wheat cultivars to high-temperature stress.

Inese Kokina¹, Ilona Plaksenkova¹, Aleksandra Mošenoka¹, Marija Jermaļonoka¹, Marina Krasovska², Eriks Sledevskis²

¹Daugavpils University, Institute of Life Sciences and Technology, Department of Technology, Parades street 1A, Daugavpils, Latvia, LV-5401

²Daugavpils University, G. Liberts' Innovative Microscopy Centre, Institute of Life Sciences and Technology, Department of Technology, Parades Street 1A, Daugavpils, Latvia, LV-5401

EFFECT OF NANOPARTICLES ON THE GENOME STABILITY OF BARLEY (HORDEUM VULGARE L.) SEEDLINGS GROWN UNDER SALINITY STRESS

Soil salinity is considered to be one of the most serious abiotic factors, that reduces harvest quantity and quality and leads to soil degradation. High salt concentration in soil is one of the reasons why plant does not receive enough water. It is also a cause why plant can face such probes as nutrients imbalance. Iron oxide (Fe₃O₄) nanoparticles can be a promising solution for this problem. It is proved, that Fe₃O₄ nanoparticles can reduce soil salinity caused stress on crop photosynthesis rate and overall growth. Iron is an important micronutrient for plants since it is involved in many processes connected with plants development, growth, metabolism and photosynthesis.

Barley (*Hordeum vulgare* L.) is one of the most important cereal crops in the world. Barley seedling were obtained using conventional growing method. After a week of seeds germination, seedlings were divided into five groups. One of them served as a control group and daily received only deionized water. Seedling from other four experimental groups were obtained in contaminated substrate only with NaCl presence (i), only with presence of 72 mg/L concentrated Fe₃O₄ nanoparticles (ii), with presence of both NaCl and 72 mg/L concentrated Fe₃O₄ nanoparticles (iii), and with presence of NaCl and 36 mg/L concentrated Fe₃O₄ nanoparticles (iv). Each experimental group was daily watered with corresponding solution. After one month, genotoxic analysis were performed, using RAPD method.

The initial data showed, that genomic template stability decreased up to 60 %for some experimental groups. Nevertheless, based on obtained results it can be assumed, that Fe₃O₄ nanoparticles at higher concentrations can reduce stress level caused by soil salinity.

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Indriķis Krams^{1,2,3,4}, Colton B. Adams^{2,5}, Todd M. Freeberg⁵, Sergejs Popovs¹, Ronalds Krams¹, Dāvids Fridmanis³, Dita Gudrā³, Māris Munkevičs^{1,2}, Giedrius Trakimas^{1,6}, Tatjana Krama^{1,7}

¹Daugavpils University, Parādes street 1A, Daugavpils, indrikis.krams@du.lv, sergey.p@email.com, ronalds.krams@du.lv, tatjana.krama@du.lv

²University of Latvia, Jelgavas street 1, Rīga, indrikis.krams@lu.lv, marismunkevičs@gmail.com

³Latvian Biomedical Research and Study Centre, Rīga, Rātsupītes street 1, indrikis.krams@biomed.lu.lv, davids@biomed.lu.lv, dita.gudra@biomed.lu.lv

⁴University of Tartu, Ülikooli street 18, Tartu, Estonia, indrikis.krams@ut.ee

⁵University of Tennessee, TN 37916, Knoxville, Tennessee, United States of America, cadams54@vols.utk.edu, tfreeber@utk.edu

⁶Vilnius University, Saulėtekio street 7, Vilnius, Lithuania, giedrius.trakimas@gf.vu.lt

⁷Estonian University of Life Sciences, Friedrich Reinhold Kreutzwaldi street 5, Tartu, Estonia, tatjana.krama@emu.ee

FEEDING BEHAVIOUR, BLOOD GLUCOSE AND BLOOD MICROBIOME IN WINTERING EUROPEAN GREENFINCHES (*CHLORIS CHLORIS*)

To improve bird survival, humans often provide extra food to wintering birds. This study shows that wintering near permanent feeders significantly increased body mass, body mass index (BMI) and plasma glucose levels of greenfinches (*Chloris chloris*). Excess body fat and plasma glucose may suggest low-grade systemic inflammation in greenfinches wintering near permanent ad-lib feeders. Low-grade inflammation is often associated with physiological stress affecting the intestinal microbiome and causes serious microvascular and intestinal pathologies. Under such conditions, we expected contamination of the blood microbiome by bacterial pathogens leaking from the intestinal microbiome.

However, the frequency of *Firmicutes*, *Bacteroidetes*, and *Firmicutes+Bacteroidetes* types did not differ significantly between feeder types. The relative frequency of *Escherichia-Shigella* bacteria in the irregular feeding group was 0.18%, while in the permanent feeding group, it was 9.2%. The group of permanent ad-lib feeders had higher observed OTUs and Chao1 index, while the beta diversity of bacteria did not show differences. We found that the relative abundance of *Bacteroidia* and *Gammaproteobacteria* was positively correlated with BMI and excess body fat. *Clostridia*, a class of microorganisms typical for type 2 diabetes, was found only in birds wintering near permanent feeders. During the study, many greenfinches died from trichomonosis, which could have significantly impacted the birds' blood microbiome, so further research is needed.

Inese Kokina¹, Ilona Plaksenkova², Lauris Jankovskis³, Marija Jermaļonoka⁴, Renata Galek⁵, Ligita Mezaraupe⁶, Marina Krasovska⁷ and Eriks Sledevskis⁸

¹Laboratory of Genomics and Biotechnology, Department of Biotechnology, Daugavpils University, Parādes str. 1A, LV-5401 Daugavpils, Latvia; inese.kokina@du.lv

²Laboratory of Genomics and Biotechnology, Department of Biotechnology, Daugavpils University, Parādes str. 1A, LV-5401 Daugavpils, Latvia; ilona.plaksenkova@du.lv

³Laboratory of Genomics and Biotechnology, Department of Biotechnology, Daugavpils University, Parādes str. 1A, LV-5401 Daugavpils, Latvia; laurisjankovskis@gmail.com

⁴Laboratory of Genomics and Biotechnology, Department of Biotechnology, Daugavpils University, Parādes str. 1A, LV-5401 Daugavpils, Latvia; marija.jermalonoka@du.lv

⁵Department of Genetics, Plant Breeding and Seed Science, Wrocław University of Environmental and Life Sciences, Grunwaldzki Sq. 24A, 50-363 Wrocław, Poland; renata.galek@upwr.edu.pl

⁶Institute of Life Sciences and Technology, Daugavpils University, Parades Street 1A, LV-5401 Daugavpils, Latvia; ligita.mezaraupe@du.lv

⁷G. Liberts' Innovative Microscopy Centre, Department of Technology, Institute of Life Sciences and Technology, Daugavpils University, Parades Street 1A, LV-5401 Daugavpils, Latvia; marina.krasovska@du.lv

⁸G. Liberts' Innovative Microscopy Centre, Department of Technology, Institute of Life Sciences and Technology, Daugavpils University, Parades Street 1A, LV-5401 Daugavpils, Latvia; eriks.sledevskis@du.lv

IN VIVO BIOSYNTHESIS OF AU AND AG NPS USING MEDICAGO SATIVA L. SEEDLINGS

Au and Ag nanoparticles (NPs) are widely used in medicine for anti-cancer and anti-bacterial applications as well as in plant protection for the fight against plant diseases caused by viruses, bacteria, fungi, and other parasitic organisms. During chemical synthesis, toxic solvents are used which makes NPs harmful to the environment. Artificial NP synthesis can be replaced by biosynthesis, such as the *in vivo* method when plants are growing independently and has the ability to take up and then split the precursor down to nano size using synthesis-promoting solvent-biomolecules, which are localized in plant cells. Biosynthesis makes NPs with anti-inflammatory, and antioxidant effects because in synthesis no free radicals are involved. This study aims to test the possibility of *in vivo* synthesis, if two-week-old seedlings of two *Medicago sativa* L. genotypes, 'Kometa' and 'la Bella', were exposed to two precursors (AgNO₃, HAuCl₄) for 24 and 48 h. Confocal microscopy, two-beam, and also certain wavelength spectrophotometry confirmed statistically significant ($p < 0.05$) changes in light fluorescence and light absorption compared to the control. Confocal microscopy showed both precursors visible in the roots of both genotypes. As it stands now, NPs synthesis and visualization methods are complex, expensive, and time-consuming sequences of methods. It is important to search for an effective, environmentally friendly, and as cheap and simple as possible method for the biosynthesis of NPs.

Makabelo Tenane¹, Tsepo Mokuku²

¹National University of Lesotho, Maseru, Lesotho, makabelotenane@yahoo.com

²National University of Lesotho, Maseru, Lesotho, tmmokuku@yahoo.com

INVESTIGATING BIOLOGY STUDENTS CONCEPTION OF ECOLOGY OF A WETLAND ECOSYSTEM

Abstract

Background

Wetlands ecosystems are important and relevant to biotic and abiotic factors including survival of humans. Therefore it is imperative that students in Lesotho become sensitized to the conception on some ecological concepts of the ecology of wetland ecosystems based on Ecological Literacy (EL) framework. Very few studies investigated Lesotho students' EL of wetlands hence why this study explored biology students' knowledge on the ecology of a wetland. Two research questions guiding the study were: 'What is the nature of biology students' conception on the ecology of a wetland ecosystem?' and 'What are the differences between the conception of girls and boys on the ecology of a wetland ecosystem?'

Methods

A local wetland in the vicinity of one school was used for data collection and observations were based on close ended questionnaires focusing on EL tenets. Questionnaires were administered to thirty students, 15 boys and 15 girls participating and 30 non-participants. Quantitative and qualitative methods were used in data analysis.

Results

Findings revealed that students were ecologically literate on the ecology of a wetland ecosystem but to some extent. The analysis also pointed that, boys were more ecologically literate than girls.

Conclusions

It is recommended that for further research, higher order levels of Bloom's taxonomy could be tested by using other different research tools so as to meet the demands of EL. It is also recommended that results should be obtained from more than one school with higher number of population and other demographic variables such as age, place of residence and the level of education.

Keywords: ecological literacy, knowledge, wetlands ecosystems, gender, biology students.

Ronalds Krams¹, Colton B. Adams^{2,3}, Sergejs Popovs¹, Māris Munkevics^{1,3}, Tatjana Krama^{1,4}, Giedrius Trakimas^{1,5}, Markus J. Rantala⁶, Todd M. Freeberg², Indriķis Krams^{1,3,7,8}

¹Daugavpils University, Parādes street 1A, Daugavpils, ronalds.krams@du.lv, sergey.p@email.com, tatjana.krama@du.lv, indrikis.krams@du.lv

²University of Tennessee, TN 37996, Knoxville, United States of America, cadams54@vols.utk.edu, tfreeber@utk.edu

³University of Latvia, Jelgavas street 1, Rīga, marismunkevics@gmail.com, indrikis.krams@lu.lv

⁴Estonian University of Life Sciences, Friedrich Reinhold Kreutzwaldi street 5, Tartu, Estonia, tatjana.krama@emu.ee

⁵Vilnius University, Saulėtekio street 7, Vilnius, Lithuania, giedrius.trakimas@gf.vu.lt

⁶University of Turku, 20014, Turku, Finland, mjranta@utu.fi

⁷Latvian Biomedical Research and Study Centre, Rīga, Rātsupītes street 1, indrikis.krams@biomed.lu.lv

⁸University of Tartu, Juhan Liivi street 2, Tartu, Estonia, indrikis.krams@ut.ee

PERMANENT AND IRREGULAR FEEDING REGIME EFFECT ON THE SURVIVAL OF WINTERING GREAT TITS (*PARUS MAJOR LINNAEUS*, 1758)

Survival for birds can be challenging during the cold winter months in Northern Europe. Humans often provide food to wintering birds, thus, improving their winter survival. The optimal body mass hypothesis posits that the body reserves of wintering birds are balanced between the risk of starvation and predation.

In this study we tested whether the body mass of wintering great tits (*Parus major* Linnaeus, 1758) was higher under conditions of less predictable food resources. We compared body mass, body mass index, the speed at take-off and apparent survival of great tit adult males wintering in small urban areas, either near feeders providing permanent access to food for months, or near feeders providing irregular access to food.

Body mass and body mass index were greater, while take-off speed and apparent survival were lower in birds wintering near permanent feeders than birds wintering near irregular feeders. Thus, urban birds, with their predictable access to high energy food, did not follow the fattening strategy predicted by the optimal body mass hypothesis.

This study shows that excess under skin fat reserves of great tits wintering near permanent feeders can make them slow at take-off, which increases their exposure to predators. Regular excess amounts of high-energy food may affect urban birds' physiological and behavioural strategies in a non-adaptive way.

We suggest that caution should be taken when choosing a proper place to position bird feeders to prevent making birds at feeders' easy prey for predators. We recommend irregular feeding of wintering birds and the placing of feeders in places that are safe against attacking predators.

Colton B. Adams^{1,2}, Indriķis Krams^{2,3,4,5}, Todd M. Freeberg¹, Tatjana Krama^{3,6}, Giedrius Trakimas^{3,7}, Sergejs Popovs³, Māris Munkevics^{2,3}, Ronalds Krams³

¹University of Tennessee, TN 37996, Knoxville, United States of America, cadams54@vols.utk.edu, tfreeber@utk.edu

²University of Latvia, Jelgavas street 1, Rīga, indrikis.krams@lu.lv, marismunkevics@gmail.com,

³Daugavpils University, Parādes street 1A, Daugavpils, indrikis.krams@du.lv, tatjana.krama@du.lv, sergey.p@email.com, ronalds.krams@du.lv

⁴Latvian Biomedical Research and Study Centre, Rīga, Rātsupītes street 1, indrikis.krams@biomed.lu.lv

⁵University of Tartu, Juhan Liivi street 2, Tartu, Estonia, indrikis.krams@ut.ee

⁶Estonian University of Life Sciences, Friedrich Reinhold Kreutzwaldi street 5, Tartu, Estonia, tatjana.krama@emu.ee

⁷Vilnius University, Saulėtekio street 7, Vilnius, Lithuania, giedrius.trakimas@gf.vu.lt

WILLOW TITS (*POECILE MONTANUS*) ELICIT PROPHYLACTIC MOBBING CALLS UPON APPROACH TO DENSELY VEGETATED FORAGING SITES

Willow tits (*Poecile montanus*) routinely form social groups of 4 individuals with a clear hierarchy during winter across most of Europe and northern Asia. Vocal behavior within these flocks is important for maintaining flock organization and territory, and also for foraging and antipredator contexts. The “chick-a-dee” call is ubiquitous in parids and is possibly multipurpose in function, especially during antipredator mobbing events and potential prophylaxis of predators.

Although mobbing is a widespread behavior, its evolution and ecology remain poorly understood, as the specific social and environmental stimuli that trigger it. Prophylaxis or preventative mobbing event, thought to expose potential threats in inconspicuous environments even if there is no threat, hasn't been widely studied in parids.

We tested for the effects of vegetation density (open/dense habitat) and social rank (1: most dominant, 4: least dominant) on prophylactic antipredator behavioral responses during and following the arrival of tit flocks to feeders. After a feeder had been stocked with seed, we waited for the first individual to arrive and begin mobbing. For this individual we counted number of “chick-a-dee” calls per minute and number of D-notes in these calls until flockmates joined. We noted social rank (1-4) of the first individual and openness of the feeder site as well. Once the remaining flockmates appeared, we calculated total mob duration and latency of flock arrival.

We found that individual willow tits tended to elicit more “chick-a-dee” calls per minute containing a higher proportion of D-notes when approaching a feeder in a denser environment. Similarly, we found that the responsiveness of other flockmates increases with the intensity of mob by first individual.

These results support the idea that mobbing may serve as predator prophylaxis to reveal predators and prevent their potential threat. More intense mobs are more likely to intimidate or otherwise expose predators.

KĪMIJA

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CHEMISTRY

Andrejs Grigorjevs¹, Jeļena Kirilova²

¹Daugavpils University, Parādes street 1, Daugavpils, gamer55@inbox.lv

²Daugavpils University, Parādes street 1, Daugavpils, jelena.kirilova@du.lv

ELECTROCHEMICAL REACTION OF ANTHRAQUINONE AND 1-AMINOANTHRAQUINONE WITH ARYLHYDRAZINES

Electrochemical synthesis represents a promising approach, offering precise control over reaction conditions and the potential for synthesizing diverse organic compounds. Recently, there has been a significant increase in the use of electrochemical methods applied in organic synthesis, where electrosynthesis becomes a tool for creating new procedures used to obtain the desired organic compound. Among the advantages of this methodology, the most significant are mild reaction conditions, efficient use of energy, the use of electrons as reducing or oxidizing reagents to break or form new bonds. Therefore, electrosynthesis is a promising method for the synthesis of organic compounds such as heterocycles, halogen derivatives, thiocyanates, etc.

The present research focuses on the electrochemical transformations of anthraquinone and 1-aminoanthraquinone upon interaction with phenylhydrazine and 4-nitrophenylhydrazine in an acidic environment. The products of the conducted electrosynthesis were isolated and studied by chromatographic and spectroscopic methods.

Armands Maļeckis¹, Elena Kirilova²

¹Institute of Chemistry and Chemical Technology, Faculty of Natural Sciences and Technology, Riga Technical University, P. Valdena Str. 3, LV-1048 Riga, Latvia

²Department of Environment and Technologies, Faculty of Natural Sciences and Healthcare, Daugavpils University, LV-5401 Daugavpils, Latvia

ADVANCEMENTS IN FLUORESCENT α -AMINOPHOSPHONATES

α -Aminophosphonates serve as analogues to amino acids, substituting the carboxylic group with either phosphonic acid or a related group. These compounds are extensively investigated due to their diverse biological activities, notably as antagonists. Additionally, α -aminophosphonates represent a crucial class of compounds for the synthesis of potential novel antibiotics, herbicides, and neuromodulators. Recent research has focused on exploring the fluorescent properties of certain α -aminophosphonates. Investigations into the synthesis and fluorescence characteristics of α -aminophosphonates derived from aromatic amines such as benzene, naphthalene, pyrene, anthracene, and phenanthrene, alongside bis-aminophosphonates featuring anthracene rings, have been documented. In our current study we examined synthesis, luminescent properties and application of benzanthrone and anthraquinone α -aminophosphonates.

Jeļizaveta Širokova¹, Nataļja Škute¹

¹Daugavpils Universitāte, Parādes iela 1, Daugavpils

ALTERATIONS IN THE PHYSICAL PROPERTIES OF DNA UPON INTERACTION WITH FLUORESCENT COMPOUNDS

Researches investigating the interaction between DNA and fluorescent dyes holds significant importance across scientific and technological fields and harnessing applications across diverse research areas in such as biology, medicine and pharmaceuticals. Studying DNA is crucial for understanding genetic mechanisms, hereditary diseases, evolution, and other aspects of biology. DNA analysis allows the identification of genetic variations, the study of mutations, and the tracking of cellular developmental processes and organism functioning. The

development of new analysis methods and understanding of molecular interaction mechanisms can clarify on many aspects of biological processes and aid in the creation of more accurate diagnostic methods.

Alise Kirilova¹, Marina Savicka², Tatjana Grigorjeva²

¹ Department of Environment and Technologies, Faculty of Natural Sciences and Healthcare, Daugavpils University

² Institute of Life Sciences and Technology, Daugavpils University

APPLICATION OF TURBIDIMETRIC ANALYSIS TO ASSESS TOXICITY

As many chemicals used by humans are released into the aquatic environment, aquatic toxicity testing requires rapid and representative bioassays. In a previous study, we evaluated the toxicological effects of benzanthrone derivatives on wheat germ (*Triticum aestivum*) as a test organism. We found that the tested compounds had varying degrees of toxicity on the growth of wheat seedlings, depending on the concentration and nature of the substituent. Then the study of the biotoxicity of these substances was extended to a new test object - the yeast *Saccharomyces cerevisiae*. The biological toxicity testing, the *S. cerevisiae* lethality test, is based on detecting changes in yeast viability. The studied dyes in different concentrations were exposed to yeast cells for different durations. After the selected exposure time, the number of living and dead cells was counted and analyzed to assess the toxicity of the studied luminescent dyes.

In the present study, we apply a new method based on the detection of growth inhibition by measuring the optical density of a yeast suspension in the presence of various toxicants. The results of this study indicate that the *S. cerevisiae* growth inhibition test is effective in detecting chronic chemical toxicity.

This test has the potential to expand the capabilities of non-specific comprehensive rapid detection of toxic substances in water within the range of biological toxicity tests available in ecotoxicology.

Romualds Radiševskis¹, Sergejs Osipovs¹, Dainis Lazdāns¹

¹Daugavpils University, Parādes street 1A, Daugavpils, romualds.radisevskis@inbox.lv

DETERMINATION OF PHARMACEUTICAL CONTAMINATION IN THE SURFACE WATERS OF THE DAUGAVA RIVER WITHIN THE AUGŠDAUGAVA MUNICIPALITY TERRITORY

This study addresses the pressing environmental concern of pharmaceutical contamination in the surface waters of the Daugava River, particularly within the Augšdaugava Municipality territory. The research aimed to quantify the presence and distribution of pharmaceutical compounds, focusing on antibiotics, nonsteroidal anti-inflammatory drugs (NSAIDs), and hormones, which pose significant risks to aquatic ecosystems and human health.

Water samples were collected from multiple points along the Daugava River within the municipality boundaries during different seasons to account for variability in pharmaceutical discharge and environmental conditions. The samples underwent rigorous analysis using advanced liquid chromatography-mass spectrometry (LC-MS) techniques, enabling the identification and quantification of trace levels of pharmaceutical substances.

The findings reveal a concerning presence of various pharmaceuticals, with concentrations of certain antibiotics and NSAIDs exceeding environmental safety thresholds. Notably, the study identified seasonal variations in pharmaceutical concentrations, with higher levels observed during the winter months, attributed to reduced dilution effects and increased pharmaceutical usage.

The research highlights a significant environmental issue, emphasizing the need for effective wastewater treatment solutions and stricter regulations on pharmaceutical disposal. Additionally, the study calls for further investigation into the long-term impacts of pharmaceutical contamination on aquatic life and human health. By shedding light on the extent of pharmaceutical pollution in the Daugava River, this research contributes valuable data to environmental scientists and policymakers, paving the way for improved water quality management and conservation efforts in the region.

Mantas Meiliunas¹, Aleksandrs Pučkīns¹, Dainis Lazdāns¹, Sergejs Osipovs¹

¹Daugavpils University, Parādes street 1, Daugavpils, meiliunas.mantas@inbox.lv

DEVELOPMENT OF AN ANALYTICAL METHOD FOR THE DETERMINATION OF POLLUTANTS IN INDUSTRIAL WATER USED FOR COOLING OF PYROLYTIC GASES IN THE PYROLYSIS PROCESS OF SOLID WASTE

The burgeoning industrialization and the escalating reliance on pyrolysis for solid waste management underscore the necessity for stringent monitoring of environmental pollutants. Particularly, the water used in cooling pyrolytic gases harbors a complex matrix of contaminants, necessitating robust analytical techniques for their comprehensive determination. This study introduces a pioneering analytical method tailored for the quantification and identification of pollutants in industrial water used for the cooling of pyrolytic gases in the solid waste pyrolysis process.

The methodology commences with a pre-treatment phase, employing solid-phase extraction (SPE) to concentrate and purify the analytes from the complex water matrix. This is followed by the integration of High-Performance Liquid Chromatography (HPLC) with Mass Spectrometry (MS), facilitating the precise quantification and identification of a wide array of organic and inorganic pollutants, including heavy metals, polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs).

Validation parameters, such as accuracy, precision, limit of detection (LOD), and limit of quantification (LOQ), were rigorously evaluated, underscoring the method's reliability for environmental monitoring. The method demonstrated excellent reproducibility, with LOD and LOQ surpassing existing methodologies, thereby enabling the detection of contaminants at significantly lower concentrations.

The application of this method in a case study involving industrial cooling water from a pyrolysis plant revealed a diverse pollutant profile, highlighting the method's efficacy in environmental risk assessment and management. In conclusion, the developed analytical method represents a significant advancement in the field of environmental monitoring, offering an effective tool for the comprehensive assessment of pollutants in industrial cooling water.

Jevgenijs Dubovskis¹, Sergejs Osipovs¹, Mihails Pupinš¹

¹Daugavpils University, Parādes street 1, Daugavpils, jevgenijs.dubovskis@inbox.lv

EVALUATION OF THE EFFICIENCY AND UTILIZATION POTENTIAL OF BIOGAS PRODUCED FROM ALGAE

This research delves into the exploration of biogas production from algae, presenting a comprehensive evaluation of its efficiency and utilization potential. Algae, as a renewable biomass resource, offers a promising alternative to conventional biogas substrates due to its high growth rate, carbon neutrality, and ability to grow in various water bodies without necessitating arable land. This study adopts a multifaceted approach, encompassing the cultivation of different algae species, optimization of anaerobic digestion processes, and analysis of biogas yield and composition.

Initial phases involved the selection of suitable algae species, focusing on those with high carbohydrate and lipid content, essential for methane production. Subsequent stages optimized the anaerobic digestion process parameters, including temperature, pH, and retention time, to enhance biogas yield. The study also investigated pre-treatment methods to increase the bioavailability of algal biomass for digestion.

Findings reveal that certain algae species, when subjected to optimal digestion conditions, can produce biogas yields comparable to or exceeding traditional agricultural feedstocks. The biogas generated was predominantly methane, with minimal presence of hydrogen sulfide, making it a cleaner alternative. The study further explores the scalability of algal biogas production, addressing challenges such as biomass harvesting and processing costs. In conclusion, the research underscores the viability of algae as a sustainable source for biogas production, highlighting its efficiency and environmental benefits. It opens avenues for future studies on integrating algal cultivation with wastewater treatment, thereby achieving dual objectives of bioenergy production and water purification. The findings contribute significantly to the discourse on renewable energy sources, offering insights into leveraging algae's untapped potential for a sustainable energy future.

Sergejs Osipovs¹, Aleksandrs Pučkins¹

¹Daugavpils University, Parādes street 1A, Daugavpils, sergejs.osipovs@du.lv

INNOVATIVE METHODS OF BIOGAS PRODUCTION USING RESIDUES FROM FISH PROCESSING AND AQUACULTURE

The aquaculture and fish processing industries generate substantial organic waste, including fish offal, sludge, and uneaten feed, traditionally treated as disposal problems. However, these residues are rich in nutrients and organic matter, making them excellent substrates for anaerobic digestion (AD), a process that converts organic materials into biogas, primarily composed of methane (CH₄) and carbon dioxide (CO₂). This study introduces novel pre-treatment and co-digestion techniques aimed at improving the efficiency and output of biogas production from such residues.

The benefits of co-digesting fish waste with other organic wastes, such as agricultural residues and food waste, are investigated. Co-digestion balances the nutrient composition and improves the microbial synergy within the digester, leading to higher biogas yields and process stability. Case studies where co-digestion strategies have been optimized for specific mixtures of fish waste and other substrates highlight the importance of selecting compatible feedstocks and adjusting process parameters accordingly.

The potential environmental benefits and economic viability of implementing these innovative biogas production methods in the aquaculture and fish processing industries are evaluated. The reduction in waste disposal needs, coupled with the generation of renewable energy, presents a compelling case for the adoption of such technologies. Furthermore, the production of digestate, a by-product of AD, offers an additional avenue for resource recovery, serving as a nutrient-rich fertilizer that can support sustainable agriculture practices.

In conclusion, the development and implementation of innovative methods for biogas production from fish processing and aquaculture residues offer significant opportunities for energy recovery, waste reduction, and environmental sustainability in these industries.

Vladimirs Gusarovs¹, Aleksandrs Pučkins¹, Valdis Mizers¹

¹Daugavpils University, Parādes street 1A, Daugavpils, gusarovs.vladimirs@inbox.lv

OPTIMIZATION OF THE METHOD FOR REDUCING TAR CONCENTRATIONS IN THE PRODUCTS OBTAINED IN THE PYROLYSIS PROCESS OF SOLID WASTE

The pyrolysis process of solid waste offers a sustainable avenue for waste management and energy recovery, yet the presence of tar in the resultant products poses significant challenges, including operational issues and environmental concerns. This study focuses on the optimization of a novel method aimed at reducing tar concentrations in the products obtained through the pyrolysis of solid waste. The methodology leverages a combination of catalytic decomposition and post-treatment filtration techniques to achieve significant reductions in tar content, thus enhancing the quality and usability of pyrolysis products.

The optimization process employs a design of experiments (DOE) approach to determine the optimal catalyst type, quantity, and reaction conditions (temperature, residence time) that maximize tar conversion while minimizing energy input and catalyst cost.

Subsequent to catalytic treatment, a novel filtration system, incorporating a combination of physical and chemical filtration methods, is applied to remove residual tar particles from the pyrolysis vapors. The system's efficiency in tar removal is assessed through a series of performance tests, measuring the final tar concentration, purity of the pyrolysis gas, and the physical properties of the solid and liquid products.

The results demonstrate a substantial reduction in tar concentrations, with optimized conditions achieving up to 90% reduction compared to untreated pyrolysis products.

In conclusion, the optimized method presented in this study offers a practical and effective solution to one of the key challenges in the pyrolysis of solid waste. By significantly reducing tar concentrations, this method paves the way for the broader adoption of pyrolysis technology in sustainable waste management practices, contributing to the circular economy and reducing reliance on landfill disposal.

Aleksandrs Pučkins¹, Sergejs Osipovs¹

¹Daugavpils University, Parādes street 1A, Daugavpils, aleksandrs.puckins@du.lv

PREPARATION OF MANGANESE DIOXIDE CATALYST ON SILICA GEL SURFACE

Manganese dioxide (MnO₂) is one of the most widely used catalysts in various industrial processes, such as the oxidation of alcohols and aminoalcohols, hydrogen production, etc. This substance is also utilized in several educational processes, for example, during laboratory work in schools and higher education institutions. One effective method of obtaining the MnO₂ catalyst is by applying it to the surface of silica gel.

Silica gel is a porous material with a large surface area and high adsorption capacity. These properties make it attractive for use as a catalyst support. In this work, the process of obtaining the MnO₂ catalyst on the surface of silica gel is investigated.

Amorphous silica gel obtained by the salt-gel method using tetraethylorthosilicate (TEOS) and ammonia was used as the raw material. The silica gel surface was then modified with nitric acid to ensure a high dispersion of MnO₂ on the surface.

The resulting catalyst was characterized by various methods such as X-ray diffractometry (XRD), thermal gravimetry (TG), differential scanning calorimetry (DSC), and electron microscopy (SEM). The results showed that the obtained MnO₂ catalyst has a high dispersity on the surface of silica gel, which allows for an increase in its catalytic activity.

Irina Bezručenko¹, Sergejs Osipovs², Jelena Kirilova³

¹Daugavpils University, Parādes street 1, Daugavpils, i.kurse@inbox.lv

²Daugavpils University, Parādes street 1, Daugavpils

³Daugavpils University, Parādes street 1, Daugavpils

PRESENCE OF IMPURITIES IN MENTHA PIPERITA (PIPPERMINT) LEAF WATERS PRODUCED IN LATVIA

The aim of this paper was to reveal presence of impurities in the water distillates of essential oils of the peppermint (*Mentha piperita*). Samples of eight water distillates produced in Latvia were lyophilised and then 2 ml of Acetone and water were added to each of the evaporated samples (0,2 g) in the proportion of 1:1. Thus, the sample dilution became the same for each of the columns. Since the initial concentrations in the products were not known, the quality analysis was conducted by the GC. The obtained results of this research method were compared with the data published in ECHA CHEM database, as well as another research method with the GC – direct dilution of each sample with 2 ml of Dichloromethane and are presented in this paper.

DATORZINĀTNE

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COMPUTER SCIENCE

*Jurgita Lieponienė*¹

¹*Panevėžio kolegija/State Higher Education Institution, Laisvės sq. 23, Lithuania, jurgita.lieponiene@panko.lt*

COMPARISON OF EXPECTATION MAXIMIZATION AND K-MEANS CLUSTERING ALGORITHMS

As the volume of processed and stored data continues to grow exponentially, the use of data mining for thorough data analysis has become more widespread. The fundamental objective of data mining is to extract actionable insights from data. Various data mining techniques are employed to address analytical challenges, with careful selection of methods and algorithms to execute these techniques. This study is aimed to assess the efficiency of clustering algorithms - Expectation Maximization and K-means, focusing on their computational speed and clustering accuracy. The results are important for the practical deployment of data mining algorithms, facilitating the informed selection of the most suitable algorithm for specific datasets.

Keywords: *data mining, clustering algorithm, algorithm efficiency.*

DOKTORANTU SEKCIJA „LITERATŪRZINĀTNE”

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DOCTORAL STUDENT SECTION "LITERARY STUDIES"

Alona Dolinda

Daugavpils University, Parādes street 1, Daugavpils, alona.dolinda@gmail.com

«ЧАПАЕВ И ПУСТОТА»: ТЕКСТ И ЭКРАНИЗАЦИЯ

Полнометражный фильм «Мизинец Будды» становится вторым экранизированным романом Виктора Пелевина. Но он является первой зарубежной экранизацией, когда творчество постмодерниста настолько сильно вышло за границы своей страны, что уже даже режиссёры других стран обратили внимание на писателя и решили экранизировать один из его романов. Фильм 2015 года «Мизинец Будды» режиссёра Тони Пембертона - это экранизация романа Пелевина «Чапаев и Пустота» 1996 года.

Текст предоставляет его создателю неограниченные и множественные возможности для описания пространства и времени, внешнего вида персонажей, их взаимоотношений и других важных для сюжета элементов. С экранизациями дело обстоит иначе - чаще всего они имеют чёткие временные рамки, а учитывая, что речь в докладе идёт об экранизации постмодернистского текста, наполненного симулякрами - крайне занимательным становится то, насколько режиссёр справляется с неподъёмными для кино мистическими переходами этого жанра.

Цель доклада - выявление возможности трансформации постмодернистского текста в кинематографический, а сравнительный анализ художественного мира романа Виктора Пелевина «Чапаев и Пустота» и экранизации Тони Пембертона «Мизинец Будды» становится главным инструментом, чтобы эту цель выполнить. Область анализа охватывает все важные элементы художественного мира литературного произведения: время, пространство, героев и их репрезентацию в произведении писателя и в экранизации. Исследование основано на сравнительном анализе, на структурно-семиотическом и культурно-историческом методах. Во внимание приняты и особенности постмодернизма.

Детальный анализ романа и экранизации позволяет понять, насколько экранизированная версия удаляется от оригинального художественного произведения.

Valerii Kremenchutskiy¹

¹Daugavpils University, Parādes street 1, Daugavpils, valerii.kremenchutskiy@du.lv

IVAN YEFREMOV'S PERSONALITY IN CONTEXT OF HIS LITERARY ACTIVITY

Ivan Yefremov is a famous Soviet science fiction writer. Numerous researchers view him as the father of Soviet science fiction. The article considers various aspects related to Yefremov's personality, attitude to communist ideology being one of them.

Līga Struka

¹Daugavpils University, Vienības street 13, Daugavpils, liga.struka@inbox.lv

TELPAS KATEGORIJA ANDRAS MANFELDES TĒLOJUMĀ "ZEMNĪCAS BĒRNI"

Telpas kategorija ir nozīmīgs aspekts, kas ieņem lielu lomu Baltijas valstu rakstnieku deportāciju tekstos. Gan Igaunijas, gan Latvijas, gan Lietuvas autoru tekstos, runājot par telpu, dominē opozīcija "dzimtā jeb pagātnes telpa" un "svešā jeb tagadnes telpa".

Telpa, kurā izsūtītie dzīvoja pirms deportēšanas, ir dzimtās mājas, vide un valsts, deportēto apziņā bieži vien tiek idealizēta, tā ir idilliska un pastāv kā mērķis, kas motivē izdzīvot Sibīrijā un atgriezties tajā.

Sibīrijas jeb svešā telpa ir pretstats Latvijai - drūma, ciešanu pilna, kur nākas izdzīvot, redzēt citu deportēto nāvi un slimības, kā arī pielāgoties jaunajiem dzīves apstākļiem.

Andras Manfeldes tēlojums "Zemņicas bērni" ir izdots 2011.gadā. Tajā autore stāsta par savu vecvecāku dzīvi Sibīrijā un atgriešanos atpakaļ Latvijā. Jau tēlojuma nosaukumā tiek uzsvērtā vieta, kur dzīvo izsūtītie - zemņica. Andra Manfelde grāmatā vēsta par divām dzīves telpām - gaišo un dzimto Latviju un drūmo un piekvēpušo zemņicu Sibīrijā. Sibīrijā dzīves telpa tiek parādīta ne tikai kā māja, kur nākas dzīvot, bet arī apkārtējā vide, kur tiek iegūti dabas resursi, lai izdzīvotu, tādējādi parādot, kā cilvēks Sibīrijā kļūst atkarīgs no dabas, kas ir viens no galvenajiem izdzīvošanas avotiem.

Jekaterina Gusakova

Daugavpils University, Parādes street 1, Daugavpils, ekaterina.gusakova@delfi.lv

ИСТОРИЧЕСКАЯ ТРАВМА В РОМАНЕ «АППЕНДИКС» АЛЕКСАНДРЫ ПЕТРОВОЙ

The article examines the main narratives of historical trauma faced by European peoples. The tragic narrative is examined in detail on the example of the novel "Appendix" by Alexandra Petrova, including the example of the accident at the Chernobyl nuclear power plant.

EKONOMIKA UN SOCIOLOĢIJA

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ECONOMICS AND SOCIOLOGY

Jolanta Vjakse

WORK-BASED LEARNING IN VOCATIONAL EDUCATION AND LIFELONG LEARNING IN LATVIA, THEIR DEVELOPMENT PROSPECTS

It is the work-based learning has been identified by the Latvian state as one of its priorities in the guidelines for higher education. The objective of work-based learning is to ensure that the vocational school students gain the earliest possible understanding of the career of their choice, and learn not only in vocational education institutions, but also in enterprises – their potential workplaces. That, in turn, contributes to the improvement of vocational education through engaging employers in the improvement and development of curricula in line with the rapidly changing labour market requirements, as well as providing the basis for raising the prestige of vocational education and interest in it among students in the future.

Work-based learning was studied in an objective and comprehensive manner, taking into account the laws and regulations of Latvia, the information accumulated regarding the implementation of work-based training in Latvia since 2017, in addition to conducting academic research and probing into experience in other countries. The resulting findings, analysis and proposals can be adapted to the education and employment process in Latvia, thus contribution to the development of its national economy.

The promotion research explored cooperation between students, businesses and vocational schools in the implementation of work-based learning. It was established that work-based learning, financed from the European Social Fund for seven years, has created awareness of the learning process and the role of each party involved in that process; this clearly demonstrates the need for a concrete solution for developing work-based learning after 2023, when funding for work-based learning is discontinued in Latvia.

The hypothesis: Inadequate understanding of the importance of WBL for the reduction of youth unemployment and a subsequent lack of budgeting for the implementation of WBL may have a considerable impact on the development of vocational education and lifelong learning aligned with the labour market needs in Latvia.

The objective: Performing the analysis of the progress of WBL in Latvia, provision of proposals for broader application of WBL in vocational education and lifelong learning and for as close as possible alignment of training with labour market requirements.

Ineta Lakstigala

University of Latvia, Faculty of Business, Management and Economics, Aspazijas bulvaris 5, Riga, inetalakstigala@inbox.lv

DEVELOPMENT OF PROFESSIONAL COMPETENCE OF EMPLOYEES

Keywords: *employee development, personal values, public administration.*

Rapid developments in information technology have affected all sectors, including public administration. Mainly with an emphasis on electronic activity. In a way, it facilitates and accelerates the processing, availability, transmission and other processes of information. But as a result, the roles and work processes of employees have changed, in everyday work. Consequently, there is a need to maintain and improve the competences of employees at a level that is appropriate to have the skills, skills and knowledge necessary to be able to perform quality work duties. It is therefore in the interest of the public administration that the competences of employees correspond to demand and do not age them. Thus, the State Administration shall offer appropriate seminars, courses, conferences and exchange programmes for improvement of the professional competence of employees, which promote wider knowledge, skills and range of vision in their professional field and their competencies are appropriate to demand.

In professional development, the attitude, behaviour and behaviour of employees play a major role, which in turn is influenced by personal values created during life. Consequently, the objective of the State administration to improve the development of the professional competence of employees does not always achieve the desired results. Because it is mainly influenced by attitudes towards the learning process and the priorities of personal

life. By identifying the impact of the most significant personal value at work, it will be possible to identify risks in a timely manner and address them at an early stage.

Aleksejs Homutiņins¹, Viktorija Šipilova¹, Ludmila Aleksejeva¹

¹Daugavpils University, Parādes street 1, Daugavpils, ludmila.aleksejeva@du.lv

IEDZĪVOTĀJU DEPOPULĀCIJAS ĪPATNĪBAS EKONOMISKĀS ATTĪSTĪBAS KONTEKSTĀ

Saskaņā ar prognozēm daudzās Eiropas valstīs ilgtermiņā būs vērojama iedzīvotāju skaita samazināšanās. Ņemot vērā šo tendenci, zinātniskajās debatēs aktualizējās jautājums par cilvēkkapitāla pieejamību un ietekmi uz sociālekonomisko situāciju reģionos. Pētot sociālekonomiskās tendences, zinātnieki prognozē iedzīvotāju skaita izmaiņas, akcentējot demogrāfiskos un migrācijas jautājumus. Šajā prezentācijā autori pēta Latvijas piemēru. Latvija piedzīvo augstus emigrācijas rādītājus, savukārt, dzimstības līmenis ir zemākais pēdējo simts gadu laikā. Depopulācija rada riskus cilvēkkapitāla pieejamībai reģionos. Depopulācijas apstākļos reģioniem ir jāizstrādā mērķtiecīga ilgtspējīga reģionālās attīstības politika, kas ņem vērā zinātniski pamatotus iedzīvotāju skaita izmaiņu prognožu scenārijus. Aprēķinu rezultāti ļauj konstatēt iedzīvotāju skaita izmaiņu samazināšanās tendenci ilgtermiņā gan iedzīvotājiem darbspējas vecumā, gan bērnu vecumā Latvijas reģionos. Sociālie, ekonomiskie un vides rādītāji liecina par nepieciešamību kompleksi novērtēt iedzīvotāju skaita pārmaiņu tendences. Šajā pētījumā tiek piedāvāti dati, lai izprastu īstermiņa un ilgtermiņa perspektīvas, kas jārisina, izmantojot ilgtspējīga reģionālās attīstības politiku.

Atslēgas vārdi: iedzīvotāju skaita izmaiņas, prognozes, cilvēkkapitāls, reģioni, ilgtspējīga reģionālā attīstība.

Zane Šime¹

¹ United Nations University Institute on Comparative Regional Integration Studies (UNU-CRIS), Potterierei 72, Brugge, Belgium, zsime@cris.unu.edu

POSITIONALITY IN THE EUROPEAN RESEARCH AREA THROUGH LEARNING SPACES OFFERED BY PROJECTS

The European Research Area (ERA) is one of the most versatile supranational, post-Westphalian, and external action frameworks of the European Union (EU). Projects funded by the EU Framework Programmes serve as promising socialisation, mutual learning, and joint action enablers that translate the EU main goals and aspirations into tangible steps across the EU and world-wide. The practice theory-guided mapping of the contemporary Bourdieusian framework field of the ERA with a focus on the consortium-based engagement patterns of European Southern Neighbourhood-based entities might be an illustrative example of how to explore the intellectual entanglement of individual advanced research centres, higher education institutions, and their clusters elsewhere. The project portfolio analysis and insights generously offered by the Europe-based project managers provide nuanced insights into the way individual researchers and research administrators navigate the framework field of the ERA and immerse themselves in its transnationally steered habitus and diverse capital transactions. It is noteworthy that a project can serve as a platform for much broader outreach through various forms of academic liaison, capacity-building offers, and societal engagement. These are resourceful means to support external action, advance domain-specific diplomatic goals, and strengthen individual or institutional positionality in the ERA as an active contributor to the projection of European ideals and post-Westphalian objectives. This mode of agent's operation in the field is more advanced than a mere restraint to a sufficient level of participation in the pre-planned project activities. The enthusiasm and corresponding actions of project implementers are outstanding resources for the EU. The devotion of project implementers to make the most of all project cycle stages translates a considerably long list of lofty supranational goals into tangible, time-bound actions on the ground across the globe.

Violeta Vilkoityte

Lithuanian Centre for Social Sciences, A. Goštauto street 9, Vilnius, Lithuania, violeta.vilkoityte@lcss.lt

SOCIAL INVESTMENT STRATEGIES FOR ACTIVE AGING SUCCESS IN LITHUANIA

The aging population has significant implications for the welfare states, many of them exceeded their capacity to meet welfare commitments. Social investment strategies could play a crucial role in creating an environment that supports active aging by addressing various aspects of an older individual's life, including health, education, and employment, providing individuals with the resources and skills they need to succeed in a rapidly changing world. It can help older people to stay active and avoid early retirement as well. These strategies aim to maximize the potential of older individuals and enable them to lead fulfilling and active lives as they age.

Even though the social investment perspective has been discussed for the past decades, there is still a void of empirical evidence to explain how social investment affects older adults. Most empirical attempts to assess the impact of social investment focus on objective material socioeconomic conditions such as employment and poverty among working-age groups. This study aims to examine the results of social investment for active aging. Within the social investment framework, there are three main policy functions of the modern welfare state; stock, flow, and buffer policies (Hemerijck 2015; 2017). The active aging model is based on the Health, Lifelong Learning, Participation, and Security pillars (Zaidi, 2015; Rojo-Perez et al., 2022).

To investigate the research question, Secondary quantitative data analysis was performed of the Survey of Health, Ageing and Retirement in Europe (SHARE) wave 8 (Lithuania N = 1437). In the analytical phase, quantitative Principal Component Analysis and Cluster Analysis (SPSS 26). The results reveal different active aging profiles (low activity; moderate activity; balanced activity; and high activity). The first two profiles are characterized by bad aging conditions such as bad health, a large share of social benefits in income, and insufficient social investment interventions. The last two profiles are described by better conditions and confirm the positive impact of the social investment.

Inguna Lazdiņa¹, Andra Zvirbule², Līna Šneideraitiene³

^{1,2}*Latvijas Biozinātņu un tehnoloģiju universitāte, Latvija; Kripatina2014@inbox.lv, andra.zvirbule@lbtu.lv*

³*AB "Dolomitas", Lietuva*

THE SMART CONCEPT TRANSFORMATION AND INTEGRATION IN THE SUSTAINABLE ROAD NETWORK DEVELOPMENT OF LATVIA AND LITHUANIA

On the eve of the fifth industrial revolution, roads will no longer be seen as static infrastructure, but as a “smart network” fully aware of the situation, context and environment. The development of the transport network paves the way for a more environmentally friendly, smart and flexible sustainability of the transport system. Sustainability, wisdom and flexibility are the cornerstones of transport network mobility.

The scientific novelty of the topic is reflected in the evolution of the empirical review of the theoretical transformation of the concept of smartness. For the interpretation and interpretation of the conceptual concept of smart, the author used comparing the scientific axiom of empirical studies to maintaining a new perspective of the concept of “smart concept.” Experiments and conclusions from traditional studies in regions, the road sector and the economy have been used to maintain a new perspective. As a result, the methodology of the selected study describes and explains more competently the most relevant relationships and developments in the realm of the smart reality of the road network.

The framework of the discussion consists of a critical comparative approach to the priorities “smart” and “flexible” set out in the sustainable and Smart Mobility Strategy in the development and policy planning documents of Latvia and Lithuania, and practical action in the infrastructure applications of road networks. The results of the phenomenological analysis and synthesis of the authors for the comparison between Latvia and Lithuania are presented visually in Ishikawa fish bone chart.

Keywords: *smart, transformation, smart concept, intelligent transport system.*

IZGLĪTĪBAS ZINĀTNES

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EDUCATIONAL SCIENCES

*Shuying Li*¹

¹*Daugavpils University, Parādes street 1, Daugavpils, 447805364@qq.com*

UMMARY OF THE HAPPINESS OF HIGH SCHOOL TEACHERS AND STUDENTS IN CHINA AND LATVIA AND THEIR IMPLEMENTATION IN EDUCATION

This article aims to explore the understanding of happiness concepts among high school teachers and students in China and Latvia, as well as their specific manifestations in educational practice. By comparing the cultural backgrounds, educational systems, and social values of the two countries, this study found that although there are differences in educational traditions and happiness concepts between China and Latin America, both emphasize the importance of personal growth, family harmony, and social contribution in building a happy life. Chinese high school teachers and students tend to closely link the concept of happiness with the "harmony" and "achievement" in Confucian culture, emphasizing academic achievement and social responsibility. In the implementation of education, Chinese educators emphasize the combination of knowledge transmission and moral education, cultivating students' comprehensive qualities and social responsibility through classroom teaching, social practice activities, and other means.

Latvian high school teachers and students place greater emphasis on the development of personal freedom, creativity, and social skills, understanding happiness as the unity of individual inner needs and social integration. In educational practice, Latvian educators tend to adopt more flexible and open teaching methods, encouraging the cultivation of students' critical thinking and innovative abilities.

This study also explores how to integrate each other's beneficial elements into the education systems of the two countries to promote cross-cultural understanding and internationalization of education. Through comparative analysis, a series of improvement suggestions in education policies, curriculum design, and teaching methods have been proposed to better meet the diverse development needs of students, enhance education quality and happiness.

The conclusion of this article is that although there are differences in happiness concepts and educational implementation between China and Latin America, mutual learning and integration can enrich and improve their respective educational systems, providing strong support for cultivating a new generation of young people with international perspectives and cross-cultural communication abilities.

*Shenglin SUN*¹, *Dzintra Iliško*²

¹*Daugavpils University, Parādes street 1, Daugavpils, 1250115359@qq.com*

²*Daugavpils University, Parādes street 1, Daugavpils, dzintra.ilisko@du.lv*

ADAPTIVE SPORTS ACTIVITIES FOR THE ADOLESCENTS WITH MILD INTELLECTUAL DISABILITIES

According to the *World Report on Disability* (2011), over 1 billion people worldwide are with various forms of physical disabilities, accounting for 15% of the world's population and the disability problem has reached an alarming level. As this was reported, "Disability is part of the human condition and almost everyone will be temporarily or permanently impaired at some point in life, therefore disability is complex,and the interventions to overcome the disadvantages associated with disability are multiple and systemic" (*The World Report on Disability*, 2011). Integrated education has been introduced in China and becomes a core of development of education for children with special needs. *The Law of the People's Republic of China* has made further developments for the comprehensive schools to accept children with disabilities by providing them with all necessary services. Further, a series of policies and regulations have been introduced by providing more specific instructions for ensuring quality of learning of all children. The focus of this study is to trace the developments of inclusive education in sport classes in China. This paper provides systematic literature review on developing inclusive sport education in comprehensive schools in China. The study analyses current situation and hindering factors of integration of adolescents with mild

intellectual disabilities in sport classes. The authors have identified a range of problems related to integration of pupils with special needs in sport classes and suggest adaptive framework for integration of adolescents with special needs in sport classes. It was concluded that the success of inclusive sport education depends on school's commitment to create inclusive legislation, inclusive learning environment, to establish infrastructure and teachers' capacity to implement inclusive training and more accessible, flexible, and well-coordinated services.

Keywords: *adolescents with special needs, disability, inclusion, adaptive framework.*

Alise Mishkovska¹, Dzintra Iliško²

¹*Daugavpils University, Parādes street 1, Daugavpils, burvigas_slidas@inbox.lv*

²*Daugavpils University, Parādes street 1, Daugavpils, dzintra.ilisko@du.lv*

COMPETENCES FOR BUILDING THE ALLIANCE BETWEEN COACHES AND ELITE FIGURE SKATERS

The coach plays a very important role in fostering success of athletes, since the coach has the greatest influence on improving or decreasing athletes performance. Therefore, the coach must have professional knowledge and experience. The main task of the coach is the ability to teach specific skills, to build and to maintain relationships with the athlete. Preliminary study of research carried out so far indicates to such significant aspects that need to be taken into consideration as aspects of athletes performance as stress, coping, anxiety, self-confidence, mindfulness, imagery, and emotions. Such psychological factors as psychological stress mainly encountered by adult athletes, fear of failure, loss of internal control, and current physical state may influence the performance. The main aim of building relationship between the coach and the athletes is to improve the skills of athletes in different ways. In sports, a wide array of physical, technical, tactical, and psychological skills are important for the athletes. Thus, coaches need to be instructors, motivators, strategists, organizers and character builders. The process of achieving the potential of an athlete's performance abilities is very complex. The author has applied qualitative methodology, namely interviews with the coached who are engaged in training athletes. The aim of the paper is explore the main competences that requires for coaches who are training elite figure skaters as defined by the coaches themselves. As this was discovered, efficient alliance between the coach and the athlete ensures more efficient training process and requires the coach to have the competencies of coaching. This authors have designed suggestions for improving coaching process that involves also such aspects psychological environment and forms of organizational management.

Keywords: *elite figure skaters, coach, alliance, competences.*

Jūlija Šķestere¹, Ilze Šenberga², Eridiana Oļehnoviča³

¹*Daugavpils University, Parādes street 1, Daugavpils, juliadudareva815@gmail.com*

²*Daugavpils University, Parādes street 1, Daugavpils, ilze.senberga@du.lv*

³*Daugavpils University, Parādes street 1, Daugavpils, eridiana.olehnovica@du.lv*

DEVELOPING STUDENTS' CRITICAL THINKING SKILLS IN THE "SOCIAL SCIENCES AND HISTORY" SUBJECT, GRADE 5

Developing students' critical thinking skills in the "Social Sciences and History" subject, grade 5.

Keywords: *Critical thinking, literacy, social science and history, text tasks, 5th grade.*

The achievable results defined in the national Basic Education Standard in the Social and Civic section and the model curriculum of the subject "Social Sciences and History" emphasise the need to improve students' critical thinking skills by incorporating critical selection and analysis skills of texts and sources into the curriculum. It also promotes the creation of new texts to enable pupils to understand in greater depth the social, economic and political processes they are learning about within the social and civic curriculum. Critical thinking has become relevant in today's geopolitics, where pupils may be exposed to misleading content and disinformation.

The acquisition of critical thinking skills takes place through text and involves the selection, analysis, evaluation, comparison and expression of opinion of information based on facts. However, in practice working as a social and civic teacher and teaching the subject "social sciences and history" in Class 5, it must be concluded that textual tasks still present difficulties for pupils. The report will analyse the personal professional experience of a future teacher, the results of pupil performance in tasks related to pupil skills in critical thinking of different types of texts. It is concluded that if these skills are not fully acquired, this poses cognitive challenges in working with

different types of texts, not only in social sciences and history, but also in language subjects, mathematics and science.

Shenglin Sun¹

¹*Daugavpils University, Parādes street 1, Daugavpils, 1250115359@qq.com*

EMPIRICAL STUDY ON THE IMPACT OF SPORTS INTEGRATION EDUCATION (ADAPTIVE SPORTS ACTIVITIES) ON SPORTS PARTICIPATION OF SPECIAL NEEDS CHILDREN (ADOLESCENTS WITH MILD INTELLECTUAL DISABILITIES)

The content of this study mainly includes the current situation and influencing factors of sports participation among children and adolescents with mild intellectual disabilities who are enrolled in regular classes; Construction of an adaptive sports activity plan for children and adolescents with mild intellectual disabilities enrolled in regular classes; The action research on the implementation effect of adaptive sports activities for children and adolescents with mild intellectual disabilities enrolled in regular classes consists of three parts.

(1) The current situation and influencing factors of sports participation among children and adolescents with mild intellectual disabilities enrolled in regular classes. Through methods such as data collection, testing, and interviews, this study analyzes the current situation and influencing factors of sports participation among children and adolescents with mild intellectual disabilities enrolled in regular classes, providing a reality for the construction and implementation of sports participation promotion programs for this group Based on.

(2) Construction of an adaptive sports activity plan for children and adolescents with mild intellectual disabilities enrolled in regular classes. Through theoretical basis, program objective system, organizational form, content selection, implementation structure, etc., construct an adaptive sports activity plan for children and adolescents with mild intellectual disabilities enrolled in regular classes, establish a reference framework for the development and implementation of adaptive sports activities, and provide reference and guidance for the practical development of adaptive sports activities for children and adolescents with mild intellectual disabilities enrolled in regular classes.

(3) Using the action research method, the adaptive sports activity plan for children and adolescents with mild intellectual disabilities enrolled in regular classes was designed and implemented by researchers and practitioners, with division of labor and data collection and feedback. The feasibility and effectiveness of the plan were tested, and the impact of adaptive sports activities on the sports participation of children and adolescents with mild intellectual disabilities enrolled in regular classes was explored.

Darja Komlačeva¹, Sandra Zariņa², Mārīte Kravale-Pauliņa³

¹*Daugavpils University, Parādes street 1, Daugavpils, darjaa2000@inbox.lv*

²*Daugavpils University, Parādes street 1, Daugavpils, sandra.zarina@du.lv*

³*Daugavpils University, Parādes street 1, Daugavpils, marite.kravale-paulina@du.lv*

EVALUATION OF LEARNING ACHIEVEMENTS OF 7TH GRADE STUDENTS IN LATVIAN LANGUAGE LESSONS WITHIN THE FRAMEWORK OF LEARNING THE TOPIC "PARTICIPLE".

Vērtēšana ir neatņemama mācību procesa daļa, kas palīdz saprast, vai skolēns ir sasniedzis iepriekš izvirzītos mērķus. Kompetencēs balstītās pieejas ietvaros ir mainījusies vērtēšanas loma – tā vairs nav tikai darbs uz atzīmi, bet gan vesels “ceļš” līdz izvirzītajiem sasniedzamajiem rezultātiem.

Ministru kabineta noteikumi Nr. 416 paredz, ka no 2024. gada 1. septembra stāsies jauna vērtēšana skolās, kas palīdzēs skolotājam izvērtēt katra skolēna zināšanu līmeni, veidojot pareizi summātīvos darbus. Līdzās jau uzkrātajai pieredzei pedagogiem, tostarp arī latviešu valodas skolotājiem, jāturpina pilnveidot prasmes veidot summatīvās vērtēšanas darbus, izmantot daudzveidīgus formatīvās vērtēšanas paņēmienus, lai palīdzētu skolēniem sasniegt izvirzītos mērķus, sniegt mācību procesā jēgpilnu atgriezenisko saiti, iesaistīt skolēnu savu un klasesbiedru mācību sasniegumu vērtēšanā.

Par pamatu pieredzes darbam tika izvēlēta viena no sarežģītākajām 7. klasē apgūstamajām tēmām latviešu valodā – “Divdabji”. Mācoties divdabjus, skolēni bieži sastopas ar dažādām problēmām, ar tādām, kā divdabju veidošana no darbības vārda, nelokāmo divdabju un darbības vārda atstāstījuma izteiksmes jaukšana, lai tās atrisinātu, ir

nepieciešama visa mācību procesa laikā formatīvā vērtēšana, ar kuras palīdzību, skolēni varēs parādīt pēc iespējas labākus rezultātus arī summatīvajā vērtēšanā.

Darba mērķis ir noskaidrot, un apkopot dažādus vērtēšanas paņēmienus, kurus iespējams izmantot temata apguvei. Balstoties uz normatīvajiem dokumentiem, izstrādāt gan formatīvās, gan diagnostiskās, gan summatīvās vērtēšanas darbus 7. klases tēmai "Divdabji".

Retselisitsoe Lebona

EXPLORING THE INTEGRATION OF MODERN TECHNOLOGY IN EDUCATION: INSIGHTS FROM ERASMUS STUDENTS

The integration of modern technologies in education improves educational practices and learning outcomes. However, some developing countries like Lesotho still rely on basic technological tools like projectors and desktop computers. Resultantly, learners are deprived of the benefits facilitated by emerging technologies like robotics, game-based learning, virtual reality and augmented reality. These include ability to optimize educational outcomes, empower learners, and foster competitiveness in the global knowledge economy. Thus, the aim of this study is to investigate strategies, approaches, and experiences of Erasmus students in leveraging modern technologies to enhance their educational practices. In this regard, the following questions guided this study; What kind of modern technologies are Erasmus students exposed to? How does the use of modern technologies aid teaching and learning process? What are the perceived challenges of integrating modern technologies in the classroom? The methodology adopted in this study is qualitative research approach. Focus group and In-depth interviews were conducted with the 2024 Spring Semester Erasmus students. The data collected were analysed using qualitative data analysis software called Atlas.ti. The findings revealed that the use of modern technology enhances learners' engagement, interests, motivation and ultimately improves academic performance. The findings concluded that modern technology enhances educational practices and therefore, developing countries should harness modern technologies to improve their education system.

Keywords: Modern technology, education, educational practices, learning outcomes.

Mingzhi. Hu¹, Dzintra.Ilisko²

¹Daugavpils University, Sporta street 8, Daugavpils, 1343481879@qq.com

²Daugavpils University, Vienības iela 13, Daugavpils, dzintra.ilisko@du.lv

ICT IN VOCATIONAL EDUCATION IN CHINA IN POST-PANDEMIC

In the post COVID-19 era, China is facing the challenges and opportunities of integrating ICT into vocational education. As vocational schools cooperate with IT companies, policies and legislation in the field of vocational education are also affected. Therefore, the study of integration of information and communication technologies in Chinese vocational education is of great significance for understanding the development, problems and solutions of country's vocational education. This study aims to investigate the current status of ICT application in China's vocational education and related policies and measures by the in depth analyses of documents and legislation Through the in-depth understanding and the analysis of these aspects, targeted suggestions and guidance can be provided to improve the quality and effect of vocational education. Additionally, the study will consider management and the use of ICT in vocational schools in order to identify problems and potential solutions. The authors draws suggestions for a sustainable use of information technologies in the vocational education in Post-Pandemic. You need to offer suggestions in the article of the sustainable use of technologies.

Lipolelo Thamae¹, Dzintra Iliško²

¹National University of Lesotho, Roma, Maseru, lipolelothamae977@gmail.com

²Daugavpils University, Parādes Street 1, Daugavpils, dzintra.ilisko@du.lv

LITERACY SUSTAINABILITY: WHAT PEDAGOGICAL PRACTICES? WHOSE ROLE?

Background: In our rapidly evolving world, equipping English as a Second Language (ESL) learners with literacy skills has become imperative, enabling them to navigate dynamic environments by evaluating information critically, adapting to technological changes, and participating thoughtfully in global conversations. However, what remains questionable is the teachers' and learners' roles in sustaining literacy in an education system.

The aim of the research: This study investigated teachers' and learners' roles in sustaining literacy among ESL learners.

Methodology: Drawing on two theoretical frameworks, Legitimation Code Theory, and Constructivism, the study employed a mixed-method approach. Data collection involved tests, questionnaires, document analysis, focus groups, and observations, with analysis conducted using Atlas.ti, Excel, and ANCOVA via Strata17 in SPSS.

Research Findings: Results affirmed that employing semantic gravity and semantic density significantly accelerates literacy skills within a compressed two-month period. Simultaneously, the incorporation of scaffolding and active participation facilitates gradual literacy development. Notably, the null hypothesis (H_0) was rejected, confirming the impact of teachers' and learners' roles in sustaining literacy. This research underscores the potency of the active role as a robust strategy and catalyst for enhancing literacy proficiencies while the interplay of the two theoretical perspectives underscores the intricacies of effective pedagogy. The implications extend to teachers and researchers seeking impactful literacy practices in diverse language learning while including the learners for sustainability purposes.

Keywords: literacy skills, sustainability, ESL, teachers, learners, pedagogical practices, roles.

Dina Silova¹, Ilona Fjodorova²

¹Daugavpils University, Parādes street 1, Daugavpils, silova0708dina@gmail.com

²Daugavpils University, Parādes street 1, Daugavpils, ilona.fjodorova@du.lv

MANIFESTATION AND IMPROVEMENT OF GRAPHIC AND GRAMMATICAL INTERFERENCE: A CASE STUDY OF FORM 9 STUDENTS' WRITING TASKS OF TRIAL EXAM IN ENGLISH

Keywords: linguistic interference, bilingualism, multilingualism, English trial exam.

Nowadays, the issue of language skills is more significant than ever. In the era of globalization and digital technology, people can access different language-learning resources. Language skills are essential in personal and professional life, opening doors to new opportunities, contacts, and experiences. Moreover, the demand for bilingualism and multilingualism on the market is increasing, so people are trying to improve their language skills to be competitive. Thus, the improvement of language skills has become a crucial priority in today's society. In this study, the tasks from the writing part of the trial exam in English performed by form 9 students, using qualitative research method and techniques of statistical research, are systematically analyzed, taking into account the characteristics of the relevant age group, the level of education and other factors, to identify language transfer or linguistic interference. In the process of analysis, current language and grammar rules, as well as pedagogical principles, are taken into account to understand why these interferences occur and how they could be prevented or improved. Thus, the study provides valuable insight not only into the problems of language learning but also discusses the information about the factors affecting them and possible solution strategies.

The aim of the work: To confirm the competences acquired in the workplace of the teacher, analyzing the manifestation of graphic and grammar interference, as well as offering strategies for its improvement.

The research methods:

1. the analytical research method;
2. the qualitative research method;
3. the techniques of the statistical research;
4. the descriptive research method.

Inese Grīnvalde¹, Aija Virse², Mārīte Kravale-Pauliņa³

¹ SIA "BeATUS" vadītāja, Mālu iela 15, Odukalns, Ķekavas novads, inese.grinvalde@gmail.com

² Rīgas Valdorfskola, Baltā iela 10, Rīga, aija.virse@inbox.lv

³ Daugavpils Universitāte, Pārādes iela 1- 204, Daugavpils, marite.kravale@du.lv

NODARBĪBAS AR SILTAJIEM GRAUDIEM STRESA MAZINĀŠANAI UN EMOCIONĀLĀ LĪDZSVARA NOTURĪBAI

Klīniski neirobioloģiskie pētījumi liecina, ka ilgstošs stress rada vairākas sociāli emocionālas problēmas, kā trauksmi, bailes, atturēšanos no kontakta, kā arī kognitīvas problēmas – samazinās spēja koncentrēties un atcerēties, mazinās spēja savaldīties un kontrolēt savas emocijas. Pētījuma autores vairāk nekā divdesmit gadus strādā ar dažāda vecuma, dzimuma un nacionālās piederības personām, saskaroties ar izaicinājumiem, kas skar arī emocionālo sfēru.

Raksta mērķis ir aktualizēt silto dabas materiālu izmantošanas iespējas un to ietekmi uz personas emocionālo līdzsvaru un stresa mazināšanu. Rakstā tiek apspoguļoti teorētisko avotu atziņas un empīriskā pētījuma dati, kas iegūti divu gadu laikā, veicot aptauju un eksperimentu, piedaloties 376 dalībniekiem.

Iegūtie pētījuma rezultāti norāda uz silto darba materiālu pozitīvo ietekmi, t.i. ķermeņa atslābināšanos, drošības sajūtu, labsajūtu, koncentrēšanās spējas paaugstināšanās un komunikācijas spēju pilnveidi.

Rakstā atspoguļotais materiāls ir tikai neliela daļa labās prakses pieredzes apkopojuma, kas empīriski ir fokusēts vairāk uz bērniem.

Pētījums un dažu materiālu iegāde ir veikta pateicoties Eiropas Sociālā fonda projekta Nr.9.1.3/15/1/001, ko piešķir finansu institūcija Altum.

Alex Roberto¹, Maria Ana Ella Gonzales², Honeybe D. Bantulo³

¹University of Mindanao, Bolton St., Davao City, Philippines, a.roberto.520859@umindanao.edu.ph

²University of Mindanao, Bolton St., Davao City, Philippines, m.gonzales.478505@umindanao.edu.ph

³Daugavpils University, Parādes street 1, Daugavpils, honeybe.bantulo@umindanao.edu.ph

³University of Mindanao, Bolton St., Davao City, Philippines, honeybe.bantulo@umindanao.edu.ph

PRODUCTION OF ALTERNATIVE ELECTROLYTE SOURCE FOR BIO-BATTERY VIA SYNERGISTIC ACTIVITY OF FERMENTED POMELO (CITRUS MAXIMA) PEEL AND CALAMANSI (CITRUS MICROCARPA) PEEL

The growing global production of electronic trash (E-waste) emphasized the need for ecologically friendly and sustainable energy solutions. This study delved in using agricultural waste, notably fermented pomelo (*Citrus maxima*) peel and calamansi (*Citrus microcarpa*) peel to create an alternative electrolyte source for bio-battery applications. Parameters such as voltage and current strength of electrolyte mixtures generated from fermented pomelo and calamansi peels for bio-battery applications were investigated in this study. Furthermore, various composition of ratios of pomelo and calamansi peels concentrates were used to find the optimal combination. Results indicated that the combination of 75% pomelo peel and 25% calamansi peel produced the highest electrical power of 1.4245 mW. Additionally, the study resulted an inverse relationship between pH levels of the pomelo and calamansi concentrate and electrical parameters produced. This research contributed to the investigation of bio-battery technology based on locally abundant biomass resources, with the potential to address environmental issues and energy concerns. The findings shed light on the possibility of fermented pomelo and calamansi peels as a clean and renewable supply of electrolyte for bio-battery applications, potentially providing a long-term solution to both E-waste and agricultural waste concerns. Furthermore, expanding the scope to include different fruits can provide insights into their distinct chemical compositions, potentially discovering alternative and locally available materials for sustainable energy generation.

Vija Kovaļkova

Daugavpils Universitāte, Parādes iela 1, Daugavpils, vija.ka@inbox.lv

READING PROMOTION ACTIVITIES FOR PRIMARY SCHOOL STUDENTS

Every student has the right to a quality educational process and self-development. Studies show that reading literacy a very important and significant role in a child's acquisition of quality education. reading literacy quality indicators: are awareness, correctness, expressiveness and reading speed, which is conditionally important only at the initial stage of learning and improving reading skills. At the primary school stage, a lot of attention is paid to the development of reading skills in the family, school and national level. Students, teachers, parents of students are involved in promoting children's reading process. The author's work is about her experience of reading promotion activities for elementary students in her school and district.

Mareks Briška, Andris Vagalis, Eridiana Oļehnoviča

Daugavpils University, Parādes street 1, Daugavpils, mareksbriska1@inbox.lv, andris.vagalis@du.lv, eridiana.olehnovica@du.lv

STRATEGIES FOR IMPROVING STUDENTS' IDEA GENERATION SKILLS IN THE SUBJECT OF STUDY "DESIGN AND TECHNOLOGIES" IN THE 9TH GRADE

The connection between learning, idea generation and creativity is growing and strengthening today, including the aspect of educational institutions, where idea generation is an element that unites the principles of learning and creativity, especially in the subject "Design and technologies".

In order for the idea generation process to be managed both quantitatively and qualitatively, the teacher needs to create a set of strategies that will be able to lead the student to the development and successful implementation of a corresponding idea prototype.

School 2030 settings actualize the improvement of students' self-directed learning skills in the education system, thus emphasizing also the improvement of idea generation skills, especially in the 9th grade stage, when students have to create their final works in various subjects, including especially design and technology. By using the steps of the design thinking process, students are directed towards achieving a specific learning outcome in the learning process. The teacher, using certain strategies, helps students to improve the quantitative and qualitative skills of idea generation, thus preparing them for potential involvement in the learning and development process of innovation and technology, which is an important aspect of the national economy.

The purpose of the study is to analyze the strategies for improving students' idea generation skills in the subject "Design and technologies" in the 9th grade, summarizing the accumulated pedagogical experience and developing methodological recommendations.

Juris Miņins, Eridiana Oļehnoviča, Andris Vagalis

Daugavpils University, Parādes street 1, Daugavpils, jurisminins@gmail.com

Daugavpils University, Parādes street 1, Daugavpils, eridiana.olehnovica@du.lv

Daugavpils University, Parādes street 1, Daugavpils, andris.vagalis@du.lv

THE USE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR INDIVIDUALIZING LEARNING IN COMPUTER SCIENCE CLASSES IN 9TH GRADE

The Latvian basic education standard stipulates that by the end of 9th grade, students will have acquired numerous digital skills, including the ability to create technological solutions themselves and having implemented a programming project.

In acquiring digital skills, especially topics related to algorithms, including the basics of programming, students must overcome various challenges depending on their individual abilities. The acquisition of certain more complex topics is influenced by each student's "learning pace." In the format of school lessons, the teacher does not have enough time to differentiate and individualize the learning process of topics.

Such situations can be effectively improved by applying solutions based on artificial intelligence (AI) technologies for individualized and personalized topic learning.

The aim of the study is to compare already available AI-based solutions that offer an individualized and personalized learning solution, developing methodological recommendations for their use in computer science classes.

Endija Vāvere¹, Ilona Fjodorova²

¹*endija85@inbox.lv*

²*Daugavpils University, Parādes street 1, Daugavpils, ilona.fjodorova@du.lv*

THE USE OF DIVERSE TEXTS IN ENGLISH TO DEVELOP READING COMPREHENSION SKILLS OF 8TH GRADE STUDENTS

Keywords: *Form 8 students, English as a Foreign language, reading, text comprehension, text literacy, reading strategies, text types.*

The Organization for Economic Co-operation and Development (OECD) in the international student assessment program has observed a deterioration in the competence of students in reading during the last five years. The average reading achievements of Latvian students are slightly lower than the average results of OECD countries. Literacy is the interpretation of the text, where the student's analytical and critical attitude is visible. It includes the various skills and abilities needed to effectively read and understand text. Reading helps to expand vocabulary, which develops language skills and awareness of language diversity, as well as the ability to analyse and understand content, identify key issues, memorise relevant information, and create coherent understandings of the meaning of a text. Promotes critical thinking, the ability to evaluate, analyse and express critical opinions about text content, authority, arguments and justification.

The aim of the study is to promote students' understanding and perception of what they read in a foreign language, to expand their vocabulary. To promote the ability to express in writing and orally what has been read, using a reasoned and logical approach. Develop skills to analyse and understand text, by identifying key issues and important information.

Anastasija Šablinska¹, Ilona Fjodorova²

¹*Daugavpils University, Parādes street 1, Daugavpils, anastasiashsh@outlook.com*

²*Daugavpils University, Parādes street 1, Daugavpils, ilona.fjodorova@du.lv*

USE OF GAMIFICATION IN VOCABULARY DEVELOPMENT IN FORM 5 EFL LESSONS WITHIN ONE THEMATIC BLOC

The current report aims at looking at possible ways to teach and improve the vocabulary of Form 5 students who are learning English as a foreign language. The main method studied within the current research is gamification. The aim is to determine the method's effectiveness in enhancing students' vocabulary. As a result of the study, a list of apps, websites, and other resources that can be employed in the classroom to enhance the acquisition of vocabulary is generated, providing the feedback from students about their use. The author provides the evaluation of the effectiveness of gamification as a tool which may help students expand their vocabulary, utilize passive vocabulary, and become more confident in speaking a foreign language, English in particular. In addition, after the conducted monitoring of students' progress, the author has determined the resources which were the most effective, as well as the ones which were most preferred by students themselves.

Jelena Maksimova¹, Andris Vagalis², Eridiana Oļehnoviča³

¹*Daugavpils University, Parādes street 1, Daugavpils, jelena_maksimova@inbox.lv*

²*Daugavpils University, Parādes street 1, Daugavpils, andris.vagalis@du.lv*

³*Daugavpils University, Parādes street 1, Daugavpils, eridiana.olehnovica@du.lv*

USING DIFFERENTIATED TASKS FOR LEARNING VISUAL PROGRAMMING SKILLS OF 4TH GRADE PUPILS.

The standard of basic education in Latvia provides the acquisition of digital skills from the first stage of basic school. Learning the basics of programming often presents significant challenges for pupils and pedagogical challenges for teachers. This research will analyze the approach of differentiated teaching and learning, the

regulatory acts that regulate the learning of programming in basic school, as well as the experience of using differentiated tasks in the learning of visual programming skills of 4th grade pupils in computer science lessons. Challenges that pupils may encounter: difficulty understanding basic concepts, basic operations, difficulty understanding the logic of the computer programs, different learning styles, difficulty identifying errors, etc. To make it easier for pupils to learn programming, a methodological material of visual programming was created, because graphic and visual elements make the skills acquisition process more accessible and understandable for pupils. The use of differentiated learning tasks offers pupils additional explanations and tasks that match the pupils' skills and learning needs, with the tasks created with progressively increasing complexity. Pupils with higher achievements are offered learning tasks according to their ability level.

Kristīne Ozollapa

VALIDATION OF A CRITICAL THINKING TEST TO ASSESS REFLECTION SKILLS OF GYMNASIUM STUDENTS IN THE 7TH GRADE

Key words: critical thinking, essential skills, critical thinking assessment test.

Critical thinking is an important skill to have for everyday and professional life, as well as personal growth. It is a process that uses methods to make objective and critical evaluations of information and ideas, and to reflect in a reasoned way on one's own achievements. Critical thinking is one of the essential skills in Latvia's education system and every student must learn them, that is why teachers need instruments to evaluate them. The Cornell Critical Thinking Test, developed by Professor Robert Ennis, one of the founders of critical thinking tests in the USA, has been validated as the most appropriate way to assess students' critical thinking skills. This test is designed to evaluate students critical thinking skills from 5th to 12th grade and to build a clear idea of students' critical thinking. They can be used to teach, develop, and assess critical thinking skills.

The study base is made of 120 gymnasium students in the 7th grade. The analysis of the empirical study concludes that there is no significant difference between genders. However, the test results show, that there are differences in skills between the blocks, with the lowest scores in identifying assumptions, which is a key critical thinking skill. And as this study concludes, students score only 27%, which is average according to the assessment criteria. When measured by the average score obtained, 33 out of 71, or 48%, it can be concluded that students' critical thinking skills are at an average level overall.

LIU YUFEI

VR HOLOGRAPHIC CONNECTED CLASSROOM AND METAVERSE THE SIGNIFICANCE OF NEW TECHNOLOGY IN THE EDUCATION INDUSTRY

Current technical background development analysis 1. In recent years, 5G communication has been widely popularized around the world, making long-distance communication It is very convenient to transfer information from very large data volumes. 2. The application of VR holographic products, both in hardware and software It has been popularized, and the overall cost of construction and technology has been greatly reduced. 3. The concept of the meta-universe (that is, virtual reality technology) is widely accepted By accelerating development combined with more and more industry changes, travelDrama, film, entertainment and even military, medical, industrial related collar Domains have commercial success stories.

In the past few years, there have also been a number of education companies of a certain size, Universities and primary and secondary schools have deployed VR meta-universe and other related technologies in education. The landing of karma. The effect is not ideal for multiple reasons.

It can be seen that the development of a set of 5G communication as the basis, VR virtual reality and dynamic capture system as the underlying technology, to achieve the construction of meta-universe virtual classroom space, combined with the corresponding subject teaching materials and AIDS CG modeling 3D panoramic teaching space refinement and systematization, can greatly improve the cross-space online and offline education teaching effect. Therefore, the use of existing 5G technology, VR technology, motion sensing dynamic capture technology, as well as three-dimensional modeling CG and other aspects of the relatively cutting-edge technology to achieve the above needs of the education system has become an inevitable trend of future development. Based on the above background, the current education system that solves cross-spatial dimensions, synchronizes in real time and can greatly improve the overall teaching effect has a broad application scenario and market. And similar technologies have been piloted in some cities and are gradually improving.

- 1.Improving education and teaching effectiveness (immersion) 教学效果
2. Reduce the cost of studying abroad and cooperating in running schools (合作办学)
3. Academic communication becomes convenient (学术交流)
4. Effectively promote the progress of scientific research projects (推动科研)
5. The significance of educational equity (sending education flat and standardized)教育公平的意义
6. Sharing high-quality educational resources (curriculum - teacher - teaching program)共享资源

VIDES ZINĀTNES

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ENVIRONMENTAL SCIENCES

Dāvis Gruberts¹, Ilmārs Luksts²

¹Daugavpils University, Parādes street 1, Daugavpils, davis.gruberts@du.lv

²Daugavpils University, Parādes street 1, Daugavpils, ilmarsluksts@inbox.lv

XVII DU DRIFT EXPEDITION IN THE DAUGAVPILS-JĒKABPILS SECTION OF THE DAUGAVA RIVER

The XVII Daugavpils University Drift Expedition took place in the Daugavpils-Jēkabpils section of the Daugava River on April 9-10, 2023 by using the Drifting Scientific Research Platform "Aventura 2", specially equipped and suitable for a continuous 24-hour drift and safe field research procedures according to the Lagrangian method. The drift expedition started in Daugavpils on April 9, 2023 at 18:00 and ended in Jēkabpils on April 10 at 09:40. Total duration of a continuous drift – 15 hours 40 minutes; total drifted distance – 91.4 km; frequency of instrumental measurements and water sample collection – once an hour; the number of measurement and sample collection sites – 17. The following parameters were determined *in situ*: drift distance; coordinates; average drift speed; width and depth of the river; water temperature; pH; redox potential; electrical conductivity; mineralization; dissolved oxygen; turbidity; transparency. Simultaneously, 34 water samples were collected during the drift for biogenic (N, P) and suspended material concentration analyses.

Downstream increase in the average drift speed, water temperature, electrical conductivity, mineralization, and transparency has been observed during the drift. On the other hand, the average depth and width of the riverbed, as well as the concentration of oxygen dissolved in the water, the degree of oxygen saturation and water turbidity gradually decreased. By performing correlation analysis of the obtained data series, it was discovered that the width of the Daugava's riverbed has a significant effect on the average current speed and the water mass turbidity. In result, a more complete picture of how the Daugava's width, depth, current speed and water physico-chemical parameters change downstream in the entire Daugavpils-Jēkabpils section at the peak of the spring floods was obtained. The successful implementation of this research was possible thanks to the financial support from the Society "Daugavas Savienība".

Ineta Krūleņa¹

¹Daugavpils University, Parādes street 1, Daugavpils, ineta.kruleva@gmail.com

AIR QUALITY ASSESSMENT IN THE STATE CITY OF DAUGAVPILS USING THE LICHENOINDICATION METHOD

Air pollution is a growing concern in many cities, posing a significant threat to human health and the surrounding ecosystem. To effectively combat this issue and develop targeted pollution control strategies, continuous monitoring of air quality is essential. Lichenoindication, a well-established method that capitalizes on the sensitivity of lichens to various air pollutants, offers a reliable and effective technique for air quality assessment. This method has been extensively employed in environmental research and monitoring programs worldwide due to its accuracy and ease of implementation.

While a broader study investigated both pines (*Pinus sylvestris* L.) and lindens (*Tilia cordata* Mill.) within state city of Daugavpils, this particular article focuses specifically on the lichen diversity found on pines (*Pinus sylvestris* L.). By analyzing the diversity of lichen communities specifically on pines (*Pinus sylvestris* L.), the study aims to assess air quality and compare results with previous surveys conducted in 2012 and 2013. This approach not only provides valuable data on air quality trends but also offers insights into the overall health of the urban ecosystem. Additionally, by comparing findings with past surveys, the effectiveness of any air quality control measures implemented in the intervening years can be evaluated.

The overall research methodology relies on *European guidelines for mapping lichen diversity as an indicator of environmental stress* (2002). To assess lichen diversity on pines across state city of Daugavpils, 22 regular grid squares were surveyed throughout the city. In each square, lichen communities on 4-6 trees meeting specific criteria were documented.

Sandra Stankeviča

Daugavpils University, Parādes street 1, Daugavpils, sandra.rudka97@gmail.com

ANALYSIS OF PROBLEMATIC WASTEWATER TREATMENT EQUIPMENT DATA AND CREATION OF A GIS DATABASE

Keywords: *problematic wastewater treatment equipment, Geographic Information System (GIS), data analysis.*

Insufficiently treated wastewater reaching open waters and groundwater can significantly impact water quality, thereby causing substantial harm to both the environment and human health. It is crucial to thoroughly treat wastewater to the highest possible standards, nearing a natural quality state in all centralized wastewater treatment facilities. The potential environmental damage resulting from untreated wastewater entering the environment depends on the volume of wastewater, the composition and concentration of pollutants, as well as the location and surroundings where the wastewater is discharged. During the development of the master's thesis, several methods were employed, encompassing both the analysis of Cabinet of Ministers Government of the State of Latvia regulations regarding wastewater management and the compilation of data on problematic wastewater treatment equipment. In order to create a GIS database that would be based on the latest and most current data, State Environmental Service reports on state testing results reflecting the effectiveness of wastewater treatment equipment were utilized. Based on the collected data, a Geographic Information System (GIS) database was created, applicable to problematic wastewater treatment facilities in Latvia. Within the scope of the study, data was analyzed and compared to identify positive or, conversely, negative trends over several years. Mapping data related to problematic wastewater treatment facilities is a great way to present all the essential information in a clear manner, which can be beneficial to a wide range of people, especially industry professionals.

Ignacy Kitowski

University College of Applied Sciences in Chełm, Pocztowa 54, 22-100 Chełm, Poland

BIOMONITORING OF HEAVY METALS, METALLOIDS AND PESTICIDES WITH THE COMMON BUZZARD (*BUTEO BUTEO*) FROM EAST POLAND

Raptors are very often used as indicator species, providing many early signals of potential environmental problems. Due to their top position in food chains, long life span, and exposure at different scales both temporal and spatial, this group is considered prospective bioindicator. Using the example of the Eurasian buzzard *Buteo buteo*, will be presented the problem of the accumulation of heavy metals, metalloids and pesticides in the organisms of individuals from the area of eastern Poland. Special attention will be paid to the dangers of lead bullets used by hunters. In addition to the environmental dimension, the social dimension of the presented issue will be discussed, including the problem of smuggling of pesticides used to kill considered birds across the eastern Polish border.

Māris Liepiņš¹

¹Daugavpils University, Parādes street 1, Daugavpils, marisliepins79@gmail.com

COMPARISON OF FISH COMMUNITIES IN ALŪKSNE RIVER BEFORE AND AFTER DAM REMOVAL

River barriers have profound impacts on aquatic ecosystems by blocking fish and invertebrate species migration and water and sediment movement. Removal of redundant dams have in recent years picked up pace in Europe as this is an eco-efficient and cost-effective measure to reach the objectives of the Water Framework Directive. The river Alūksne is a 24 km long fast-flowing tributary of Pededze that connects lake Alūksne and the river Pededze. The obsolete Beja watermill dam was partially demolished in spring of 2023. The goal of this study is to evaluate the fish communities and their spatial distribution above and below Beja watermill dam before and after its removal.

In this study electrofishing in 5 upstream and 5 downstream stretches were used to assess the species composition and spatial distribution of fish before and after the dam removal. The fish were caught, species identified, counted, and measured and consecutively released. Before demolition of the dam we found that the downstream stretches are more densely populated and fish communities more diverse. Upstream stretches were found to contain less species overall and lower density, even in highly suitable habitats.

After the removal changes in species composition were observed below the dam site and recolonization of former impoundment by riverine species has occurred. Still the remains of the dam has to be completely removed to allow unhindered fish migration to upstream stretches.

Jekaterina Goršentova¹

¹*Daugavpils University, Parādes street 1, Daugavpils, forsa14@inbox.lv*

DRINKING WATER QUALITY ANALYSIS IN VIDUSPOGUĻANKA

Every person needs drinking water to survive. In order to maintain good health, drinking water must be clean and suitable for drinking purposes. In 2015, the United Nations (UN) set 17 global goals for the 2030 Agenda for Sustainable Development, one of which is clean water and sanitation.

In Latvia, about $\frac{3}{4}$ of the population uses central water supply systems, which are periodically checked for drinking water quality. The remaining $\frac{1}{4}$ of the population uses local water supply systems, which can be tested for drinking water quality only at the request of the user for a fee.

The research object of this work is the drinking water in Viduspoguļanka neighborhood in Daugavpils city, which was established in the last decades of the 19th century as a summer village place and later became a full-fledged neighborhood. Viduspoguļanka is a private houses sector and it is not connected to the city's central water supply system, so most residents have boreholes or wells installed in their houses.

In the period from October 16, 2023 to January 5, 2024, water samples were collected from inhabited houses. Using the FIALab-2500 apparatus were determined the presence of nitrate ions, total phosphorus, total nitrogen and phosphate ions according to the testing methodology of FIALab® Instruments. Using the pH meter, the pH of water was determined in laboratory conditions. Using spectrophotometer CECIL CE 1021 was determined the presence of iron according to the methodology of iron determination with 1,10-phenanthroline.

Jana Paidere¹, Aija Brakovska¹, Marina Savicka¹, Aleksandrs Pučkins², Sergejs Osipovs², Dāvis Gruberts²

¹*Daugavpils University, Institute of Life Sciences and Technologies, Parādes Street 1a, Daugavpils, jana.paidere@du.lv*

²*Daugavpils University, Faculty of Natural Sciences and Healthcare, Department of Environment and Technologies, Parādes Street 1a, Daugavpils, aleksandrs.puckins@du.lv*

ENERGY RESERVES OF AMPHIPODS GAMMARUS VARSOVIENSIS IN THE COURSE OF THE DAUGAVA RIVER

Amphipods are shredders, also omnivores feeding primarily on detritus material and consequently play a key role in the incorporation of terrestrially fixed organic material into the freshwater food web. Including the above, as well as changes in the physico-chemical parameters of water of the Daugava River, this study clarified spatial changes of Gammarus varsoviensis energy reserves and organic matter from upstream to downstream in the Daugava River.

Gammarus varsoviensis specimens were collected in the summer of 2022 in the course of the Daugava River (Piedruja-Veczelki) and analysed for glycogen content. Simultaneously measurements of water physico-chemical parameters were performed, and biochemical oxygen demand (BOD) and total organic carbon (TOC) also were determined. Results showed that the TOC concentration and the content of glycogen increased from upstream to downstream of the Daugava River but the BOD concentration decreased. Such TOC and BOD results were similar to the last observations of European rivers that suggest changes in the bioreactivity of organic matter.

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Juris Soms¹, Aleksandrs Pučkīns¹, Sergejs Osipovs¹

¹*Daugavpils University, Parādes street 1, Daugavpils, juris.soms@du.lv, aleksandrs.puckins@du.lv, sergejs.osipovs@du.lv*

EVALUATION OF GEOCHEMICAL CHARACTERISTICS OF AEOLIAN DEPOSITS IN THE AUGŠDAUGAVA SPILLWAY VALLEY USING XRF ANALYSIS

The aeolian deposits in the Augšdaugava spillway represent the evidence of former wind activity and environmental changes at the end of the Pleistocene, and later during the Holocene, when human-affected disturbances in vegetation cover occurred. However, the possible sources of aeolian sediments, and pathways of their transportation remain insufficiently studied. In turn, it limits the understanding of questions related to the formation and development of the river valley. Additional data for the revealing of sediment provenance can be derived from aeolian sand geochemistry. Recently, developments in XRF spectrometry have led to the wide use of this analytical technique for obtaining geochemical data for Quaternary sediments. Therefore, in this study evaluation of geochemical characteristics of aeolian deposits have been obtained by Olympus portable XRF instrument Vanta M-Series. From previously collected aeolian sand 192 samples, 5 samples were selected in each meander section of the spillway valley for the XRF analyses, hence providing 45 samples in total so that they representatively characterize the chemical composition of aeolian sediments throughout the entire study area. Samples were analysed following the modified procedure of Chagué-Goff et al. (2012) and Williams et al. (2018). The obtained data indicates that geochemical characteristics are rather typical for aeolian sediments, determined by the mineralogical composition, where quartz and K-silicates dominate. In addition, data show moderate Fe oxides concentration associated with coating on the surface of sand grains. Among trace elements, aeolian sand is dominated by Ba and Zr, followed by Sr and Rb. Among REE elements, only Y and Nb were identified in detectable concentrations. Similar geochemical signatures of aeolian sands across the valley suggest the provenance of these deposits from one main source, possibly from glaciofluvial sediments which have been transported, sorted, and deposited by wind.

Diāna Mariņičeva¹, Juris Soms¹

¹*Daugavpils University, Parādes street 1, Daugavpils, dianarimele@inbox.lv, juris.soms@du.lv*

GIS-BASED MULTICRITERIA ASSESSMENT OF GEOHAZARD FACTORS FOR THE DEVELOPMENT OF CIVIL SAFETY MEASURES IN THE AUGŠDAUGAVA MUNICIPALITY

Although the identification and evaluation of risk related to geological and geomorphological natural processes is of topical interest to the scientific community thorough the world, in Latvia studies on geohazards with scientific or applying perspective are so far relatively few. At the same time adequate assessment and mapping of geohazards is crucial in terms of territorial planning. Hence analysis of geological risk factors and assessment of potential threats associated with these factors is one of the prerequisites in terms of effective management of territories and planning of civil safety measures at local and regional authorities level. On the other hand, information about geohazards is important also at larger scale considering the demands of EU legislation documents in the field of environmental management and territorial planning (Directive 2000/60/EC; Directive2007/60/EC). Thereby, to ensure development planning and civil safety management at municipal level in Latvia, and simultaneously to mitigate risks associated with geohazards, it is necessary to aggregate geological information and to develop GIS-based solutions allowing to store, analyse and visualize data on geological risk. Application of GIS-based methods for multicriteria evaluation of geohazard factors, among different processes (e.g. karst processes or earthquakes) analyse geomorphological hazards like accelerated soil erosion by water and mass movement. Therefore, at the first stage of the study, analysis of slope and topography was carried out using high-resolution DEM. DEM was generated from airborne laser altimetry or LiDAR data available in the Digital Height Data open data files of the Latvian Geospatial Information Agency. The ArcGIS Pro tools were used to obtain data on slope inclination and length from DEM. Subsequently these raster surfaces were combined by data on vegetation cover and geology to identify the areas prone to erosion and development of mass movement.

Marvin D. Batican¹, Charlotte Ghem A. De Paz¹, Ric Beryl B. Diola¹, Sheryl Anne B. Jamero¹, Jason Ben R. Paragamac²

^{1,2}University of Mindanao-Main Campus, Davao City, Philippines, mbatican@umindanao.edu.ph, c.depaz.515581@umindanao.edu.ph, diolapogi@gmail.com, s.jamero.483684@umindanao.edu.ph, jasonben_paragamac@umindanao.edu.ph

SPATIOTEMPORAL ANALYSIS ON GREEN SPACES OF URBAN BARANGAYS IN DAVAO CITY USING NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

It was predicted that by the year 2050, almost 68% of the people will reside in urban regions due to the high trend of urbanization. In developing nations, this poses a serious issue since it results in the loss and destruction of urban green spaces. Numerous social and environmental issues, including the extinction of animal habitats, disturbance of urban ecosystems, and a reduction in biodiversity, can be caused by the fragmentation and deterioration of green areas. Due to rising population density, a growth in many types of pollution, traffic congestion, and fast urbanization, cities today suffer environmental strain. This study analyzed the change of green spaces in year 2015 and 2020 using the Normalized Difference Vegetation Index (NDVI) and compared the green spaces of Urban Barangays in the three (3) Congressional Districts of Davao City. The results showed that the area of built-up had increased, while the area of the green spaces had decreased through time. Thereupon, these changes highlight the necessity of targeted measures to encourage sustainable urban growth and protect the environment.

Keywords: NDVI, Green Spaces, Built-up, Change, Davao City.

Uldis Egle¹, Juris Soms¹,

¹Daugavpils University, Parādes street 1, Daugavpils, uldisegle@gmail.com, juris.soms@du.lv

SURVEY AND GIS ANALYSIS OF THE CĒSU PALACE POND BOTTOM SEDIMENT THICKNESS AND DISTRIBUTION FOR ECOLOGICAL RESTORATION OF URBAN WATERBODY

Water bodies in the urban environment like ponds and lakes play an important role - they sustain ecological processes and preserve biological diversity, participate in microclimate regulation, and perform hydrological functions. They also improve the aesthetic image of the city and serve as recreational areas. Therefore, it is very important to maintain and properly manage these water objects, including their restoration and rehabilitation. This can be fully attributed to the ponds of the city of Cēsis. However, the water bodies of the city have not been studied and assessed for their environmental condition until now, accordingly, there are no planning documents at the municipal level for their management. In turn, this hampers the development and implementation of scientifically substantiated ecological restoration. Therefore, the field survey and GIS analysis of the Cēsu Palace Pond bottom sediment thickness and distribution was carried out, to obtain data for the further development of the pond management plan. For these purposes, a sediment level stave as a sounding rod was used for sounding the thickness of the sediment layer in the pond. In total 32 soundings were done. Sounding points were recorded by GPS and then imported into the ArcGIS Pro environment. These input data were interpolated by the Kriging method, allowing to develop raster surface and produce map of sediments spatial distribution. The obtained results demonstrate that bottom sediment thickness in the pond varies from 0.4 m to 1.4 m. Hence measurements of sediment layer thickness provide essential insights into the volume and distribution of sediment deposition within the water body. It is also necessary to note that by integrating field measurement data into the ArcGIS platform, there is an opportunity to systematically analyze and visualize the distribution of sediment layers, offering a comprehensive view of the water body condition and providing data for ecological restoration of the pond.

Armands Vagals¹, Juris Soms¹, Māris Nitcis¹

¹Daugavpils University, Parādes street 1, Daugavpils, 1rgpzsknmpanka@gmail.com, juris.soms@du.lv, maris.nitcis@du.lv

THE ANALYSIS OF SPATIOTEMPORAL CHANGES IN FOREST COVER USING SATELLITE IMAGES AND GOOGLE EARTH ENGINE CLOUD COMPUTING PLATFORM: A CASE STUDY OF KOMBUĻI PARISH, LATVIA

Vegetation cover, especially forests, is an essential factor in maintaining the functions and environmental condition of these habitats, as it plays an important role in the preservation of biodiversity, sustaining ecosystem services, water regulation, etc. Despite their importance, forest cover has been changing rapidly and in fact, declining due to intensive logging and timber production. At the same time, a successful forest conservation policy and sustainable management largely depend on the availability of precise geospatial data on the changes and dynamics of this vegetation type. Therefore, analysis techniques for accurate and efficient identification and mapping of information on spatial and temporal changes in forest cover are developing rapidly. In this context, remotely sensed data such as satellite images and GIS tools have been recognized as the most useful techniques for analysing and mapping the spatial and temporal changes in forest cover. Recent progress in IT and GIS technologies, including cloud computing platforms like Google Earth Engine (GEE) and machine learning algorithms, makes it easier to process and classify satellite data. In many publications, it is noted that GEE includes tools that can be used to evaluate and quantify deforestation. Considering that, the main objective of the presented study was to obtain the Sentinel-2 images-based geospatial data for analysis of the spatiotemporal changes in forest cover in Kombuļi parish, SE Latvia. That data was obtained through the GEE cloud computing platform and 10 m resolution satellite image datasets to create pixel-by-pixel histograms of vegetation loss for different years, thereby identifying areas affected by deforestation. The obtained results demonstrate that the application of cloud-based GEE tools and analysis of satellite images can provide an accurate assessment of vegetation alteration.

Kirils Sidorovs

Daugavpils University, Parādes street 1, Daugavpils, sidorovkirill@inbox.lv

THE COMPOSITION, QUALITY, TROPHIC LEVEL OF THE WATER OF THE LAKE MAZAIS KLUSAIS AND THE FACTORS INFLUENCING THEM

The life cycle of an average lake in Latvia is relatively short and predetermined – it's to become a swamp and a forest afterwards. Yet the water quality indication is an important step to follow one of the Water Framework Directive 2000/60/EC requirements – at least “good” quality of natural waters, including but not limited to determining anthropogenic effects (like pollution and excessive eutrophication). This works object is 1.9 ha small lake – Mazais Klusais – in the pine and pine-birch forest in Liksnas parish, just near Daugavpils city.

Despite bodies of water covert location and lack of tourism infrastructure, its proximity to the city and the dirt road of decent condition makes the lake a popular place for recreational and social purposes. Still Mazais Klusais remains a rare biotope and an important ecosystem, which should be preserved and which ecological condition should be monitored to recognize potential changes in water quality, as well as to collect data about not the most typical and well-researched type of water body in this area, so the long-term management approach can be applied

To approach this goal physical, chemical and biological water quality indicators are measured, including temperature, transparency, pH levels, electrical conductivity, lakes depth, dissolved oxygen and carbon, dissolved biogenic elements (total phosphorus and nitrogen), as well as zooplankton and zoobenthos biomass and taxonomical content in different seasons. Some of this indicators were also measured in the two similar small forest lakes just a few kilometers to the west, to compare possible similarities between them, trophic levels, possible origins and mutual connections.

VESELĪBAS APRŪPES ZINĀTNE

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HEALTH CARE SCIENCE

Arnita Papenoka

Rīga Stradins University, Dzirciema street 16, Rīga, arnita2022@inbox.lv

PERTUSSIS VACCINATION DURING PREGNANCY. DIFFERENCE BETWEEN VACCINATION RATES IN RIGA AND REGIONS OF LATVIA

Key words: *pregnancy, vaccine, whooping cough, immune system.*

Introduction. Whooping cough is a highly contagious respiratory tract infection. It primarily affects children too young to have completed the full course of vaccinations and teenagers and adults whose immunity has faded. First few months of life are when infants are at the greatest risk of contracting pertussis and having severe, potentially life-threatening complications from the infection. To help protect babies during this time when they are most vulnerable, women should get the tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine during each pregnancy. Optimal timing is between 27 and 36 weeks gestation to maximize the maternal antibody response and passive antibody transfer to the infant. From 2022, the vaccination calendar has been supplemented with vaccinations against whooping cough in pregnant women paid for by the state in Latvia. The aim of this study was to find out if there is a difference between pregnant women immunization rate from whooping cough.

Materials and methods. The survey was carried out from January 2023 to October 2023 in Rīga M76 maternity Hospital and in maternity wards in regions of Latvia. 276 postpartum women volunteered and anonymously replied to originally created questionnaire. Obtained data was statistically analyzed in Microsoft Excel 2021 and IBM SPSS software, 20.0 version.

Results. Participants were divided in 2 groups, those who live in Riga (group 1) - 48,2% (n=133), and those who live in regions of Latvia (group2)-51,8% (n=143). 64,7% (n=86) postpartum women were vaccinated from whooping cough in group 1, but in group 2 were vaccinated 65,9% (n=95). Major reasons for being unvaccinated were that nobody recommended it 42% (n=21), afraid of side effects for women and/or fetus' development 32% (n=16) and the perception that vaccination was not necessary 28% (n=14) in group 1, but in group 2 results was respectively: 29,2% (n=14) 47,9% (n=23) and 12,5% (n=6).

Conclusion. We noticed that there isn't statistically significant difference between living place and immunization rate from whooping cough. Despite the fact that the pertussis vaccine is included in the National Immunization Calendar of Latvia, there are many pregnant women who do not receive this vaccine.

Beatrie Elizabete Gustsone¹, Māris Belte², Elīna Vilkārese³

¹*Rīga Stradiņš University, Faculty of residency, General practitioner resident, Dzirciema street 16, bbeatrisegg@gmail.com*

²*Rīga Stradiņš University, Faculty of residency, General practitioner resident, Dzirciema street 16, maris@mba.lv*

³*Private family physician's practice "VIMED", Jelgava*

PHOTOBIMODULATION THERAPY EFFECT ON REMISSION TIME IN HERPES RECURRENS

Keywords: *photobiomodulation, laser, herpes recurrens, remission.*

Introduction: Herpes simplex virus can cause different types of symptoms and diseases. One of the most common is Herpes labialis and Herpes genitalis. They are caused by Herpes simplex-1 and 2 viruses which affect 67% and 13% worldwide. The primary infection is usually acquired in childhood and then the virus remains latent in the sensory nerve ganglia. Stimulating factors like immunosuppression, stress, cold, fever, menstruation and others can reactivate the virus causing recurrent herpes infection. Recurrent infection can cause pain, discomfort and may impair quality of life. Medication used to treat Herpes recurrens shows limited effect. There are other possible ways to help patients to improve their lives- photobiomodulation therapy (PBMT) which have shown great results of reducing frequency and intensity of Herpes recurrens.

Aim: Evaluate what is the increase in Herpes recurrens remission interval between relapses and changes in the intensity of relapses after a course of photobiomodulation therapy.

Methods: The study included a 3-day therapy course of PBMT with 120 mv Treatlite laser or equivalent laser. The therapy course included 6 points around the problematic region with 4 Joules per point. A questionnaire was developed to collect data before and after PBM therapy. The study was approved by the Rīga Stradiņš University Ethics Committee. Obtained data were analyzed using statistical analysis methods.

Results: The study included patients with median age 44 years (27-62) and had a predominance of females, consisting of 7 women (77.8%) and 2 men (22.2%). Before the PBM therapy 4 patients claimed to have 1 outbreak every 3 weeks, 2 patients- every 2 months, 3 patients-every 3 months. After the PBM therapy the follow-up results shows that the frequency of Herpes recurrences have decreased- 3 patients who had outbreak every 3 weeks now have outbreak every 2 months, 1 patient who had every 3 weeks now have every 3 months. The change of pain intensity is also significant. Before the treatment, the average pain intensity was 7 points, after the PBMT average pain intensity was 5 points. Other results will follow.

Conclusion: Further study and follow-up need to be done. From the results obtained can be concluded that PBM therapy is effective - the remission interval increases between the relapses, and it helps to decrease the pain intensity of Herpes recurrences and it is a safe method.

Dženifera Kerubiņa-Ļesņevska¹, Dārta Geižāne²

¹Rīga Stradiņš University, Faculty of Medicine, Dzirciema 16, 032353@rsu.edu.lv, 032341@rsu.edu.lv

²Rīga Stradiņš University, Department of Family Medicine, Dzirciema 16, darta.geizane@rsu.lv

REMOTE CONSULTATIONS - WHAT ARE THE WISHES AND NEEDS OF PATIENTS?

Objective: To determine the patient's wishes and needs concerning receiving remote consultations from a family doctor.

Methods and materials: Retrospective cross-sectional study. Quantitative research methods (survey) were used for data collection, developed online using the "MS Forms" platform and distributed via "Facebook."

Main Results and Conclusions: In total, 107 respondents participated in the study. The majority of respondents were aged 18 to 24 50.5% (N=54), as well as capital city residents, accounting for 72.0% (N=77). Evaluating the gathered data, it can be concluded that patient's knowledge about remote consultations (RC) and their availability in general practice (GP) in Latvia is insufficient; however, more than half of the respondents, 53.3% (N=57), have received GP RC. According to respondents, RC provided by GPs ensures more accessible primary health care. This has been statistically significant associated with gender (females 93.4% (N=71); males 90.3% (N=28); $p=0.031$). In the respondent's view, RC is a convenient, safe, and qualitative way to receive medical consultations, with 87.8% (N=94) agreeing, but its format should be simple and understandable, as stated by 97.2% (N=104), as well as providing quick and easy access, agreed upon by 87.9% (N=94). Phone calls are considered the most suitable format for receiving RC, especially favored by respondents living outside the city, with 90.9% (N=10) preferring this format. A statistically significant association was found between the suitability of RC format and gender ($p=0.013$). For women, 32.9% (N=25) find receiving text messages as a RC format more suitable compared to 9.7% (N=3) of men. To receive a consultation, RC timings should be convenient and accessible, with the desired waiting time at GP being 1 - 2 days for 52.3% (N=56), and preferred days being independent of GP working hours, including workdays, weekends, and holidays, for 51.4% (N=55). The optimal duration of a consultation would be 15 - 30 minutes, agreed upon by 95.3% (N=102). There is statistically significant evidence of an association between age and the ability to provide respondents with basic personal information completed by themselves (from 25 to 44 years old 93.1% (N=27); $p=0.004$), as well as providing information about the necessity to prepare for the consultation (from 18 to 24 years old 90.7% (N=49); $p=0.046$). Overall, the perspective on the future use of RC from the patient's perspective is positive. 79.4% (N=85) would like to use RC, and 80.4% (N=86) would recommend its use.

The study needs to be continued, examining family doctor's preferences and needs in providing RC to obtain a comprehensive overview, contributing to the improvement of RC consultations in GP in Latvia.

Karlīna Emīlija Melberga¹, Laura Bērziņa²

¹Rīga Stradins University, Dzirciema iela 16, Rīga, emilija.melberga.elm@gmail.com

²Rīga Stradins University, Dzirciema iela 16, Rīga, laura.berzina@icloud.com

RELATION BETWEEN PATIENT ADHERENCE AND THE RESPECTIVE INHALER DEVICE IN INHALATION THERAPY. FIRST RESULTS OF THE STUDY: ANALYSIS OF THE PATIENT ADHERENCE USING THE MARS-5 METHOD

Key words: Adherence, MARS-5 method; inhalation therapy.

Introduction: Patients' adherence in inhalation therapy is at a critical level which severely influences ability to help with their chronic disease.

Aim: To assess adherence by using MARS-5 method and determine how to improve compliance in inhalation therapy.

Materials and methods: The study was to give patients a survey questionnaire where the table of MARS-5 method was included. In total, 50 participants aged between 32 and 87 self-administrated filled out the survey. Results were calculated based on a publication in PubMed.

Results: Medication adherence on the MARS-5 scale was performed on adherence levels <70%; ≥70%; ≥80%; ≥90%; 100%. At adherence <70%, a MARS-5 value of <17 points had 22% of participants, at adherence ≥70%, a MARS-5 value of ≥17 points had 18% of participants, at adherence ≥80%, a MARS-5 value of ≥20 points had 34% of participants, at adherence ≥90%, a MARS-5 value of ≥23 points had 14% of participants, at adherence 100%, a MARS-5 value of 25 points had 12% of participants. Distribution is similar between genders, however, the most significant difference was at adherence ≥80%, a MARS-5 value of ≥20 points, where from all women participating it was 40% whilst from men 26%.

Conclusions: The results show that adherence needs to be improved, as its shortcomings can significantly affect the treatment of chronic patients. Most of the participants have adherence ≥80%. Women tend to have a somewhat higher adherence.

Rūdolfs Ļaksa¹

¹Rīga Stradins University, Dzirciema iela 16, Rīga, laksarudolfs2@gmail.com

ACUTE MESENTERIC VASCULAR DISEASE: RETROSPECTIVE ANALYSIS OF CLINICAL PRESENTATION, DIAGNOSTIC FINDINGS, AND THE IMPACT OF THERAPY ON DISEASE OUTCOME

Acute intestinal vascular disease constitutes a medical emergency associated with the acute occlusion of mesenteric vessels. Classically, such occlusions manifest in elderly, polymorbid patients, with the relevance of this disease increasing as the population ages. Mortality rates are alarmingly high with delayed diagnosis and treatment. Early diagnosis stands as a cornerstone for a favorable disease outcome, with contrast-enhanced CT being the diagnostic gold standard. Advancements in medicine have led to endovascular revascularization methods playing a significant role in mortality reduction. Given the disease's low incidence, nonspecific symptoms, and limited diagnostic tools, maintaining a high degree of suspicion among doctors is crucial.

Methods: We conducted a retrospective cohort study, including 72 patients treated at PSKUS for acute intestinal vascular disease (ICD-10 code K55.0) from January 1, 2019, to December 31, 2023. Data encompassed patients' gender, age, clinical presentation, comorbidities, diagnostic approaches, therapeutic interventions based on diagnostic findings, and in-hospital disease outcomes. Data analysis utilized SPSS 29.0.0.0, with statistical analyses conducted to ascertain associations and differences between various factors among surviving and deceased patients. Tests employed included the Chi-square test, Fisher's exact test, and Mann-Whitney test, with significance set at $P < 0.05$.

Results: Disease mortality stood at 79.9%, with patients averaging 79.14 (SD 10.2) years of age. On average, each patient presented with 3.78 (SD 2.2) comorbidities. Most prevalent comorbidities included arterial hypertension (82.8%), atrial fibrillation (68.8%), and chronic heart failure (65.6%). Dominant symptoms comprised abdominal pain (95.6%), vomiting (55.9%), and diarrhea (36.8%). Out of 72 patients, 36 underwent invasive interventions, including diagnostic laparotomy. Prognostic factors influencing disease outcomes included age ($P = 0.007$), impaired consciousness ($P = 0.029$), general condition ($P = 0.012$), blood urea changes ($P = 0.029$), tachycardia ($P = 0.004$), intestinal pneumatosis ($P = 0.007$), APTL changes ($P = 0.044$), receipt of invasive therapy (including diagnostic laparotomy) ($P = 0.035$), superior mesenteric artery occlusion ($P = 0.039$), occlusion level ($P < 0.001$),

and artery contrasting below occlusion level ($P = 0.038$). Factors lacking prognostic value encompassed symptom duration ($P = 0.773$) and endovascular therapy versus laparotomy ($P = 0.411$).

Conclusions: Disease mortality remains critically high. Predictors of negative outcomes include severe patient general condition, advanced age, altered consciousness, tachycardia, elevated blood urea levels, increased APTL, intestinal pneumatosis, involvement of the superior mesenteric artery, and complete proximal or distal artery occlusion. Patients exhibiting these prognostic factors warrant close monitoring due to the potential for rapid deterioration. Therapy decisions should not solely hinge on symptom duration. Considering disease pathogenesis, a negative outcome is anticipated without targeted therapy. Invasive therapy consideration, regardless of extent or type, may mitigate mortality rates in such patients.

Elīna Cimbolīneca^{1,2}, Beate Raituma^{1,2}, Santa Maksimova^{1,2}, Dace Bogorada-Saukuma²

¹ University of Latvia, Raiņa bulvāris 19, Rīga

² Riga East clinical university hospital, Oncology centre of Latvia, Hipokrāta street 4, Rīga

ACUTE SIDE EFFECTS AFTER INTENSITY-MODULATED RADIATION THERAPY FOR HEAD AND NECK CANCER

Background: The incidence of head and neck cancer (HNC) is rising, with 75% of patients needing radiotherapy, either alone or with chemotherapy. Side effects like mucositis, pain, weight loss, and xerostomia are significant. However, data on these side effects in the Latvian population is lacking.

Aim: This study evaluates the severity of side effects from Intensity-Modulated Radiation Therapy (IMRT) in head and neck cancer patients and identifies risk factors to improve patient education.

Materials and Method: A prospective cohort study involved interviewing head and neck cancer patients at RAKUS LOC using a specific survey and assessing bloodwork before and after treatment. Factors like smoking, alcohol, surgery history, and concurrent chemotherapy were considered.

Results: Of 27 patients, the median age was 62 years, and 19 patients (70.4%) were men, with the larynx being the common treatment site and most patients received concurrent chemotherapy (66.6%). Significant weight loss was observed in patients undergoing concurrent chemotherapy ($p=0.007$), correlating with lower hemoglobin and neutrophil levels, which also linked to the severity of mucositis ($p=0.01$ and $p=0.003$, respectively). By the end of treatment, severe oral mucositis was developed in 48.1% of patients. Notable correlations included sex and depression ($p=0.005$) and depression and sleep disorders ($p=0.002$) were found, with females being more susceptible to depression and sleep disorders.

Dmitrijs Kovaļs¹, Ivans Oļeičenko², Aleksejs Višņakovs³

¹Rīgas Stradiņa Universitāte, Dzirciema iela 16, Rīga, kovalsdmitrijs@gmail.com

²Rīgas Stradiņa Universitāte, Dzirciema iela 16, Rīga, ivan.oleicenko@gmail.com

³RAKUS Neatliekamās Medicīniskās Palīdzības un Pacientu Uzņemšanas klīnikas vadītājs aleksejs.visnakovs@aslimnica.lv

ALCOHOL INTOXICATION INDUCED RESPIRATORY FAILURE AND ITS ASSOCIATION WITH THE RASS SCALE EVALUATION IN THE PREHOSPITAL STAGE

One of the most common intoxicating agents among Latvian patients is alcohol. Patients with alcohol intoxication are most frequently brought to the Emergency Department by Emergency Medical Service (EMS) from public places. During the prehospital stage, EMS specialists suspect alcohol intoxication in patients by assessing their level of consciousness, behavior, and specific smell of alcohol from the patient. One of the specific features of alcohol is its effect on the central nervous system (CNS). Severe alcohol intoxication leads to CNS depression, which can provoke respiratory insufficiency in patients. This pathological condition can endanger the patient's life.

In this prospective study, 100 patients from the Emergency Department of Riga Eastern Clinical University Hospital participated anonymously, who were brought by EMS with diagnoses of "alcohol intoxication" and who did not receive oxygen inhalation therapy prehospitally. The level of consciousness of patients has been assessed using the Richmond Agitation Sedation Scale (RASS) (from -5 - unresponsive to +4 - agitated), and the alcohol concentration in the blood was also determined. The type and degree of respiratory insufficiency was determined using arterial blood gas analysis.

The study found that excessive alcohol consumption can induce respiratory failure, most commonly developing type 2 respiratory failure. It has been observed that respiratory failure more frequently develops in patients with severe sedation levels (with RASS scale rating less than 0). Patient age or gender is not a prognostic factor for the risk of developing respiratory failure. From the results obtained in the study, it can be concluded that special attention should be paid to patients with higher ethanol concentrations, lower levels of consciousness, or more pronounced degrees of sedation, as these patients have an increased risk of developing acute respiratory failure.

Anastasija Koleda¹, Daria Medvedeva¹, Kristine Fomina^{1,2}, Kristine Baumane^{1,2}

¹University of Latvia, Riga, Latvia

²Riga East Clinical University Hospital Clinical Centre "Bikernieki", Riga, Latvia

ALTERATIONS IN PERIPAPILLARY MICROVASCULAR DENSITY AND VISUAL FIELD AMONG PATIENTS WITH OPTIC DISC DRUSEN

Introduction Optic nerve drusen (ODD) are calcareous, reflective deposits found in the optic nerve head. They may be misidentified as disc edema, either unilateral or bilateral, leading to diagnostic challenges. While generally harmless, ODD can lead to visual field impairments and are linked with conditions resulting in vision impairment, including central retinal artery occlusion and ischemic optic neuropathy. The occurrence of ODD is estimated between 3.4 and 24 cases per 1,000 people, impacting both genders equally and predominantly seen in Caucasians compared to other ethnic groups

Aim. To investigate the effect of ODD on functional and structural parameters of the eye and to compare these results with age-matched control group patients.

Methods. The study included 19 patients (33 eyes) with ODD and 18 age-matched controls (33 eyes). All study subjects underwent an automated static perimetry examination, optical coherence tomography (OCT) imaging of optic disc and macula, as well as OCT angiography (OCTA) imaging of optic disc.

Results. In patients diagnosed with ODD, the average age was 56 years, with being women 66% and men 34%. Of the total number of patients, women accounted for 74% of those diagnosed with ODD, while men represented 26%. Among these patients with ODD, unilateral defects were found in 21.05%, and bilateral defects in 73.68%. Additionally, 67% of patients with ODD exhibited changes detected through computerized perimetry. Eyes with ODD had significantly reduced mean deviation, dB (22,35 [-4,57] ($p < 0.001$)) and compared to controls group (44,64 [-0,49]). Eyes with ODD had significantly pattern standard deviation, dB (44,23 [4,04] ($p < 0.001$)) and compared to controls group (22,77 [1,65]). Eyes with ODD, had significantly reduced peripapillary retinal nerve fiber layer (RNFL) thickness (23,77 [79,36] ($p < 0,001$)) to controls group. (43,23 [92,39]). Macular ganglion cell complex (GCC) thickness analysis showed patients with ODD (23,83 [92,06] ($p < 0,001$)) and control group (42,17 [101,52]). Peripapillary vascular density (pVD) showed patients with ODD (21,82 [44,63]) and control group (45,18 [50,22]) ($p < 0,001$). The correlation between mean deviation and peripapillary vascular density was positive, showing a correlation coefficient of (0.295 ($p < 0,95$)). A significant negative correlation was found between mean deviation and pattern standard deviation (-0,875 ($p < 0,001$)). A negative correlation was observed between macular ganglion cell complex (GCC) thickness and pattern standard deviation, with a coefficient of (-0.441 ($p < 0,001$)).

Conclusion. The findings indicated that eyes with ODD were predominantly found in women and most commonly exhibited bilateral defects. This study has shown that optical coherence tomography angiography (OCTA) serves as an objective tool for analyzing changes in peripapillary vascular density (pVD) in patients with ODD, which positively correlates with mean deviation.

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Liene Salmiņa¹, Jūlija Ivanova¹, Marta Anna Ozoliņa¹, Kristīne Geldnere^{1,2}

¹University of Latvia, Jelgavas street 3, Riga, Latvia, liene.salmina@gmail.com, julijaivanovaa@gmail.com, martaaozolina@gmail.com

²Pauls Stradiņš Clinical University Hospital, Pilsoņu street 13, Riga, Latvia, kristineab@inbox.lv

ANALYSIS OF THE ASSOCIATION BETWEEN BODY MASS INDEX AND LIPOHYPERTROPHY DEVELOPMENT IN PATIENTS WITH TYPE 1 DIABETES MELLITUS

Background. Obesity is rising among type 1 diabetes mellitus (T1DM) patients, leading to insulin resistance, increased insulin requirements, and heightened risk of chronic complications.

Aim of the study. To evaluate the association between increased body mass index and the presence of lipohypertrophy in individuals diagnosed with 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 utilized a custom survey, obtained patient measurements for calculating Body Mass Index (BMI), and clinically evaluated lipohypertrophy by inspecting and palpating insulin injection sites in all participants. 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. Participants had an average diabetes duration of 18.92 years. Among the respondents, 54.90% (n=28) had a BMI below 25 kg/m², while 45.10% (n=23) had a BMI exceeding 25 kg/m², with 15.69% (n=8) of the high-BMI cohort being obese (BMI > 30 kg/m²). Lipohypertrophic changes were observed in 50.98% (n=26) of low-BMI patients and in 41.18% (n=21) of those with a high BMI. Notably, all patients with a BMI over 30 kg/m² (15.69%, n=8) exhibited lipohypertrophy. A weak Pearson's correlation was observed between body mass index and lipohypertrophic changes (r = +0.068), as well as between the frequency of injection site rotation (r=-0.182), needle reuse (r=-0.271) and lipohypertrophy.

Conclusions. Lipohypertrophy occurrence appears independent of body mass index variations. Crucial for managing insulin-induced lipohypertrophy is educating patients on correct insulin injection techniques and emphasizing routine needle replacement.

Ieva Marija Raice¹, Dzintra Kažoka^{2,1}

¹ Faculty of Medicine, Rīga Stradiņš University, Latvia

² Department of Morphology, Institute of Anatomy and Anthropology, Rīga Stradiņš University, Latvia

ANATOMICAL VARIATIONS OF NASAL CHOANAE

Introduction. The *nasal choanae* are located at the posterior of the nasal cavity and connects it with the *nasopharynx*. It is a pair of oval openings that are separated from each other by the *vomer's posterior* border. Therefore, it is not a structure but a space bounded anteriorly and inferiorly by *lamina horizontalis ossis palatini*, superiorly and posteriorly by *os sphenoidale*, and laterally by the *processus pterygoideus medialis*. The adult *choana* measures approximately 2.5 cm in height vertically and 1.3 cm in transverse length (Samoliński et al., 2007). Normal nasal function largely depends on the nasal anatomy. Nasal diseases can arise from even the most minor abnormality.

Objectives. This study aimed to investigate the anatomical variations of nasal *choanae*, including their length, width and associated structures, and to assess their potential implications for nasal obstruction and subsequent diseases.

Materials and Methods. Virtual dissection table "Anatmage" and human dry skulls provided by the Laboratory of Anatomy of the Department of Morphology of the Institute of Anatomy and Anthropology were used for measurements. 32 skulls were examined to determine the length and width of each *choana*. The length of *vomer*, *ala vomer*, and base of *vomer* were also observed. Since there was a lack of classification method for choanal measurements, it was categorized into 3 groups for choanae length: short (< 23 mm), normal (23 mm ≤ *choana* length ≤ 27 mm), long (> 27 mm), and 3 groups for *choanae* width: narrow (< 11mm), normal (11mm ≤ *choana* width ≤ 15 mm), wide (> 15 mm). Theoretical backgrounds were sourced from different sources, including *PubMed* and *ScienceDirect*.

Results. After analyzing nasal *choanae* dimensions, it was found that there were diverse measurements among the study participants. The mean lengths of the right and left *choanae* were 25.44 ± 2.36 mm and 25.47 ± 2.15 mm, respectively. The collective mean width of the *choanae* was 26.48 ± 4.11 mm. On the other hand, the mean widths of the right and left *choanae* were 13.22 ± 2.23 mm and 13.03 ± 2.74 mm, respectively. The mean length of the *vomer*

was 24.63 ± 3.74 mm, while the *ala* of the *vomer superior* width had a mean of 8.21 ± 3.12 mm, and the *vomer* base width displayed a mean of 5.45 ± 2.37 mm. There were 11 short and 22 normal *choanae* in length, while there were 22 narrow, 10 normal and 2 wide *choanae* in width. These variations may impact airflow dynamics, nasal obstruction and susceptibility to respiratory conditions.

Conclusions. In this study, most of the choanae length measurements were within the normal range, including only a few deviations. The detected asymmetry in choanae width emphasizes the significance of considering individual anatomical characteristics during clinical evaluations and treatments to enhance nasal function and respiratory health.

Ieva Vīksna

Rīga Stradiņš University, Faculty of Medicine

ANXIETY AND DEMOGRAPHIC DIFFERENCES AMONG WORKERS OF SPECIALIZED HOSPITAL IN RIGA, LATVIA

Keywords: *anxiety, General Anxiety Disorder – 7, hospital workers.*

Objectives: To ascertain anxiety levels and interaction with gender, age, level of education in workers from specialized hospital in Riga, Latvia.

Methods: An internet survey was made from February till April of 2023, which consisted of General Anxiety Disorder 7-item scale and demographic information - gender, age, level of education.

Results: There were 94 respondents in gender group. Amongst women, minimal anxiety were found in 25 (36,8%), mild in 35 (51,5%), moderate in 8 (11,8%) and there were no women with severe anxiety. Amongst male respondents, minimal anxiety were found in 16 (61,5%), mild anxiety in 7 (26,9%), moderate anxiety in 1 (3,8%) and severe anxiety in 2 (7,7%) respondents, ($\chi^2(3 N94) = 11.646, p=0,009$).

There were 95 respondents in age group. Anxiety levels (minimal, mild, moderate, severe) in age group 20-29: 8 (34,8%), 11 (47,8%), 3 (13,0%), 1 (4,3%); in age group 30-39: 16 (53,3%), 12 (40,0%), 1 (3,3%), 1 (3,3%); in age group 40-49: 7 (28,0%), 13 (52,0%), 5 (20,0%), 0; in age group 50+: 10 (58,8%), 7 (41,2%) and no respondents with moderate or severe anxiety.

There were 96 respondents in education level group. Anxiety levels (minimal, mild, moderate, severe) in high school education group: 5 (27,8%), 12 (66,7%), 1 (5,6%), 0; in unfinished higher education group: 3 (27,3%), 4 (36,4%), 3 (27,3%), 1 (9,1%); in bachelor's degree group: 24 (47,1%), 22 (43,1%), 5 (9,8%), 0; in master's degree group: 10 (62,5%), 5 (31,3%), 0, 1 (6,3%).

No statistic significance were found with anxiety levels and respondents age and education groups.

Conclusions: In women and male respondents, more were with minimal and mild anxiety, but there were no woman with severe anxiety, while two male respondents had severe anxiety. Amongst all age groups and all education levels, more respondents were with minimal and mild anxiety.

Anna Dzerkale¹, Lauma Kalvāne¹, Gunta Tīcmane¹

¹Rīga Stradiņš University, Department of Residency¹, Latvia

ASSESSMENT OF CARDIOVASCULAR RISK IN GENERAL PRACTITIONERS IN LATVIA.

Keywords: *cardiovascular risk, SCORE, GP, adherence.*

Introduction: Cardiovascular disease (CVD) is a very significant public health problem worldwide and the most common cause of death. CVD treatment is improving rapidly, but mortality is decreasing slowly. Ignoring CVD risk factors, where primary prevention plays an important role, is one of the problems. General practitioners, in addition to annual preventive screening, assess CVD risk by the SCORE method once every five years in patients aged 40-65.

Objective: To clarify the habits of using the SCORE algorithm, to collaborate with patients in assessing CVD risk among general practitioners in different age groups.

Material and methods: An anonymous electronic questionnaire was used, consisting of 23 questions on CVD risk assessment using the SCORE method. The questionnaire was sent to publicly available emails from family doctors. The questionnaire took place between 18 January and 22 February. A total of 122 certified family doctors participated in the questionnaire, from all cultural and historical regions of Latvia. All questionnaires completed correctly, included in the study. Data analysis was performed with Microsoft Excel 2016 and IBM SPSS.

Results: The responses from 122 general practitioners were divided into two study groups - group 1 - general practitioners aged ≤ 55 years and the second group - general practitioners aged ≥ 56 . There were data that the cardiovascular risk in their patients was not determined by 4% ($n = 13$). There is a statistically significant association between study groups ($p < 0.001$). In both study groups, 56.9% of general practitioners explain the importance of SCORE to their patients. As additional time is needed to assess CVD risk, approximately 66% of general practitioners (62.8% in group 1, 69% in group 2) require ≥ 2 visits. Patient adherence is important in reducing CVD risk. The results show that in the 1 group 52.6% of general practitioners think their patients are more likely to adhere, but in group 2 - 43.1% are partially adherent. In order to promote patient health, more than 60% of general practitioners (62.8% in group 1, 64.4% in group 2) recommend follow-up visits every 3 months in patients at high risk of CVD.

Conclusions: After analysis of the data, it is concluded that 96% of general practitioners carry out CVD risk detection according to the SCORE method, while patient adherence is positive in about 50% of cases, which negatively affects improvement of CVD therapy and reduction of mortality. Additional patient information and education is needed on this topic, which should be associated with additional time for family doctors for each patient.

Laura Justīne Bajāre¹, Inta Zīle¹

¹University of Latvia, Riga, Latvia

ASSOCIATION BETWEEN DEPRESSION AND ANXIETY SYMPTOMS AND LEVEL OF PERFECTIONISM AMONG MEDICAL FACULTY STUDENTS IN LATVIA

Background. Perfectionism is a personality characteristic defined as “the pursuit of impeccable and the setting of extremely high-performance standards, accompanied by overly critical judgement”. Studies have shown relationship between depression and higher levels of perfectionism. From a psychiatric and psychotherapy perspective, perfectionism is seen as a contributing factor to depression. Multiple studies between perfectionism and anxiety have revealed a strong association.

Aim. Find out if there is an association between perfectionism, anxiety, and depression symptoms for medical students in Latvia.

Methods. There were 85 respondents between 18 and 31 years old, 84.71% were women ($n=72$). Students were asked to undergo an anonymous online questionnaire: perfectionism screening (Frost's Multi-dimensional perfectionism scale), depression screening after patient Health Questionnaire-2 (PHQ-2) and Anxiety Scale (GAD-7 self-evaluation scale). The correlation between perfectionism, anxiety and depression symptoms was evaluated using the Spearman's rank correlation coefficient.

Results. Overall, 63% ($n=53$) respondents showed moderate level of depression and 33% ($n=28$) severe anxiety level. The level of perfectionism significantly correlated with the level of anxiety ($r_s = 0.40$; $p < 0.001$), but not with the level of depression ($r_s = 0.05$; $p = 0.659$). Anxiety and depression showed statistically insignificant positive correlation ($r_s = 0.10$, $p = 0.35$). No statistically significant correlations were found between gender or age.

Conclusions. When the level of perfectionism increases, the level of anxiety grows as well, but no results suggest increase in depression. This indicates that the hypothesis - as perfectionism grows, the degree of anxiety and depression increases - has been partially confirmed. This result could be due to the small number of respondents and further study must be conducted.

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Santa Sīle¹, Linda Zēģele²

¹ Rīga Stradiņš University, Dzirciema street 16, Riga, Latvia

² Lindas Zēģeles family doctor's practice, Tēriņu street 79, Riga, Latvia

ASSOCIATION BETWEEN LIPID LEVELS AND DEPRESSION IN GENERAL PRACTITIONER'S PRACTICE

Keywords: Lipid levels, depression, family medicine.

Objectives. Depression is a common mental disorder that negatively affects quality of life. It may be associated with other chronic diseases and can lead to an increased risk of death. Previous studies have shown that there is

a correlation between lipid levels and depressive mood. The aim of this study was to investigate the correlation between lipid levels and depression and evaluate the potential use of lipids as biomarkers for depression.

Materials and methods. A cross-sectional study of general practice patients over 18 years of age who do not take drugs for dyslipidemia or antidepressants and have recently tested for lipid panel. Data were collected from anonymous questionnaires: age, gender, height, weight, smoking status, physical activity level, PHQ-9 depression scale, lipid levels and glucose. Data were analyzed using IBM SPSS Statistics 29.0.

Results. From 104 patients (mean age 44 ± 8.95 years) 53 (51.0%) were females (mean age 45 ± 8.91 years) and 51 (49.0%) males (mean age 44 ± 9.04 years). Research did not show statistically significant correlation between lipid levels and severity of depression after PHQ-9 questionnaire ($p > 0.05$). Also, level of glucose, body mass index, smoking status or physical activity level did not show statistically significant association with PHQ-9 total score ($p > 0.05$). Weak, but statistically significant negative correlation ($r = -0.224$) was found between age and severity of depression ($p = 0.02$). Statistically significant difference was found between gender and PHQ-9 total score – women showed higher depression rates than men ($p < 0.001$).

Conclusions. Research did not show an association between lipid levels and depression. Higher rates of depression were found among younger people and women.

Līga Vaģele¹, Līga Careva¹, Jelena Daniļenko^{2,3}

¹Rīga Stradiņš University, Department of Family Medicine, Faculty of Residency, Dzirciema street 16, Riga, liga.landmane@gmail.com, liga.galvanovska@gmail.com

²Rīga Stradiņš University, Department of Family Medicine, Dzirciema street 16, Riga, Jelena.danilenko@rsu.lv

³Family Physician's Practice, Buļļu street 7, Riga

ASSOCIATION BETWEEN VITAMIN D DEFICIENCY AND SUBCLINICAL HYPOTHYROIDISM IN GENERAL PRACTICES (GP)

Introduction: 25(OH)D deficiency is a global issue, with prevalence rates ranging from 14% to 100%. The effect of 25(OH)D on the endocrine system is being studied increasingly as well as its possible link to Subclinical Hypothyroidism (SH), which often remains undiagnosed. This condition presents with nonspecific symptoms. Recognizing this link can improve diagnosis and treatment, enhancing patient health.

Aim: This study aims to determine if there is an association between low 25(OH)D levels and SH to enhance diagnosis, patient care, and quality of life in primary healthcare.

Materials and Methods: A retrospective cross-sectional analysis involved 2000 medical record reviews of patients within two GP. A subset of 56 patients were identified based on the presence of 25(OH)D deficiency, high TSH levels, and normal FT4 and FT3. Patients under 18, those with cancer, or pre-existing thyroid issues were excluded. Analysis was conducted using IBM SPSS Statistics 29.0.2.0, considering $p < 0.05$ as significant. The statistical significance of the relationship between 25(OH)D deficiency severity and TSH elevation was assessed. Additionally, the study explored gender differences in the severity of 25(OH)D deficiency among patients showing symptoms of SH.

Results: The research included 56 participants aged from 19 to 85 years old, median age reaching 55.11, modal age 44. A majority, 69.64%, were female, marking a statistically significant gender disparity ($p < 0.05$). The Pearson correlation showed no significant link between age and 25(OH)D levels ($p > 0.05$). Notably, individuals with 25(OH)D in the range of 20-29 ng/mL demonstrated significantly lower TSH levels compared to those with more pronounced deficiencies (10-19 ng/mL) ($p < 0.05$). The independent samples t-test revealed no statistically significant variation in TSH levels between males and females with a 25(OH)D deficiency ($p > 0.05$).

Conclusions: Research data reveal patients exhibiting signs of SH and 25(OH)D deficiency are present in GP practice. It was concluded that the more severe 25(OH)D deficiency, the higher the TSH levels in patients with SH. Additionally, the research showed no significant variance in TSH level increases between females and males with 25(OH)D deficiency.

Vladislavs Kvelde¹, Egils Vjaters²

¹Pauls Stradiņš Clinical University Hospital, Pilsoņu iela 13, Zemgales priekšpilsēta, Rīga, LV-1002, vladislavs.kvelde@gmail.com

²Pauls Stradiņš Clinical University Hospital, Pilsoņu iela 13, Zemgales priekšpilsēta, Rīga, LV-1002, vjaters@gmail.com

ASSOCIATION OF LYMPHADENECTOMY DURING LAPAROSCOPIC RADICAL PROSTATECTOMY ON THE VOLUME OF INTRAOPERATIVE BLOOD LOSS AND DURATION OF HOSPITALIZATION

Background. Prostate cancer is one of the malignancies that affects men and significantly contributes to increased mortality rates in men globally. Worldwide, an estimated 1,414,259 people were diagnosed with prostate cancer in 2020. It is the fourth most commonly diagnosed cancer in the world. Laparoscopic radical prostatectomy is a relatively new approach to the surgical treatment of localized prostate cancer. Since its inception, the technique, however challenging, is undergoing continuous refinements, which make it today a feasible, reproducible, and teachable operation practiced by urologists worldwide.

Objectives The primary goal is to determine if lymphadenectomy affects the volume of bleeding, duration of surgery, and duration of hospitalization. The data obtained will be used to develop new recommendations - expected intraoperative blood loss, expected days spent in the urology department depending on the volume of surgery.

Methods. A prospective study was conducted involving 122 patients who underwent laparoscopic radical prostatectomy. Patients were divided into two groups: Group A (48 patients) underwent surgery without lymphadenectomy; Group B (74 patients) underwent surgery with lymphadenectomy. The following measurements were used for analysis: surgical time, intraoperative blood loss volume and the duration of hospital stay. Predictive analytics and statistical analysis software SPSS was used to determine statistical correlations.

Results. The respondents were divided into two groups - A and B (Group A - surgery without lymphadenectomy, Group B - surgery with lymphadenectomy). The obtained results indicate a statistically significant correlation between the surgical volume with/without lymphadenectomy and the duration of surgery ($r=0.316$, $p < 0.001$), which is justified by the additional operative stage. There is a statistically significant difference between the respondent groups (A and B) and the duration of hospitalization ($Sig2 < 0.035$, $t = -0.609$). There is also a statistically significant difference between the respondent groups (A and B) and blood loss ($Sig2 < 0.025$, $t = -1.570$).

Conclusion: Performing of lymphadenectomy increases the duration of hospitalization and the volume of intraoperative blood loss. The gathered data should be incorporated into surgical daily activities planning in the urology department.

Margarita Ļoļāne¹, Ilze Tumšā¹, Ināra Laizāne²

¹Faculty of Medicine, University of Latvia, Riga, Latvia

²SIA "I.Laizānes medical practice", Latvia

BURNOUT IN LATVIA'S EMERGENCY MEDICAL SERVICE: A CAUSE FOR CONCERN

Introduction. Burnout syndrome is a state of emotional, physical, and mental exhaustion ambulance workers experience from prolonged or excessive stress. It's frequency among emergency medical personnel seems to be high nowadays.

Aim. The aim is to answer the question – how frequently does this psychological syndrome happen among EMS workers in Latvia.

Methods. Maslach Burnout Inventory was used to measure burnout, specifically in a work setting. It helps assess an individual's experience of burnout and risk factors of it.

Results. 200 participants were enrolled in this study, of which 70% (N=140) were females and 30% were males (N=60). The study revealed a concerning prevalence of burnout among participants. A staggering two-thirds (66%) reported above-average burnout risk, while another 30% indicated a high risk. Encouragingly, a small minority (4%) did not experience any burnout risk ($p < 0,001$). The highest risk of burnout is most common among resident doctors (85%) and dispatchers (77%) ($p = 0,012$). There is no statistically meaningful link between an individual's sex and their risk of burnout ($p = 0,711$). The most burned-out groups are 21-30 (72.7%), 31-40 (66.4%) and then 41-50 years (40.9%) ($p = 0,023$). Speaking about experience - those with less than 3 years experience had

a burnout rate of 71.1%, while the rate fell to 37.2% for workers with over 10 years experience. Individuals juggling multiple jobs are especially vulnerable to burnout, with a rate as high as 79%. (p=0.003).

Conclusion. An alarming 96% of workers face a significant risk of burnout. Several factors appear to contribute to this risk, including job type, age, experience level, holding multiple jobs.

Kārlis Meirāns^{1,2}, Andrejs Simonovs⁴, Oļesja Basina^{2,3}, Anita Lapīņa²

¹Rīga Stradiņš University, Department of Residency, Dzirciema street 16, Rīga, Latvia, karlis.meirans@gmail.com

²Rīga East University Hospital, Endoscopy department, Hipokrāta street 4, Rīga, Latvia

³Rīga Stradiņš University, Faculty of Medicine, Internal diseases department, Dzirciema street 16, Rīga, Latvia

⁴Rīga Stradiņš University, Faculty of Medicine, Dzirciema street 16, Rīga, Latvia

COMPLEX BILIARY STONES: A 10 YEAR TERTIARY CENTRE EXPERIENCE OF ENDOSCOPIC TECHNIQUES AND POST-ERCP COMPLICATIONS

Key words: choledocholithiasis, complex biliary stones, ERCP.

Introduction: Endoscopic retrograde cholangiopancreatography(ERCP) is a widely used well-established mini-invasive approach for the treatment of choledocholithiasis. Conventional ERCP using standard endoscopic stone removal techniques effectively manages more than 90% of all bile duct stones. However, in approximately 10-15% of patients stones are “difficult” or complex due to size (>12mm in diameter), shape, number of stones (>2), altered biliary tree anatomy, location of the stone or individual patient risk factors. Extraction of complex bile duct stones is associated with a higher risk of procedural failure and complications.

Aim: The aim of study is to evaluate the efficacy and safety of therapeutic ERCP for complex biliary stones.

Materials and methods: A retrospective study analyzing endoscopy database and medical history data of 198 patients admitted to Endoscopy unit at Rīga East university hospital with complex biliary stones over a 10-year period (from 1 January 2014 to January 2024) was done. The results were collected and statistically analyzed using Microsoft Excel, Jamovi.

Results: A total of 198 patients were included in this study of whom 64,6% (n=128) were female. The median age of patients was 78 years (IQR 69-83.8). In our study 35,7% (n=70) had multiple stones (>10mm in diameter), 64,3%(n=126) had 1 stone larger than 12mm in diameter. Complete stone extraction was noted in 77,8% (n=154) using single therapeutic approach in 99% cases - endoscopic papillosphinterotomy combined with variable size and configuration baskets. Postprocedural ERCP-related complications occurred in 13,1% (n=26). The most common complication was pancreatitis in 9,09% (n=18) as cases were classified mild to moderate; two mild cholangitis and mild bleeding in one case. There were no perforations reported. Our data showed a few (n=4) serious adverse events in 2,02% - two serious pancreatitis of whom one were fatal due to multiorgan failure and two indirect complications - one fatal cardiac arrest and one respiratory failure.

Conclusions: Although ERCP is highly effective for managing choledocholithiasis our study outcomes demonstrate that complex biliary stones can make stone extraction challenging and increase post-procedure complication rates. Therefore, additional advanced techniques for stone removal are essential to be implemented to maximize clinical, technical success and minimize complication rates.

Kristīne Lapšova¹, Ilze Konrāde^{1,2}, Inga Orleāne²

¹ Rīga Stradiņš University, Dzirciema street 16, Rīga, Latvia

² Rīga East University Hospital, Hipokrāta street 2, Rīga, Latvia

DECREASE OF SERUM GLUCOSE AND TREATMENT COMPLICATIONS IN THE FIRST 24 HOURS OF DIABETIC KETOACIDOSIS MANAGEMENT

Keywords: Diabetic ketoacidosis, intensive care, serum glucose.

Introduction. Diabetic ketoacidosis (DKA) is a diabetic emergency that continues to account for hospitalizations and to cause high morbidity and mortality. Most guidelines suggest starting intravenous insulin infusion with 0.1 unit/kg/h, which, as described in the UK study in 2016, can cause such complications as hypoglycemia in almost 28% of patients. Therefore, in this study we used low-dose insulin therapy of 0.05 unit/kg/h instead of regular dose of 0.1 unit/kg/h to determine the general decrease of serum glucose in the first 24 hours of treatment and if there were any cases of hypoglycemia.

Methods. 143 patients in the age group of 18-89 years with diagnosed diabetic ketoacidosis were included in the study. All patients were treated in the intensive care unit of Rīga East University hospital. A retrospective study was performed and statistically analyzed with IBM SPSS.

Results. From 143 patients with mean age 46.5 years, 59 were female and 84 were male. 76 patients had type 1 diabetes mellitus (DM), 64 had type 2 DM and three patients had other types of diabetes. Mean serum glucose decrease was 27.5 mmol/L or 70.4% or from the baseline in the first 24h after diagnosis. 16 patients (11%) reported having a hypoglycemia episode with serum glucose ≤ 3.9 mmol/L. There was no association between patients' age and occurrence of hypoglycemia ($p=0.923$) as well as with the type of diabetes and hypoglycemia ($p=0.491$). **Conclusion.** In DKA management it is crucial to have a patient-specific treatment regardless of age and diabetes type as all patient groups are at risk of developing hypoglycemia. Treatment of DKA with low-dose insulin therapy accounts for less cases of hypoglycemia (11%) than with regular dose insulin (27.6%), according to literature.

Aušrelė Visockienė, Loreta Remeikienė

EFFECT OF PHYSIOTHERAPY ON BALANCE, RISK OF FALLS AND COGNITIVE FUNCTIONS IN THE ELDERLY WITH DEMENTIA

Keywords: *dementia, cognitive functions, physiotherapy program.*

Dementia is becoming an increasingly important public health issue. This is one of the more common mental disorders in the elderly. The world's population was 35.6 million with dementia in 2010 population. Dementia is one of the more common mental disorders in the elderly. Physiotherapy is very useful for people suffering from all forms of dementia. It helps to stabilize and improve cognitive function, as well as reduce and delay the appearance of severe neuropsychiatric symptoms. Physiotherapy provides regular physical activity, which has a positive effect on physical health, improves mobility function, balance and coordination, reduces the likelihood of falls, so people can remain independent longer in their daily activities. The goal was to assess the effect of physiotherapy on balance, the risk of falls and cognitive functions in the elderly with dementia. Research methods – analysis of the scientific literature and other sources of scientific information was carried out. A qualitative study was conducted in which 14 subjects living in care homes and who were diagnosed with dementia took part. The self-sufficiency of the subjects was judged by the Barthel index, which could not be less than 50 points. Berg's and Tinetti's tests were used to assess balance. According to the Short Study on Mental State and the clock drawing test evaluated the cognitive functions of subjects. After a four-week study that aimed to assess the effect of physiotherapy on balance, risk of falls, and cognitive functions in the elderly with dementia, the physiotherapy program applied was generally appropriate to improve imbalances, the risk of falls, and cognitive impairment. Due to the fact that the study was conducted for a sufficiently short period of time, the results of the study, however, showed that the physiotherapy program applied to people with dementia reduced the risk of falls, improved balance indicators and cognitive functions.

Lilīta Beķere¹, Indra Zeltiņa^{2,3}

¹Rīga Stradiņš University, Faculty of Medicine, Dzirciema street 16, Rīga, Latvia, 042888@rsu.edu.lv

²Rīga East University Hospital, Gastroenterology and Hepatology Centre, Hipokrāta street 2, Rīga, Latvia

³Rīga Stradiņš University, Department of Infectology, Linezera street 3, Rīga, Latvia, indra.zeltina@rsu.lv

ELDERLY HIV DIAGNOSIS: BREAKING THE AGE BARRIER

Introduction. Despite advancements in healthcare, HIV infection continues to pose significant public health challenges worldwide. While often associated with younger populations, HIV can affect individuals of all ages, including the elderly. This case report highlights the importance of considering HIV infection in the differential diagnosis of older adults presenting with non-specific symptoms, such as gastroenteritis, to ensure timely diagnosis and appropriate management.

Case report description. An 84-year-old man presented with complaints of dyspeptic symptoms for 1 week, subfebrile temperature up to 37.5°C, dizziness, and difficulties in speech formulation. The patient sought medical assistance at the Rīga East University Hospital clinical center "Gaiļezers" Clinic of Emergency Medicine. Investigations were conducted, and in the diagnostic imaging the presentation of an enteritis and suspected renal neoplasm were noted. For further examination and therapy, the patient was admitted to the Rīga East University Hospital Oncology Centre of Latvia 1.Gastroenterology department. Upon admission, the patient's general condition was stable, with no recurrence of liquid stool and normal temperature. CT of the head was performed to assess speech impediments, revealing no acute pathology. CT of the abdominal cavity was conducted to evaluate the renal neoplasm, visualizing a vascularized lesion in the right kidney, malignancy cannot be ruled out. Consultation with a urologist recommended a CT follow-up of the abdominal cavity after 1 year. HIV

infection was confirmed through screening analyses. The HIV RNA load was high – 572 000 copies/ml, with CD4 cells 426, corresponding to stage AII. The patient admitted to potential exposure through casual sexual encounters in the last 4 months, with no other risk factors identified. Additional tests were conducted, with HLAB5701 being negative, and no HIV resistance observed. Considering the patient's accompanying conditions and vestibular disorders, a medication combination was chosen: Doravirine/ Lamivudine/ Tenofovir 100/300/245mg - one tablet to be taken once daily. Recommendations were provided, and the patient was discharged in a relatively satisfactory condition.

Conclusion and Summary. This case underscores the importance of maintaining a high index of suspicion for HIV infection, even in older adults without apparent risk factors. Healthcare providers should consider HIV testing as part of the comprehensive assessment of elderly patients, particularly when presenting with non-specific symptoms or concurrent comorbidities. Timely diagnosis and intervention are crucial for improving outcomes and reducing the transmission of HIV in this vulnerable population.

Ilze Tumšā¹, Margarita Ļoļāne¹, Ināra Laizāne²

¹Latvijas Universitātes Medicīnas fakultāte, Rīga, Latvija, ilze1305@inbox.lv

²I. Laizānes ārsta prakse, Latvija

EMS BURNOUT IN LATVIA: IDENTIFYING CONTRIBUTING FACTORS

Introduction. Exhaustion plagues medical professionals, but it seems to hit emergency responders especially hard. The demanding and fast-paced nature of emergency medical services makes its workers particularly susceptible to burnout.

Aim. This study seeks to quantify the burden of burnout and identify its potential correlates within Latvia's ambulance service workforce.

Methods. Researchers anonymously collected data on burnout through an online survey using the Maslach Burnout Inventory and some additional questions. The information was then analyzed using statistical software (SPSS) to understand the trends.

Results. The study garnered the participation of 200 individuals, with a well-represented mix of genders: 70% (N=140) identifying as female and 30% (N=60) as male. The study revealed a pervasive burnout issue, with nearly all respondents (96%) exhibiting at least some clinical signs of it. Our study found a significant link between burnout and workload ($p=0.0073$). Interestingly, the group working 0.25 FTE (full-time equivalent) had the highest burnout risk (66.7%). This might be due to juggling multiple jobs or full-time studies alongside their ambulance service duties. Then persons who work 1,25 (61%), then 1 (53%) and 0,5 (18%). Among students who work in EMS the highest burnout rate have trainee doctors (85%), however doctors assistants tend to have burnout much lesser (31%). Among those with additional job burnout occurs in 79% of cases but in those who don't in 29% ($p=0.003$). Among those who frequently experience anxiety on a workplace burnout occurs in 60.1% of cases ($p=0.001$). Among those who described themselves as lonely and socially isolated burnout occurs in 87% of cases. Among those whose work affects their sleeping patterns, burnout occurs in 49.6% of cases ($p=0.001$). Unhealthy coping mechanisms, including smoking, energy drinks, and binge eating, were linked to increased burnout risk ($p=0.003$).

Conclusion. Nearly all workers (190) faced a significant risk of burnout. This risk was directly linked to factors like heavy workloads, juggling full-time studies or additional jobs, heightened anxiety, social isolation, sleep disruptions, and unhealthy ways of coping with stress. Combating burnout in EMS requires proactive strategies to safeguard the well-being of these vital healthcare providers.

Dina Zaiceva¹, Sigita Hasnere^{1,2}

¹University of Latvia, Raiņa bulvāris 19, Rīga, Latvia, dinazaiceva99@gmail.com

²Pauls Stradiņš Clinical University Hospital, Pilsoņu street 13, Rīga, sigita.hasnere@gmail.com

EVALUATION OF PROGRESSION-FREE SURVIVAL IN PATIENTS WITH METASTATIC BOWEL CANCER AFTER FIRST-LINE SYSTEMIC THERAPY AT PAULS STRADIŅŠ CLINICAL UNIVERSITY HOSPITAL FROM 2018 TO 2023

Background. Colorectal cancer is the third most prevalent cancer type worldwide and the second most common cause of cancer death. Unfortunately, the screening program in Latvia covers only a small part of the target

population, resulting in a high primary missed cases (stage III-IV), which significantly complicates and limits treatment. Standard regimens used to treat patients with metastatic colorectal cancer are FOLFOX, FOLFIRI and 5Fu/LV, which probably affects progression-free survival.

Aim. The aim of this study was to identify the progression-free survival in patients with metastatic bowel cancer after first-line systemic therapy.

Methods. A retrospective study of patients who underwent first-line chemotherapy. Patient data was collected for a period of 5 years.

Results. A total of 160 cases were analyzed – 63% of men and 38% of women. The mean age of patients was 65.13, SD = 10.122 for men, and 67.42, SD = 11.985 for women. Colorectal cancer incidence varied depending on the primary tumor location: rectum (35%), colon sigmoideum (21%), rectosigmoid region (15%), caecum (8%), colon descendens (7%), colon transversum (6%) and colon ascendens (6%). Additionally 65% presented with liver metastasis, 18% with lung, 10% with peritoneum and 8% with other localization. The results show that there is a statistically significant negative correlation between progression-free survival and systemic therapy ($r_s = -0.287$, $p=0.001$). The most frequently used systemic therapy was a combination of FOLFOX6 and Bevacizumab (30%), with a progression-free survival of 14.2 months. Furthermore there was a weak negative correlation between progression-free survival and grade ($r_s = -0.115$; $p = 0.15$). There also is a statistically significant negative correlation between progression-free survival and ECOG ($r_s = -0.172$, $p=0.03$), survival decreases with increasing ECOG.

Conclusion. Colorectal cancer demonstrates a higher incidence among men. Systemic therapy choice is influenced by primary tumor localization, grade, and ECOG performance status. These findings underscore the importance of personalized treatment approaches in managing metastatic colorectal cancer.

Alīna Kuprjašova¹, Elīna Aleksejeva², Madara Auzenbaha², Linda Gailīte², Sabīne Laktiņa²

¹ Rīga Stradiņš University, Faculty of Medicine, Dzirciema street 16, Riga, Latvia, alina.kupr9@gmail.com

² Children Clinical University Hospital, Vienības street 45, Riga, Latvia

FACTORS AFFECTING NEWBORN SCREENING FOR CYSTIC FIBROSIS

Introduction. Cystic fibrosis (CF) is a congenital autosomal recessive genetic disorder that affects various organ systems (Radlović, 2012). Wide spectrum of different symptoms and variability in phenotype severity makes CF a serious disease, therefore it is crucial for CF patients to be diagnosed and receive treatment early in life to prolong life expectancy and improve quality of living. Newborn screening (NBS) for CF allows to identify children with CF before development of symptoms and complications related to the disease. This program has become a worldwide accepted health strategy in almost all European countries, Canada, Australia, and some others (De Boeck, 2020) (Course, Hanks, 2019). The first-tier test for CF screening algorithm is based on detection of serum immunoreactive trypsinogen (IRT) which is sensitive but not specific enough to differentiate real CF cases from false-positive ones (Kharrazi, 2016).

Aim. The aim of this study was to evaluate the anamnesis data of newborns included in CF NBS to find possible factors influencing IRT level.

Materials and methods. Rīga Children`s Clinical University Hospital DIALAB database was used to get access to newborn screening results and find potential participants for the study. Between July 2021 and June 2022, NBS results for 381 infants were chosen as potential participants for this study. Of these, 110 infants met all the inclusion criteria and were eligible to participate. During the telephone interviews with parents after NBS, additional anamnesis data were obtained and possible influencing factors on IRT level were clarified. Verbal consent from neonates` parents was acquired for participation in this study.

The statistical analyses were performed using the Jamovi program [<https://www.jamovi.org/>].

Results. Control group consisted of 53 participants, whose IRT1 level was within normal ranges ($<70 \mu\text{g/l}$). 57 neonates, whose IRT1 was elevated ($>70 \mu\text{g/l}$) but IRT2 was within normal range ($<70 \mu\text{g/l}$), were selected for the study group. Participants in both groups were sex, weight and age matched individuals, with no pathologies diagnosed at the moment when interviews were conducted.

Despite our hypothesis, there was not found any strong correlation between different anamnesis data in control and study group and elevated IRT level.

Conclusions. Although our study could not provide any strong evidence of factors which could help to distinguish CF NBS false-positive neonates, it only proves the necessity to continue further investigations in order to find a way to improve current CF NBS algorithm.

Viktorija Fokina¹, Samanta Reine¹, Kirills Fokins²

¹ University of Latvia, Raiņa bulvāris 19, Rīga, Latvia, fokina.viktorija@inbox.lv

¹ University of Latvia, Raiņa bulvāris 19, Rīga, Latvia, samantareine@inbox.lv

² Riga Eastern Clinical University Hospital, Hipokrāta iela 4, Rīga, Latvia, kirills.fokins@gmail.com

FREQUENCY OF POST-SURGICAL COMPLICATIONS IN PANCREATIC CANCER PATIENTS

Background. Pancreatic cancer is a devastating disease known for its aggressive nature and low survival rate, largely attributed to late diagnosis and rapid progression. Surgical resection is a primary treatment option for pancreatic cancer, offering a chance for disease control and potential cure. The frequency and types of complications following pancreatic surgery play a critical role in patient outcomes and overall survival rates. Common complications include pancreatic fistula, delayed gastric emptying, postoperative hemorrhage, and infection. These complications can prolong recovery time, increase the risk of hospital readmission, and impact long-term quality of life.

Aim. The aim of this research is to comprehensively investigate the post-surgical complications in pancreatic cancer patients.

Methods. A retrospective study of patients with pancreatic cancer who had undergone surgical treatment. The data was collected from medical documents of patients from 2016-2018.

Results. Out of all 176 (88 males) patients, 76 (43.18%) experienced post-surgical complications and were included in the study. The breakdown of complications is as follows:

12 patients (15.789%) developed pancreatic fistula. 8 patients (10.562%) experienced delayed gastric emptying. 7 patients (9.210%) encountered sepsis, multiple organ dysfunction syndrome (MODS), and shock. 25 patients (32.894%) suffered from malabsorption and malnutrition. 18 patients (23.684%) had insufficiency issues. 8 patients (10.562%) faced post-operative hemorrhage. 9 patients (11.842%) developed post-operative diabetes. 6 patients (7.894%) experienced post-operative pancreatitis. 6 patients (7.894%) had hepato-renal complications. 6 patients (7.894%) developed infections. 9 patients (11.842%) experienced thrombosis. 33 patients (43.42%) encountered various other complications.

Conclusion. Based on the data from the research on pancreatic cancer and complications after surgery, it is evident that post-surgical complications are a significant concern among patients. The study revealed a range of complications, including malabsorption, malnutrition and insufficiency issues and as most common.

Jūlija Ivanova¹, Renārs Deksnis²

¹ University of Latvia, Faculty of Medicine, Jelgavas street 3, Riga, Latvia, julijaaivanovaa@gmail.com,

² Latvian Oncology Center, Hipokrāta street 4 Riga, Latvia renars.deksnis@aslimnica.lv

FUNCTIONAL ASSESSMENT OF PATIENTS AFTER TOTAL OR PARTIAL GLOSSECTOMY WITH RECONSTRUCTIVE SURGERY USING MICROVASCULAR TRANSPLANTATION

Introduction: The basis of tongue cancer treatment is total or partial glossectomy, after which patients often require prolonged rehabilitation.

Aim: To investigate the functional status of patients after total or partial glossectomy with reconstructive surgery.

Methods: A prospective study including 22 patients who underwent total or partial glossectomy between 2019 and February 2024 at Latvia Oncology Center, during outpatient visits through a patient survey including questions about functional status after treatment.

Results: The study included 22 patients, 59.1% (n=13) male and 40.9% (n=9) female. The average patient age was 60.4 years. 81.8% (n=18) underwent partial glossectomy and 18.2% (n=4) underwent total glossectomy. Treatment method was combined with neoadjuvant chemotherapy in 18.2% (n=4) or radiotherapy in 72.7% (n=16) of cases. Severe pain in the oral cavity was noted by 13.6% (n=3) and 9.1% (n=2) reporting no significant pain. Severe difficulty swallowing liquids was noted by 40.9% (n=9), 27.3% (n=6) reporting some difficulty but manageable. Significant difficulty in consuming solid food was noted by 40.9% (n=9), with 27.3% (n=6) reporting manageable difficulty. There is no significant relationship between patients experiencing difficulty swallowing liquids and those who underwent radiotherapy (p=0.0641), or between patients experiencing difficulty swallowing solid food and radiotherapy (p=0.464). Severe taste perception problems were experienced by 27.3% (n=6) and 18.2% (n=4) experiencing manageable problems. There is no significant relationship between taste perception and radiotherapy (p=0.0254). Difficulty pronouncing words was encountered by 59.1% (n=13).

Conclusion: The functional status of a patient after treatment may depend on various factors, including treatment methods applied, and individual patient characteristics.

Maksims Trišins¹, Med. Doc. Nauris Zdanovskis^{2,3}

¹Riga Stradiņš University, Faculty of Medicine, Dzirciema street 16, Riga, maksims.trisins@gmail.com

²Riga Stradiņš University, Department of Radiology, Dzirciema street 16, Riga

³Department of Radiology, Riga East University Hospital, Hipokrata street 2, Riga

GREY MATTER VOLUME OF THE ENTORHINAL CORTEX AS A DIAGNOSTIC BIOMARKER FOR COGNITIVE IMPAIRMENT

Background and Objectives: The entorhinal cortex, pivotal for memory and navigation, is critically implicated in cognitive decline, notably in Alzheimer's disease where it is among the earliest and most affected regions, and in mild cognitive impairment as a transitional stage between normal aging and Alzheimer's. Our objective was to analyze entorhinal complex grey matter volume and determine the associations within patients with normal cognition (NC), mild cognitive impairment (MCI), and dementia (D).

Materials and Methods: In this retrospective cohort study, we included 43 patients (13 NC; 18 MCI; 12 D). All patients underwent neurological examination, and Montreal Cognitive Assessment (MoCA) test scores were recorded which was used for patient division in 3 groups. Scans with a 3T MRI scanner were previously done, and volumetric data were acquired using Freesurfer software.

Results: We found a statistically significant difference in left entorhinal complex volume ($H(2) = 13.241; p = 0.001$) and no significant differences in right entorhinal complex volume ($H(2) = 5.354; p = 0.069$) among the NC, MCI, and D groups. There was a significant positive correlation between MoCA test scores and left entorhinal cortex volume ($r = 0.659, p < 0.001$) and right entorhinal cortex volume ($r = 0.443, p = 0.003$).

Conclusions: Left entorhinal cortex volume showed significant differences between the NC, MCI, and dementia patient groups, with a statistically significant positive correlation between MoCA scores and both left and right entorhinal cortex volumes. Despite our small cohort size, our study lays the groundwork for using entorhinal cortex volume as a biomarker in diagnosing cognitive impairment, although further research is needed to evaluate other brain hub regions associated with MCI and dementia.

Arta Patrīcija Pētersone¹

¹Riga Stradiņš University, Dzirciema iela 16, Rīga, artapetersone99@gmail.com

GYNAECOLOGISTS' PRACTICE IN THE CARE OF PATIENTS WITH PERIMENOPAUSAL AND POSTMENOPAUSAL BLEEDING IN LATVIA

Introduction: Abnormal uterine bleeding (AUB) presents a significant concern, especially in perimenopausal and postmenopausal women, with diverse underlying causes including endometrial hyperplasia and malignancy. Understanding the diagnostic and therapeutic practices of gynecologists is crucial for optimizing patient care.

Methods: A cross-sectional study involving 56 gynecologists in Latvia was conducted to assess their practices regarding AUB. Questionnaires were distributed to gather data on diagnostic and therapeutic approaches, considering factors such as age, experience, and practice location. Data were analyzed using Microsoft Excel 2021 and SPSS.

Results: The study revealed diverse responses among gynecologists regarding clinical scenarios related to AUB. While certain practices, such as endometrial biopsy for perimenopausal uterine bleeding, were widely accepted, others showed variability. Transvaginal ultrasound emerged as a preferred diagnostic modality, highlighting its importance in clinical decision-making. Therapeutic interventions exhibited a range of preferences, suggesting the need for individualized treatment approaches. Awareness of risk factors for endometrial cancer varied among participants.

Conclusion: The study provides valuable insights into the clinical practices of gynecologists in managing AUB. It underscores the importance of standardized guidelines and continuing medical education to enhance patient care. However, the study identified a relatively low level of responsiveness among participants, which may impact data accuracy. Future research should focus on strategies to improve participant engagement and ensure data integrity within the gynecological community.

Rinkus Dora¹, Hasnere Sigita^{1,2}, Nusberga Evija Anna¹, Gerke Mārtiņš¹, Meistere Elīza¹

¹ *University of Latvia, Riga, Latvia*

² *Pauls Stradiņš Clinical University Hospital, Riga, Latvia*

INCIDENCE OF BRCA-POSITIVE GENE MUTATIONS IN OVARIAN CANCER PATIENTS AT PAULS STRADIŅŠ CLINICAL UNIVERSITY HOSPITAL FROM 2017 UNTIL 2022

Background: Ovarian cancer (OC) has the highest mortality rates among female reproductive tumors in Latvia. One of the main predisposing risk factors for OC is BRCA-positive gene mutation. Genetic testing of somatic and germline BRCA gene mutations for all OC patients helps to better predict response to treatment, as well as reduce and prevent morbidity and mortality among BRCA gene mutant carriers.

Aim: To determine the prevalence of somatic BRCA gene mutations in patients with ovarian cancer at Pauls Stradiņš Clinical University Hospital from 2017 until 2022.

Methods: Seventy ovarian cancer patients were included in a retrospective research study. They were treated at the Oncology Centre of Pauls Stradiņš Clinical University Hospital from 2017 to 2022. Archived tumor tissue material was analyzed by NGS to detect somatic mutations in BRCA. Data were collected from ambulatory medical records of the Oncology Centre of Pauls Stradiņš Clinical University Hospital. Microsoft Excel 2016 was used for data registry. Statistical analysis was performed using Analysis ToolPak.

Results: The mean age of all OC patients was 62.6 ± 12.5 years. The mean age of patients with positive BRCA gene mutation OC was 56.6 ± 10.6 years. Out of the 70 OC patients, 32.9% (n=23) tumors were tested for BRCA gene mutation, and 52.2% (n=12) of them were BRCA positive gene mutations. 31.3% (n=5) were tested with stage I ovarian cancer, where 80% (n=4) were positive BRCA gene mutation. 75% (n=3) were tested with stage II ovarian cancer, where 67% (n=2) were positive BRCA gene mutation. 40% (n=10) were tested with stage III OC, and BRCA positive gene mutations were found in 30% (n=3). 20% (n=5) were tested with stage IV OC, and BRCA positive gene mutations were found in 60% (n=3).

Conclusion: In this study, somatic BRCA gene mutation testing was most commonly performed for stage II ovarian cancer – 75%, and the total prevalence of somatic BRCA gene mutation is high in the Latvian population. Of all ovarian cancers, 32% were tested, more than 50% of which had positive BRCA gene mutations, leading to the conclusion that testing for the BRCA gene mutation is significant, and likely testing all women for the BRCA gene mutation would manage to improve the prediction of arching and survival in women with ovarian malignancy.

Jelizaveta Antonika¹, Margarita Pukite², Glushchenko Olga³, Slobodjana Oksana⁴

¹ *University of Latvia, Jelgavas street 3, Riga, jelizaveta312@gmail.com*

² *University of Latvia, Jelgavas street 3, Riga, margarita.pukite@lu.com*

^{3,4} *Jelgavas city hospital*

INFLUENCE OF BMI ON THE DEVELOPMENT OF HYPERTENSION DURING PREGNANCY

Introduction. Obesity (elevated BMI) can influence pregnancy and childbirth outcomes. Since the beginning of the 20th century, the prevalence of obesity has been increasing in developed countries. In Europe, already 50% of women suffer from overweight or obesity, while 33% of pregnant women have obesity issues. Based on statistical data, the proportion of pregnant women with excess weight is increasing in Latvia every year. One of the significant complications associated with increased weight in pregnant women is hypertension. In this study, the author evaluates the possible correlation between the development of hypertension during pregnancy and women's elevated body mass index (BMI).

Aim. To determine the relationship between BMI indices and the development of hypertension during pregnancy.

Materials and Methods. A retrospective, descriptive study was conducted, analyzing the medical records of 49 women with diagnosed pregnancy hypertension admitted to a single-city hospital between 2022 and 2023. The study assessed women with both altered and unaltered BMI indices. Data were analyzed using MS Excel and IBM SPSS 28.0 software.

The following criteria were evaluated in the study: women's age, women's BMI, and average arterial blood pressure readings.

Results. The average age of the women was 33.04 years (SD±5.20).

The average BMI of the women was 30.62 (SD±7.11).

The average fluctuations in arterial blood pressure ranged from 135/70 to 160/90.

Conclusions. Arterial hypertension during pregnancy was more common in women aged 35 (n=6) and 32 (n=6) years old.

Elevated BMI (above 25), which influences the development of arterial hypertension during pregnancy, was observed in 30 women.

Arterial hypertension during pregnancy without elevated BMI was observed in 19 women.

Altered BMI influences the elevation of arterial blood pressure during pregnancy.

Sources:

[https://statistika.spkc.gov.lv/pxweb/lv/Health/Health__Mates_berna_veseliba/MCH080_Mates_slimibas_sarezgijumi.px/]

Dagnija Šteina¹, Ilze Apine^{2,3}

¹ Riga Stradiņš University, Faculty of Medicine, Latvia

² Children`s Clinical University Hospital, Diagnostic radiology department, Latvia

³ Riga Stradiņš University, Faculty of Medicine, Department of Radiology, Latvia

INFLUENCE OF THE LENGTH OF THE SCANNING AREA ON THE RADIATION DOSE RECEIVED BY THE PATIENT IN COMPUTED TOMOGRAPHY AND THE RISK OF CARCINOGENESIS IN PEDIATRIC PATIENTS

Keywords – *pediatric, computed tomography, diagnostic reference levels, ionising radiation, head trauma.*

Introduction – Child trauma in Latvia remains at a high level and is prevalent among preschool children. In cases of clinically significant head injuries, computed tomography (CT) is the method of choice for determining the extent of the lesion. While CT is crucial imaging tool, it exposes patients to high doses of ionizing radiation, which is associated with carcinogenesis. Approximately 1-2 in 10 000 children and young adults may develop hematological cancers within 12 years of undergoing a CT examination. The lifetime cancer risk from CT was previously estimated at 1 in 1000. In the summer of 2023, a new Canon Aquilion One CT machine with a wide 320-layer 16 cm detector was installed at the Children's Clinical University Hospital in Latvia, enabling children`s head scanning with a single rotation of the detector.

Objectives – The study aims to assess the impact of head CT (using the new Canon Aquilion One CT machine) by 1) calculating radiation doses and comparing them with European standard levels, 2) calculating the effective radiation doses for the tissues included in the examination area (bones, bone marrow, brain, skin, eye lens, salivary glands, thyroid gland and oral mucosa), 3) researching the risk of carcinogenesis resulting from CT examinations.

Methods – Several programs were utilized for the research implementation. General patient information such as age, gender, weight, ICD-10 code, and CT examination date was extracted from the Children`s Clinical University Hospital information system "ANDROMEDA". CT examination characteristics were obtained through PACS SECTRA. Radiation doses, effective doses and risk calculations were performed using the virtual online program "VirtualDoseCT" and software PCXMX 2.0. Descriptive and statistical analyses were conducted using SPSS program with a significance level of $p < 0.05$. Inclusion criteria were: child`s age – 0 to 6 years; ICD-10 codes – S00-S02.9, S06.0-S06.9., S09.9; head CT scans performed between June 1, 2023 and December 31, 2023; CT machine – Toshiba Aquilion One 320-layer 160 mm; scanning type – axial scanning and collimation width – 160 mm.

Results – The study included 40 pediatric patients, with 23 girls and 17 boys. The mean age of participants was 2.05 years (SD ± 1.648). Research data were compared with European Diagnostic Reference Levels for Paediatric Imaging (PiDRL) across different age groups. The age groups in the study were: 0-<3 months – 0 children, 3 months-<1 year – 7 children, 1-<6 years – 32 children and 6 years – 1 child. All children had suspected head trauma. Analysing the head CT parameters: the mean CTDI (CT dose index) was 15.19 mGy (± 3.21) in age group 3 months-<1 year, 15.59 mGy (± 2.25) in age group 1-<6 years and 16.40 (± 0.00) mGy in age group 6 years; the mean DLP (dose length product) was 242.46 mGy*cm (± 51.44) in age group 3 months-<1 year, 248.94 mGy (± 35.91) in age group 1-<6 years and 261.90 (± 0.00) mGy in age group 6 years. Seven age groups were created, to analyse the research data of the effective radiation doses: <1 year – 7 children, 1-<2 years – 9 children, 2-<3 years – 9 children, 3-<4 years – 4 children, 4-<5 years – 5 children, 5-<6 years – 3 children, 6 years – 1 child. The average effective dose was: 1.90 mSv (± 0.44) in age group <1 year; 1.60 mSv (± 0.68) in age group 1-<2 years; 2.08 mSv (± 0.00) in age group 2-<3 years; and 2.45 mSv (± 0.00) in age groups 3-<4 years, 4-<5 years, 5-<6 years and 6 years. The difference of effective dose in different age groups was statistically significant ($p < 0.001$). Using Spearman's rank correlation, a high and statistically reliable positive correlation was observed between children's age and

effective radiation dose ($\rho = 0.806$; $p < 0.001$). The highest organ dose was received by the eye lens, followed by brain, oral mucosa, salivary glands, bones, red bone marrow, skin and thyroid gland. Looking at the radiation doses in different age groups, it was observed that children 2-3 years old received the highest dose to bones, brain and skin, children 3-6 years old received the highest dose to red bone marrow and eye lens, children 6 years old received the highest dose to salivary glands and to the oral mucosa, while the highest dose to the thyroid gland was received by 3-4 years old. The distribution of the doses of the specific organ between different age groups was statistically significantly different.

Conclusions - The study revealed that mean CTDI and DLP measurements were significantly lower than the accepted European Diagnostic Reference Levels for Paediatric Imaging (PiDRL). The study results indicated that the effective radiation dose increased progressively with children's age, and that the eye lens received the highest organ dose. The statistically reliable positive correlation was observed between children's age and effective radiation doses. Considering the potentially negative impact of ionising radiation on a growing organism, CT examinations in children should be justified. Taking into account the high dose received by the eye lens, a gantry tilting during head CT should be implemented, so that the lens of the eye is not included in the CT scan.

Ilze Tumšā¹, Margarita Ļoļāne¹, Ināra Laizāne²

¹Faculty of Medicine, University of Latvia, Riga, Latvia, ilze1305@inbox.lv

²I. Laizānes medical practice, Latvia

ISOTRETINOIN AND MENTAL HEALTH IN LATVIAN USERS

Background: Isotretinoin, a prescription drug reserved for severe acne, comes into play after other treatments have proven ineffective. Considered a third-line medication, it boasts a strong safety and efficacy record. However, some users report experiencing depression and/or anxiety while undergoing treatment with Isotretinoin. The concern lies in the potential psychiatric side effects some users experience.

Aim: 1 - To investigate the symptoms of depression and anxiety and their association with isotretinoin use in people receiving isotretinoin therapy. 2 - To compare the severity of depression and anxiety symptoms between isotretinoin users and a control group.

Methodology. A cross-sectional study was conducted with 300 participants from 2 groups: the study group (isotretinoin users) and the control group (people receiving 1st line acne vulgaris medications, such as topical and/or oral antibiotics, benzoyl peroxide, and topical retinoids). The research instruments used were a survey questionnaire consisting of the Depression (PHQ-9) and Anxiety (GAD-7) screening tools.

Results. The study included 300 respondents, of which 222 were women (77%) and 78 were men (23%). The sample consisted of 153 people (52%) who were using isotretinoin (hereinafter referred to as Group 1) and 147 (48%) who were using other medications (topical and/or oral antibiotics; benzoyl peroxide; topical retinoids) (hereinafter referred to as Group 2). The age of the survey participants ranged from 16 to 38 years. An evaluation of depression levels showed that 57% of those currently using isotretinoin had moderate to severe depression, 36% had moderate depression, and 7% had mild or subclinical depression ($p < 0.001$). In patients from the second group, who were using other medications, 24% had moderate to severe depression, 30% had moderate depression, and 46% had mild or subclinical depression or no depression ($p < 0.001$). An evaluation of anxiety levels showed that 40% of patients in the first group had severe or generalized anxiety, 28% had moderate anxiety, and the remaining 32% had either mild or no anxiety ($p < 0.001$). In comparison, the distribution of numbers for the second group is the opposite, with 65% of patients having no anxiety or mild anxiety, 18% with moderate anxiety, and the remaining 17% with severe anxiety levels ($p < 0.001$).

Conclusion. Our study found that higher levels of depression and anxiety were associated with isotretinoin use. Currently, due to the limitations of the study, it is not possible to draw conclusions about isotretinoin-induced depression and anxiety, and it seems appropriate to regularly screen all patients with isotretinoin for symptoms of depression and anxiety and promptly refer them to a mental health specialist if they are present.

KNOWLEDGE ABOUT PREMENSTRUAL SYNDROME AND ITS TREATMENT OPTIONS AMONG LATVIAN OBSTETRICIANS AND GYNAECOLOGISTS

Objectives. Up to 90% of women in reproductive age will experience symptoms of PMS and 20% will be diagnosed with PMS. The aim of this study is to analyze gynaecologists knowledge about PMS and its treatment and to evaluate whether it is up to date with current recommendations.

Methods. A multi-choice questionnaire was developed, that included questions about the classification and diagnostics and treatment of PMS, and distributed among gynaecologists. Their answers regarding the treatment were compared to recommendations made by ROCG and UpToDate.

Results. 57 participants were included. 4 of 55 (7,0%) answered the question about percentage of women that will experience PMS symptoms at least once correctly. 34 of 55 (61,8%) answered the question regarding number of menstrual cycles that must be affected to establish PMS diagnosis correctly. 32 of 55 (58,2%) answered the question regarding whether symptoms need to affect a person's relationships, academic/work performance to establish PMS diagnosis correctly. 29 of 55 (52,7%) answered the question regarding the difference between PMDD and PMS correctly. 22 of 56 (39,3%) answered the question regarding exclusion criteria for PMS correctly. 29 of 56 (51,8%) answered the question regarding the most effective SSRI protocol for reducing somatic symptoms of PMS correctly. 8 of 56 (14,3%) answered the question regarding preconditions for surgical treatment of PMS correctly. 28 of 56 (50,0%) answered the question regarding first-line of treatment of PMS correctly. 50 of 56 (89,3%) answered the question regarding treatment of patients with minor PMS symptoms correctly. 51 of 56 (91,1%) answered the question regarding treatment of patients with moderate/severe PMS symptoms correctly. 25 of 55 (44,6%) answered the question regarding the most effective COC protocol for treating PMS symptoms correctly. 21 of 55 (38,2%) answered the question regarding second-line treatment of PMS correctly and 9 of 54 (16,7%) - regarding third-line treatment.

Conclusions. Overall knowledge about diagnosis and treatment of PMS was inconsistent among gynaecologists.

LATVIAN EMERGENCY MEDICAL SERVICES EMPLOYEE PREPAREDNESS FOR THE IMPLEMENTATION AND USE OF ULTRASONOGRAPHY IN PRECLINICAL STAGE OF PATIENT CARE

Over the past two decades, ultrasonography has emerged as a widely utilized diagnostic tool across various healthcare settings, including emergency medical services (EMS) in Europe. Its widespread adoption in countries like Germany, France, Austria, and Poland underscores its importance in medical practice. This study aimed to explore the necessity and advantages of integrating ultrasonography into prehospital care within Latvia's EMS. Additionally, it sought to assess its potential impact on patient outcomes while gauging the readiness of Latvian EMS personnel—including physician assistants, nurses, and physicians—to incorporate ultrasonography into their daily routines.

The research employed a prospective longitudinal approach, allowing participants to contribute via an electronic survey questionnaire between February 20th and March 1st, 2024. Information on participants' demographics, including gender, age, tenure within EMS, and occupational roles, was collected. Their subjective perspectives on the need for ultrasonography in Latvian EMS operations, key indications for its usage, and self-assessment of preparedness for its implementation in prehospital scenarios were also gathered. Statistical analysis of the collected data was conducted using SPSS 29.0, with significance determined at a P-value <0.05.

Out of the 120 EMS personnel surveyed, comprising 85 physician assistants, 2 nurses, and 33 physicians, 43% expressed a desire to utilize ultrasonography within the past year if it were available in ambulance settings. Notably, physicians were more inclined towards this viewpoint compared to physician assistants and nurses (p = 0.006). Respondents identified several potential applications for ultrasonography, including confirming diagnoses, excluding differential diagnoses, executing the FAST protocol for polytrauma patients, assessing individuals with severe abdominal pain or signs of peritonitis, suspected tension pneumothorax, cardiac tamponade, and hypovolemic shock. An overwhelming majority (85%) of participants expressed willingness to undergo training in prehospital ultrasonography, with 63% indicating readiness to integrate it into their daily

EMS duties post-training. However, a significant portion (40%) acknowledged having minimal knowledge in this area.

In conclusion, Latvian EMS personnel exhibit a readiness to incorporate ultrasonography into their practices post-training. Implementation is recommended within specialized EMS teams, such as those comprised of specialist physicians, intensive care, or resuscitation units. Primary applications include utilizing ultrasonography for the FAST protocol in polytrauma cases, diagnosing tension pneumothorax, and identifying hypovolemic shock.

Renāte Skaistkalne

Rīga Stradiņš University, Dzirciema street 16, Rīga, renaate79@inbox.lv

MAXILLARY EXPANSION IN INTERCEPTIVE THERAPY

Aim. The aim of this study is to explore and compare the possibilities of expanding the upper jaw in cases of posterior crossbite, with a focus on incorrect occlusion and treatment in general dental practice. The introduction highlights the prevalence of incorrect occlusion, a common type of dento-skeletal anomaly that affects not only aesthetics but also functionality, facial harmony, and the psychoemotional well-being of the patient.

The research covers various causes of incorrect occlusion, ranging from genetic factors influencing its development to the impact of harmful oral habits, as well as an early treatment options for crossbite.

Materials and methods. A comprehensive literature review was conducted to gather information on current treatment possibilities related to potential upper jaw expansion. Various scientific databases, subscribed to by Rīga Stradiņš University, such as ProQuest, PubMed, EBSCOhost, ScienceDirect, Wiley, and Cochrane, were utilized. Search terms included phrases such as "maxillary expansion", "crossbite", "quad-helix", "rapid maxillary expansion", "habits", "orthodontics treatment", "interceptive", "mixed dentition", "midpalatal suture", "finger-sucking", "genetics", "aligners", "upper jaw", "invisalign first", "malocclusion". The review focused on scientific publications in English, covering the period from 1995 to 2023.

Conclusion. The study concludes that upper jaw expansion is a perspective in changing occlusal treatment, offering various appliances to successfully correct incorrect occlusion. The work provides not only theoretical understanding but also practical recommendations for general dental practitioners.

Darja Portnova-Zilbermane¹, Samanta Reine², Viktorija Fokina³, Daniels Zilbermans⁴, Kirills Fokins⁵

¹*University of Latvia, Raiņa bulvāris 19, Rīga, darja84@inbox.lv*

²*University of Latvia, Raiņa bulvāris 19, Rīga, samantareine@inbox.lv*

³*University of Latvia, Raiņa bulvāris 19, Rīga, fokina.viktorija@inbox.lv*

⁴*University of Latvia, Raiņa bulvāris 19, Rīga, danielzilbermans99@gmail.com*

⁵*Rīga Eastern Clinical University Hospital, Hipokrāta iela 4, Rīga, LV-1079, kirills.fokins@gmail.com*

MORTALITY RATE IN POST-SURGICAL PANCREATIC CANCER PATIENTS

Background. Pancreatic cancer remains one of the most aggressive and challenging malignancies to treat, with a persistently high mortality rate worldwide. Despite advances in surgical techniques and multimodal treatment strategies, the prognosis for pancreatic cancer patients remains poor, particularly in the advanced stages of the disease. Surgical resection, considered the only potentially curative treatment option, offers hope for improved survival outcomes, yet even among those who undergo surgery, the risk of mortality remains significant. Pancreatic cancer is often diagnosed at an advanced stage when surgical intervention may no longer be feasible due to local invasion or distant metastasis. Even after surgical resection, patients encounter several hurdles during the postoperative phase, encompassing complications like anastomotic insufficiency pancreatic fistula,, infections, diabetes, and kidney and urinary tract issues. These challenges not only affect immediate recovery but also play a role in prolonged morbidity and mortality rates. Understanding the mortality rate in post-surgical pancreatic cancer patients is paramount for optimizing patient care and guiding treatment decisions.

Aim. Assess the overall mortality rate in post-surgical pancreatic cancer patients.

Methods. For accomplishing the aim of the study the retrospective research was performed. Information was obtained from medical records of patients who were diagnosed with pancreatic cancer and undergone surgery.

Results. In total, 176 patients were included. 132 patients died and 44 patients survived. Based on the research conducted on mortality rate in post-surgical pancreatic cancer patients, the following results were obtained:

Anastomotic insufficiency: 2 people, accounting for 1.51% of the mortality rate. Diabetes: 19 people, representing 14.39% of the mortality rate. Other tumors: 26 people, making up 19.70% of the mortality rate. Cardial reasons: 15 people, contributing to 11.36% of the mortality rate. Respiratory reasons, including Covid-19: 11 people, comprising 8.33% of the mortality rate. Kidney and urinary tract complications: 4 people, accounting for 3.03% of the mortality rate. Hepato-pancreato-biliary complications: 9 people, representing 6.81% of the mortality rate. Other reasons: 15 people, making up 11.36% of the mortality rate.

Conclusion. In conclusion, the research on mortality rate in post-surgical pancreatic cancer patients highlights the various factors contributing to patient mortality. The findings reveal that complications such as anastomotic insufficiency, diabetes, other tumors, cardial reasons, respiratory reasons (including Covid-19), kidney and urinary tract complications, and hepato-pancreato-biliary complications play significant roles in patient outcomes. These results emphasize the importance of addressing and managing these complications effectively to improve the survival rates of post-surgical pancreatic cancer patients.

Rita Pozharska¹, Evita Leikarte², Kristine Baumane^{2,3}, Anatolijs Pozarskis⁴

¹ Riga Stradins University, Dzirciema street 16, Riga, Latvia, ritapozarska@inbox.lv

² Clinical Centre Bikernieki, Riga East University Hospital, Lielvārdes street 68/1, Riga, Latvia, evita.leikarte@gmail.com

³ University of Latvia, Raina Bulvaris 19, Riga, Latvia, kbaumane75@gmail.com

⁴ Daugavpils University, 13 Vienības Str., Daugavpils, Latvia, drpozarskis@inbox.lv

OCULAR TUBERCULOSIS IN A YOUNG PATIENT WITH ACUTE VISUAL IMPAIRMENT

Introduction: Tuberculosis (TB) has reemerged as a pressing global health problem, marked by the chronic and insidious progression of granulomatous infection initiated by Mycobacterium tuberculosis. Although primarily affecting the lungs, this acid fast bacillus can manifest in various organs, presenting diagnostic complexities in cases of ocular TB. Despite the absence of symptoms of pulmonary TB, ocular involvement is considerable, with around 60% of extrapulmonary TB cases showing no signs of pulmonary involvement.

Case Description: A 20-year-old male patient was admitted to the hospital with acute vision impairment in the left eye in the last three days. Upon examination of the slit lamp in the emergency department, the findings revealed conjunctival irritation in both eyes (OU), clear anterior chamber content with normal depth, clear lenses and a brisk light reflex. In the upper temporal quadrant of the left eye (OS) a hemorrhagic vasculitis pattern, phlebitis and ischemic zones were observed. Further investigations, including chest radiographs and CT scans, disclosed destructive infiltrative TB pneumonia in the upper lobe of the left lung. Blood analysis indicated positive results for Borrelia burgdorferi IgG, tick-borne encephalitis IgG, and Varicella Zoster IgG. The patient was promptly referred to the Centre of Tuberculosis and Lung Diseases, initiating antituberculosis therapy. Treatment included Maxitrol eye drops six times daily and Cyclogyl eye drops three times daily for the left eye until symptoms resolved. His final diagnosis was infiltrative tuberculosis pneumonia in the right upper lobe and acute chorioretinitis, vitritis, and uveitis in the left eye. After recovery, he underwent annual control RTG and received Sol.Bevacizumab injections due to macular neovascularisation.

Conclusions: The diagnosis of ocular TB presents a formidable challenge, often resulting in misdiagnosis and delayed recognition. Diagnostic criteria include clinical presentation, a positive Mantoux test, and a positive clinical response to antituberculous therapy with no relapse. The development of diagnostic methods is necessary not only for ophthalmologists, but for other medical professionals as well.

Keywords: Ocular tuberculosis, chorioretinitis, uveitis, vitritis, Bevacizumab.

Armands Rimšāns¹, Hasnere Sigita^{1,2}, Ilja Degtjarjovs¹, Rebeka Dragūne¹

¹University of Latvia, Riga, Latvia

²Pauls Stradiņš Clinical University Hospital, Riga, Latvia

ONCOMARKER CORRELATION WITH SITES OF TUMOUR METASTASIS

Background. CA 15-3, a tumour antigen, is overproduced in breast cancer patients and originates from normal breast cells. Monitoring CA 15-3 levels aids in assessing therapy effectiveness and initiating treatment for recurrence. Similarly, CA 125, found on ovarian cell surfaces, is also secreted by certain cancers, including breast cancer. Elevated CA 125 levels can predict a poor prognosis for breast cancer patients. CEA, a tumour marker for breast cancer and other malignancies, serves as a tool to evaluate therapy efficacy and guide treatment decisions in cases of recurrence.

Aim. The aim of the study was to determine if there is a statistically significant correlation between the site of tumour metastasis and four types of oncomarkers – CEA, CA125, CA15-3, CA19-9.

Methods. The selection of patients was carried out using Pauls Stradiņš Clinical University Hospital Oncology clinic multi-disciplinary tumour board conclusions in 2022. Altogether 43 patients with stage IV breast cancer were enrolled in the study after patient selection from 692 patients. 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, SPSS program and Chi-square test were used to determine the correlation of oncomarkers with the site of tumour metastasis.

Results. The results showed that there was statistically significant correlation between mediastinal lymph nodes metastasis and CA 19-9 marker ($p=0.007$), brain metastasis and oncomarkers CA125 ($p=0.003$), CA19-9 ($p=0.013$), CEA ($p=0.034$), liver and oncomarker CA15-3 ($p=0.026$). On the contrary no significant correlation was found between mediastinal lymph nodes metastasis and oncomarkers CA15-3 ($p=0.457$), CA125 ($p=0.72$), CEA ($p=0.457$), bones metastasis and oncomarkers CA125 ($p=0.234$), CA19-9 ($p=0.105$), CEA ($p=0.282$), brain metastasis and oncomarker CA15-3 ($p=0.884$), liver metastasis and oncomarkers CA125 ($p=0.120$), CA19-9 ($p=0.845$), CEA ($p=0.201$), lungs metastasis and oncomarkers CA15-3 ($p=0.432$), CA125 ($p=0.836$), CA19-9 ($p=0.859$), CEA ($p=0.910$), skin metastasis and oncomarkers CA15-3 ($p=0.182$), CA125 ($p=0.630$), CA19-9 ($p=0.809$), CEA ($p=0.520$).

Conclusions. Statistically was proved that patients with brain metastasis had increased level of oncomarkers CA19-9, CA125 and CEA, patients with liver metastasis had increased level of oncomarker CA15-3 and patients with mediastinal lymph nodes metastasis had increased level of oncomarker CA19-9.

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Alīna Verba-Solomaha¹, Gunta Tīcmane²

¹Rīga Stradiņš University, Faculty of medicine, Dzirciema 16, 032341@rsu.edu.lv, 032353@rsu.edu.lv

²Rīga Stradiņš University, Department of Family Medicine, Dzirciema 16, Gunta.Ticmane@rsu.lv

PATIENTS WITH DIABETES IN A FAMILY DOCTOR'S PRACTICE - THE USE OF THE NEWEST GENERATION MEDICATIONS, ITS RESULTS

Aim of the Study. To assess the awareness of family physicians about the latest generation of medications for treating diabetes (DPP-4 inhibitors and SGLT-2 inhibitors), knowledge of the indications, side effects, and mechanisms of action of these medications, as well as their possibilities for use in treating their patients.

Materials and methods. A cross-sectional study with survey questionnaire was conducted. The survey was sent to the email addresses of family doctors in Latvia. The study was approved by the Research Ethics Committee of Rīga Stradiņš University.

Results. A total of 100 respondents participated in the study, of whom 81% were female and 19% were male. Respondents' ages ranged from 27 to 80 years, with a mean age of 51.49. 94% of family physicians have prescribed or continued SGLT-2i to their patients either as monotherapy or in combination with metformin/other drugs over the past 2 years. 82% have prescribed or continued DPP-4i to their patients over the past years.

Evaluating family physicians' awareness of SGLT-2i, a statistically significant association was found ($p=0.034$) between family physicians' awareness of the mechanism of action of SGLT-2i and whether they have prescribed it to their patients in the past two years. Better awareness of the mechanism of action of SGLT-2i was found among family doctors who attend conferences or education events once or twice a month ($p=0.008$). It was also found that family doctors who better understand the side effects of SGLT-2i are more confident in prescribing them to their patients ($p<0.001$). The most common positive outcomes observed by family physicians in their diabetic patients undergoing SGLT-2i therapy were: good tolerability (74%), reduction in body mass (64%), and the absence/rare occurrence of hypoglycemia compared to previous therapy (50%).

Evaluating family physicians' awareness of DPP-4i, a statistically significant association was found between family physicians' awareness of the mechanism of action ($p<0.001$) and side effects ($p<0.001$) of DPP-4i and whether they have prescribed it to their patients in the past years. Family physicians observed the following positive outcomes in their diabetic patients undergoing DPP-4i therapy: good tolerability (74%), reduction in body mass (39%), and the absence/rare occurrence of hypoglycemia compared to previous therapy (37%).

Conclusions. Family physicians' awareness of the indications, mechanism of action, and side effects of the latest generation of antidiabetic medications is not comprehensive. Family physicians are better informed about the side effects and mechanism of action of SGLT-2 inhibitors than DPP-4 inhibitors.

Arta Ārsmeniece¹, Linda Jurginauska², Valērija Kopanceva³

¹University of Latvia, Raiņa bulvāris 19, Rīga, Latvia, arta203@inbox.lv

²Pauls Stradiņš Clinical University Hospital, Pilsoņu street 13, Rīga, Latvia, lindabarona@inbox.lv

³University of Latvia, Raiņa bulvāris 19, Rīga, Latvia, kkopanceva@gmail.com

PERCENTAGE FREQUENCY OF ALK, EGFR, AND PD-L1 EXPRESSION AMONG PATIENTS WITH NON-SMALL CELL LUNG CANCER STAGE III-IV: A SINGLE-CENTER EXPERIENCE IN 2022

Background: Lung cancer is the primary cause of cancer-related deaths worldwide, with non-small cell lung cancer being the most common type. The expression levels of Programmed Death Ligand-1 (PD-L1), Epidermal Growth Factor Receptor (EGFR), and Anaplastic Lymphoma Tyrosine Kinase Gene (ALK) are important for selecting targeted treatments in stage III-IV lung cancer. Positive ALK and EGFR statuses predict responses to targeted therapies such as EGFR tyrosine kinase inhibitors (TKIs) and ALK TKIs. PD-L1 protein expression has emerged as a biomarker predicting which patients are more likely to respond to immunotherapy. PD-L1 expression is categorized as negative (< 1%), positive (1-49%), or high positive (> 50%).

Aim: The aim of the current study was to determine the prevalence of positive ALK, EGFR mutation, and PD-L1 expression among patients with non-small cell lung cancer.

Methods: A total of 98 patients with histologically confirmed stage III-IV NSCLC and ECOG scores of 0-2 were enrolled in this retrospective study at the Oncology Clinic of Pauls Stradiņš Clinical University Hospital. Data were collected and patient groups were established based on oncological council decisions in 2022.

Results: Among all 98 patients with NSCLC, 61% (n=60) were in stage III and 39% (n=38) were in stage IV. The most common histologic type was squamous cell carcinoma (48%; n=47), followed by adenocarcinoma (46%; n=45), with 6% (n=6) being undifferentiated. The average age of the patients was 68. Of all tested patients, 7% (n=7; all adenocarcinomas) had positive ALK status, 84% (n=84) were negative, and 7% (n=7) were of unknown status. Positive EGFR mutation was found in 9% (n=8/9 was adenocarcinomas), 53% (n=55) were negative, and 38% (n=39) were of unknown status. Positive PD-L1 expression was observed in 63% (n=62) of patients. When divided into groups, 30% (n=29) of patients had PD-L1 < 1%, 39% (n=38) had PD-L1 1-49%, and 24% (n=24) had PD-L1 > 50%. Metastases were most often observed in the lungs, lymph nodes, pleura, bones, brain, and liver, and rarely in the adrenal glands, kidneys, and pericardium.

Conclusion: The obtained results for PD-L1 ≥ 50% and PD-L1 ≥ 1% were 24% and 63%, respectively, which is similar to statistics from other studies on PD-L1 levels in patients with non-small cell lung cancer worldwide. Of all tested patients, 7% were ALK positive and 9% were EGFR positive, partially corresponding to reported worldwide frequencies.

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Ozoliņa Marta Anna¹, Liene Salmiņa¹, Dzintra Jakubaņeca²

¹Faculty of Medicine, University of Latvia, Rīga, Latvia, martaaozolina@gmail.com

²Emergency medical service department, Latvia

POSSIBLE COMPLICATIONS OF ACUTE CORONARY SYNDROME WITH ST AND WITHOUT ST SEGMENT ELEVATIONS IN THE EMERGENCY MEDICAL SERVICE PHASE

Background. Myocardial infarction (MI) has a high risk of complications. Employees of the emergency medical service (EMS), by timely diagnosing and treating ACS, can reduce the damage of myocardium and, therefore, the risk of the patient's death.

Aim. To analyse complications of ACS with ST segment elevation (STE-ACS) and without ST-segment elevations (NSTEMI-ACS) in the EMS phase.

Methods. This retrospective study included data from the state EMS database. In this study were included cases with diagnosis unstable angina, acute MI and acute MI without ST segment elevation from January 1, 2018, to December 31, 2020. Patients by complication ACS with ST elevation were divided into two groups: STE-ACS patients and NSTEMI-ACS patients. Data was analysed and statistically calculated by codes of complication and diagnosis. *IBM SPSS* was used to analyse the data.

Results. In total, 25540 cases were included. NSTEMI-ACS was in 81.1% (n=20724), but STE-ACS was in 18.9% (n=4816) cases. Shock developed in 7.8% (n=374) of STE-ACS, but in 1.2% (n=253) of NSTEMI-ACS cases. Cardiac arrest occurred in 6.9% (n=329) of STE-ACS cases, but in NSTEMI-ACS in 1.0% (n=216) of cases. Stupor and comatose

state were in 1.0% (n=48) of STE-ACS, but 0.2% (n=42) of NSTEMI-ACS cases. AV blocks were present in 2.4% (n=22) of STE-ACS, but in 0.4% (n=20) of NSTEMI-ACS cases. In NSTEMI-ACS heart failure developed in 2.8% (n=587), but in STE-ACS in 1.1% (n=56) of cases. Left heart failure with cardiac asthma developed in 1.0% (n=215) of NSTEMI-ACS, but 0.9% (n=41) of STE-ACS cases.

Conclusion. In STE-ACS, complications that cause unstable hemodynamic and reduce the chance of survival are more likely to develop, such as shock, ventricular tachycardia, AV blocks, pulmonary edema. The percentage of cases of cardiac arrest and resuscitations also prevails. Cardiac arrhythmias are more prevalent in NSTEMI-ACS than in STE-ACS.

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Alise Mirdza Jēgere¹, Mihails Žuravļovs², Andis Užāns³

¹University of Latvia, Riga, Latvia, Jelgavas iela 3, mirdza.jegere@gmail.com

² University of Latvia, Riga, Latvia, Jelgavas iela 3, mtjazelov@gmail.com

³ University of Latvia, Riga, Latvia, Jelgavas iela 3, andis.uzans@gmail.com

PREVALENCE OF BORDERLINE PERSONALITY DISORDER AND GENDER IDENTITY/GENDER DYSPHORIA AMONG LGBTQ+ PERSONS IN LATVIA

Background. According to literature, borderline personality disorder (BPD), is the most common personality disorder among LGBTQ+ people. BPD is a mental illness that seriously affects a person's ability to manage their emotions. This loss of emotional control can increase impulsivity, affect how a person deals with their identity, and negatively impact their relationships with other people. As well, LGBTQ+ people often experience a significant prevalence of gender dysphoria, which can be affected by multiple biopsychosocial aspects. However, no studies have been conducted in Latvia on borderline personality disorder and gender identity/gender dysphoria among LGBTQ+ people.

Aim. The aim of the current study was to determine the prevalence of BPD and gender identity/gender dysphoria in the population of LGBTQ+ people in Latvia, to compare their prevalence in relation to sexual orientation, and gender identity.

Methods. Model of the study – longitudinal, quantitative. Instruments: a survey questionnaire: the IPO screening translated into Latvian (it assesses the level of mental functioning) and the gender identity/gender dysphoria questionnaire: version for adults (women and men). Data was processed using IBM SPSS Statistics 22. Fisher's exact test and chi-square test were used for group comparison. Spearman's correlation coefficient (r) was used for correlation analysis. The t-test was used to determine whether there was a difference between the arithmetic means of the two samples and statistically significant differences.

Results. In total 37 participants were enrolled in this study, of which 78% (N=29) were females and 22% were males (N=8). To evaluate BPD we looked at two main domains – primitive psychic defences and identity diffusion scale. In total BPD was present in 27% (N=10) of the participants (at least 40% of questions were answered as sometimes true/often true/always true) of which 90% (N=9) were females and 10% (N=1) were males. Gender dysphoria was found in 43% of females (N=14) and 13% of males (N=2). 9 females who presented with signs of BPD, 78% (N=7) reported to have gender dysphoria. Female sex is associated with gender dysphoria. Females with a high score of BPD, had a bigger score of gender dysphoria. Only 29% without BPD reported signs of gender dysphoria (N=8). Female sex was associated with BPD (p<0.003).

Conclusion. Subjects who identify within the LGBTQ community orientation had a significant risk of BPD and gender dysphoria. Females are the ones to report a higher risk of BPD and gender dysphoria. Females with more prominent BPD reported the most severe gender dysphoria symptoms. Study data is limited to form a scientifically significant conclusion so further research needs to be conducted.

Maija Ločmele

Riga Stradins University, Dzirciema street 16, Riga, Latvia, 028112@rsu.edu.lv

PREVALENCE OF BURNOUT SYNDROME AND ITS ASSOCIATION WITH ADVERSE CHILDHOOD EXPERIENCES AMONG MEDICAL STUDENTS

Keywords: Burnout syndrome, adverse childhood experiences, students, sociodemographic factors.

Introduction: Burnout is defined as a psychological syndrome resulting from chronic workplace stress. It includes emotional exhaustion, chronic fatigue, depersonalization, and reduced professional effectiveness. Burnout syndrome is a growing issue among students, negatively impacting their psychoemotional health and

professionalism. The prevalence and severity of burnout syndrome can be influenced by sociodemographic factors, such as socioeconomic background. Individuals who have experienced adverse childhood experiences are at higher risk of encountering psychoemotional health problems, including burnout syndrome.

Aim of the study: To clarify the frequency of burnout syndrome and adverse childhood experiences among students of the Riga Stradiņš University faculty of medicine; to assess the correlation between burnout syndrome and adverse childhood experiences as well as sociodemographic factors.

Methods: A Quantitative Cross-Sectional Study was conducted, involving 141 medical faculty students of Riga Stradins University. The research employed an online survey to gather information about the frequency of burnout syndrome and adverse childhood experiences, as well as to examine their correlations using the Burnout Assessment Tool and a questionnaire on Adverse Childhood Experiences.

Results: A total of 141 respondents participated in the study, comprising 13.5% (n=19) males and 86.5% (n=122) females. The median age of the respondents was 22 years (IQR 20-24). Regarding burnout assessment, the median score index for primary symptoms was 2.65 (IQR 2.13-3.11). Among respondents, 46.1% (n=65) showed no risk of burnout, 24.8% (n=35) were at risk, and 29.1% (n=41) were classified as having a very high risk of burnout. For secondary symptoms, the median score index was 2.9 (IQR 2.3-3.4). 36.2% (n=51) showed no risk, 21.3% (n=30) were at risk, and 42.6% (n=60) were classified as having a very high risk of burnout. Regarding adverse childhood experiences, 52.5% (n=74) reported less than four, while 47.5% (n=67) reported at least four adverse childhood experiences. Weak positive correlations were also observed between adverse childhood experiences and primary burnout symptoms ($r(141)=0.254$, $p<0.05$), and between secondary burnout symptoms and adverse childhood experiences ($r(141)=0.216$, $p<0.05$). Furthermore, there was a statistically significant association between primary burnout symptomatology and respondent's satisfaction with their financial situation ($\chi^2=22.388$, $p<0.01$). Among respondents who reported dissatisfaction with their financial situation, 52% (n=13) were determined to be at a high risk of experiencing burnout. In contrast, among those who were satisfied with their financial situation, 72% (n=18) did not display any signs of burnout risk.

Conclusion: It was found a substantial proportion of students experienced symptoms of burnout syndrome. Additionally, adverse childhood experiences correlates with higher levels of burnout symptoms. Our findings underscore the importance of addressing mental health issues among medical students, as they can have significant implications for their well-being and academic performance. Furthermore, the association between burnout symptoms and satisfaction with financial situations highlights the need for comprehensive support systems to mitigate the risk of burnout syndrome in this population.

Jūlija Ivanova¹, Liene Salmiņa¹, Marta Anna Ozoliņa¹, Renārs Deksnis²

¹University of Latvia, Faculty of Medicine, Jelgavas street 3, Riga, Latvia, julijaaivanovaa@gmail.com, liene.salmina@gmail.com, martaaozolina@gmail.com

² Riga East University Hospital, Latvian Oncology Center, Hipokāta street 4 Riga, Latvia renars.deksnis@aslinnica.lv

PSYCHO-EMOTIONAL ASSESSMENT OF PATIENTS AFTER TOTAL OR PARTIAL GLOSSECTOMY WITH RECONSTRUCTIVE SURGERY USING MICROVASCULAR TRANSPLANTATION

Introduction: The basis of tongue cancer treatment is surgery - total or partial glossectomy, after which patients often psychological support.

Aim: To investigate the psycho-emotional status of patients after total or partial glossectomy with reconstructive surgery.

Methods: A prospective study including 22 patients who underwent total or partial glossectomy between 2019 and February 2024 at Latvia Oncology Center, during outpatient visits. The study was conducted through a patient survey including questions about psychoemotional status after treatment.

Results: The study included 22 patients, 59.1% (n=13) male and 40.9% (n=9) female. The average patient age was 60.4 years. 81.8% (n=18) underwent partial glossectomy and 18.2% (n=4) underwent total glossectomy. 45.5% (n=10) respondents feel limited in their daily life and 54.5% (n=10) perform their daily tasks without difficulty. 54.5% (n=12) patients noted that they feel a lack of energy during daily tasks. 63.6% (n=14) noted that they were not easily irritated or tearful, however, 36.4% (n=8) are more emotional than before the diagnosis. A feeling of anxiety or fear is present in 63.6% (n=14). Patients were offered to rate their quality of life from 1 to 10 points. The average quality of life rating from 22 respondents - 6.32. There is weak positive Spearman's correlation between total glossectomy and quality of life ($p=0,095$) and weak negative Spearman's correlation between partial glossectomy and quality of life ($p=-0,141$).

Conclusion: Medical staff and patient family support after total or partial glossectomy is an important factor in patient recovery.

Madara Kiseļova¹, Līga Kozlovska¹

¹Rīga Stradiņš University, Dzirciema street 16, Rīga, Latvia

PSYCHO-EMOTIONAL DISORDERS IN PATIENTS AFTER COVID-19 INFECTION

Key words: Covid 19, Coronavirus, Psychoemotional disorders, insomnia, headache, memory impairment, anxiety, fatigue, mood disorders.

Introduction: Covid-19 has been one of the biggest challenges in 21st century. This world wide pandemic took about 6686 people lives in Latvia and overall 7'003'732 worldwide. Most people who develop Covid19 fully recover, but current evidence suggests approximately 10–20% of people experience a variety of mid and long-term effects after they recover from their initial illness. Besides respiratory symptoms there are very many cases, when people have lot of psychoemotional residual symptoms- anxiety, headache, memory impairment and insomnia.

The Aim of this study was to find out the most common mental disorders after recovering of Covid-19 infection.

Materials and methods. Quantitative retrospective study was made using program *Medius*. There were selected patients from an age at least 12 years with diagnosis "Covid-19" who was infected during the period of 2020.-2022. In case if patients was infected repeatedly, only the first episode of illness was analyzed. This research was made in one general practitioner practise in Balvi (Latvia) who had some psycho-emotional disorders after recovering of Covid-19 infection. Statistical analysis was performed with SPSS IBM program.

Results. There were 99 of 549 patients with some psycho-emotional disorders after recovering of Covid-19 infection, 68 women and 31 men. Mean age of women were 61 year, of men 38 years. The most common symptom was headache (71,7%), following sleep disorders (55,6%), fatigue (47,5%), anxiety (35,4%), mood disorders (31,3%) and memory impairment (21,2%). Headache were observed for 73,8% of women and 68,4% of men. Statistically significant measurement was for sleep disorders- 63,9% of women and 42,1% of men (Pearson Chi-Square test 0.034)

Conclusions. The most common psycho-emotional symptom was headache. The least common- memory impairment. The youngest person in this study was only 12 years old. Psycho-emotional disorders after Recovering of Covid-19 infection are quite often, but most of the time-undiagnosed. Psycho-emotional symptoms are more frequent in women population

Ineta Krūmiņa¹, Sigita Hasnere^{1,2}, Krista Elīza Cekule¹

¹University of Latvia, Faculty of Medicine, Jelgavas street 3, Rīga, Latvia, ineta.kruminaa@gmail.com, krista.cekule@gmail.com

²Pauls Stradiņš Clinical University Hospital, Oncology clinic, Pilsonu street 13, Rīga, Latvia

RATIO OF TOTAL AND PARTIAL PRIMARY BRAIN TUMOR RESECTION BASED ON MR DATA AT PAULS STRADIŅŠ CLINICAL UNIVERSITY HOSPITAL IN 2023

Background: Primary brain tumors encompass growths that originate from the brain tissues or its immediate vicinity. These tumors are divided into glial (comprising glial cells) or non-glial (arising within brain structures such as nerves, blood vessels, and glands), and further classified as benign or malignant. For patients with resectable tumors, research has shown the importance of achieving total resection rather than partial resection or biopsy. Following surgery, it is recommended to evaluate the extent of tumor removal and residual tissue using MRI within 24–48 hours to differentiate post-surgical contrast enhancement from any residual tumor.

Aim: The aim is in how many cases of patients with primary malignant brain tumor (glioma, glioblastoma, astrocytoma and oligodendroglioma) underwent total resection and in how many cases - partial resection was performed based on MRI data.

Material and Methods: A retrospective study was conducted for the period from 01.01.2023. until 31.12.2023. using patient data from the information system - Doctor's Office. The data used in the study covers only the patients examined and treated at the Pauls Stradiņš Clinical University Hospital during the relevant period. Patients who underwent primary brain tumor surgery in 2023 were selected and subsequently determined how long after surgery MRI was performed. If MRI was performed no longer than 48 h after surgery, then the findings of these examinations were included for further statistical analysis.

Results: Total number of patients – 67, of which 33 (49%) - women, 34 (51%) – men. In 14 cases (21%) no MRI was performed after surgery or performed CT scan instead. In 21 cases (31%) the MRI was performed later than 48h. In 32 cases (48%) MRI was performed within 48h post-surgery. From these cases total resection was performed in 22 cases (69%), but partial resection – in 10 cases (31%). Total resection was performed in 14 cases (44%) with glioblastoma, in 2 cases (6%) with oligodendroglioma, in 4 cases (13%) with anaplastic astrocytoma (G3), in 1 case (3%) with diffuse astrocytoma (G2) and glial tumor. Partial resection was performed in 6 cases (19%) with glioblastoma, in 2 cases (6%) with oligodendroglioma, in 1 case (3%) with diffuse astrocytoma (G2) and with pilocytic astrocytoma (G1).

Conclusion: In most cases total resections were performed based on MRI examinations. In only half of the cases, MRI was performed within 48h post-surgery how it is recommended.

Anna Stašulāne

Rīga Stradins University Dzirciema Street 16, Rīga, anstas@inbox.lv

RECENT ADVANCES IN LABORATORY DIAGNOSTICS: EMERGING CARDIAC BIOMARKERS ASSOCIATED WITH CORONARY ARTERY DISEASE

Keywords: *cardiology, cardiovascular disease, novel, tests, risk prediction.*

Relevance: Coronary artery disease is third leading cause of mortality worldwide. Laboratory tests are routinely conducted as part of the management of patients with coronary artery disease in order to identify biohumoral cardiovascular risk factors, track their trends, evaluate the efficacy and safety of therapy, and serve as a prelude to invasive investigations. **Objectives:** The aim of this study was to identify, evaluate sources and analyse the results of the latest research and guidelines on the novel biomarkers associated with coronary artery disease. **Materials and methods:** This literature review aims to examine the latest research and guidelines on the novel biomarkers associated with coronary artery disease. This includes selective and critical literature selection, credibility assessment of the sources and identification of themes, debates and gaps in the latest research and guidelines on the novel biomarkers associated with coronary artery disease. **Results:** Currently there are several routine cardiac biomarkers used in every day medical practice, including but not limited to cardiac troponins, cardiac natriuretic peptides, myoglobin and creatine phosphokinase. New cardiac biomarkers such as interleukins, bioactive lipids, heart-type fatty acid-binding protein, growth differentiation factor 15, fibroblast growth factor, pentraxin 3 and others' precise clinical use and potential benefits are being weighed against currently recognised and established biomarkers. **Conclusions:** The global scientific community has been paying more attention in recent years to the quest for emerging cardiac biomarkers associated with coronary artery disease since new ways are required for even earlier and more accurate diagnosis, novel therapeutic approaches, and the identification or modification of the course of coronary artery disease.

Evita Kokina¹, Androniks Mitildzans MD²

¹Rīga Stradiņš University, Faculty of Medicine, Dzirciema Street 16, Rīga, Latvia 038943@rsu.edu.lv, evitakokinae@gmail.com

²Latvian Oncology Centre, Department of Gynecologic Oncology, Hipokrāta Street 4, Rīga, Latvia, andronmit@gmail.com

REFERRAL TO TREATMENT PERIOD DEPENDING ON THE RADIOLOGIC STAGING METHODS USED IN CANCER PATIENTS IN THE GYNECOLOGIC ONCOLOGY DEPARTMENT OF LATVIAN ONCOLOGY CENTRE

Keywords: *gynecologic oncology, referral to treatment period, magnetic resonance imaging.*

Objectives: In 2021 the European Commission published the European plan to beat cancer, identifying oncology as a health priority. It is widely recognised that cancer patients should receive treatment within a 62-day interval from their first visit. To assess whether improvements are needed in the existing algorithm and to achieve the goals of Europe's Beating Cancer Plan in Latvia, it is crucial to determine whether patients in Latvia fit into the specified time interval.

Methods: A retrospective, descriptive and analytical study, included 144 patients who had Gynecologic Oncology Department appointment at the Latvian Oncology Centre (LOC) within the green corridor from September 2023 to January 1, 2024. Records were collected from the LOC data system "Ārstu birojs". The study

examined the duration between the first appointment and computed tomography (CT), magnetic resonance imaging (MRI), multidisciplinary team meeting (MTM), and surgery. Further patients were divided into two main groups, based on the necessity of MRI. Data was analysed using IBM SPSS. Differences between referral to treatment period in patients who needed an MRI and those who did not were analysed using the Independent Samples Mann Whitney U Test.

Results: 144 patients needed CT scan and 88 patients needed both CT and MRI. The median time to CT was 4 days and the median time to MRI was 27 days (IQR 16;35). The median time to MTM was 30 days. The median time to surgery in patients who need MRI is 64 days (IQR 54;72) and in patients who do not need MRI is 34 days (IQR 27;49).

Conclusions: The time from referral to surgery is statistically significantly longer in patients who require MRI than in patients who do not ($p < 0,001$). Patients who need an MRI to clarify the diagnosis and to choose treatment tactics do not fit the 62-day interval.

Dāvis Edgars Liepa¹, Marta Jasa¹, Sandra Samoilova¹

¹University of Latvia, Raiņa bulvāris 19, Rīga

RELATIONSHIP BETWEEN ANXIETY AND UNDERSTANDING EMOTIONS IN STUDENT POPULATION

Key words: Anxiety, alexithymia, emotions, students, TAS-20, GAD-7.

Introduction. Prevalence of anxiety has been increasing among students in universities and colleges over the years. There are lots of factors that contribute to stressful student life and few coping strategies that may be maladaptive in concern to source of the anxiety. Difficulties in understanding emotions have shown to be an important correlate of psychopathology and cause for psychosomatic illness. If source of anxiety would be related to inability to understand one's emotions (alexithymia) then more successful coping strategies could be used to alleviate student distress.

Aim. To evaluate prevalence of anxiety and alexithymia among Latvian students and explore the relation between anxiety, alexithymia in different university faculties.

Materials and methods. In this study students from University of Latvia and Rīgas Stradiņš University participated in questionnaire. Besides demographic inquiry, questions were taken from TAS-20 alexithymia scale and GAD-7 anxiety scale. Data were analysed using IBM SPSS.

Results. 123 students (81% female) from 11 faculties completed the questionnaire from which 50.4% showed no alexithymia signs, 20.3% showed possible alexithymia and 29.3% showed signs of alexithymia. In regards of anxiety 14.6% students had no anxiety, 31.7% minimal anxiety, 35.8% mild anxiety and 17.9% students had severe anxiety symptoms. A weak positive correlation was found between anxiety and alexithymia (0.263, $p=0,003$). No correlations were found between alexithymia and choice of studies.

Conclusions. Results show alarmingly high scores of anxiety among Latvian students. Positive correlation between anxiety and alexithymia could point to a factor in etiology of anxiety- the inability to identify and express emotions.

Jekaterina Klevere

Rīga Stradiņš University, Rīga, Latvia, jekaterina.klevere@gmail.com

RETENTION AFTER ORTHODONTIC TREATMENT: LITERATURE REVIEW

Keywords: Retention, orthodontic treatment, relapse, fixed retainers, removable retainers, retainers.

Introduction. The main goal of orthodontic retention is to keep the teeth in their corrected positions. Fixed or removable retainers are the most common types of retainers used during the retention phase.

Aim. The aim of this literature review was to identify results and make analysis of different types of retainers like fixed retainers and removable retainers. To find data about effectiveness of each retainer type.

Materials and methods. A search of the literature was performed in the following databases: PubMed, ScienceDirect and Cochrane Library. The search was limited to publications in English during the period 2008-2023.

Conclusion. The retention appliance choice and retention protocol is specific for every patient and no single protocol can be followed. Different reviews concluded that there was no uniform retention approach that could avoid relapse and that more research was needed to provide evidence for optimal retention. Further research on the effectiveness of the different retentive devices is needed to resolve the problems in this respect.

Abstract.

The achievement of aesthetic, functional occlusion should not mark the end of the orthodontic intervention. "Retention and Relapse" are two important components of orthodontics. To prevent relapse, retention needs advance planning, and may vary in duration. Without period of retention, there is a propensity for teeth to new position for their underlying position causing relapse. Hence it is very necessary to prevent relapse which depends on many factors. The most important of which being changes in the late ages of craniofacial development, and the post-treatment reorganization of the periodontal ligament, soft tissue pressures, growth, and occlusion. Understanding these factors is crucial for orthodontists to design appropriate retention protocols and enhance treatment outcomes. Therefore, it is not possible to presume which cases will remain stable and which cases will experience relapse. A recent Cochrane review concluded that there are voids in the literature with no evidence of superiority for fixed over removable retainers or vice versa in terms of their effectiveness, and limited evidence concerning associated harms, long-term implications, and patient satisfaction. Every orthodontic patient must wear retention appliances to prevent relapse. This review article will show different retention appliances that can help to prevent relapse in orthodontics.

Samanta Reine¹, Viktorija Fokina¹, Kirills Fokins²

¹University of Latvia, Raiņa bulvāris 19, Rīga, samantareine@inbox.lv

¹University of Latvia, Raiņa bulvāris 19, Rīga, fokina.viktorija@inbox.lv

²Riga Eastern Clinical University Hospital, Hipokrāta iela 4, Rīga, LV-1079, kirills.fokins@gmail.com

SURVIVAL OUTCOMES IN PANCREATIC CANCER PATIENTS BASED ON TUMOR STAGE

Background. Pancreatic cancer presents a formidable challenge with a notably low survival rate when compared to other forms of cancer. While early detection and prompt treatment are key factors in improving outcomes, the insidious nature of pancreatic cancer often leads to diagnosis at an advanced stage when the disease has already metastasized to distant organs. The stage of pancreatic cancer at the time of diagnosis is a crucial determinant of prognosis and survival rate, underscoring the importance of timely detection and intervention.

Aim. The aim of this study was to investigate the association between pancreatic cancer stage and survival

Methods. The material of the study was the data acquired from accounting and reporting documents of pancreatic cancer patients from 2016 till 2018.

Results. A total of 176 patients were included, 50% (n=88) were women and 50% (n=88) were men. 75% (n=44) patients survived and 25% (n=132) died. Based on research the following results were found: Stage 1: 52 patients with a survival rate of 30% and an average survival of 33 months after operation. Stage 1A: 2 patients with a survival rate of 1.14% and an average duration of survival of 19 months after operation. Stage 2 and 2A: 45 patients with a survival rate of 26% and a average duration of survival of 26 months after operation. Stage 2B: 40 patients with a survival rate of 12% and a average duration of survival 15 months after operation. Stage 3: 21 patients with a survival rate of 12% and an average duration of survival 15 months. Stage 4: 10 patients with a survival rate of 6% and an average duration of survival 15 months after operation.

Conclusion. In conclusion, the research on pancreatic cancer survival rates based on tumor stage reveals varying outcomes for patients at different stages of the disease. The data shows that survival rates and durations post-operation differ significantly across different stages. Stage 1A and Stage 1 demonstrate relatively higher survival rates and longer average durations of survival after operation, while Stage 4 has the lowest survival rate. These findings emphasize the importance of early detection to improve patient outcomes in pancreatic cancer.

Sanda Putniņa¹, Aleksejs Zavorins²

¹Riga Stradins University, Dzirciema street 16, Riga, Latvia, putninasanda@gmail.com

²Riga Stradins University, Department of Dermatology and Venerology, Baznīcas street 18, Riga, Latvia, aleksejs.zavorins@gmail.com

SYSTEMIC TREATMENT OF PSORIASIS IN LATVIA: SURVEY OF DERMATOLOGISTS AND DERMATOLOGY RESIDENTS

Background

Psoriasis is chronic immune mediated skin disease. There are several treatment options for psoriasis, including phototherapy, topical and systemic medications. Systemic therapy is indicated for moderate to severe psoriasis.

Each of these medications has a different efficacy, potential side effects, and regimen that must be considered when prescribing these therapies.

Aim

To investigate the choice of systemic treatment of psoriasis in Latvia, prescribed by dermatologists and dermatology residents.

Methods

31 respondents participated in the study, of which 22 (71%) were dermatologists and 9 (29%) were dermatology residents. The study evaluated and compared factors affecting and limiting the choice of systemic therapy. Data collection using systematized survey questionnaire. Non-parametric statistics were used to compare data amongst study groups. P value below 0.05 was considered statistically significant.

Results

A statistically significant difference ($p=0.039$) in the frequency of prescribing systemic therapy was observed between both groups, where dermatologists prescribe systemic therapy in 25.59% of cases, while resident dermatologists only in 5.8%. Among the more frequently prescribed drugs of conventional systemic therapy, a statistically significant difference ($p=0.012$) was observed only in the use of methotrexate – dermatologists prescribe it more often. When evaluating the frequency of prescription of biological systemic therapy, no statistically significant difference was found. Dermatologists are deterred from more frequent prescribing of systemic biological medications by the need for a council, working in a medical institution that has a contract with National Health Service, as well as lack of personal experience and knowledge.

Conclusion

Systemic therapy for psoriasis is more often prescribed by certified dermatologists. The conventional systemic drug of first choice is methotrexate. Biological drugs are still prescribed relatively rarely.

Anna Kodinceva¹, Sarmīte Skaida²

¹Rīga Stradins University, Dzirciema street 16, Rīga, anna.kodintseva@inbox.lv

²Rīga Stradins University, Dzirciema street 16, Rīga, sarmite.skaida@rpnc.lv

THE LEVEL OF KNOWLEDGE AMONG THE PATIENTS OF THE ADDICTION DEPARTMENT OF RIGA PSYCHIATRY AND ADDICTION MEDICINE CENTRE ABOUT ALCOHOL USE DISORDER, ADDICTION, THEIR CONSEQUENCES AND TREATMENT OPTIONS

Introduction. Alcohol misuse and addiction is a prevalent issue for society all around the world. According to the latest research its availability in the Latvian market is increasing not only among adults, but teenagers as well. For now Latvia has become the world's leader in terms of alcohol consumption as the statistics shows that an average Latvian resident consumes 12.1 litres of pure alcohol per year. Due to high alcohol consumption the number of hospitalised patients also has a tendency to increase.

Aim. The aim of the study is to examine the level of knowledge of patients with alcohol use disorder about alcohol addiction, its development, main symptoms, consequences of alcohol abuse and its impact on health. To examine the knowledge about available professional help and treatment options for patients with alcohol use disorder.

To find out the patients's opinion about alcohol availability in Latvia, its price, and the effectiveness of possible selling restrictions, that could might positively impact or even reduce the alcohol consumption in the country.

Materials and methods. The data were collected by using a cross-sectional survey that was given to the patients of the Addiction department of Riga Psychiatry and Addiction Medicine centre suffering from alcohol use disorder (F10.1) and addiction diagnosis (F10.2). The survey consisted of 28 questions and was divided into several sections, which included questions about the patient's age, gender, education, place of residence, definition of alcohol addiction, its symptoms, factors influencing addiction development, its impact on health and treatment methods. In the section on alcohol trade in Latvia, questions were asked about alcohol trade restrictions and the patients's opinion about how it could affect alcohol demand and reduce consumption. The data were analysed by using MS Excel and IBM SPSS. The results have been defined as statistically significant if $p<0.05$.

Results. There were 100 people involved in the study, mostly men (68%), 30-55 y.o. (85%), living in Riga. Most of them were diagnosed with alcohol dependence – F10.2 (87%) and hospitalised repeatedly. 81% of all patients involved in the study were brought to the hospital by emergency medical services, and 28% of them were admitted with a concurrent diagnosis F10.8 (Mental and behavioural disorders due to alcohol use), 10% with X78 (Intentional self-harm with a sharp object). 70% of respondents have demonstrated relatively good knowledge about inpatient, pharmacological, psychotherapeutic and alternative treatment methods. They recognized the Minnesota program as the most effective method (73%). 85% indicated family members, acquaintances, and the internet as the main source of information about treatment. Only 8% of patients were informed about alcohol

addiction treatment by their family doctor. 77% of patients considered alcohol trade restrictions to be ineffective and believed that they would not change alcohol consumption habits or reduce its consumption.

Conclusions. The results of the study shows that patients generally understand the nature of alcohol addiction, its impact on health and its consequences. They are informed about basic treatment options and based on feedback from other patients, consider the Minnesota program to be the most effective. However, they more often choose not to undergo treatment or choose to visit an ambulatory addiction specialist and take medicine, or pursue other alternative methods. There is a high level of „magical thinking” and belief in alternative methods of treatment. Involvement of family doctors in patients’ education is very low, yet it is very important in early recognition, monitoring, and education about treatment options for addiction.

Alīse Maksimova-Agafonova^{1,2}, Alina Kuzņecova^{1,3}, Māris Taube^{1,2}

¹ Rīga Stradiņš University, Department of Psychiatry and Narcology, Latvia

² The Rīga Centre of Psychiatry and Addiction Disorders, Latvia

³ Psychiatrisches Zentrum AR – Herisau, Switzerland

THE LIKELIHOOD OF BIPOLAR SPECTRUM DISORDERS IN PATIENTS WITH INITIALLY DIAGNOSED ATYPICAL AND TYPICAL DEPRESSION

Keywords: *Atypical depression, bipolar spectrum disorders, BSDS, PHQ-9.*

Introduction: Depression can manifest as typical or atypical in patients. Atypical depression often correlates with bipolar disorders, while typical depression is associated with unipolar depressive disorder. Diagnosing bipolar disorders in initial patients is challenging as mania or hypomania may not always be evident during a first depressive episode. Hence, atypical depression occurrence could indicate potential bipolar spectrum disorders, affecting medication selection differently.

Aim: Compare depression course characteristics in patients with initial depressive episodes at the Rīga Centre of Psychiatry and Addiction Disorders in inpatient and outpatient settings. Evaluate bipolar spectrum disorder probability in patients with atypical and typical depression.

Methods: Patients with initial depressive episodes (F32 ICD-10) were selected using the Patient Health Questionnaire-9 (PHQ-9). Atypical depression symptoms were identified per DSM-5 criteria. Inclusion criteria: aged 18-65, clear consciousness; exclusion criteria: comorbidities, severe somatic pathologies, substance abuse, age outside range. The Bipolar Spectrum Diagnostic Scale (BSDS) assessed bipolar spectrum disorder probability. Quantitative and qualitative comparison of patients with atypical depression used statistical parameters (T-Test, Spearman correlation). Data were analyzed with Excel and SPSS.

Results: 100 patients were included, 37 men, 63 women. Control group (n=52) had typical depression, study group (n=48) had atypical depression. Patients averaged 27 years (range: 18-45). Statistically significant Spearman correlation coefficients were found between depression types and bipolar spectrum disorder likelihood (p=0.00). Mean BSDS score differed by 11 points between groups (p=0.00), indicating higher bipolar spectrum disorder likelihood in atypical depression. Male patients had lower likelihood than females, mean BSDS score 6 points lower (4.95 males, 10.98 females). BSDS results: 60% low likelihood, 28% moderate, 12% high likelihood.

Conclusion: First-time diagnosed depressive episode patients with atypical depression symptoms show higher bipolar spectrum disorder likelihood than typical depression patients.

Katrīna Truksne

Rīga Stradiņš University, Dzirciema street 16, Rīga, truksne.katr@gmail.com

THE ROLE OF FAMILY ONCOLOGICAL ANAMNESIS IN DETERMINING BRCA1/2 GENE MUTATION STATUS

Objectives Breast cancer is the most common malignancy in women in Latvia - one in nine women will be diagnosed with breast cancer. Around 10% of cases are hereditary. The purpose of this study is to determine whether familial oncological history can predict BRCA status and whether it can be used as basis for population wide genetic screening for the most common BRCA mutations.

Methods Data from Paula Stradiņa Clinical University Hospital about BRCA negative breast/ovarian cancer patients’ and BRCA1/2 positive patients’ familial oncological history was gathered. Data was analysed using IBM SPSS27. Pierson’s Chi test was used to determine association between BRCA status and familial oncological history. If a statistically significant association was found Cramer’s V test was used to determine the strength of association.

Results

10 876 participants were included. 10 162 were BRCA negative breast or ovarian cancer patients, 677 were BRCA1 positive and 37 - BRCA2 positive.

A statistically significant association was found between BRCA1/2 status and breast (p -value<0,001) and ovarian cancer (p -value<0,001) in familial history overall, breast (p -value<0,001 in first-degree relatives, p -value<0,001 in second-degree relatives) and ovarian (p -value<0,001 in first-degree relatives, p -value<0,001 in second-degree relatives) cancer in first- and second-degree relatives, negative familial oncological history (p -value<0,001), gastric cancer (p -value<0,001), colorectal cancer (p -value<0,001), lung cancer (p -value0,001), hematological malignancies (p -value0,016), malignancies of unknown primary origin (p -value<0,001), prostate cancer in family history overall (p -value<0,001), pancreatic cancer in family history overall (p -value0,013). No association was found between BRCA1/2 status and prostate cancer (p -value0,062) and pancreatic cancer (p -value0,125) in first-degree relatives.

Conclusions

There is a statistically significant association between BRCA status and breast and ovarian cancer in familial history, and malignancies not associated with HBOC syndrome. Familial oncological history can serve as a predictor of BRCA mutation status.

Marta Anna Ozoliņa¹, Daniels Zilbermans¹, Igors Bobrovs²

¹Faculty of Medicine, University of Latvia, Riga, martaaozolina@gmail.com

²Emergency medical service department, Latvia

THE TACTICS OF THE STATE EMERGENCY MEDICAL SERVICE TEAM IN THE CASE OF WIDE COMPLEX QRS TACHYCARDIA WITH A PULSE

Background. Ventricular tachycardia (VT) is one of the leading causes of sudden death worldwide, so timely diagnosis and correct action by emergency medical service (EMS) team is very important to save patient's life.

Aim. To collect data from EMS of the cases of wide QRS complex tachycardia with a pulse and compare the tactics to the guidelines of the European Resuscitation Council (ERC).

Methods. This retrospective study included data from the state EMS database. In this study were included 51 calls from January 1, 2017 to December 1, 2017, in which the patient had wide complex QRS tachycardia in the 12-lead ECG and had a pulse. *IBM SPSS* was used to analyse the data.

Results. In total, 51 cases were included in this study. The condition of 37.3% (n=19) of patient cases was assessed as hemodynamically unstable. Synchronized electrical cardioversion (ECV) was performed in 25.5% (n=13) of cases, which stopped the tachycardia in all cases. EMS teams choose the power of the first synchronized ECV from 100J to 200J: 100J in 15.4% (n=2) of cases; 125J in 38.4% (n=5); 150J in 23.1% (n=3); 200J in 23.1% (n=3). In 15.4% (n=2) repeated ECV with increasing power were applied. After synchronized ECV, all patients received amiodarone. In 15.8% (n=3) of hemodynamically unstable cases was used 300 mg of amiodarone. In other cases, amiodarone administration was chosen in 62.7% (n=32) cases, which was effective in 59.4% (n=19) of those cases. Amiodarone 150 mg was administered in 7.8% (n=4) and tachycardia was stopped in 50% (n=2) of those cases. Amiodarone 300-900 mg was administered in 56.9% (n=29) of cases, which stopped arrhythmia in 33.3% (n=17) of cases. In 1.9% (n=1) of cases, bolus administration of lidocaine was used, which didn't stop the arrhythmia. In 1.9% (n=1) of cases, the EMS team chose to only transport the patient to a hospital.

Conclusion. In most cases, EMS team tactics follow ERC guidelines.

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Arta Ungure-Pastare¹, Sandra Lejniece²

¹Riga Stradiņš University, Dzirciema street 16, Riga, Latvia, artaungure2@inbox.lv

²Riga East University Hospital, Latvian Oncology Center, Hipokāta street 4, Riga, Latvia Sandra.Lejniece@aslimnica.lv

TREATMENT-FREE REMISSION FOR CHRONIC MYELOID LEUKEMIA PATIENTS AT "LATVIAN ONCOLOGY CENTER" FROM 01.01.2000. TILL 01.01.2023.

Introduction: Chronic myeloid leukemia (CML) is a myeloproliferative disorder. Tyrosine kinase inhibitors (TKI) are the cornerstone of CML treatment. Previously, it was believed that TKI therapy should last for the patient's remaining life. However, studies have shown that achieving treatment-free remission is possible. In Latvia, there are also CML patients who have achieved treatment-free remission. As this topic is relevant worldwide, it is

important to gather Latvian data and compare it with global data. More than 95% of Latvian CML patients are treated at the "Latvian Oncology Center".

Methods and materials: Data were obtained from the CML patient medical records from the Riga East Clinical University Hospital "Latvian Oncology Centre". This is descriptive research.

Results: From 01.01.2000. until 01.01.2023. 29 CML patients treated at the "Latvian Oncology Center" have achieved treatment-free remission. 58.6% of them achieved treatment-free remission with imatinib. 25 patients, or 86.21%, remain in treatment-free remission until the end of follow-up. Patients who are still in treatment-free remission received a total of 61 months to 231 months of TKI therapy, on average 130.79 months. DMR4.0 in these patients lasted from 37 months to 111 months before stopping TKI therapy, on average 78.32 months. In only 4 patients, or 13.79%, relapse of the disease was observed, it was observed 2-3 months after stopping the TKI therapy.

Conclusion: Comparing the data from global studies, this research observed a lower percentage of disease recurrence in CML patients after discontinuation of therapy. 64% of patients remain in treatment-free remission for more than 24 months. When comparing the total duration of therapy with the TKI received by the participants in this study, and the duration of DMR4.0 and DMR4.5 before therapy discontinuation, it can be observed that these periods significantly exceed the necessary timeframes mentioned in the 2017 ESMO and 2023 NCCN guidelines.

Natālija Tkačenko¹, Maija Gureviča^{2,3}

¹Rīga Stradiņš University, Dzirciema street 16, Rīga, Latvia, natalija.tkachenko.95@gmail.com

² AS Veselības centru apvienība, Nīcgala street 5, Rīga, Latvia

³AS Latvija Jūras medicīnas centrs, Patversmes street 29, Rīga, Latvia

USAGE AND KNOWLEDGE OF VITAMIN D IN POPULATION OF LATVIA

Keywords. Vitamin D, use of vitamin D, vitamin D functions.

Objective. Our body creates vitamin D from direct sunlight on the skin. In Latvia it is not enough sunlight to gain sufficient level of vitamin D therefore it is necessary to take vitamin D supplement. Vitamin D has a lot of functions in human body and more of them are still getting discovered.

Aim. The aim of the study was to find out about the usage and knowledge of vitamin D in population of Latvia.

Methods. Data about the usage of vitamin D and knowledge about it in population of Latvia was gathered by the survey. IBM SPSS Statistics v.27 was used to perform statistic analyze.

Results. Overall, 168 responds were gain and analyze. Average respondent age was 40,1. 137 respondents were female, 31 males. 25 respondents or 14,9% does not take vitamin D supplements. 67 respondents or 39,9% take vitamin D supplement regularly every day all year. 48,2% take 4000 IU of vitamin D daily. 68 respondents or 40,5 % have sufficient D vitamin level in their latest blood sample but 64 (38%) respondents have not enough of it. 36 (21,4%) respondents have never checked their level of vitamin D in blood. 51,19% of respondents named immune function of one of the vitamin D functions. Second most named function was bone strengthening (25,59%) and calcium metabolism (21,43%). 24 respondents or 14,3% do not know any functions of vitamin D.

Conclusion. The study results show that people in Latvia use vitamin D but not enough as less than half has sufficient level of it in blood. Knowledge about vitamin D in population of Latvia is sufficient but could improve.

Aleksejs Kokorevičs, Gunta Ozola

Rīgas Stradiņa Universitāte, aleksejs.kokorevics@gmail.com

USE OF ANTIBIOTICS AT THE GENERAL PRACTICE

Introduction

The objective of the study was to analyse the use of antibiotics at the General practition. It was studied, which antibiotics are prescribed, and what were the most common indications. The results were compared with the antibiotic use guidelines approved by the Practice.

Methodology

In a prospective analysis, the medical cards of stationary patients were analysed for 14 consecutive days – from 12 to 25 February 2024. During this period a total of 321 ambulatory patients, of which 43 patients were prescribed antibacterial therapy.

Results

During this period, 321 patients were consultated, out of which 151 men and 170 women. The average age of the total female group was 54 years, while the average age of the total male group was 53 years.

43 patients or 13,3 %, of which 44,2% (n= 19) were males and 55,8% (n= 24) women – received antibiotic therapy. The most frequent diagnoses between antibiotic-treated patients were as follows: respiratory tract infection 58,1 % (n= 25), tonsillitis 27,9. % (n= 12).

In case of urinary tract infection, the most common antibiotic used was ciprofloxacin 50% (n= 1), amoxicillin 50 % (n= 1), which did not comply with the guidelines, which recommended nitrofurantoin and amoxicillin – clavulanate.

There were a total of 25 patients diagnosed with lower respiratory infection – 11 men and 14 women. Most common of the prescribed antibiotics were amoxicillin 44 % (n=11), amoxicillin/clavulanate 28% (n=7), claritromycin 20% (n=5), ceftriaxone 8% (n=2). These results comply with the guidelines, which recommended ampicillin leaving amoxicillin/clavulanate as the second choice.

Conclusions

Most common infections in the practice are the upper respiratory tract infections, soft tissue and urinary infections. Prescribed antibiotics did not match the recommended medication according to guidelines.

Ligita Gukauskienė, Justina Levkovič

WOMEN'S KNOWLEDGE ABOUT EARLY BREAST CANCER AND ITS PREVENTION IN LITHUANIA

Keywords: knowledge, women, breast cancer, prevention program.

The scientists have proven that carcinogenesis occurs due to nonlethal genetic changes (mutations). Such mutations can occur under the influence of environmental factors - chemicals, ionizing radiation or viruses, or can be inherited. The most common types of breast cancer are: 1. Invasive ductal carcinoma. This breast cancer begins to form in the ducts, and then grows into other parts of the breast tissue. Ductal breast carcinoma accounts for almost 75% of all breast cancer cases. 2. Invasive lobular carcinoma. Cells of this type of cancer begin to form in the lobes, and then spread from them to the nearby breast tissues. The object of this study: women's knowledge of early breast cancer and its prevention in Lithuania. The aim of this study: to analyze women's knowledge about early breast cancer and its prevention in Lithuania. Tasks of this study: 1. To identify women's knowledge of the signs and risk factors for breast cancer. 2. To find out women's knowledge about the age and frequency of women participating in the breast cancer prevention program. In the organization and conduct of this study were used these methods: analysis of scientific literature, histological examination, quantitative research method (questionnaire survey), statistical and graphic analysis of the results. Breast tissues were processed according to the protocol of histological materials. Before specific staining was occur, tissue samples were prepared undergo preparation through the following stages: fixation, processing, embedding, sectioning. 5 preparations were used for histological examination. 503 women participated in this study. Summarizing the results of this study, it can be said that the vast majority of the women do not take enough care of themselves and do not regularly check their breasts. A significant part of them lacks knowledge about the correct performance of breast self-examination. The vast majority of respondents know or have heard about the breast cancer prevention program, but they are not interested in it. They learn about it mainly through communication with others. In addition, a large part of those surveyed lacks knowledge about the frequency of participation in this program. Conclusions. 1. Identified signs of breast cancer were hardening in the breasts, changes in the size and shape of the breast, enlarged axillary lymph nodes, breast pain and a change in the skin around the breasts, and risk factors that determine the development of breast cancer were heredity, smoking, non-malignant breast diseases, ionizing radiation. 2. It was found that most women correctly identified the age (50-69 years) and frequency (once every two years) of those participating in the breast cancer prevention program.

VĒSTURE UN KULTŪRAS VĒSTURE

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HISTORY AND HISTORY OF CULTURE

Zintis Kārklīņš

Daugavpils University, Parādes street 1, Daugavpils, karkl.zin@gmail.com

THE LEGAL REGULATION OF SMUGGLING COMBAT IN LATVIA: HISTORICAL DEVELOPMENT (1918-1940)

Smuggling, involving the illegal transportation of goods across national borders, is a phenomenon that not only persists but also evolves depending on the global and local economic situation, as well as the ability of national legal regulations to limit this phenomenon. A particularly significant period in the history of smuggling is interwar Latvia, which is notable for its unique political and economic conditions, when the newly established state struggled for its sovereignty and economic stability. During this time, situated between the two world wars and experiencing various political and economic crises, Latvia actively formed and adapted its legal regulations to effectively combat smuggling. The laws adopted during this period served as the basis for the formation of the state's customs policy and were essential in ensuring economic stability and state sovereignty. The aim of this paper is to explore how the legal regulation of smuggling combat was formulated and implemented in Latvia during the interwar period, highlighting its impact on the state's economic stability and political sovereignty. The study includes the evolution of regulation in response to internal and external economic and political changes, as well as an analysis of its main principles and objectives.

Ina Kirņičanska

Daugavpils University, Vienības street 13, Daugavpils, ina.kirnicanska@gmail.com

CHANGES IN THE APPEARANCE OF THE OLD BELIEVERS OF LATVIA IN THE 20S-30S OF THE TWENTIETH CENTURY

The traditional appearance of the Old Believers is quite well known to the inhabitants of Latvia. This is a mandatory beard and "kosovorotka" for men, "sarafan" and headscarf for women. After the proclamation of independence of Latvia in 1918, the Old Believers became an equal part of Latvian society and went outside the closed space of the traditional Old Believer community, not renouncing the faith of their ancestors, although the older generation accused them of worldliness. There had been some internal secularisation, which led to a change in their appearance, which, in fact, was no longer different from that of other inhabitants of Latvia. The report uses photographs from the archives of the families of their descendants - the present Old Believers of Latvia.

Paula Sekača

RTU Liepājas akadēmija, Lielā iela 13, Liepāja, paula.sekaca@rtu.lv

KULTŪRAS PRESE NACISTISKĀS OKUPĀCIJAS PERIODĀ (1942-1944): LAIKMETS UN LATVJU MĒNEŠRAKSTS

Kultūra okupācijas apstākļos ir viena no visapdraudētākajām jomām. Gan fiziski – iznīcinot mākslas darbus, kultūras pieminekļus, dedzinot grāmatas –, gan arī abstrakti – pārklājot esošo kultūru ar okupantu kultūru, aizliedzot nacionālos simbolus, aizstājot simbolu nozīmi ar jaunu, pielāgotu okupācijas varas ideoloģijai. Nacistiskās okupācijas laikā Latvijas teritorijā iznāca salīdzinoši liels skaits preses izdevumu. To vidū bija arī kultūrai veltīti izdevumi, divi lielākie – *Laikmets* un *Latvju Mēnešraksts* – tika radīti ar vienu mērķi, taču to izpildījums bija atšķirīgs. Kamēr *Latvju Mēnešraksts* vairāk rūpējās par kvalitatīva kultūras satura piedāvāšanu latviešu lasītājam, tikmēr *Laikmets* caur latviešiem zināmām vērtībām un dzīvesziņu bagātīgi izplatīja okupācijas varas propagandas naratīvus.

Žurnāls *Laikmets* iesākumā bija iecerēts kā oficiālas propagandas avīzes *Tēvija* kultūras pielikums, taču vēlāk šī iecere tika atmesta. *Laikmets*, lai arī bagātīgi ilustrēts, saturiski vērtīgiem rakstiem un ar krietnu devu kultūras materiālu, bija pārsātināts ar nacisma ideoloģijas propagandu, kas to padarīja par spēcīgu propagandas ieroci. Turpretī žurnāls *Latvju Mēnešraksts* vismaz ārēji palika apolitisks. Žurnāls varēja lepoties ar bagātīgu literatūras klāstu, tajā tika publicēta gan latviešu, gan ārzemju (galvenokārt vācu, austriešu un skandināvu) dzeja, stāsti, publicistikas teksti. Plaši par okupācijas perioda kultūras dzīves norisēm tika aprakstīts apskatos un recenzijās. Cita starpā, tika arī populārzinātniski meklētas baltu un vācu, baltu un āriešu saiknes un kopīgās saknes un skaidrotas žurnāla lasītājiem.

Referāta mērķis ir salīdzināt un raksturot abus kultūras izdevumus, secināt par to atšķirībām un kopīgajām iezīmēm, kā arī vērtēt, kā tie veica savu uzdevumu attiecīgajā politiskajā sistēmā.

Kristaps Jumis

Daugavpils University, Vienības street 13, Daugavpils, aha6@inbox.lv

RESTORATION OF DAUGAVPILS BEER BREWERY AFTER THE 2ND WORLD WAR, BASED ON ARCHIVE DOCUMENTS

The article aims to research the speed at which Daugavpils Beer Brewery restored its work and to compare it with other factories. Based on the document found in the Regional State Archive of Daugavpils, mainly factory director directives and production reports, we can research the restoration of the operations. This includes information about the state of the factory buildings, its equipment, and the amount of workers. Through this information, we can see how the factory operated during its restoration. There has been similar research done regarding heavy industry and building material factories, as well as food factories, yet the work and the development of beer breweries during the soviet period is not widely researched.

Aleksandrs Šehordanovs

Daugavpils University, Vienības street 13, Daugavpils, aleksandrzhordanov@gmail.com

SOCIAL CONDITIONS OF WORKERS IN THE REZEKNE FERROCONCRETE CONSTRUCTION PLANT (1957-1990)

Keywords: *industry, working conditions, social conditions.*

Industry has always been an integral part of our history. The development of industry has improved many areas of our lives, but it is worth asking the question of what happened at industrial enterprises with workers, that is, with the development of industry, it is also worth paying attention to who worked at the enterprises and in what conditions this work was done. As has already become clear, this study will focus on the social conditions of workers. Since there are quite a lot of enterprises around the world, the Latvian Soviet Republic and specifically the city of Rezekne will be taken.

The Rezekne ferroconcrete construction plant, which was built in 1957 on February 1 and which existed until 2003, will be taken as an example. The period will be taken from the creation of the plant until the collapse of the Soviet Union to see how this plant worked during the period under review. When viewing the conditions at a given plant, documents will be reviewed that describe the conditions provided for workers and, just as importantly, the work of the workers' union will be reviewed. All information obtained from sources and literature should serve one purpose, namely to show under what conditions the workers worked during the allotted period.

Mārtiņš Vesperis

Daugavpils University, Parādes street 1, Daugavpils, marves@inbox.lv

SOME ASPECTS OF THE ACTIVITIES OF THE LATVIAN JEWISH HEALTH PROTECTION SOCIETY "OZE" (1923-1940)

During the Republic of Latvia (1918-1940), various organizations and societies operated in Latvia, one of the main goals of which was the fight of the tuberculosis. Among them are the Latvian Red Cross (1918-1940) and the Latvian Tuberculosis Control Society (1923-1938), as well as the Latvian Jewish Health Protection Society "Oze",

which was founded in 1923. In the Latvian State History Archive of the National Archives of Latvia is fund F 6511 of this society with 336 files. Also, the association itself regularly published and issued its activity reports, which provide a broad insight into its various activities.

The main activity goals of the "Ozes" society were: 1. establishment and maintenance of anti-tuberculosis support points - dispensaries; 2. establishment and maintenance of infant consultation points and milk kitchen "Milk drop"; 3. organize school hygienic work, create medical sections in them; 4. creation and maintenance of winter and summer playgrounds; 5. sanitary educational activity, preparation and distribution of propaganda material. In order to more successfully realize its goals, over time the association established branches in Riga, Daugavpils, Liepāja, Rēzekne, Līvāni, Ludza, Krāslava and elsewhere. 20th century At the end of the 1920s, the association maintained two tuberculosis dispensaries in Riga and Daugavpils, milk consultation points in Liepāja and Rēzekne; four children's playgrounds in Riga, Rēzekne and Liepāja and two children's summer colonies in Riga Jūrmala and Daugavpils. In 1929, in Jaundubultos, Jūrmala, Riga, the association "Oze" built and opened a children's colony with funds donated by Yudel Braun, where 250-300 Jewish children stayed every year. The second large children's colony operated in the Daugavpils summer cottage district in Stropos, which was built with funds donated by the world-famous sculptor Nohum Aronsons. On April 22, 1939, the Latvian Jewish Health Protection Society "Oze" was re-registered as the Jewish Health Protection Society "Oze".

In 1940, the society maintained tuberculosis protection points, X-ray rooms, mountain sun rooms, medical laboratory, consultation points for infants and grandchildren, dental offices, playgrounds, children's summer colonies and others. The association stopped its activity in August 1940, but its institutions were taken over by the health departments of local municipalities.

TIESĪBU ZINĀTNE

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LAW

Anita Kovaļevska

University of Latvia, Raina blvd. 19, Riga, anita.kovalevska@lu.lv

COMPETENCE OF ADMINISTRATIVE COURTS IN LATVIA: DOES THE LAW CONTAIN AN EXHAUSTIVE LIST OF TYPES OF APPLICATIONS?

There are different models of how judicial control over public administration is organised. These models can be characterised on the basis of various features, including whether or not the competence of the administrative court is exhaustively defined.

In Latvia, Article 103 of the Law on Administrative Procedure states that the task of the administrative court is to ensure judicial control over an administrative act issued by an authority or a real action (material act) of an authority, as well as to clarify the obligations or rights of a private individual in the field of public law and to settle disputes arising from a public law contract. Moreover, Article 184 of the Law on Administrative Procedure lists specific types of actions relating to an administrative act, a real action (material act), a public law contract or the establishment of a legal relationship in the field of public law.

However, the Constitutional Court in its judgment of 29 June 2018 in Case No 2017-32-05 noted that the law does not provide a specific and definitive formalised list of the types of cases falling within the jurisdiction of the administrative court. The legal literature also indicates that the competence of the administrative court is not exhaustively defined.

The paper therefore analyses whether the competence of administrative courts in Latvia is exhaustively defined in the Administrative Procedure Law.

Elizabete Bartansone

University of Latvia, Raiņa bulvāris 19, Rīga, elizabete.bartansone@gmail.com

KRĀPŠANA IZMANTOJOT INFORMĀCIJAS UN KOMUNIKĀCIJAS TEHNOLOĢIJAS

1. Pētījums ir aktuāls, jo pretēji stereotipiem, ka upuri parasti ir seniori, no noziedzīgiem nodarījumiem, kas veikti ar informācijas un komunikācijas tehnoloģiju palīdzību, parasti cieš personas vecumā, kas aktīvāk izmanto internetu (no 18 līdz 35 gadiem).

2. Pati sabiedrība tieši vai netieši atbalsta noziedzīgus nodarījumus tiešsaistē gan ignorējot, gan neziņojot par to. Līdz ar to šiem noziegumiem ir augsta latentuma pakāpe, kas bremzē likumdevēja spējas regulēt šo jautājumu, jo parasti likumdevējs var reaģēt tad, ja ir radusies situācija, kurai nepieciešams risinājums.

3. Latvijas normatīvie akti un tiesas spriedumi kļūst modernāki, ieviešot tajos funkcionālās ekvivalences principu, kas nosaka: "kas ir nelikumīgs reālajā vidē, tādām jābūt arī tiešsaistē", mazinot praktiķu iespējamās neskaidrības, izmeklējot nodarījumus, kas izdarīti tiešsaistē.

4. Mūsdienās ir manāma daudzu krāpšanas veidu atbalstīšana sabiedrībā, ja tie tiek attaisnoti vai pamatoti ar cēlāku mērķi. Tas sarežģī cīņu ar noziedzīgiem nodarījumiem informācijas un komunikācijas jomā.

5. Neviena starptautiska vienošanās neparedz veidu, kā noteikt jurisdikciju kibernetizētos, valstu attiecīgās institūcijas nosaka to pārrunu ceļā. Tomēr tā kā konflikti kļūst arvien izplatītāki, pārrunas objektīvi nav universāls jurisdikcijas noteikšanas paņēmieni.

6. Likumdevējam ir jārod balanss starp funkcionālās ekvivalences principu un teoriju, ka vienādu noteikumu piemērošana tiešsaistē un bezsaistē varētu radīt haosu, ņemot vērā lielās atšķirības vidē un jāveido sistēma, kurā viegli varētu ziņot par piktākerēšanas mēģinājumiem vai viltus zvaniem pat, ja kaitējums nav radies.

Silvija Stupāne (Kotāne)

Daugavpils Universitāte, Parādes iela 1, Daugavpils, silvijakotane@inbox.lv

IMPACT OF FOREST USE VIOLATIONS ON CONSERVATION OF NATURAL DIVERSITY

Breaches of animal and forest protection rules in forest use, offences against the natural environment: statistics and impacts on changes in forest ecosystems, birds and animal populations; Measures to protect the natural environment: establishment, monitoring of micro-reserves, actions to preserve natural diversity.

Iwona Lasek-Surowiec

State Academy of Applied Sciences in Chełm, Pocztowa 54, Chełm, Poland, isurowiec@panschelm.edu.pl

PREPARATIONS FOR THE INTRODUCTION OF THE DIGITAL EURO IN THE EUROPEAN UNION - LEGAL APPROACH

In 2023 European Commission presented a "Single currency package". It contains draft additional provisions. Under these rules, the digital euro is intended to complement cash and be available to the general public. As a central bank digital currency, it is to be directly supported by the ECB. The package includes, among others, proposals for the legal framework for the possible introduction of a digital euro. To date, the ECB has published three progress reports on the project's objectives and "key design options" that have been approved by its Governing Council. The ECB will decide on the introduction of a digital euro only after the Council and Parliament have adopted the appropriate final legal framework.

The lecture will include an assessment of preparations for the introduction of the euro digital currency in the EU in the light of current legal regulations.

MENEDŽMENTS

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MANAGEMENT

Anna Dembovskaya, Irēna Kokina

Daugavpils Universitāte, Parādes iela 1, Daugavpils, Latvija, LV-5401, dembovka@gmail.com

Daugavpils Universitāte, Parādes iela 1, Daugavpils, Latvija, LV-5401, irena.kokina@du.lv

DAUDZDIMENSIONĀLĀ PIEEJA RAŽOŠANAS PROCESA KVALITĀTES NODROŠINĀŠANAI PUBLISKAJĀ UN KOMERCIĀLAJĀ SEKTORĀ LEAN TRANSFORMĀCIJAS KONCEPTA IETVAROS

Raksts ir veltīts kvalitātes izpētei Lean filosofijas koncepta ietvaros. Uzskatot *Lean* filosofiju par vienu no galvenajām iespējām publiskā un komerciālā ražošanas sektora efektivitātes uzlabošanai, tiek atrisinātas daudzas ražošanas procesa problēmas komerciālo un sabiedrisko pakalpojumu nodrošināšanā reģionos un valstī kopumā, kas neapšaubāmi uzsver šīs tēmas aktualitāti. Rakstā īpaša uzmanība veltīta ražošanas procesa kvalitātes noteikšanas formām un to analīzei vairāku dimensiju griezumā. Uz valsts iestāžu un komercuzņēmumu piemēra izpētīti ražošanas procesā radušies zudumi un parādītas dažādas pieejas to mazināšanai.

Atslēgvārdi: kvalitāte, daudzdimensionālā pieeja, *Lean* filosofija, ražošanas zudumi.

Jolanta Rimša-Auguceviča

Daugavpils University, Parādes street 1, Daugavpils, jolanta.rimsha@inbox.lv

EMOTIONAL INTELLIGENCE MANAGEMENT IN A HYBRID WORK ENVIRONMENT

Hybrid work is a mixed model of work that involves organizing work both-on-site in company premises and remotely, outside the company. The rise of this combined work model was observed during the COVID-19 pandemic, when employers faced the challenge of ensuring uninterrupted operations in new circumstances. Today, hybrid work is a product of society's digital transformation, facilitating effective and mutually beneficial work relationships. Adapting corporate culture to changing life circumstances is one of the key tasks of sustainable leadership to increase employee productivity, in the same time promoting team cohesion. To maintain a favorable internal climate in your organization, leaders need to take care of their own and their team's emotional intelligence, which is the ability to perceive and process the hidden information in emotions. For each person, emotions are a call to action, so it is important to ensure that this call is directed towards improving personal effectiveness. In hybrid work conditions, emotional intelligence is a powerful tool, which helps leaders identify key issues in employees engagement and develops a strategy to achieve the best results.

Keywords: hybrid work, emotional intelligence, leader, emotions, employee effectiveness and productivity.

The academic literature & many journal discussed individually on retention, expansion & international relation, which played important role to make the proposal. In academic literature, there are some specific discussions that easily understand to obtained the knowledge which is directly impact on proposed topic. It is highly interested to complete the research & expect the proposed topic will be added in academic literature after completion the research & contribute the education & business sector near future. Global Business by international relation covers with important key factors, these are development, recognition, employment, resource, sales, locations, investment, diversity, jobs, cost countries, cultures, society, region as well as relationship in broad aspect, which is mentioned shortly in academic decision.

As findings of academic literature view this analysis has focused only on business retention & expansion which is determined on business, local economic development, sales, employment & build relationships with individual company executives to promote a sense of loyalty. It is an ongoing process by the long-term strong relationship & build the network in business community. The ultimate aim of business retention & expansion is to stimulate local economic development by cooperating existing businesses increase, their sales and employment, through a combination of programs. An effective retention strategy insists community leaders to informed about possible changes that existing businesses may be under the planning. If these plans involve a reduction in jobs, it gives the community advanced notice and time to prepare. At the time of the expansion, most of the companies also

consider other locations of achieving their objectives at the minimum possible cost as well as attraction of new investment for business expansion into the community. Commonly, more jobs are created by business expansions than by new business start-ups. The concern leaders must stay informed and make every effort to ensure that these changes and expansions benefit their communities. Global business Programme makes relation between private & public sector & both stakeholders allow the mobilization of more resources, ideas, and contacts to identify problems in the proposed area.

Farook al Masud

GLOBAL BUSINESS BY INTERNATIONAL RELATIONS

the concept discusses an international system that focuses more on issues of power, security, peace & business. However, in international relation studies, there are a relationship among countries, cultures, societies, which is considered only purpose of business. In order to understand the business dimension of globalization through the international relation, the changing nature of interaction, the growing financial market and the role of labor must all be understood. It is necessary to acknowledge the etiquette essential for sustainable international relation & only way to truly understand overseas customer in a multinational context. Some issues focused in literature, which is very important to understand business concepts all over the world by international relation. International relations can play a significant role in business retention & Expansion. Here are some ways in which international relations can impact the expansion & retention of businesses.

Marcin Oskierko¹, Sławomir Żurawski²

¹ *University College of Applied Sciences in Chełm, Poczтовая 54, 22-100, Chełm, Poland, moskierko@panschelm.edu.pl*

² *University College of Applied Sciences in Chełm, Poczтовая 54, 22-100, Chełm, Poland, szurawski@panschelm.edu.pl*

SECURITY MANAGEMENT DURING THE MIGRATION CRISIS ON THE POLISH-BELARUSIAN BORDER

The migration crisis on the Polish-Belarusian border was triggered by Lukashenko's regime and is linked to the presidential elections in Belarus. Repression and persecution have been used against the opposition, independent media and civil society. In response, the EU imposed further sanctions and restrictions. UE also did not recognise the presidency of A Lukashenka, who, in order to force the EU to lift sanctions and change its decision, implemented the operation „Lock” prepared in 2010-2011. Since August 2021, thousands of Middle Eastern migrants, with the support of the Belarusian government apparatus and the participation of uniformed services, have been trying to cross the Polish-Belarusian border and entered into the territory of Poland. The migration crisis organised by Belarus is intended to lead to internal destabilisation, weaken the position of the Poland and introduce divisions in the EU.

Marcin Oksierko¹, Sławomir Żurawski²

¹ *University College of Applied Sciences in Chełm, Poczтовая 54, PL 22-100 Chełm, Poland, moskierko@panschelm.edu.pl*

² *University College of Applied Sciences in Chełm, Poczтовая 54, PL 22-100 Chełm, Poland, szurawski@panschelm.edu.pl*

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Joe Mari N. Flores

**WORK ENGAGEMENT AS A FUNCTION OF PSYCHOLOGICAL
EMPOWERMENT, SELF-EFFICACY AND JOB SATISFACTION AMONG
FINANCIAL MANAGERS**

The main objective of the study is to examine the influence of psychological empowerment, self-efficacy and job satisfaction on work engagement towards financial managers in Davao Region, Philippines that could be beneficial to management leaders and employers of various entities. Results of this study are based on the data gathered from respondents who are finance and accounting related leaders, supervisors and managers through dissemination of adopted and modified questionnaire. The data was analyzed and interpreted using mean, Pearson (r), and linear regression analysis

Result of this study shows that the level of psychological empowerment, self-efficacy, job satisfaction and work engagement are all very high. In addition, the results indicate a positive significant relationship between the independent variables namely psychological empowerment, self-efficacy and job satisfaction towards work engagement which is the dependent variable. Thus, the null hypothesis of the three relationships in this study are rejected. This implies that psychological empowerment, self-efficacy and job satisfaction influence the work engagement of financial managers in Davao Region, Philippines.

MATEMĀTIKA

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MATHEMATICS

Anita Kiričuka

Daugavpils University, Vienības street 13, Daugavpils, anita.kiricuka@du.lv

ON BOUNDARY VALUE PROBLEMS FOR LIÉNARD TYPE EQUATION

The generalized Liénard type differential equation is studied together with the two-point linear boundary conditions of the Sturm-Liouville type. The existence and multiplicity of solutions are considered. The existence under suitable conditions is shown to follow from the lower and upper functions theory. For multiplicity, the polar coordinates approach is used. The multiplicity results are based on the comparison between behavior of solutions near the trivial one, and solutions near the special one, which is preassumed to be non-oscillatory. The existence of the latter is required. It is shown also, that these conditions are fulfilled for a relatively broad class of equations. Some examples are constructed, which are supplied by comments and illustrations.

Inara Yermachenko¹, Armands Gritsans²

¹Daugavpils University, Parādes street 1a, Daugavpils, inara.jermachenko@du.lv

²Daugavpils University, Parādes street 1a, Daugavpils, armands.gricans@du.lv

POSITIVE SOLUTIONS OF SECOND-ORDER BOUNDARY VALUE PROBLEM WITH THREE PARAMETERS

We study the existence of positive solutions of the second order boundary value problem $T''+(1-a)/r$ $T'+Fe^T=0$, $T(R)=0=T(1)$, where a is a real number, F is positive number and $0<R<1$.

The results obtained allow us to formulate a number of statements about solvability of the problem under consideration depending on the values of one of the parameters a , F or R , if other two parameters are fixed.

Anita Sondore

Daugavpils University, Parādes street 1, Daugavpils, anita.sondore@du.lv

PROBABILITY PROBLEMS WITH TWO PARAMETERS

Mathematical problems with parameters offer a higher semiotic complexity level of mathematical activities. The study aims to collect suitable probability problems with at least two parameters for secondary school and university probability courses and provide them with recommendations about individualization of the study process of probability theory. Combinatorics and probability problems with one or more parameters can improve teachers' and students' competencies in understanding ideas related to probability theory and the parameter concept itself.

Keywords: *problems with parameters, probability theory, school education, higher education.*

MŪZIKA

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MUSIC

Evija Lagzdina

Daugavpils University, Parādes street 1, Daugavpils, Latvia

MUSICALLY THEORETICAL ANALYSIS OF GILDA'S ARIA "TUTTE LE FESTE AL TEMPIO" FROM GIUSEPPE VERDI'S OPERA "RIGOLETTO"

The research provides a theoretical analysis of the musical form and means of musical expression of Gilda's aria from Giuseppe Verdi's opera "Rigoletto". Comparative analysis of various interpretations of the aria is presented. The conclusion is drawn about the vocal and rhythmic specificity of the composition.

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Key words: *aria, musical form, interpretation.*

FILOLOĢIJA

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PHILOLOGY

Agnese Cera

RTU Liepāja, Lielā street 14, Liepāja, Latvia, agnese.cera@inbox.lv

MULTIMODALITĀTE UN MULTIMODĀLA DZIESMA LATVIEŠU VALODAS KĀ SVEŠVALODAS MĀCĪBU PROCESĀ: TEORĒTISKIE UN PRAKTISKIE ASPEKTI

Valodu apguvē gan Latvijā, gan pasaulē multimodalitātes jēdzienam pēdējos gados tiek pievērsta aizvien lielāka uzmanība. Par multimodālu tekstu izmantojumu izglītībā veiktie pētījumi un atziņas liecina, ka to lietojums mācību procesam ļauj kļūt daudzveidīgākam, jēgpilnākam un efektīvākam, attīstot gan lingvistiskas, gan komunikatīvas, gan sociokultūras prasmes. Latviešu valodas kā svešvalodas mācību procesā pieaugušajiem iesācēju līmenī novērotās tipiskākās pieļautās valodas kļūdas liek meklēt efektīvākos veidus, kā iespējami iedarbīgi tās novērst, piemēram, ar dažādu modu jeb informācijas nodošanas līdzekļu palīdzību. Referātā uzmanība tiks pievērsta pašam multimodalitātes jēdzienam un svarīgām atziņām par to svešvalodu apguvē, kā arī doktorantūras studiju pētniecības procesā aktualizētajam multimodālas dziesmas izmantojumam latviešu valodas kā svešvalodas mācību procesā ar praktiskiem piemēriem no empīriskās pedagoģiskās pieredzes.

Amanda Sparāne

Daugavpils University, Parādes street 1, Daugavpils, amanda121@inbox.lv

WAYS OF (NOT) SEEING IN "THE OLD DRIFT" BY NAMWALI SERPELL

Key words: *magical realism, science fiction, identity, historical fiction.*

The title of the research paper is *Ways of (not) seeing in "The Old Drift" by Namwali Serpell*. Along various themes the novel *The Old Drift* encompasses, the theme of different ways of seeing, whether that be seeing through something (hair, tears), seeing nothing (being blind), or even being seen in a certain way comes up often in relation to different characters of different generations. *The Old Drift* can undoubtedly be considered a family novel, following three families and three generations, as they make their way and find it back to Zambia. The novel covers one hundred twenty years of Zambian history with a slight insight into the future.

Mainly focusing on the manifestation of magical realism and science fiction elements that relate to different ways of seeing, the various meanings they reveal about the characters and the socio-political situation of Zambia throughout history and in the vision of future are discussed. This paper argues that Serpell uses 'different ways of seeing' to provide us a different vision of history and the future, by using magical realism elements that closely connect to the identity of the characters and their establishment of 'self,' while challenging Eurocentric discourses; and by using science fiction elements that relate to the establishment of power that resonate on global level.

FIZIKA

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PHYSICS

Jans Kevis¹, Marina Krasovska², Eriks Sledevskis², Vjaceslavs Gerbreders², Irena Mihailova², Valdis Mizers²

¹*Daugavpils University, Parādes street 1, Daugavpils, jans.keviss@gmail.com*

²*G. Liberta Inovatīvās mikroskopijas centrs, Parādes street 1a, marina.krasovska@du.lv*

ENHANCING SALT STRESS TOLERANCE IN RYE WITH ZNO NANOPARTICLES: DETECTION OF H₂O₂ AS AN OXIDATIVE STRESS BIOMARKER VIA NIO NANOSTRUCTURE-BASED ELECTROCHEMICAL SENSOR

Salt stress in crops is a significant agricultural challenge, often resulting in reduced growth, yield, and overall plant health. Excessive salt levels in the soil can disrupt water uptake by plant roots, leading to dehydration and ion toxicity. In response to such stress, plants generate reactive oxygen species like H₂O₂ as signaling molecules. H₂O₂ accumulation serves as a crucial indicator of plant stress, as it plays a dual role - signaling stress responses and causing oxidative damage when accumulated excessively. Monitoring H₂O₂ levels serves as a valuable tool for assessing the extent of salt stress and implementing appropriate mitigation strategies to enhance crop resilience.

Nanoparticles offer promising solutions for enhancing stress tolerance in plants. Their unique properties enable them to regulate ion balance, boost antioxidant defenses, and modulate stress-responsive gene expression. Acting as carriers for beneficial molecules, nanoparticles deliver essential nutrients and stress-alleviating compounds directly to plant cells.

This study provides compelling evidence of the substantial positive impact of ZnO nanoparticles on enhancing resistance to salt stress in rye plants. Through exposure to nanoparticles during irrigation, a notable enhancement in the morphological characteristics of plants subjected to salt stress was observed. Moreover, significant improvements were noted in the concentration of chlorophyll within the plant samples, indicating enhanced photosynthetic activity crucial for plant growth and resilience. Additionally, a remarkable reduction in the levels of H₂O₂, a key indicator of oxidative stress, was detected in response to stress. The utilization of the NiO-based nanostructured sensor in this study has demonstrated its reliability in accurately detecting H₂O₂ within real samples characterized by complex chemical compositions

Valdis Mizers¹, Vjaceslavs Gerbreders¹, Irena Mihailova¹, Marina Krasovska¹, Eriks Sledevskis¹, Andrejs Bulanovs¹

¹*Daugavpils University, Parādes street 1, Daugavpils, valdis.mizers@du.lv*

MATHEMATICAL MODELING AND THEORETICAL INSIGHTS INTO THE MECHANISMS OF ELECTROCHEMICAL SENSORS

Electrochemical sensors are instrumental in the selective detection and quantitative analysis of chemical entities, finding extensive utility across environmental surveillance, biomedical diagnostics, and process control in industrial settings. This discourse aims to meticulously elucidate the mathematical theories and frameworks that constitute the operational backbone of electrochemical sensors, thereby delineating the fundamental principles that govern their functionality. Through a rigorous exploration of electrochemical thermodynamics and kinetics, particularly emphasizing the Nernst equation's role in elucidating the equilibrium potential and the Butler-Volmer equation in detailing electron transfer kinetics, this presentation seeks to provide a holistic understanding of sensor dynamics. By leveraging established theoretical models, the presentation intends to offer predictive insights into sensor responses under varied operational regimes, thus significantly contributing to the refinement and application of electrochemical sensing technologies. By delving into the established mathematical models and theoretical constructs, it is anticipated that this comprehensive exploration will not only augment the existing academic discourse but also catalyze the development of next-generation electrochemical sensors.

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Polina Maluhina, Andrejs Bulanovs

G. Liberts' Innovative Microscopy Centre, Department of Technology, Institute of Life Sciences and Technology, LV-5401, Latvia, polina.maluhina@du.lv

PRODUCTION OF PLANAR OPTICAL ELEMENTS BY OPTICAL LITHOGRAPHY

The aim of this work is the development of planar optical elements in micro size using the optical lithography method. Special attention is given to the fabrication of an array of Fresnel microlenses, axicon microlenses and regular microlenses, which are key components of optical technology. The paper discusses the technique of optical lithography to form diffractive structures on photoresist surfaces as well as useful optical properties and potential applications of these planar microstructures.

As a result of the research, lenses with the required properties were successfully fabricated and confirmed by microscopic examination. This is an evaluation of the quality and efficiency of the manufactured diffractive optical elements. This research supports the development of optical element technologies and offers potential applications in a variety of fields, including laser systems, medical devices and communication systems.

PSIHOLOĢIJA

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PSYCHOLOGY

Sergejs Andrejevs¹, Vitālijs Raščevskis²

¹*Daugavpils University, Parādes street 1, Daugavpils, sergejs193@gmail.com*

²*Daugavpils University, Parādes street 1, Daugavpils, Latvia, LV-5401, vitalijs.rascevskis@du.lv*

PATTERNS OF PARENT-CHILD RELATIONSHIPS IN LATVIAN EMERGING ADULTHOOD: A CLUSTER ANALYSIS APPROACH

The onset of emerging adulthood marks a crucial stage marked by substantial changes in family dynamics. The journey into adulthood marks a notable milestone in the developmental pathway of families, encapsulating the phases of parent-child disengagement, the integration of this detachment, and the reconfiguration of roles within familial frameworks. This person-centered study aims to identify clusters of perceived parent-child relationships. Perceptions of Parents Scales (POPS) were utilized to assess parent-child relationships, with the College-Student Scale measuring six subscales: mother and father Autonomy Support, mother and father Involvement, and mother and father Warmth.

The study comprised emerging adults (total N = 464, 56% women) aged between 18–29 (M = 21.20, SD = 2.83). Two-step cluster analyses were employed to create perceived parent-child relationship clusters. Hierarchical cluster analysis using Ward's method was conducted in the first step, followed by a k-means clustering procedure in the second step.

Perceived parent-child relationship clusters were categorized as low-quality family relationships, low mother and high father quality family relationships, high mother and low father quality family relationships, high-quality family relationships, moderately low-quality family relationships, moderately high-quality family relationships, and non-differentiated.