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BOOK OF ABSTRACTS

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The conference is an initiative of the Club of the Young Scientists at the Union of Scientists in Bulgaria – Plovdiv. The main goal of the conference is to provide an opportunity for young scientists from different countries to gain experience and confidence in presenting scientific ideas and results to the academic community, as well as to conduct scientific discussions with Bulgarian and foreign scientists.

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Plenary Session

THE SYMBOLISM IN THE MOSAICS WITH BIRDS AT THE EARLY CHRISTIAN BASILICA IN PLOVDIV

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The ancient Thracian city Plovdiv had numerous names over its 8000 years of history (including Puldin, Trimontium and Philippopolis). It served as a capital of the Roman province of Thrace and obviously it had a significant proportion of Christians at the dawn of Christianity. The Episcopal Basilica in Plovdiv was built in the first half of IV century at the time of the Emperors Constantine the Great and Licinius. It has been a bit smaller than the old St Peter's basilica in Rome, but larger than the first basilica in Constantinople at the time – St Irene. According to the archaeologists' hypothesis – such huge basilica could be built only with the Emperor's permission.

The Episcopal Basilica in Plovdiv was uncovered during the 1980s and its exclusive floor mosaics were restored and opened for the public in 2021. The crystallographic analysis shows that the mosaics tesserae are made of stones from the nearby Rhodopa mountain – i.e. most likely from a local Workshop. The mosaics are in two layers (one over the other) - the lower one from the first half of IV century, while the upper one from mid V century (a total of 2000 sq.m. of mosaics). The upper layer contains an exquisite mosaic carpet of birds. It includes 154 medallions with symbolic images (of these - 102 with birds, 77 very well preserved). This is the largest Early Christian mosaic carpet with birds discovered in Christendom. As per the author's hypothesis – this huge and expensive mosaic carpet could be made with the Emperor's permission - at that time Marcian, Emperor of the Eastern Roman Empire, a devoted Christian, canonised as Saint, who lived many years in Plovdiv (and was likely born in the city).

From the beginning of Christianity, pictorial symbols became part of the world of early Christians. Some of these symbols existed before that time, but then they were infused with a new meaning. The pictorial symbols were used not simply for decoration, but as an open pictorial book for the uneducated people, most of whom knew only their native language and could not follow the message of the church service (delivered in one of the three canonical languages of the church at these times – Hebrew, Latin and Koine-Greek).

The panels with birds have been used as a symbol of the Garden of Eden [Luke 13:18-19]. Most of the birds have also their own specific symbolism (e.g. peacock – symbol of immortality, quail – symbol of heavenly blessing, etc). Specific pictorial compositions with birds will be described in the presentation – such as the Spring of Life with birds, the Entrance panel with peacock of the Basilica, the combinations of birds depictions with images of chalices and panels with bread, birds in cage, etc.

The presentation also describes the specific symbolism of various birds in the floor mosaics of the Episcopal Basilica in Plovdiv. These are compared with images in other mosaic floors from Early Christian churches in various sites of the Roman Empire (Italy, Greece, the Balkans, Middle East, North Africa, etc). The explanations of the symbols is based on the established Christian symbolism, while their illustrations use the author's photographs, collected over 15 years from 25 countries. The author, a professor in Physics of Medical Imaging (Lead Editor of the "Encyclopaedia of Medical Physics"), has recently published part of his photographic collection in the book "Symbols in Christian Mosaics".

The analysis of the pictorial symbols in the mosaics of the Early Christian Episcopal Basilica in Plovdiv opens a window to the life, beliefs and aesthetics of the inhabitants of the city during the first centuries of Christianity in Europe.

Keywords: Early Christian art, Christian mosaics, Christian symbolism

THE PAST AS A KEY TO THE FUTURE – A GEOARCHAEOLOGICAL PERSPECTIVE DERIVED FROM COASTAL RESEARCH

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The past as a key to the future – a geoarchaeological perspective derived from coastal research.

Coasts are globally distributed ecosystems on all continents. They are threatened by a variety of hazards, which are presented here from a historical, archaeological and geological perspective. Short-term events such as storm surges, tsunamis and cliff failures occur rapidly, lasting only minutes or a few days, but often significantly alter coastal zones. The footprints of these extreme wave events are archived in several ancient coastal cities. Historically, the most dangerous long-term hazard has been the siltation of harbours, particularly in areas where port cities were adjacent to a river delta.

The main future coastal hazards are continued and accelerated sea-level rise and increased storminess (see IPCC 2023). This is illustrated by scenarios for the coastal area around the ancient Graeco-Roman city of Ampurias in Catalonia from 5500 BC to 2300 AD. How the research design led to these results and how the synopsis of different dating methods produced a robust chronology of events is also discussed.

Keywords: Coastal hazards, Geoarchaeology, Global Warming, Retrospective, Prognosis, Mediterranean

CHRONOS & TOPOS – THE MEDICAL HISTORY OF PLOVDIV

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The historical background of ancient Philippopolis, the rich tradition of medical schools over the centuries, memorable events and prominent physicians the city has seen, give reason to consider the medical history of Plovdiv as an indivisible part of our cultural heritage.

The lecture traces the chronological development of medicine as practice, art and science in the territory of Plovdiv and the region from the Antiquity to the end of the 19th century.

The first part includes the period from the establishment of the earliest settlement on the hills near-by Maritsa River during the Chalcolithic Age to the later division of the Roman Empire. The main focus is ancient medicine, which on the territory of Philippopolis unites the traditions of Thracian, Greek, and Roman healing practices. The second part covers the period of Plovdiv's existence within Byzantium, the First and Second Bulgarian Kingdoms. From a historical-medical point of view, this period is characterized by the emergence and consolidation of church-monastery medicine. The third part is devoted to medical practice from the period of Ottoman rule and the National Revival to the War of Liberation at the end of the 19th century.

Keywords: Plovdiv, medical history

WARS AND KIDNEY PATIENTS

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Wars are the most important man-made disasters, causing extreme medical and logistic problems. Healthcare provision is hampered during wars through infrastructural damage and lack of medical material and personnel. People living with kidney disease deserve special attention because their survival depends on functional infrastructure, specific drugs, and well-trained personnel. Both AKI and CKD patients are adversely affected by wars.

Etiology of AKI during wars is diverse, including polytrauma, gunshot and crush injuries, exposure to nephrotoxins and dehydration. Prognosis of war-related acute kidney injury (AKI) is unfavorable. Also, prognosis of all patients with chronic kidney disease (CKD) (i.e. those who do not need kidney replacement therapy and those living with dialysis or transplantation) are adversely affected from wars.

The most serious problems are observed in patients living with hemodialysis because it requires intact infrastructure and experienced personnel. Immunosuppressive state of transplant recipients may result in life-threatening infections, whereas stopping immunosuppressants cause graft loss.

During wars, displacement to other regions or to other countries is considered, whereas this relocation is associated with extra risks for kidney patients. Refugees are faced with unhealthy and unsecure conditions, both during displacement and at destination. Mitigating war-related medical and logistic problems is highly problematic. Overall logistic planning and nephrological planning, which includes preparation of medical and logistic relief scenarios to overcome personnel and material shortage, maintaining stocks of safe food and medications, and extensive education and training may be helpful to mitigate the risks and improve morbidity and mortality in kidney patients during wars.

Keywords: wars, acute kidney injury, chronic kidney disease

“Agricultural Sciences and Ecology” Session

LINK BETWEEN THE DECIDUALIZATION STATUS OF HUMAN DECIDUAL STROMAL CELLS AND THE TETRASPANIN EXPRESSION PROFILES IN A MODEL OF INHIBITED PREIMPLANTATION DECIDUALIZATION

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Human decidual stromal cells (hDSCs) are differentiated endometrial cells in the decidual niche where embryo implantation takes place. Among others, transmembrane CD9 and CD63 tetraspanins are receptors, presumably responsible for signal transduction, cell adhesion, cellular communication, etc. We aimed to explore a possible link between decidualization signaling pathways and regulation of CD9 and CD63 expression in hDSCs. Therefore, primary hDSCs were cultured with deciduogenic factors, and upstream signaling pathways were targeted by H-89 (PKA) and IFNγ (STAT5) inhibitory molecules to block decidualization. Indeed, treatment with H-89 suppressed decidualization and showed a decrease in mean prolactin levels vs normal decidualization (12.4 vs. 70.3). Similarly, treatment with IFNγ also demonstrated decidual inhibition (24.3 vs. 58.9). Decidualization of hDSCs upregulated CD63 receptor expression on the cellular membranes compared to the mock-treated time-matched controls (74.7 vs. 28.5), while the addition of H-89 and IFNγ led to its decrease (33.78 and 43.5 respectively) compared to normal decidualization. In contrast, decidualization led to a decrease to CD9 receptor expression compared to controls (80.7 vs. 140.3). Changes to CD9 due to H-89 treatment were not statistically significant, while IFNγ induced a further decrease to CD9 receptor (57.6) compared to normal decidualization. qRT-PCR analysis showed no statistically significant changes to transcript levels between different treatments. In conclusion, CD63 is regulated through PKA and STAT5 and its membrane density could be linked to the decidual status of the hDSCs.

Keywords: reproduction, decidua, tetraspanins

Acknowledgements: The study is supported by project KP-06-N61/7 from the Scientific Research Fund, Bulgaria.

TRIBOACTIVATION OF PHOSPHORITE ORE – AN ECOLOGICAL APPROACH FOR THE PRODUCTION OF SOIL IMPROVERS

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Phosphorite is a phosphate-rich sedimentary rock that has found wide implementation in the production of soil improvers. However, before it can be used for such purposes, it needs to undergo processing where the gangue minerals are first removed from the ore. The traditional methods for the treatment of the ore include the application of mineral acids that serve as dissolvinig agents. The use of such chemicals is related to the production of solid-phase and gaseous technogenic waste, which in turn increases the environmental impact of the soil improvers. An emerging method that could lead to a more sustainable production is triboactivation. The technology does not require the use of mineral acids and allows for the manufacture of slow-release fertilizers that are water insoluble, thus preventing a possible contamination of underground waters.

This work investigates the effect of triboactivation on Tunisian phosphorite ore by varying the size of the grinding bodies (3 mm, 5 mm, 10 mm and 20 mm) used during the activation process, while keeping the activation time similar for all samples – 30 minutes. The samples were analyzed via powder X-ray diffraction (PXRD), X-ray fluorescence (WD-XRF) analysis and Fourier transform infrared spectroscopy (FTIR). The obtained results demonstrate differences in the tribochemical effect achieved as a result of the structural changes occurring in the phosphorite. The effect varies according to the different grinding bodies, with the most effective being those with sizes 3 mm and 5 mm.

Keywords: phosphorite ore, triboactivation, soil improvers, environmental impact, sustainable production

RECONSTRUCTION OF RECIPES FOR THE PREPARATION OF ANCIENT SUSTAINABLE BUILDING MATERIALS

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Clay is one of the oldest building materials in the world, whose use dates back for thousands of years. Its application can vary, from being used on its own, as well as in combination with other materials like stone, wood, lime, as well as for the manufacture of different types of construction products – plasters, bricks, tiles, etc. Nowadays, with the impending threat of climate change, conventional materials such as cement pose a serious problem for the building sector, as its production process is associated with a very high environmental impact. In order to reduce such emissions and increase the sustainability of buildings, the implementation of natural materials is once again becoming widespread.

This work investigates the production technology of ancient sustainable building materials, as their recipes can be applied as a foundation for the creation of modern ones. The investigated samples include clay wall plasters from 6 archaeological sites during the Roman Age and Late Antiquity. The samples were studied by phase (X-ray phase analysis and infrared spectroscopy) and thermal (TG/DTG-DSC) methods. The mineral composition of the source clay (illite-montmorillonite type) and three temperature ranges of thermal treatment were determined: 500- 700°C and 700 - 817.5°C - the plaster was part of a thermal facility, or formed during burning; up to 500°C - thermal treatment after application and drying, with no relation to burning and thermal facilities. A decrease in the plaster's ability to absorb moisture was also established, with the increasing of the temperature during thermal treatment.

Keywords: ancient recipes, building materials, clay, sustainability

Acknowledgements: The authors gratefully acknowledge New Bulgarian University, the Department of Natural Sciences and the Geology laboratory – BF.

ANALYSIS OF GENETIC DIVERSITY IN BULGARIAN COMMON BEAN ACCESSIONS THROUGH MICROSATELLITE MARKERS

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The common bean (*Phaseolus vulgaris* L.) is a significant legume crop globally for the future nutrition of the population, used in crop rotations and intercropping, rich in protein and dietary fiber, a good source of vitamins (like B) and minerals (Ir, Mg, Po). Characterizing genetic diversity through molecular markers based on the microsatellites within and between common bean accessions helps for conserving genetic resources, it ensures the preservation of rare alleles, maintains a broad genetic base, and accelerates the breeding of new common bean varieties with desirable traits for future breeding.

The present study analyzes Bulgarian common bean accessions through 7 SSR and 14 ISSR reactions. As a result, we found 4 SSR reactions amplified polymorphic profiles, and the rest 3 amplified monomorphic profiles. From the 14 performed, 11 ISSR reactions allowed us to identify polymorphic profiles. The polymorphism through the ISSR reactions ranged from 18.65 % to 87.50 % in the analyzed genotypes. Microsatellite markers are powerful tools in the molecular characterization of the common bean for analyses of genetic diversity.

Keywords: Common bean; *Phaseolus vulgaris* L.; Genetic diversity; microsatellite; markers

Acknowledgements: ERA-NET CORE Organic (DIVERSILIENCE) (МОН—КП06ДО-02/7); RER/5/024 and BUL/5/020 funded by FAO/IAEA.

BACILLUS COAGULANS M WITH HIGH ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY FOR INCLUSION IN PROBIOTIC PREPARATIONS

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One of the requirements for the inclusion of spore-forming bacteria as probiotic supplements for animal feed, for food supplements for humans, as well as in the composition of plant protection preparations is that the strains have clearly expressed antimicrobial activity against pathogenic and saprophytic microorganisms. In a series of experiments, the antibacterial and antifungal activity of the biomass (B) and the acellular supernatant (ASN) of the cultural medium of Bacillus coagulans M after the cultivation of the strain in three different cultural media (molasses medium, malt medium and mesopeptone broth medium) was determined. Both the biomass and the acellular supernatant were shown to exhibit significantly high antifungal activity (dzones = 9 to 37 mm) against pathogenic fungi of the genera Aspergillus, Penicillium, Fusarium and yeasts of the genera Candida and Saccharomyces. The antibacterial activity against pathogenic bacteria of the species Escherichia coli, Salmonella enterica ssp. enterica serovar Enteritidis, Salmonella abony, Staphylococcus aureus, Listeria monocytogenes, Pseudomonas aeruginosa, Bacillus cereus was weaker (dzones = 8 to 32 mm). It was found that Bacillus coagulans M showed higher antimicrobial activity when grown on molasses medium, followed by malt medium and mesopeptone broth medium.

Keywords: Bacillus coagulans, bactericidal, fungicidal activity, biomass, supernatant

SURVIVAL OF BACILLUS COAGULANS STRAINS IN SIMULATED CONDITIONS OF THE GASTROINTESTINAL TRACT

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One of the main requirements for strains with probiotic potential is their resistance to the conditions in the gastrointestinal tract. The survival of two Bacillus coagulans strains under simulated conditions of the gastrointestinal tract - pH=2 + pepsin, pH=4.5 + pancreatin and pH=8 + pancreatin - was investigated. Vegetative cells and spores of both strains were shown to retain their viability under these extreme living conditions. Vegetative cells have been confirmed to be more sensitive compared to spore forms.

The resistance of the two *Bacillus coagulans* strains to the most commonly used antibiotics in clinical practice was also examined. Vegetative cells of *Bacillus coagulans* M and *Bacillus coagulans* BJ were found to be sensitive to a significant proportion of the antibiotics included in the study, with the exception of bacitracin, ampicillin and tobramycin. This in turn reveals the possibility of including these strains in the composition of probiotics.

Keywords: Bacillus coagulans, simulated gastrointestinal conditions, bile salts, antibiotics

INVESTIGATION OF THE REPRODUCTIVE AND ACID-FORMING ABILITY OF LACTIPLANTIBACILLUS PLANTARUM STRAINS ISOLATED FROM SPONTANEOUSLY FERMENTED SOURDOUGH

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The reproductive and acid-forming capacity of 6 strains of *Lactiplantibacillus plantarum* isolated from spontaneously fermented sourdough of spelt, barley, spelled and wheat at two different temperature regimes - 30±1°C and 37±1°C - was investigated. The Lactiplantibacillus plantarum strains grew equally well at both cultivation temperatures, with viable cell concentrations exceeding 1011 cfu/cm^3 at the 24th hour. The Lactiplantibacillus plantarum strains changed the acidity of the medium at both growth temperatures, and after 24 hours of cultivation, the titratable acidity exceeded 200 ºT. This in turn makes the strains suitable for inclusion in the composition of sourdough starters for the production of bread and bakery products.

Keywords: Lactiplantibacillus plantarum, reproductive capacity, acid-forming capacity

STUDY ON THE ENZYME ACTIVITY OF LACTIPLANTIBACILLUS *PLANTARUM* PH2 ISOLATED FROM SPONTANEOUSLY FERMENTED WHEAT FLOUR SOURDOUGH

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The enzymatic profile of *Lactiplantibacillus plantarum* Ph2 isolated from spontaneously fermented wheat sourdough was investigated. *Lactiplantibacillus plantarum* Ph2 was found to possess the enzymes alkaline phosphatase, lipase C 14, leucine arylamidase, valine arylamidase, cysteine arylamidase, acid phosphatase, β-galactosidase, α-glucosidase, β-glucosidase and α-glucosaminidase. A study was conducted for the expression of amylolytic and proteolytic activity of the selected strain *Lactiplantibacillus plantarum* Ph2. The strain was shown to exhibit high amylolytic and proteolytic activity.

Keywords: *Lactiplantibacillus plantarum*, proteolytic activity, amylolytic activity

PREPARATION AND CHARACTERIZATION OF FERMENTED PROBIOTIC CEREAL BEVERAGES FROM OAT AND CHICKPEA FLOURS

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Fermented probiotic cereal drinks were obtained from oat and chickpea flours, by means of targeted fermentation with the probiotic strain Lactiplantibacillus plantarum 13/20 and the selected yeast strain Saccharomyces cerevisiae 25-G. The physicochemical properties of the beverages obtained from oat and chickpea flour were determined. Single-strain controlled fermentation processes with Lactiplantibacillus plantarum 13/20 and Saccharomyces cerevisiae 25-G at a temperature of 15°C was carried out. The probiotic drinks were obtained by mixing the fermented media in a ratio of 1:1 or 1:0.6, with the subsequent addition of sugar. An organoleptic evaluation of the prepared fermented beverages was carried out. The changes in the acidity, the number of active cells of yeast and lactobacilli during storage at a temperature of 4±2°C was monitored. The resulting fermented beverages with Lactiplantibacillus plantarum 13/20 and Saccharomyces cerevisiae 25-G carry high concentration of viable lactobacilli cells. The addition of sugar to the mash after the fermentation extends the shelf life of the fermented drinks by 4 times. The resulting fermented drinks from oat flour and chickpea flour carry a significant amount of viable cells of the probiotic Lactiplantibacillus plantarum strain along with all the useful ingredients from the flour mass, which turns them into probiotic functional foods.

Keywords: cereal beverages, Lactiplantibacillus plantarum, fermentation process

“Chemistry and Physics” Session

A DFT APPROACH TO THE IMPLEMENTATION OF THREE GALLIUM-BASED COMPLEXES IN THE "TROJAN HORSE" ANTIBACTERIAL STRATEGY

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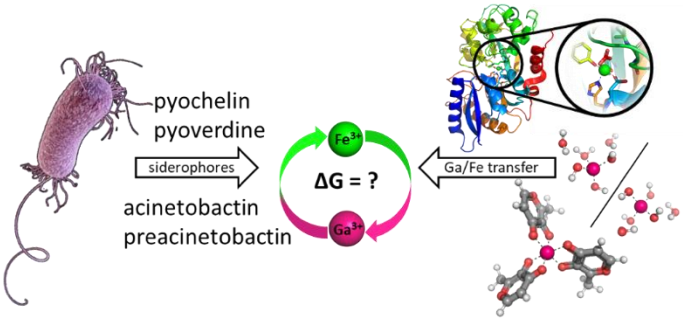
The emergence of multidrug-resistant (MDR) microorganisms combined with the ever-draining antibiotic pipeline poses a disturbing and immensely growing public health challenge that requires a multidisciplinary approach and the application of novel therapies aimed at unconventional targets and/or applying innovative drug formulations. Hence, bacterial iron acquisition systems and bacterial $Fe^{2+/3+}$-containing enzymes have been identified as a plausible target of great potential. The intriguing "Trojan horse" approach deprives microorganisms from the essential iron. Recently, gallium's potential in medicine as an iron mimicry species has attracted vast attention. Different Ga3+ formulations exhibit diverse effects upon entering the cell and thus supposedly have multiple targets. The aim of the current study is to specifically distinguish characteristics of great significance in regard to the initial gallium-based complex, allowing the alien cation to effectively compete with the native ferric ion for binding the siderophores secreted by two representatives of the ESKAPE group *P. aeruginosa* and *A. baumannii*. Therefore, three gallium-based formulations were taken into consideration: the first-generation gallium nitrate, $Ga(NO_3)_3$, metabolized to Ga3+-hydrated forms, the second-generation gallium maltolate (tris(3-hydroxy-2-methyl-4-pyronato) gallium), and the experimentally proven Ga carrier in the bloodstream – the protein transferrin. We employed a reliable in silico approach based on DFT computations in order to understand the underlying biochemical processes that govern the Ga3+/Fe3+ rivalry for binding the two bacterial siderophores.



Keywords: ESKAPE, siderophores, gallium, iron, DFT

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SYNTHESIS OF *N*-FLURBIPROFEN SUBSTITUTED 1,2,3,4-TETRAHYDROISOQUINOLINES THROUGH AN INTRAMOLECULAR ALPHA-AMIDOALKYLATION REACTION IN MECHANOCHEMICAL CONDITIONS

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Isoquinoline alkaloids are a large group of natural products in which 1,2,3,4-tetrahydroisoquinoline (THIQ) is an important class. THIQ-based natural and synthetic compounds exhibit diverse biological activity against various infectious pathogens and neurodegenerative diseases.

In our ongoing pursuit of environmentally friendly synthesis methods, we have successfully adapted the intramolecular α-amidoalkylation reaction for mechanosynthesis conditions. This mechanochemically assisted, solvent-free α-amidoalkylation reaction was utilized to create new derivatives featuring a flurbiprofen fragment within an isoquinoline framework. Our approach employs PPA/SiO_2 as a catalyst, which provides the essential proton environment needed for the reaction to proceed efficiently.

Keywords: green chemistry, mechanosynthesis, amides, 1,2,3,4-tetrahydroizoquinolines

Acknowledgements: We are grateful for the financial support of the Research Fund of Plovdiv University, project ФП23-ХФ-005.

A BOUND DINEUTRON AND POSSIBLE FORMATION OF AN ATOM WITH TWO NUCLEI

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In this work, we present our results to indirectly observe a bound dineutron in the (n, 2n) nuclear reactions on 159Tb, 197Au and 175Lu and its properties. In particular, there are estimates of the binding energy of a bound dineutron in a singlet state, its radius and possible half-lives. As a neutron excess nucleus, the dineutron must possess electron decay with the formation of the deuteron and the electron antineutrino instead. To get to the final confirmation of a bound dineutron, its decay product must be observed. Then to observe the dineutron it is necessary to measure an electron spectrum due to dineutrons decay. From this spectrum, we can derive the endpoint energy and even an experimental half-life. To proceed, the Geant4 model has been developed to simulate the decay of bound dineutrons and detect electrons. The results obtained provide a positive assurance to detect a bound dineutron within the 190-560 keV energy region of the instrumental beta spectrum.

Should the dineutron exist, after its decay the following nuclear structure could be formed: the heavy nucleus, in the potential well of which the dineutron may be settled, and the deuteron, as a dineutron decay product. Being located together at a very small distance, the heavy nucleus and the dineutron could present a nuclear molecule, which will correspond to an atom without an eponymous nucleus. For instance, 158Tb as a reaction product of the 159Tb (n,2n) nuclear reaction, and the deuteron, as a decay product of the dineutron, might be interpreted as an equivalent of the 160Dy nucleus and a dysprosium atom, correspondingly. However, 160Dy is a stable isotope and researchers may benefit from using such a nuclear-atomic structure, bearing the properties of a stable atom and radioactive nucleus in it.

Keywords: terbium, nuclear reactions, dineutron, deuteron, nuclear molecule

MODIFICATION OF CYTOSTATIC ACTIVITY OF SOME ANTICANCER DRUGS BY IRRADIATION WITH HIGH-ENERGY ELECTRONS

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The study investigates high-energy electron irradiation's impact on doxorubicin's properties. Changes in absorption spectra, cytotoxic effects on LLC cells, and duration of modification are examined. Irradiation enhances drug efficacy, with persistent effects observed.

Keywords: doxorubicin, high-energy electrons, drug efficacy

Acknowledgements: L. L. Aslamova, M. A. Zabolotnyy

INFLUENCE OF THE EXTRACTION METHOD ON TOCOPHEROL CONTENT IN TOBACCO SEED OIL

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The tocopherols are biologically active compounds in vegetable oils. They are commonly referred to vitamin E known as liposoluble compounds. This study is delved into the tocopherol content present in tobacco seed oil from the Krumovgrad 58 variety sourced, cultivated under organic production. Various extraction methods, including Soxhlet apparatus, maceration, and ultrasonic extraction, are employed to extract the oil. Solvents of different polarities, namely hexane, ethyl acetate, and a mixture of hexane/acetone (1:1, v/v), are utilized in the extraction process. Comprehensive analyses are conducted to ascertain both total and individual tocopherol compositions within the tobacco oil. The results represented tocopherol concentrations ranging from 221 mg/kg to 291 mg/kg, contingent upon the specific solvent and extraction technique employed. Furthermore, γ- and δ-tocopherol are identified within the samples. In conclusion, the individual tocopherol content remained consistent across varying solvent types and extraction methodologies, suggesting minimal influence from these factors. The highest total tocopherol content is achieved by Soxhlet apparatus in the presence of hexane and ultrasonic extraction or maceration in the presence of ethyl acetate.

Keywords: tobacco seed oil, tocopherols, extraction

FUTURE PERSPECTIVES OF THE ESSENTIAL OIL OBTAINED FROM A WILD POPULATION OF *CRITHMUM MARITHMUM* L.

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The natural evolution of the halophyte plants is associated with the development of specific mechanisms and the production of specific phytochemicals to resist the harsh conditions of their natural habitats. We have investigated the chemical composition of an essential oil isolated from a wild population of the Bulgarian halophyte Crithmum maritimum L. The most abundant compound was phenylpropanoid dillapiole (34.09%). The isolated essential oil seems to have a prominent potential to be included in novel pharmaceutical products targeting different therapeutic areas. Moreover, Crithmum maritimum L. essential oil could find a successful application as a biopesticide.

Keywords: *Crithmum maritimum* L., essential oils, halophyte

STACHYS GERMANICA L. ESSENTIAL OIL – FUTURE PERSPECTIVES

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The Lamiaceae plant Stachys germanica is used in Serbian, Turkish, and Iranian traditional medicine, but little is known about its pharmacological potential. This research aims to close this gap by investigating the chemical composition of the essential oil (EO) extracted from Bulgarian wild-grown S. germanica L. and comparing it with essential oils from other regions.

The chemical profile of the essential oil was characterized using gas chromatography analysis with mass spectrometry. Oxygenated monoterpenes emerged as the most abundant terpene class, constituting 59.30% of the total EO composition. The Bulgarian essential oil was noteworthy for having a unique chemical profile that included more than 50% camphor, which was absent from EOs from other areas. Significant concentrations of the diterpene geranyl p-cymene (10.49%) were also found.

Providing insights into possible pharmaceutical applications, this study is the first thorough examination of the essential oil content from Bulgarian Stachys germanica L. The findings highlight the EO's encouraging potential as a natural remedy or therapeutic agent for a range of medical conditions. In addition to its potential applications in medicine, EO shows promise as a biopesticide and repellent, providing a safer and more environmentally friendly alternative to traditional pesticides.

These findings open the door to more investigation into the biological effects and beneficial uses of EO obtained from Stachys germanica L.

Keywords: Stachys germanica, essential oil, camphor

SPASMOLYTIC ACTIVITY OF NOVEL MEBEVERINE DERIVATIVES

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Mebeverine. HCl is a heterocyclic compound that belongs to a group of medicines called Antispasmodics. It is used to treat symptoms of irritable bowel syndrome (IBS), the very common condition which causes spasms. There is a great demand for both developments of new antispasmodic agents and new manufacturing processes for existing antispasmodic agents. Therefore, the present study focuses on the synthesis and biological evaluation of a novel anthranilic acid hybrid and its diamides as antispasmodics. Due to the predicted in silico methods spasmolytic activity, we synthesized a hybrid molecule of anthranilic acid and 1-(3,4-dimethoxyphenyl)-propan-2-amine. The obtained hybrid was then applied in acylation with different acyl chlorides. Using in silico analysis, pharmacodynamic profiles of the compounds were predicted. The PASS online predicted the potential spasmolytic and anti-inflammatory activity, for the target compounds, which are a permanent interest for our studies. The obtained results demonstrate that the hybrid molecules inherit spasmolytic activity and anti-inflammatory capabilities, making them powerful candidates for future medications.

Keywords: synthesis, hybrid molecules, anthranilic acid, in silico, spasmolytic activity, anti-inflammatory activity

STUDY OF THE SPECTRAL PROPERTIES OF BENZOCAMALEXIN

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In recent years, the structure-activity relationship of the various synthetic analogues of Camalexin (1) is extensively studied. It is known that SAR-based modified analogues exhibit diverse biological activity. The broad-spectrum study of Benzocamalexin (2, Figure 1) is of interest, due to the possibility of its application as a chemotherapy agent for the treatment of various types of cancer.

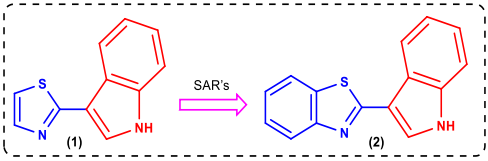

Figure 1.

Benzocamalexin was obtained by a multicomponent reaction of α-amidoalkylation. The present study is focused on the UV absorption spectra including absorption maximum of the Benzocamalexin related to its potential future application as a UV-filter.

Keywords: Benzocamalexin, UV absorption spectra

Acknowledgements: This study is financed by the European Union-NextGenerationEU, National Recovery and Resilience Plan of the Republic of Bulgaria, DUECOS BG-RRP-2.004-0001-C01, №: D23-FC-001.

ANALYSIS OF PHOTOSYNTHESIS AND ANTIOXIDANT CAPACITY OF PERENNIAL FORAGE GRASS SPECIES AND VARIETIES

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The study was conducted on the following species (and varieties): perennial ryegrass (*Lolium perenne* L.) variety Tetramis, tall fescue (Festuca arundinacea Schreb.) variety Albena, meadow fescue (Festuca pratensis Huds.) breeding population, red fescue (*Festuca rubra* L.) ecotype Ravnogor, and smooth bromegrass (Bromus inermis Leyss.) variety Nika.

The analyses of antioxidant capacity (two different methods) and photosynthetic activity of light phase (chlorophyll fluorescence) were carried out at the Institute of Forage Crops – Pleven, Agricultural Academy, Bulgaria, during the summer and autumn growth periods.

Results indicated a significant reduction in photosynthetic activity of the light phase (determined from the performance index) in perennial ryegrass and red fescue throughout the summer and autumn growth periods. However, the primary photochemical reaction at photosystem II decreased very slightly there, suggesting low levels of photoinhibition and thus low stress. Tall fescue, variety Albena has the highest photosynthetic activity of the light phase. The highest antioxidant capacity was observed in smooth bromegrass, variety Nika.

Keywords: Lolium perenne, Festuca sp., Bromus inermis, chlorophyll fluorescence, photosynthetic activity

COMPREHENSIVE ANALYSIS OF THE EFFECT OF RENEWABLE ENERGY ON THE STABILITY OF THE ENVIRONMENT

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This work represents a review of the effect of renewable energy on the stability of the environment through generating clean energy with no greenhouse gas emissions and lowering some types of air pollution by using comprehensive analysis of the processes such as consumption and production. It aims to audit the research articles in addition to the aspects and opinions to scrutiny and handle the challenges. Besides, creating an extensive vision aimed at completing research development by analyzing the published papers, patents, and industrial designs in this field. Furthermore, this present study aims to highlight on the efficient energy conversion systems, sources of greenhouse gas emissions as an attempt to reach an optimal solution to preserve the environment and climate through modern technologies. Renewable energy has unstable and indirect performance due to changing of the climate in the current era. The unstable characteristics lower the popularization and use of renewable energy resources. According to the energy consumption, analysis and studies of management system refer to the generation of photovoltaic power and wind power capacity data are predicted accurately by multiple models, which are combined with an optimal control solution equation to manage it scientifically with high efficiency.Therefore, the utilization efficiency of renewable energy sources by electricity will be improved and made considerable contributions to improving the capacity of green energy and keeping the environment lower polluted.

Keywords: Renewable energy, Solar energy, Optimization of energy resources, Climate change, Environmental pollution

BIOLOGICAL ACTIVITY OF RHAPONTICUM CARTHAMOIDES EXTRACT ON ISOLATED GASTRIC SMOOTH MUSCLES FROM RAT

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The main bioactivities of Rhaponticum carthamoides (R. carthamoides) are adaptogeneous, with a broad spectrum of biological effects, including antioxidant, immunomodulatory, antimicrobial, antiparasitic, anticancerogenic and repellent activities. This plant has great potential for therapeutic qualities.

The current study aims to investigate some of the biological activity of R. carthamoides through in vitro methods using isolated smooth muscle (SM) tissues.

A cytotoxic effect of R. carthamoides extract was studied on the primary cell culture from rat stomach smooth muscle using xCELLigence RTCA-DP system (ACEA Biosciences). The contractile activity and reactivity of SM tissues were isometrically recorded with the Tissue Organ Bath System (AD Instruments).

R. carthamoides in different doses changes the contractile activity of gastric smooth muscles. At low doses, R. carthamoides induces a contractile response. At higher doses, the extract induces a relaxation in the SM samples. The real-time cell vitality analysis, based on a measurement of the impedance of adherent cells, demonstrated cytotoxicity of high concentrations of R. carthamoides extract and slowing down cell proliferation due to treatment with lower concentrations. An average IC50 value for the rat stomach SM cells was estimated at 26 μM ± 1,3 μM.

R. carthamoides promotes biological activity in isolated SM samples and primary SM cell cultures. Clarifying the specific cellular mechanisms requires further investigation and future usage in the pharmaceutical industry.

Keywords: isometrical smooth muscle studies; in vitro; phytoextract; Rhaponticum carthamoides

СИНТЕЗ, СПЕКТРАЛНА ХАРАКТЕРИСТИКА И КРИСТАЛНА СТРУКТУРА НА НОВО МЕРОЦИАНИНОВО БАГРИЛО С ПОТЕНЦИАЛНИ НЕЛИНЕЙНИ ОПТИЧНИ СВОЙСТВА

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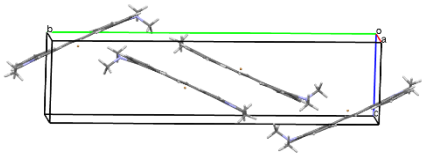
Синтезирано е ново мероцианиново багрило и е охарактеризирано спектрално и структурно. Багрилото се синтезира чрез алкилиране на 4-метилхинолин и последваща кондензация на *Knoevenagel* на получената кватернерна сол с алдехид. Елементарната клетка на кристала съдържа четири молекули на багрилото, участващи в слаби междумолекулни взаимодействия (Фигура 1.).



Фигура 1. Елементарна клетка на мероцианиновото багрило

Въз основа на информацията, получена от рентгенов дифракционен анализ, бяха изведени структурни параметри, свързани с нелинейните оптични свойства.

Ключови думи: merocyanine dyes, crystal structure, nonlinear-optical properties

Acknowledgments: This study is financed by the European Union-NextGenerationEU, National Recovery and Resilience Plan of the Republic of Bulgaria, DUECOS BG-RRP-2.004-0001-C01, №: D23-FC-001

“Phyology, Pedagody and Art Menagement” Session

КЪМ ВЪПРОСА ЗА ПРЕДПОЛОЖИТЕЛНИТЕ ФОРМИ В СЪВРЕМЕННИЯ БЪЛГАРСКИ ЕЗИК И ФУНКЦИОНАЛНИТЕ ИМ ЕКВИВАЛЕНТИ В ИТАЛИАНСКИЯ ЕЗИК

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Обект на настоящото изследване е гамата от езикови средства, с които се изразява предположително значение в българския и италианския език. Въпросът за категориалния статут и семантиката на формите несъмнено предизвиква особен интерес сред изследователите на българския език. Най-важното от теоретична гледна точка е да се отнесат *ще да*-формите към определено място в езиковата система. За да опитаме да намерим решение на въпросите, ще съпоставим българския с език, несроден на него, какъвто е италианският.

Ключови думи: презумптивни/предположителни форми, презумптивно значение, модалност, наклонение, функционално-семантична категория

GENEALOGY OF THE DYSTOPIAN IN YEVGENY ZAMYATIN'S NOVEL *WE*

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The emphasis in the report is placed on the problem of structuring the anti-utopian novel *We* by Yevgeny Zamyatin. The anti-utopian model of the world in the novel is reconstructed through analogies with fundamental civilizational constructs in the history of humanity. An attempt has been made to trace the genesis of the anti-utopian from utopian visions in philosophy and literature, to which the author opposes. Some symbolic constructs of utopian thinking are inscribed in the figurative system of the novel. Within the panorama of ancient myths, biblical plots, as well as ideas and motifs from world philosophy and literature, Zamyatin creates the anti-utopian model not only of the "ideal" totalitarian state but also his myth of the new humanity and the prospects for the development of dehumanized society in the 20th century. The novel *We* is a response to the total pressure of ideological "monotony" proclaimed by the Russian Revolution of 1917, the consequences of which were foreseen as early as 1920 by Yevgeny Zamyatin in his novel.

Keywords: genesis, myth, dystopia, novel, Y. Zamyatin

ВЪПРОСНИК ЗА ИЗМЕРВАНЕ НА УМЕНИЯТА ЗА АРГУМЕНТИРАНЕ НА УЧЕНИЦИТЕ

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Въпросникът цели да измери уменията за аргументиране на учениците по биология и здравно образование в гимназиален етап. Разработен е във връзка с педагогическо проучване. Базиран е върху три основни критерия: генериране на аргумент, генериране на контрааргумент и оценка на опровержения. Включени са въпроси с избираем и със свободен отговор. Целта е да бъдат проследени нивата за генериране на аргументи, които се явяват продукт на аргументацията.

Ключови думи: въпросник, биология и здравно образование, умения за аргументиране, гимназиален етап, критерии

COMMUNICATION AS A SPATIAL MODEL IN CHRISTO'S PROJECTS

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Communication and the dialogue between art and the public are problematic, which is as old as much of aesthetic thought. Research in this relatively undeveloped and poorly studied area began at the end of the 19th century. This article is a short overview and analysis of communication channels and patterns of interaction of Christo's work with different audiences as well as the effects achieved by their use.

Keywords: communication, art management, communication models, Christo, projects

РОЛЯТА И ПРИЛОЖЕНИЕТО НА АРТТЕРАПЕВТИЧНИЯ ПОДХОД ПРИ ОБУЧЕНИЕТО НА СТУДЕНТИ – БЪДЕЩИ УЧИТЕЛИ В ПРЕДУЧИЛИЩЕН И НАЧАЛЕН ЕТАП

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В статията е разгледан арттерапевтичният подход, който представлява иновативна и ефективна методика в подготовката на бъдещи учители за предучилищен и начален етап. Този подход акцентира върху развитието на емоционална интелигентност, креативност и умения за разрешаване на проблеми чрез използването на изкуството. Включването на арттерапията в провеждането на упражнения със студенти, в предмети, свързани с изобразително изкуство и преподаване, не само подобрява техните педагогически компетенции, но и подпомага личностното им развитие, мотивацията за работа, които са от съществено значение за бъдещата работа с деца. В статията са приведени примери и анализирани резултати.

Ключови думи: изкуство, педагогика, арттерапевтичен подход, обучение

DIAGNOSTICS OF STUDENTS' ECOLOGICAL KNOWLEDGE AND ATTITUDES TOWARDS ENVIRONMENTAL PROTECTION IN THE STUDY "MAN AND NATURE" DISCIPLINE IN 6TH GRADE

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A didactic test for diagnostic of the ecological knowledge and attitude of pupils to the problems of the environment in the process of teaching "Man and nature" (6th grade) is presented. The results are dicussed and analyzed concerning the ecological education of the students in chemistry.

Keywords: ecological education, subject "Man and nature" 6th grade

“Social Sciences” Session

UNLOCKING POTENTIAL: REIMAGINING STRANDZHA NATURE PARK'S UNSANCTIONED MANAGEMENT PLAN THROUGH TOURISM GOVERNANCE ECOSYSTEM APPROACH

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Strandzha Nature Park is the largest protected nature area in Bulgaria, holding potential not only for nature conservation and upholding of cultural heritage but also for tourism activity. However, since its foundation in 1995, the park has never had a legitimate management plan accepted by the authorities and the wide spectrum of stakeholders, corresponding to the IUCN's recommendation, and enabling the realization of its potential. This study utilizes qualitative document analysis to evaluate the only publicly available, yet unsanctioned, version of the crafted management plan from 2005. The analysis is conducted from the perspective of contemporary ecosystem approaches to tourism destination governance. Additionally, content analysis of news and other media pieces is employed to uncover the ramifications of the lack of a management plan for Strandzha Nature Park. The study holds theoretical implications as it bridges the gap between management plans of protected areas and the underresearched topic of ecosystemic governance of tourism destinations. Furthermore, it offers practical insights for practitioners, particularly authorities, managers, and stakeholders associated with Strandzha Nature Park, by providing possible directions for further exploration and updating of the management plan draft.

Keywords: Strandzha Nature Park, management plan, tourism destination governance, ecosystem approach, business ecosystem

GLOBALISATION VERSUS DEGLOBALISATION: GEOPOLITICAL IMPLICATIONS FOR THE ENERGY SECTOR

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In the past few years a new trend has been noted and explored by researchers in the field of politics, economics and international relations – that of deglobalization. While for many years national economies have been enjoying the benefits of the globalization of trade and resources, recent political events such as the conflict in Ukraine have paved the way towards a different approach in terms of energy resources and economy – increased regulation and straying away from the mechanisms of the free market. This in turn has led to geopolitical implications, which have formed new energy blocs, aimed at energy resources trade based on political aims and ambitions. Through empirical analysis the aim of this paper is to explore how the world is seemingly moving away from globalization to deglobalization, how political instruments and regulation have interfered within the sphere of energy resources and whether this is beneficial for the countries at the national level. This is also analyzed in the context of climate change and the policies that are aimed at fighting these changes.

Keywords: globalisaiton, deglobalization, energy resources, climate change

THE VALORIZATION OF LIFE: RESILIENCE AND HUMAN CAPITAL

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Human capital and resilience are frequently utilized policy catchwords. They both suggest and interplay a connection to broader concepts such as economic development and sustainable development. In critical theory, the analysis of human capital extends to a comprehensive critique of neoliberalism, scrutinizing the subjects it engenders – individuals transformed into "investors in themselves" compelled to continuously innovate their "working capacity" (Arbeitsvermögen) to keep pace with the demands of supermodern capitalism. Additionally, critical theory, employing the discourse of resilience, accentuates the inherent calamity of a world where uncertainties, risks, and threats are normalized. The present paper seeks to delve into the supermodern dynamics of biopower, exploring the resilient governmentality of grievable and ungrievable lives (Judith Butler), and the supermodern shift from the "production of man himself" as conceptualized by Karl Marx to Michel Foucault's notion of the "production of human capital", along with the concomitant shift of the valorization of life's time into human capital.

Keywords: biopower, human capital, resilience

THE CREATIVE FILM PRODUCER – ENVIRONMENTAL DEVELOPMENT CONDITIONS: THE BALKANS

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The producer is a key figure in film production, bridging the creative and business sides of the industry. Despite the significant role both financially and creatively, there is a scarcity of research dedicated to the creative producer. The Balkans, on the other hand, provide remarkable examples of producers thriving in a turbulent environment.

This study aims to identify the characteristics that shape the development environment for creative producers in the Balkan region.

The research employs a mixed methodology. Data has been collected from national film centers, international political reports, and statistical databases. These data are analyzed and categorized as follows:

1. Characteristics of cultural policies and tools in the region.
2. Distribution opportunities and exploration of the local film market – audience, cinemas, sales platforms, etc., and their potential.
3. Production capabilities. Investigation of existing services, film production infrastructure, and professional education opportunities.

Field studies were also conducted through semi-structured interviews with 25 producers from the region. By comparing all the analyses, the environment in which producers operate is depicted, and the causal relationships for their professional behavior and work patterns are presented.

The report outlines the factors that determine the behavior of film producers from the Balkans, providing insights into potential successful strategies and business models in the region based on theories of cinema and the creative industries.

Keywords: film industry, creative producer, film production, cultural policy, art management

ИЗСЛЕДВАНЕ НА ЗРИТЕЛСКОТО ВЪЗПРИЯТИЕ НА 360-ГРАДУСОВ ФИЛМ ВЪВ ВИРТУАЛНА РЕАЛНОСТ

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Изследването има за цел да проучи как зрителите се ориентират в пространството във виртуална реалност, доколко и как се проследяват композиционните елементи на 360-градусови аудио-визуални произведения.

За целите на изследването е използван българският филм „Контрол" с реж. Саша Хаджиева. Изборът на този филм е мотивиран, на първо място, от жанра – танцов филм – в него няма говор и съответно езикът не влияе на възприятията на зрителите. На второ място, филмът е подходящ, защото композицията му се състои от пет сцени, всяка от които е решена с различни структуриращи елементи.

Филмът е представен на 10 души, 5 мъже и 5 жени, на възраст от 20 до 30 години. Използват се очила за виртуална реалност Oculus Quset 2, свързани със специализиран софтуер за анализ на данните, следящ погледа на зрителя във всеки момент. Данните се представят чрез т. нар. хиит мапс (heat maps) и могат да бъдат анализирани спрямо заложените в сцените маркери. Изследването очертава трите основни фактора, които предопределят зрителското внимание във виртуалната реалност. Основно това е звуковият маркер, предварителен визуален насочващ маркер и монтажен маркер. Част от резултатите сочат към остатъчни навици във възприятието на зрителите като например гледане в неподвижно положение на 360-градусово видео. Това е остатъчен навик от гледането на 2D аудио-визуални произведения.

Изследването е крачка към разбирането и изграждането на езика и възможностите за водене на разказ във виртуалната реалност. Резултатите могат да бъдат полезни не само на изследователи в областта, но и на творци, бъдещи създатели на филми за виртуална реалност.

Ключови думи: виртуална реалност, очила за виртуална реалност, 360-градусово видео, хиит мап

SEGMENTATION OF THE TARGET AND SECONDARY CONSUMER SEGMENT – A FACTOR FOR THE POSITIONING OF THE COMPANY WITH A POSITIVE FORECAST FOR POPULATION GROWTH

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The present theoretical-empirical development is directed to the study of the problems faced by every enterprise, namely the analysis of the target and secondary segments, with which to achieve the maximum coverage of the market, for the maximum period of time. The positive growth of the population, for a long period of time, creates a prerequisite for the long life of the enterprise, on the market in which it operates. In this regard, the present work aims to refine the theoretical views on the segmentation of the target and secondary segments and on the thus constructed pedestal to present a forecast analysis of the population growth of the Republic of Bulgaria for the next few decades.

Keywords: segmentation, target and secondary segment, population growth, enterprise

COMPARATIVE ANALYSIS OF CONSUMER SATISFACTION FROM THE USE OF ITEMS FROM THE "MILK AND DAIRY PRODUCTS" GROUP OF GOODS

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The conducted survey of the specialized literature shows that consumer satisfaction and its research can be defined as an object of marketing and marketing research in recent decades. The desire of enterprises to create long-term relationships with their consumers increases the attention awarded to it. The current research interest is caused by the emergence of a number of questions that form the following research objective – to study the theoretical positions related to consumer satisfaction and, on the pedestal thus built, to carry out an empirical study of its manifestation from the use of articles from the "Milk and milk products" product group in two enterprises carrying out their activities on the territory of the Republic of Bulgaria.

Keywords: consumer satisfaction, marketing, items from the product group "Milk and milk products"

STRUCTURAL ANALYSIS OF THE PRICES OF CONSUMER PRODUCTS OFFERED ON THE BULGARIAN MARKET

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As one of the four main elements of marketing, along with product, advertising and placement, price can be predestined to be a profit driver unlike any other. In this regard, it can be noted that the current research is predetermined by questions related to the essential characteristics of prices and on the basis thus constructed to carry out an analysis of the changes in the prices of the offered consumer products.

Keywords: price, marketing, inflation, consumer products

ПОЛАГАНЕ НА ОСНОВИТЕ НА БЪЛГАРСКАТА ДЪРЖАВА БЛАГОДАРЕНИЕ НА ПОБЕДИТЕ НА КНЯЗ АСПАРУХ НАД ВИЗАНТИЙЦИ, АВАРИ И ХАЗАРИ

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България е основана през 681 г. Първият владетел на българската държава на юг от р. Дунав е княз Аспарух. Той идва с голяма войска до тези земи и с победата при Онгъла над Източната Римска империя (Византия) успява да получи признание за новата държава. За нас е добре, че той е бил силен, способен и прозорлив владетел и е наследен също от такъв – княз Тервел. Това е основната причина Първото българско царство да се закрепи на географската карта на Европа и да просъществува близо три века и половина. През това време България заедно с Византия са водещите държави на Балканския полуостров.

Ключови думи: България, Аспарух, военни победи, Балкански полуостров

SUSTAINABLE HUMAN RESOURCE MANAGEMENT IN THE CONTEXT OF CIRCULAR ECONOMY: IMPACT AND BENEFIT ANALYSIS

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The transition towards a circular economy necessitates a profound transformation in various organizational practices, particularly in the realm of Human Resource Management (HRM). This study explores the concept of Sustainable Human Resource Management (SHRM) within the context of a circular economy, focusing on the impact and benefits it brings to organizations. By integrating principles of sustainability and circularity into HRM practices, businesses can enhance resource efficiency, promote employee engagement, and achieve long-term competitive advantages. The research examines key SHRM strategies such as green recruitment, continuous professional development, employee retention, and eco-friendly workplace practices. Through a comprehensive impact and benefit analysis, this study highlights the positive outcomes of adopting SHRM, including reduced environmental footprint, cost savings, improved corporate reputation, and heightened employee morale. The findings suggest that embedding circular economy principles into HRM not only supports environmental goals but also drives organizational resilience and sustainability. This paper concludes with practical recommendations for HR professionals and organizational leaders to effectively implement SHRM strategies in their pursuit of a circular economy.

Keywords: Sustainable Human Resource Management, Circular Economy, Green Recruitment, Employee Engagement, Resource Efficiency

НАКАЗАТЕЛНА ОТГОВОРНОСТ, НАКАЗАНИЯ И МЕРКИ, ПРИЛАГАНИ ПО ОТНОШЕНИЕ НА МАЛОЛЕТНИ И НЕПЪЛНОЛЕТНИ, В БЪЛГАРСКОТО ЗАКОНОДАТЕЛСТВО

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„Децата в конфликт със закона“ трябва да се приемат като деца в риск. В социалнопедагогическите интернати в България има и малки деца – между 8- и 11-годишни по данни на проведено от НСИ изследване през 2023 г. Социалната и икономическа ситуация в България поставя много деца и семейства в риск от извършване на противообществени прояви и престъпления. В българското законодателство не се търси достатъчно отговорност от родителите на децата, които са извършили противообществена проява, а за съжаление, те са тези, които карат детето да извърши дадено престъпление, а понякога дори злоупотребяват със собствените си деца. Наказва се детето, защото е извършило противообществена проява. В Наказателния кодекс на Република България освен наказания са предвидени и възпитателни мерки, които имат доста сложен характер, тъй като, макар да са различни от наказанието, си остават държавна принуда. В доклада се разглеждат някои ключови въпроси относно наказателните и възпитателните мерки, които се прилагат относно децата – малолетни и непълнолетни правонарушители. Разглеждат се основни характеристики на възпитателните мерки при децата, видовете и условията, при които се прилагат. На база на направения анализ са формулирани определени изводи и препоръки по отношение на законодателната и институционалната рамка на тези действия.

Ключови думи: деца, малолетни и непълнолетни правонарушители, принцип на пропорционалност, възпитателни мерки, престъпления

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THE PROVISION OF NON-FINANCIAL INFORMATION ACCORDING TO THE BULGARIAN LEGAL IMPERATIVE

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This article examines some problems in accounting reporting in relation to the provision of non-financial information according to Bulgarian legislation. Instead of emphasizing the importance and capabilities of accounting for accurate, correct and full-content non-financial information, the Bulgarian legal imperative focuses on the obligation of this reporting.

Keywords: non-financial information, accounting, Bulgarian legislation

STUDENT SATISFACTION WITH CAREER CHOICES AND MARKET REALIZATION

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Admittedly, the leading factor in students choosing their studies pertains to their realization and satisfaction in the labor market. This article aims to explore and describe the indicators that facilitate finding a direction and achieving development towards improving the opportunities for realization in the labor market. The purpose of the paper is to outline the main indicators related to the market evaluation and the payment of labor. The focus is on the South Central region and Plovdiv region. Also important is the emphasis placed on the opinion of students and official data from secondary sources, and it is on their basis that important conclusions are highlighted in order to improve student realization in the region.

Keywords: Satisfaction, market realization, work, interaction, students

CHALLENGES AND OPPORTUNITIES FOR BUSINESS ORGANIZATIONS. EXPLORING REMOTE WORK

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In the past few years, technological advances have had an impact on the labor market. Digitalization, on the one hand, provides opportunities for development and progress, and, on the other hand, society faces several challenges in the work environment. The COVID-19 pandemic has had a serious impact on various spheres of public life: health, work environments, economy, technology, suppliers, tourism, and others. The possibilities of remote work continue to be more and more popular. The current study aims to explore attitudes, opportunities, and risks in this line of work. Thus, a clear picture of the challenges and obstacles of the new digital environment will emerge.

Keywords: remote work, opportunities, business, prospect, challenges

СЪЩНОСТНА ХАРАКТЕРИСТИКА НА ВЗАИМООТНОШЕНИЯТА С КЛИЕНТИТЕ (НА ПРИМЕРА НА ВАКАНЦИОННА КЪЩА ЗА ОТДИХ „ДРИЙМ ПОИНТ“)

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Управлението на взаимоотношенията с клиентите може да се определи като бизнес стратегия за създаване на дългосрочни и взаимноизгодни взаимоотношения с клиентите чрез разбиране на техните индивидуални потребности. Този модел на взаимодействие предполага, че клиентът е център на философията на бизнеса, а основни направления и цели са дейностите по поддръжка на ефективен маркетинг, продажби и обслужване на клиенти. Това предполага необходимостта от насочване на вниманието на настоящото теоретико-емпирично проучване към провеждането на задълбочен анализ на теоретичните възгледи за същностната характеристика на взаимоотношенията с клиентите и на така формираната основа да се направи емпирично проучване на мненията на клиентите, ползващи услугите, предоставени от ваканционна къща за отдих „Дрийм Поинт“.

Ключпви думи: управление на взаимоотношенията с клиентите, ваканционна къща за отдих „Дрийм Поинт“, маркетинг, продажби, обслужване на клиенти

CUSTOMER RELATIONSHIP MANAGEMENT (EXAMPLE OF DREAM POINT HOLIDAY HOME)

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In economic literature, the concept that customer relationship management is defined as a marketing approach aimed at retaining existing customers and attracting new ones is brought forward. From this point of view, it can be stated that the main goal of the present research is related to the analysis of theoretical arguments pertaining to the management of customer relationships and on the pedestal thus built to carry out an empirical study of the opinions of customers using the services provided by Dream Point Vacation Home.

Keywords: theoretical reasoning customer relationship management dream point holiday home

СПЕЦИФИЧНИ ОСОБЕНОСТИ НА СЪЩНОСТТА НА КЛИЕНТСКАТА УДОВЛЕТВОРЕНОСТ (НА ПРИМЕРА НА ВАКАНЦИОННА КЪЩА ЗА ОТДИХ „ДРИЙМ ПОИНТ“)

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Проведените проучвания на специализираната литература показват, че клиентската удовлетвореност представлява специфична материя на маркетинга, която изисква задълбочен анализ. На базата на редица изследвания може да се отбележи, че всеки бизнес ежегодно губи средно между 10% и 30% от своите клиенти. За да се установят причините за това явление, е необходимо да се анализира клиентската удовлетвореност. В маркетинговата литература удовлетвореността на клиента се възприема като комплексна категория. Тя се изгражда от четири елемента, които са във взаимна връзка и зависимост, а именно: отговор, фокус, време, динамика. Във връзка с това може да се отбележи, че основната цел на настоящото практико-приложно проучване е да се анализират теоретичните постановки за същността на клиентската удовлетвореност и на така съставения постамент да се осъществи емпирично изследване на клиентската удовлетвореност от употребата на услугите, предоставени от ваканционна къща за отдих „Дрийм Поинт“.

Ключови думи: клиентска удовлетвореност, ваканционна къща за отдих „Дрийм Поинд“, отговор, фокус, време, динамика

ARTIFICIAL INTELLIGENCE IN HR – BENEFITS AND POTENTIAL PROBLEMS

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As business domains change, human resource management (HRM) is faced with new challenges that must be addressed while ensuring the optimum growth and development of the organization. This research identifies the application of Artificial Intelligence (AI) technology in human resource departments as it relates to recruitment and selection, the onboarding process, retaining employees, compensation management, general employee management and employee retention.

Keywords: Artificial Intelligence, Human Resource management, Human Resources, Benefits, Potential Problems

TRENDS IN HUMAN RESOURCE MANAGEMENT IN THE DIGITAL AGE

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Recent decades brought about astonishing technologies that affected organizations in several ways. With the latest developments, organizations earned the capabilities to carry out their functions more efficiently and rapidly. Having several tasks affecting both interior and exterior customers, human resources departments also benefited from these technological developments.

Keywords: Digitalization, Human Resource Management, HR Thechnologies

RESEARCH ON SUSTAINABLE FOOD CONSUMPTION IN BULGARIA: STATUS AND TRENDS

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Modern food consumption is increasingly focusing on the possibilities of adapting to sustainability. Conceptual ideas of sustainability should be embedded in the development models of current and future food systems. The main goal of the present study is to analyze the dependencies of the sustainable consumption of food products, taking into account the incurred costs, and on this basis to interpret the emerging trends. Respondents of the survey of households in Bulgaria. The methodological framework of the study includes conducting regression analysis.

Keywords: sustainable consumption, sustainable food consumption, economic determinants of consumer

“Preclinical Medicine” Session

DEATH BY LACTIC ACID? THE IMPLICATIONS OF LACTATE IN HEALTH AND DISEASE – A LITERATURE REVIEW

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Lactate is an organic molecule and a normal product of glycolysis in cells. Since its discovery in the 18th century, it has been regarded as the metabolic waste of working muscle and oxygen deprived tissues – a harbinger of fatigue, acidosis and even death. Nevertheless, its role in regular metabolism and pathology has been challenged by compelling research in the last three decades, bringing a transformation in the understanding of its nature. The lactate shuttle hypothesis has been one of those revelations, which has revolutionized exercise physiology and brought astounding performance results to elite athletes. Moreover, its proposed role as a universal cellular fuel, a major gluconeogenic precursor, an important signaling molecule and a regulator of gene expression has given rise to a debate about the part it plays in normal physiology, but also in the pathophysiology of prominent medical problems such as acidosis, trauma, sepsis, brain injury, etc. Not all of its newfound glory, however, is positive in nature. It has been theorized and studied extensively whether lactate shuttling can indeed be maladaptive in cancer metabolism – promoting cancer cell regeneration and survival. Thus, this review explores an up-to-date understanding of lactate's origin and fate in physiology and pathophysiology.

Keywords: lactate, shuttles, acidosis, cancer

HAZARDOUS SPRING FOUNTAINS?

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Bulgaria is a country where most of the population has granted access to potable water. The safety of water is ensured by the constant monitoring performed by distributing companies and the Regional Health Inspectorate. Despite that, people are still using spring fountains that are not controlled by any institution. Plovdiv region could be assessed as heavily exploited by the industry and the agriculture, which creates a precondition for water contamination. The objective is to analyze the possible health hazards related to the use of spring fountain water in the Plovdiv region. Materials and methods - a literature review was performed regarding reported environmental pollution at industrial sites and mines. The recorded pollutants are assessed as hazards with long term impact on health. Descriptive and comparative methods were applied for the evaluation of the available data. Results and discussion - results from the performed analyses are presented as a mapping of a lot of spring fountains that are located in or close to sites of heavy industry or mining. This location along with absent quality control could pose high risk for contamination with heavy metals, radioacvtive elements or other pollutants that could significanty and negatively impact the health of consumers of spring fountain water. As a conclusion, from the performed research a recommendation for assessing the water quality of the most frequently used spring fountain sources is highlighted.

Keywords: spring fountain water, public health, environmental pollution

PERIADOLESCENT NPY DYNAMICS IN THE BED NUCLEUS OF STRIA TERMINALIS IN RATS AND A POSSIBLE LINK TO MALADAPTIVE STRESS COPING IN PUBERTY

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The bed nucleus of stria terminalis (BNST) is a complex structure involved in a wide variety of limbic functions like mood and stress coping in humans and rodents. As part of the extended amygdala it is involved in anxiety responses, addiction and food disorders. NPY is a novel neuropeptide which may participate in all of these aspects of limbic functions, especially in anxiety and food disorders, and it is well expressed in the BNST neurons, where it has anxiolytic and orexigenic effects. The medial anterior subnucleus (BNSTMA) has the highest NPY-expression levels. Therefore, we set it as a task to investigate the adolescent alterations of the NPY expression levels in the BNSTMA in order to get an insight in the mechanisms of adolescent stress-coping and food disorders. We found that the expression of NPY in the BNSTMA was higher in preadolescent than in adult rats without a sex difference. Such a remarkable decrease in the NPY expression in puberty might explain the maladaptive stress coping, resulting in a high incidence of food and mood disorders in the adolescent period.

Keywords: Bed nucleus of stria terminalis, anxiety, puberty, rat

Acknowledgements: This study was financially supported by the Medical Science Council at the Medical University of Sofia (Grant № Д-171/03.08.2023).

ACTIVITY OF THE PENTOSE PHOSPHATE PATHWAY ENZYMES IN THE LIVER OF DIABETIC RATS WITH PRESERVED GLYCEMIA AND MELATONIN INJECTION

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Goal: to determine the enzyme activities of glucose-6-phosphate dehydrogenase (G-6-PDH), 6-phosphogluconate dehydrogenase (6-PGDH) and transketolase (TK) under conditions of preserved glycemia and melatonin exposure.

Material and methods. Experiments were carried out on male outbred white rats weighing 180±10 grams. Diabetes was induced by a single injection of alloxan monohydrate at the rate of 170 mg per kg of animal weight. Groups: 1) control; 2) preserved glycemia (≤6.9 mmol/l); 3) preserved glucemia with melatonin (5 mg/kg of body weight for a week at 8:00 a.m. daily). Groups were under conditions of constant light, darkness and the equinox. Animals were euthanized on the 19th day, taking into account ethical principles. Statistical processing was performed according to the Student.

The results. The activities of G-6-PDH, 6-PGDH in rats with preserved glycemia were 80% and 65% higher, respectively, than in control. In the liver of control animals that were under conditions of darkness, the activities of G-6-PDG, 6-PGDH, and TK increased by 40%, 30%, and 15%, respectively while under conditions of light, these activities decreased by 20%, 13% and 17%, respectively, in comparison with control under equinox. Under constant darkness and preserved glycemia the activities of G-6-PDG, 6-PGDH and TK increased by 117%, 96% and 32%, respectively; under constant light, these activities were 25%, 17%, and 25% lower, respectively, than in control under equinox. Administration of melatonin led to normalization of investigated parameters.

Conclusion. The pentose phosphate pathway of glucose-6-phosphate oxidation is normalized in diabetic rats with preserved glycemia due to melatonin administration.

Keywords: diabetic rats, liver, melatonin, pentose phosphate pathway of glucose-6-phosphate oxidation

THE INFLUENCE OF MELATONIN ON THE MAIN INDICATORS OF THE GLUCOSE-LACTATE CYCLE IN THE SKELETAL MUSCLES AND LIVER OF RATS WITH DEXAMETHASONE DIABETES

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Melatonin is considered a promising remedy against diabetic disorders.

Goal. To investigate the effect of melatonin on the Cori cycle in skeletal muscles and liver of rats under dexamethasone diabetes.

Materials and methods. The study was conducted on 45 male 18-month-old white non-linear rats, divided into three groups: 1) control, 2) rats with diabetes (daily subcutaneous administration of dexamethasone solution at a dose of 0.125 mg/kg body weight for 13 days), 3) diabetic rats were orally administered daily melatonin (Sigma, USA) at a dose of 10 mg/kg.

Glycogen content, pyruvate kinase and lactate dehydrogenase activities were determined in the skeletal muscles and liver of rats. The activity of glucose-6-phosphatase was determined in the liver of rats. Animals were treated according to ethical principles.

The reliability of the difference between the obtained indicators was assessed using the parametric Student's t-test (for normal distribution) and the non-parametric Mann-Whitney U-test (for non-normal distribution). Differences were considered probable at $p \leq 0.05$.

The results. In the skeletal muscles of diabetic rats, glycogen content and pyruvate kinase activity were 21% and 37% lower, respectively, and lactate dehydrogenase was 18% higher compared to the control. In the liver of diabetic rats, glycogen content and pyruvate kinase activity decreased by 33% and 32%, respectively, and lactate dehydrogenase and glucose-6-phosphatase increased by 20% and 56%, respectively compared with control.

The investigated parameters of diabetic rats, that received melatonin, did not differ from the parameters of control.

Conclusion. Melatonin prevents disruption of Cory's glucose-lactate cycle in rats with dexamethasone diabetes.

Keywords: melatonin, dexamethasone diabetes, Cori cycle

A CASE OF RIGHT-SIDED AORTIC ARCH A OF A 68 YEAR OLD PATIENT

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Right-sided aortic arch is a condition acquired during embryonic development. Right-sided aortic arch occurs in 0.01% to 0.1% of the population. The presence of right-sided aortic arch can be accompanied by various clinical symptoms such as esophageal compression, heart problems, compression of the recumbent nerve, and abnormal imaging findings. There are several classifications of these cases depending on the vessels emerging from the aortic arch, the relationship with the alimentary canal, and the presence of concomitant congenital heart defects. According to one of the classifications, there are 3 types of right aortic arch.

Type 1- The left subclavian artery arises together with the left common carotid artery. It is an exact mirror image of normal anatomy.

Type 2- The left subclavian artery arises as the last branch from the right standing aortic arch.

Type 3- Right-sided aortic arch with isolation of the left subclavian artery.

Our team examines the case of a 68-year-old man admitted to the ENT department for laryngeal surgery. From the imaging findings, 1 type of right-sided aortic arch with a mirror pattern of branching of the main vessels emerging from the arch is established.

Keywords: right aortic arch, mirror pattern of the arising vessels

Acknowledgements: Margarita Vlaykova and Lyubomir Chervenkov for this rare clinical case

THE SEVENTH CRANIAL NERVE AND ITS CLINICAL MANIFESTATION – BELL'S PALSY

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The facial nerve is one of the most essential and significant cranial nerves in human anatomy. It is displayed on the surface of the brainstem via a somatomotor and sensory root. For the most part, the nervus facialis is a somatomotor nerve and is responsible for the innervation of facial muscles. The nerve has one sensory and two parasympathetic nodes. Its branches are located in and outside the canalis facialis. Paralysis of the seventh cranial nerve is a relatively common pathological condition in clinical practice. The reasons for the occurrence of this type of pathology can be due to a supranuclear, nuclear or infranuclear lesion. The symptoms of Bell's palsy can be different. Cytomegaloviruses, coxsackieviruses and adenoviruses are among the leading etiological causes. The treatment is complex.

Keywords: facial nerve, somatomotor, cytomegaloviruses, paralysis, treatment

Acknowledgements: We thank Dr. Peter-Preslav Petrov for his advances and patience.

VARIATIONS AND CLINICAL SYNDROMES OF ANATOMICAL ELEMENTS IN INFRACLAVICULAR SPACE

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The infraclavicular space is located between the clavicle and the third rib. This is a small but extremely important area through which elements pass both from the neck to the axillary fossa and from the brachial region to the root of the neck. Here is located part of plexus brachialis, a.subclavia, v.subclavia, and their branches.

In cases of anatomical variations or changes in the normal location of the above elements, pathological symptoms occur, as well as difficulties in the visualization of certain anatomical structures. An example of this is the appearance of compression syndrome. The most common one is the costoclavicular syndrome, while the cervical rib syndrome and the scalenus syndrome are much rarer. The anatomy of the infraclavicular space is also important in the administration of peripheral infraclavicular anesthesia, and any change in the normal anatomy of the space could interfere with its performance. Knowledge of the normal anatomy and different anatomical variations of the infraclavicular space is a fundamental factor for good clinical practice.

Keywords: infraclavicular space, anatomical variations

AGE-RELATED EFFECTS OF THE AT1 RECEPTOR ANTAGONIST LOSARTAN ON COGNITIVE DECLINE IN SPONTANEOUSLY HYPERTENSIVE RATS

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Although both hypertension and ageing predispose the brain to cerebrovascular and neurovascular damage, particularly cognitive impairment, the relationship is complex and ageing is not a predisposing factor for hypertension. Losartan is a well-known angiotensin receptor blocker that is widely prescribed for high blood pressure. In addition to its beneficial effects on hypertension, some studies suggest that it may improve memory and have neuroprotective effects.

The aim of the present study was to compare the efficacy of the antihypertensive drug losartan in attenuating hypertension-induced cognitive impairment in young adult and middle-aged spontaneously hypertensive rats (SHR).

The expression of amyloid beta (Aβ1-42) and CREB was assessed in the hippocampus, a brain structure closely associated with memory. Middle-aged vehicle-treated rats showed poorer performance than their younger counterparts in hippocampus-dependent memory tasks, the radial arm maze test. Supplementation with the AT1 receptor antagonist losartan (10 mg/kg, i.p. for 14 days) corrected age-related memory decline in 14-month-old rats, but was ineffective in 3-month-old rats. Changes in memory-related signalling markers were also found in the hippocampus, between young adult and middle-aged rats. Losartan reversed these memory-related markers to control levels, particularly in middle-aged SHR. Our findings highlight the importance of considering age-related factors when studying hypertension-induced cognitive impairment and suggest potential therapeutic approaches targeting the renin-angiotensin system to mitigate hypertension-induced cognitive decline.

Keywords: losartan, hypertension, pharmacology

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CHANGE IN THE MYOCARDIAL MAS RECEPTOR EXPRESSION INDUCED BY ARONIA MELANOCARPA

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Angiotensin converting enzyme 2 (ACE2) plays a fundamental role in haemodynamics and is expressed in various organs, including the myocardium. The ACE2/Ang-(1-7)/Mas axis represents an endogenous counter-regulatory pathway within the renin-angiotensin system whose effects are opposite to the vasoconstrictive and proliferative effects represented by the ACE/Ang II/AT(1) receptor axis. With age, the second axis tends to dominate. The influence of age-related changes in myocardial ACE2 after supplementation with Aronia melanocarpa has been experimentally demonstrated.

The aim of the study was to determine the influence of Aronia melanocarpa on the ACE2/Ang-(1-7)/Mas axis in ageing myocardium.

Male rats (n=18) were divided into three groups: young controls (CY) - aged 2 months, old controls (CO) - aged 27 months and old animals aged 27 months supplemented with 10 ml/kg Aronia melanocarpa juice (AMJ) for 105 days.

An immunohistochemical and morphometric study was carried out on Sessions of left ventricular myocardium. The intensity of the immunoreaction for the Mas receptor in the myocardium of supplemented animals was significantly higher than in the old controls. A significant difference in the intensity of the immunoreaction was found between the young and old controls.

The results suggest a mechanism by which chokeberry affects the myocardium.

The present data support our previous finding of positive effects of aronia supplementation on ACE2 intensity in ageing myocardium. They confirm the beneficial influence of antioxidant functional foods on age-related changes.

Keywords: Aronia melanocarpa, ACE2, Mas receptor, ageing heart.

THE GASTROINTESTINAL HORMONE GHRELIN AND ITS PROTECTIVE ROLE IN GASTRIC MUCOSA INFECTED WITH HELICOBACTER PYLORI

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The oligopeptide hormone ghrelin is produced mainly by enteroendocrine ghrelin-producing cells in the gastric mucosa and is a potent anti-inflammatory mediator. By binding to specific receptors in the nuclei of the diencephalon, ghrelin participates in the formation of the acute feeling of hunger, and through receptors in the adenohypophysis, it releases the secretion of growth hormone. Ghrelin is also a powerful anti-inflammatory mediator.

Helicobacter pylori is a gram-negative bacterium found in the stomach of injected individuals. Attached to gastric epithelial cells, it causes an inflammatory response by producing toxins such as vacuolating cytotoxin A (VacA) and cytotoxin-associated gene A (CagA), which contribute to pathogenicity and damage to gastric tissues. Carrier patients may be asymptomatic or have abdominal pain, nausea, vomiting, and dyspepsia developing only after gastritis and peptic ulcer have developed. H. pylori carriers also have an increased risk of gastric carcinoma.

In patients with atrophic gastritis infected with H. pylori, reduced ghrelin levels are observed due to the destruction of the gastric wall, including ghrelin-producing cells by H. pylori. In patients with eradicated H. pylori infection, ghrelin levels are restored to normal, but not immediately, due to the slow regeneration of ghrelin-producing cells. This relationship highlights the potential role of ghrelin as a biomarker for the progression of atrophic gastritis.

Keywords: ghrelin, Helicobacter pylori, gastric mucosa, atrophic gastritis

THE ROLE OF BILE DUCTS AND GALLBLADDER CHOLANGIOCYTES IN BILE FORMATION AND GALLSTONE DISEASE

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Bile secreted by the hepatocytes emulsify the dietary fats. The formed lipid droplets have a larger total surface area for pancreatic lipase action which facilitate lipid digestion and absorption. Bile is a highly complex watery secretion that contains less than 5% solid constituents including bile salts, bilirubin phospholipid, cholesterol, peptides, amino acids, steroids, enzymes, porphyrins. Through the coordinated action of transmembrane transport systems, hepatocytes produce bile that passes through the biliary tree. Cholangiocytes from the intra- and extrahepatic ducts are actively involved in the modification of bile juice by absorption of of water, ions, bile acids, amino acids, glucose, and other molecules. The storage of bile juice in the gallbladder is also related to its physicochemical properties such as osmolarity, ionic composition and ionization, solubility micelle formation. This creates conditions for microcrystallization and growth of the microcrystals in concretions with different composition - cholesterol, pigment, mixed and development of cholelithiasis.

Keywords: cholangiocytes, bile secretion, gallbladder, gallstone disease

INTESTINAL MICROBIOTA AND INTESTINAL PERMEABILITY IN AUTOIMMUNE THYROID DISEASE

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A large number of commensal microorganisms colonize the human body and form a complex microecosystem, which is referred to as the microbiota. The human gut is one of the most complex ecosystems, which plays a vital role in human health. The composition and abundance of the gut microbiota is dynamic and can be influenced by genetic and environmental factors. In case of disruption of the ecological balance of the intestinal microbiota, the normal physiological functions of the host may be compromised, leading to the development of associated diseases. Studies have found that the gut microbiota and its metabolites can act directly or indirectly on the thyroid gland, disrupting its function. Hashimoto's thyroiditis (HT) and Graves' disease (GD) are the main types and most common of autoimmune thyroid disease (AITD). The present study aimed to investigate the association between gut microbiota/intestinal permeability and autoimmune thyroid disease. Material and methods We searched PubMed, Web of Science, Scopus, and Cochrane databases with language restrictions. Studies were considered as eligible if they met the following criteria: 1) investigating the gut microbiota and patients diagnosed with autoimmune thyroid disease (AITD). 2) providing sufficient data on the relationship between AITD and intestinal microbiota; 3) written in English; 4) Full-text availability. Results: Graves' disease and Hashimoto's thyroiditis are chronic diseases that cause impaired immunoregulation, resulting in specific immune responses against

thyroid antigens. Emerging evidence suggests that gut microbiota alterations play a key role in the development and progress of autoimmune thyroid diseases. This may be explained by the damaged intestinal barrier and the subsequent increase in intestinal permeability, which allows antigens to pass more quickly and activate the immune system or cross-react with extra intestinal tissues. The epithelium is the main site of organism interaction with the environment. Zonulin is a 47 kDa protein that regulates tight junctions between cells in various tissues and organs of the human body. In the intestine, its higher concentration is associated with the opening of tight junctions between enterocytes and an increase in intestinal permeability. This allows bacteria, parts of bacteria, and toxins to enter the body and contact its immune system. Intestinal fatty acid-binding protein is expressed by small intestinal epithelial cells, and its emission into the circulation indicates impaired intestinal permeability. Lipopolysaccharides are a major part of the cell wall of Gram (-) bacteria, and trimethylamine_N-oxide results from their activity. The entry of lipopolysaccharides into the blood is associated with immune activation, and elevated TMAO values lead to the development of systemic inflammation, oxidative stress, and impaired lipid metabolism. Understanding the pathology of diseases, identifying etiological factors, and improving research methods will help develop therapies for prevention and treatment.

Keywords: autoimmune thyroid disease, Hashimoto's thyroiditis; microbiota, intestinal permeability

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RESEARCH ADVANCES OF POLYMERS AS MATERIALS FOR THE ACCELERATION OF BONE HEALING

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Polymers are biocompatible materails that can be used in bone tissue engineering. Polymers used in tissue engeneering can be classified as natural and synthetic polymer materials. Polymeric materials are extensively utilized in numerous industries due to their versatility, abundant sources, and molecular weight distribution variance. Polymer scaffolds are one of the most widely used approaches for bone tissue engineering because they provide a three-dimensional structure that can support the growth and differentiation of bone cells. They have excellent mechanical properties that is their main value for bone tissue engineering methodologies which can help support loads and prevent deformation of the scaffold. Furthermore, among other materials, natural and synthetic polymers are being studied as local drug delivery systems due to their excellent biocompatibility. They can also help reduce the inflammatory response and scar tissue formation. In addition, the fine-tuned biodegradability of these composite scaffolds ensured their gradual replacement with native tissues over time. Most common polymer molecule carriers are polyester, polysaccharide, and PDA. Their most common application is as carriers for macro and nanomoelcules as they easily bind non-specific cells with negative charges to the protein. They can carry peptides, vaccines, growth factors, antigens, proteins and other macromolecular drugs. Their properties can be used in the treatement of bone diseases, fractures and researched as bone replacement materials.

Keywords: Polymers, bone tissue engineering, polymer scaffolds, bone healing

“Mathematics, Informatics and Information Technologies” Session

RESEARCH NETWORKS FOR INNOVATIVE STEAM CAREERS

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In this article, the experience of an interdisciplinary scientific research ecosystem, BioMed-Varna, will be presented in conducting: scientific research in the field of biomedical image analyses; achievements in computer science research during working in interdisciplinary team; educational practices in computer vision and bioinformatics; and promoting scientific research through art since 2019.

In the paper, it will be given trends in computer science scientific research that are appropriate to be used for biomedical research using interdisciplinary, transdisciplinary, and design thinking approaches.

BioMed-Varna is actually a good practice for a non-typical network of researchers with open access not only to scientists but also to young talents in the areas of computer science and life sciences. The methodology used will be presented in the paper, and the effectiveness of the results obtained will be evaluated. Some of the practices are quite different in comparison to established practices in the methodology of research.

Last but not least, the participation of young scientists is shared, along with their motivation for and how to participate in the ecosystem, and also the knowledge, skills, attitudes, and values required, with a focus on those achieved during active participation in the ecosystem, demonstrating that the new STEAM careers are developed through the collaboration between established scientists, entrepreneurs, and young talents in life science, computer science, and the arts.

Keywords: computer science, networks, innovations, talents, STEAM

USING ARTIFICIAL INTELLIGENCE METHODS TO PREDICT SUICIDE RISK IN EUROPE

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The study of suicide risk in a given country is crucial for more effective planning of health services, assessment of the effectiveness of current policies, prevention, and more. This article presents an analysis of suicide risk in Europe. An artificial intelligence system has been developed, incorporating Artificial Neural Network, Random Forest, Support Vector Machines, Linear Regression, and Gradient Boosting. The following questions are addressed: Are the levels of suicides increasing or decreasing? Are there differences in suicide rates according to age and gender? Do economic factors influence suicide rates? Can we predict the number of suicides based on available data? The machine learning methods used for this purpose are created and modeled in the Orange environment, which also offers a variety of tools for analyzing and visualizing the obtained results.

Keywords: suicidal risk, suicide, analysis, neural networks, random forest, SVM, linear regression, gradient boosting

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CIRCLE PROBLEMS IN CARTESIAN COORDINATES

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In recent years, analytic geometry has entered the profiled mathematics preparation of 11th and 12th grade students. High schools where mathematics is intensively studied are introduced to basic concepts such as scalar product of two vectors, line equation, mutual positions of two lines, conic Sessions and others. In the last two years, analytic geometry problems are found in state matriculation exams and university entrance exams. In the textbooks for profiled preparation in mathematics, second degree curves – circle, ellipse, hyperbola and parabola are considered, but the given example problems are few in number and are not sufficient for in-depth preparation of applicant students. Students find it easier to solve problems about circles without coordinates, but when coordinates are involved, even good students experience difficulties with the new material. In this work, we present a system of problems related to circles in Cartesian coordinate system, ordered according to their difficulty. Our goal is to present the solving of such problems in an interesting way, which will be useful for matriculation students, applicant students and for teachers in mathematics profiled high schools.

Keywords: center, radius, circle, tangent to a line, tangent to a circle

AI-ASSISTED PERSONALIZED FITNESS AND DIET MANAGEMENT SYSTEM

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With the advancement of technology and the increasing interest in healthy lifestyles, the fitness industry is undergoing significant transformation. Many individuals strive to enhance their physical condition and dietary habits but often encounter difficulties in finding personalized solutions. Despite the plethora of available resources and applications, generic fitness programs and diets frequently fail to meet users' specific needs, resulting in low motivation and suboptimal outcomes.

This paper introduces an innovative web application that leverages cutting-edge technologies to provide personalized fitness and nutrition plans. The application allows users to book training sessions with instructors, receive professional advice, track progress, and obtain AI-generated workouts, thus addressing the needs of both users and instructors.

Through an integrated scheduling system, users can effortlessly book sessions with qualified fitness instructors, facilitating planning and ensuring a personalized approach to workouts. The application enables direct communication with instructors, allowing users to receive real-time professional advice, thereby enhancing their effectiveness and motivation.

Moreover, users can monitor their physical progress via data visualized in graphs and charts, providing a clear overview of their advancement and areas requiring attention. AI algorithms analyze data such as body mass and activity levels to recommend optimal dietary plans tailored to individual needs and goals.

This innovative web application offers a comprehensive solution to the challenges faced by many individuals in their pursuit of a healthier lifestyle. By integrating personalized workouts, professional advice, progress tracking, and AI-based workouts, it equips users with the necessary tools to achieve their fitness and health objectives.

Keywords: Personalized Fitness Plans, AI-generated workouts, Progress Tracking, Web Application

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AI TECHNOLOGIES IN MATHEMATICS EDUCATION

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Mathematics is a fundamental science that develops students' skills in logical and creative thinking. Mathematics education requires diverse teaching forms and methods that engage students and stimulate them to acquire new knowledge and skills. For this reason, modern education is inconceivable without the use of innovative digital technologies in the learning process. This paper examines artificial intelligence software tools that can be used in the preparation and conduct of the educational process. Applications for automated test creation, chatbots, mind maps, virtual walls, and more are presented.

Keywords: mathematics education, artificial intelligence, AI in education

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NUMERICAL SOLUTION OF THE MAGNETIC MOMENT PRECESSION UNDER THE INFLUENCE OF AN EXTERNAL CURRENT IN JOSEPHSON JUNCTION

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Josephson junctions are among the widely studied objects in the superconducting nanotechnology. The importance of the magnetic moment precession also arises in the spintronic field. One of the fundamental models takes into account the phase of the Josephson junction as a linear function of time. However, this model could not accurately include some external physical parameters. For this reason, in the presented work a more complicated model is observed, one where the dependence of the phase difference and the external current are taken into consideration. For the numerical solving a program complex for integrating a system of ordinary differential equations with initial conditions is developed. It implements a range of methods such as Runge-Kutta, Adams, etc. and could be used for arbitrary types and numbers of equations. Some of the results are graphically presented.

Keywords: Josephson junction, external current, phase difference, numerical solution, magnetic moment

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BRIDGING NATURAL LANGUAGE AND LOGIC PROGRAMMING: AN ENGLISH TO PROLOG TRANSLATOR

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This paper presents a comprehensive approach to translating natural language queries into PROLOG queries, enabling effective interaction with knowledge bases implemented in PROLOG. The system is composed of multiple Python scripts that manage various stages of the translation and querying process: input processing, query translation, PROLOG interaction, and answer translation.

Keywords: natural language processing, PROLOG, query translation, logic programming, knowledge base interaction

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ADVANCES IN QUESTION ANSWERING SYSTEMS IN COMPUTATIONAL LINGUISTICS

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The field of computational linguistics has seen significant advancements in question-answering (QA) systems, which have become integral in various applications such as search engines, virtual assistants, customer service, education, and healthcare. This paper provides an overview of the general architecture of QA systems, types of questions they address, the use of web resources, templates, and knowledge bases, and the implementation of machine learning and neural networks. A comparative analysis of different QA architectures and technologies is presented, highlighting recent developments and future trends.

Keywords: Question Answering, Computational Linguistics, Machine Learning, Neural Networks, Information Retrieval

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MICROBIAL GROWTH KINETICS OF *LACTICASEIBACILLUS PARACASEI* AS10

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A comparative study was conducted on the growth rate of lactic acid bacteria involved in starter cultures for the production of lactic acid products. Based on the data obtained, with respect to the rate of development, it is possible to predict its development as a monoculture or as involved in a symbiotic relationship. To achieve the set objective, cultivation was carried out in a bioreactor for 24 hours. The data on the rate of development in the different phases, represented by the acid formation curve for the strain Lacticaseibacillus paracasei AS10 studied, were recorded. The conclusions drawn allow the correct and predictable use of the examined strain of lactic acid bacteria in starter cultures for the production of lactic acid products.

Keywords: Mathematical modeling, kinetics, maximum specific growth rate, maximum specific acid generation rate, starter cultures

INTEGRATION OF ARTIFICIAL INTELLIGENCE MODELS IN ASSESSMENT: APPLICATION OF CHATGPT AND GEMINI IN EDUCATION

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The current study explores the potential of using artificial intelligence (AI) applications ChatGPT and Gemini for automated question generation and assessment in the educational process. The aim is to evaluate the effectiveness of these models in creating relevant and diverse questions, providing objective assessment, and delivering feedback. The methodology includes selecting academic subjects, creating control and experimental groups, and integrating AI models into educational platforms. The question generation system analyzes educational materials and creates questions with varying levels of complexity. Automated assessment ensures objectivity and consistency in grading and timely feedback. The study also involves collecting and analyzing data on student performance and engagement, as well as feedback from teachers and students regarding the quality and effectiveness of the generated questions and assessments.

Keywords: artificial intelligence, education, text genetaration, students assessment, students evaluation

Acknowledgements: This work was partly funded by the MUPD23-FMI-021 project of the Research Fund of the University of Plovdiv Paisii Hilendarski.

“Pharmacy” Session

SALVIA VERTICILLATA – BIOLOGICAL ACTIVITY

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More than 900 plants belong to the genus Salvia. The origin of Salvia genus comes from the word “salvare” (in Latin, means “to save” or “to heal”). Humanity has used many Salvia species since ancient times as spice, repellents, diuretics, as remedies for treatment of inflammation, etc.

Salvia verticillata is an important species which belongs to this genus. Despite the wide distribution and the presence of Salvia species in the traditional medicine of many nations, the in vivo studies about the biological activity of Salvia verticillata are limited. However, many in vitro studies demonstrated that Salvia verticillata has a prominent potential to be included in novel phytopharmaceutical products. Extracts isolated from Salvia verticillata are associated with a promising antioxidant profile, antimicrobial activity against gram-negative and gram-positive microorganisms, antiinflammatory and anticholinesterase activity.

Keywords: Salvia verticillata, essential oils, phytopharmaceuticals

STRUCTURAL CHARACTERIZATION OF GALACTOMANNAN FROM *TRIGONELLA FOENUM-GRAECUM* L. SEEDS

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Fenugreek (*Trigonella foenum-graecum* L.), an annual dicotyledonous medicinal plant belonging to the Leguminous family, is cultivated and widely used throughout the world. Its leaves and seeds are extensively utilized, not only as a vegetable, a condiment and a forage crop, but also as a remedy for a number of diseases. The seeds are rich in secondary metabolites as flavonoids, steroidal sapogenins and alkaloids. Additionally, the seeds are abundant in primary metabolites, as carbohydrates and notably water-soluble galactomannans.

Fenugreek galactomannan composition and structural characterization were determined and confirmed by High-Performance Anion-Exchange Chromatography (HPAEC) and Fourier-Transform Infrared Spectroscopy (FTIR). The FTIR spectra showed a variety of bands ranging from 500 cm−1 to 4000 cm−1. The spectra at 771 cm-1 and 866 cm-1 were associated with the appearance of anomeric configurations and glycosidic linkages attributed to α-D-galactopyranose units and β-D-mannopyranose units, respectively. A galactose:mannose ratio 1:1 was established by HPAEC following a 2M TFA acid hydrolysis of the galactomannan.

Fenugreek polysaccharides possess a wide range of medicinal and pharmaceutical applications. They can act as wound-healing and cholesterol-lowering agents, anti-obesity and educing and healing liver's hepatotoxicity. Moreover, their inherent properties, such as biodegradability and biocompatibility, make frenugreek polysaccharide a prospective drug delivery agents, superdisintegrating agents, as well as a bioavailability enhancers.

Keywords: Fenugreek, Trigonella foenum-graecum, polysaccharide, HPAEC, FTIR

EXPERIMENTAL STUDY OF THE EFFECT OF TANACETUM VULGARE'S ALCOHOL EXTRACT ON COGNITIVE FUNCTIONS

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The plant Tanacetum vulgare L. belongs to the Asteraceae family and it is widespread in Europe and Asia. The herb contains bitter substances, flavonoids, gums, gallic acid, and essential oil. Recent data have demonstrated some new biological effects of the herb, including antioxidant, antibacterial, anti-inflammatory, and antiviral activity. However, there is no information about the cognitive effects of the herb. Purpose: The present study investigated the effect of alcohol extract of T. vulgare on learning and memory. Materials and methods: We use Shuttle box (Ugo Basile, Italy) – apparatus for passive and active avoidances. We trained 32 male adult rats, divided into four groups (n=8): first group – placebo; second – glycerin; third – T. vulgare (200 mg/kg), and fourth group – T. vulgare (1000 mg/kg). Results: We found that T. vulgare 200 mg/kg increased the number of active avoidances on the 5th day compared to both groups, treated with glycerin and with T. vulgare 1000 mg/kg ($p<0.05$) as well as on the re-test ($p<0.05$). No significant differences were found regarding the number of escapes, inter-training crossings and latency time on all tested days. Conclusion: The study conducted found a beneficial effect of the alcoholic extract of T. vulgare at a low dose of 200 mg/kg p.os. on some measures of cognitive function in the Shuttle box.

Keywords: Tanacetum vulgare, cognitive function, shuttle box

Acknowledgements: This research received funding from Medical University of Plovdiv, project No. DPDP-07/2023.

SEPARATION OF ETHANOL AND BIOLOGICALLY ACTIVE COMPOUNDS BY NANOFILTRATION OF RED WINE MAVRUD

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Nanofiltration is a successful method for retaining and concentrating ethanol and bioactive substances in real systems. In this study, nanofiltration of the dry red wine Mavrud via membrane filtration system MaxiMem, Prozesstechnik GmbH, completed with an Alfa Laval NF99HF polyester membrane (MWCO 200 Da) was performed. The experiments were conducted in concentration mode of the filtration system, with cooling provided by a Lauda Alpha RA8 cooling thermostat, maintaining an operating temperature of 17-19°C. The operating parameters of the membrane separation included transmembrane pressures of 10, 20, 30, 40 and 50 bar, and a tangential velocity rate of 1.2 l/min. The study aimed to investigate the influence of operating parameters (pressure and temperature) on the concentration of ethanol and bioactive substances such as polyphenols, anthocyanins, and antioxidant activity in the wine. The optimal conditions of nanofiltration under which these important compounds had been maximally retained by the nanomembrane were determined. In addition to the analysis of the composition of the filtered wine, the research also included the investigation of changes in the bulk morphology of the polyester membrane as a result of nanofiltration.

Keywords: membrane nanofiltration, ethanol separation, biologically active compounds

Acknowledgements: This work was financially supported by the National Science Fund of Bulgaria [project No KP-06-N47/1 – 26.11.2020].

BIOLOGICAL POTENTIAL OF THE BALKAN ENDEMIC SPECIES MICROMERIA FRIVALDSZKYANA (DEGEN) VELEN. (*LAMIACEAE*)

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Phytopreparations are broadly applicable since they appear to be a safer and more favourable alternative to traditional syntetic drugs in both prophylaxis and therapeutics. The Lamiaceae family is a large herbal family, widely known for its great variety of curative effects. It includes the genus Micromeria Bentham, which is characterised with an antirheumatic, antiseptic, antioxidant, gastroprotective, hepatoprotective, anti-inflammatory and central nervous system stimulating activity. Agents from the genus are often used in folk medicine in the treatment of cardiovascular and respiratory diseases as well as skin infections. Micromeria frivaldszkyana (MF) is a Bulgarian endemic species, registered in Appendix 3 of the Biological Diversity Act and the Red Data Book of the Republic of Bulgaria as endangered. The scientific data referring to Micromeria frivaldskyana is scarce due to its rare occurence.

Phytochemical composition. Recent detailed analysis shows that Micromeria frivaldskyana is rich in carbohydrates (mostly glucose), organic acids, polyphenols and flavonoids. It consists of a high level of rosmarinic acid, which is a caffeic acid ester, with antinociceptive, antidepressive, anxiolytic, neuroprotective and antiepileptic activity. Micromeria frivaldskyana also contains a large amount of hesperidin - a flavonoid, abundant in citrus fruits, with possible antiviral, analgesic, hypoglycaemic and anticoagulant effects.

This study presents a concise review about the phytochemical composition and therapeutic potential of Micromeria frivaldskyana and the biological effects of its main compounds.

Keywords: Micromeria frivaldszkyana, phytochemical composition, endemic species, biological potential

ANALYSIS OF DIAGNOSTIC AND THERAPEUTIC STRATEGIES IN PATIENTS WITH ARTERIAL HYPERTENSION BY THE METHODS OF MEASURING DRUG UTILIZATION AND RATIONAL DRUG USE AT THE MACRO LEVEL IN BULGARIA – A SYSTEMATIC REVIEW

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Aim: To determine the frequency and relevance of scientific publications dedicated to the WHO methodology of drug utilization and rational drug use as a means of assessing the effectiveness of treatment of patients with essential hypertension.

Materials and Methods: We conducted a retrospective systematic review of scientific publications from specialized scientific literature by searching for predefined keywords. The search was performed in MEDLINE database and Central Medical Library of Medical University – Sofia for the period from January 1990 to December 2020. Over the 30-year period, we found 154 scientific publications. We selected articles according to the recommendations of the Cochrane Collaboration and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The final analysis included 3 articles that fully met the prespecified criteria.

Results and discussion: Arterial hypertension is a socially significant disease that, if not monitored and treated according to the individual patient's needs, can lead to heart, brain and kidney impairments. Despite the plethora of scientific publications analyzing arterial hypertension, for the 30-year period we surveyed, we found only 3 articles dedicated to the necessity of studying drug utilization and rational drug use in the treatment of essential hypertension in actual clinical practice. The lack of representative studies on quantitative and qualitative measures of drug utilization is a serious problem facing the health care system.

Keywords: essential hypertension, drug utilization, rational drug use, defined daily dose (DDD), DDD/1000

TREATMENT OF DIABETES MELLITUS WITH BIOLOGICAL MEDICINAL PRODUCTS – THE NEW REALITY

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Diabetes mellitus is one of the most frequently represented health problems worldwide. About 8% percent of the world's population aged 20-79 years is affected, with about 90% of patients having diabetes mellitus type 2 and about 10% having diabetes mellitus type 1. In type 1 due to autoaggression from the immune system, there is destruction of the pancreatic beta cells with loss of insulin secretion. Although the demographic distribution, type 1 diabetes is usually diagnosed in pediatric patients and young adults. Aim: To analyze the new therapeutic strategies, to comparatively evaluate the pharmacokinetic and pharmacodynamic characteristics of biological medicinal products for the treatment of type 1 diabetes mellitus. Materials and Methods: We conducted a systematic review of scientific publications, content analysis and documentary analysis. Results and Discussion: In recent years, there have been sufficient studies that products containing monoclonal antibodies might have pathogenetic relevance in the treatment of diabetes mellitus type 1. Is the autoaggression and beta cell destruction preventable and treatable? In November 2022, the FDA launched the world's first monoclonal antibody for the treatment of diabetes mellitus type 1, Teplizumab, a humanized anti-CD3 monoclonal antibody that binds to certain cells of the immune system, slows progression, inactivates immune cells that attack insulin-producing cells, while mitigating the immune response. Are we on the verge of a new therapeutic revolution...?

Keywords: diabetes mellitus, biological medicinal products, monoclonal antibodies, insulin

NUTRIVIGILANCE OF FOOD SUPPLEMENTS IN THE EUROPEAN UNION

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In European Union (EU) legislation, there is no established harmonization regarding the requirements of food supplement composition, pre-marketing obligations, and post-marketing surveillance. In addition, no obligatory pre-marketing safety studies are conducted since the safety of the product is the responsibility of the manufacturer. Although the European Directive 2002/46/EC defines food supplements, the regulation of these products varies considerably from country to country. For example, some countries do not impose pre-marketing obligations under European directives, while others have established notification or authorization systems. Although food supplements are marketed under Regulation (EC) No. 432/2012, there are no mandatory pre-marketing efficacy studies for these products. Our study aims to describe and compare the existing national vigilance systems for reporting on the safety of food supplements in the EU. Additionally, we attempt to highlight the need for a European harmonized nutrivigilance system. Of the 27 member states of the EU, 10 of them have implemented their own national food supplement adverse effects reporting systems (Belgium, Croatia, Czech Republic, Denmark, France, Hungary, Italy, Portugal, Slovenia, and Sweden). The first European country to establish a national nutrivigilance system was France. Between its launch in 2009 and the end of 2021, the French agency received 7,235 reports. Having a national nutrivigilance system could help increase consumer safety by quickly identifying possible adverse effects associated with the consumption of food supplements. Gathering and analyzing the data on adverse events reported by health professionals (physicians, pharmacists, dietitians, etc.), consumers, manufacturers, or distributors will increase awareness and ensure the distribution of safe food supplements.

Keywords: food supplements, nutrivigilance, adverse effects, EU

INFLUENCE OF OVER-THE-COUNTER MEDICINES ON THE ABILITY TO DRIVE AND USE MACHINES

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Aim: This study aims to analyze the over-the-counter (OTC) medicines authorized in Bulgaria concerning their impact on driving ability and machine operation.

Materials and methods: The list of authorized OTC medicines in Bulgaria, as of March 21st, 2024, was obtained from the Bulgarian Drug Agency's (BDA) website and analyzed. Dermal dosage forms and medicines for paediatric use were excluded from the analysis, as they are not within the scope of the study's objectives. For all other OTC medicines, Session 4.7 of the Summaries of Product Characteristics (SmPC) was evaluated, which describes the effects of the product on the ability to drive and use machines.

Results: As of March 21st, 2024, a total of 1,097 OTC medicines were authorized in Bulgaria, of which 803 were included in the final analysis. The examined medicines were categorized based on their impact on driving ability and machine operation into the following groups: 1) No or negligible influence; 2) Minor influence; 3) Moderate influence; 4) Major influence on these abilities.

Conclusion: Certain medicines may significantly impair a person's ability to drive, or operate machines. Therefore, appropriate labelling on the packaging of these medicinal products is advisable. Currently, Bulgaria lacks a warning symbol for this purpose, unlike other European countries such as France and Spain.

Keywords: OTC medicines, ability to drive, operation of machines, SmPC, labelling, warning sign

NATURAL PHYTOSTEROIDS – FROM PHARMACOLOGICAL BENEFIT TO ABUSE IN SPORT

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Phytosteroids are plant steroids that occur naturally in various types of plants and have a similar structure to cholesterol. Some of the well-known phytosteroids are digoxin, digitoxin, and compounds that are currently under investigation: 20-hydroxyecdysterone, turkisterone, polypodinB, ayugasteroneC. They are found in many plants such as spinach, black sedge, leuzea, serratula, sweet fern and etc. *Serratula coronata* and *Rhaponticum carthamoides* (*Leuzea*) are widespread in China, Siberia and central Asia and well known to the local population for centuries. They are used for their anti-inflammatory effect, in wounds, bronchitis, tuberculosis, etc. Nowadays, many studies focus on the extracts of these plants containing 20-hydroxyecdysterone, turkisterone, polypodinB. The pharmacological effects studied are in the field of dermatology, oncology, cardiology, as well as their action as adaptogens. It is known and proven that they also have an anabolic effect, due to the presence of phytosteroids. Anabolic action is also being studied in animals, with the aim of introducing phytosteroid mixtures and using them in feed, for faster weight gain and to reduce the use of antibiotics. In the past, *Leuzea* was widely used by Soviet athletes, precisely because of its adaptogenic and anabolic effects. From 2020, 20-hydroxyecdysterone enters the monitoring program of the World Anti-Doping Agency. *Leuzea* is available as tablets, capsules, liquid dosage forms, and extracts derived from it as 20-hydroxyecdysterone and turkisterone, in the form of dietary supplements promoted as natural steroids.

Seratula is successfully cultivated in Bulgaria, which is a prerequisite for future research and application possibilities as food and feed additives.

Keywords: Rhaponticum carthamoides, Serratula coronata, 20-hydroxyecdysterone, doping

REGULATORY ASPECTS OF PLANNING AND CONDUCTING CLINICAL TRIALS OF MEDICINAL PRODUCTS FOR TREATMENT OF DIABETES MELLITUS

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Diabetes mellitus is a chronic metabolic disease with complex pathogenesis characterized by hyperglycemia resulting from impaired insulin secretion, increased insulin resistance, or a combination of both. Chronic hyperglycaemia is associated with serious long-term complications including damage and dysfunction of various organs - kidneys, eyes, heart, blood vessels, nerves. Developing medicinal products with low risk of hypoglycaemia is a major challenge.

Aim: To analyse the current regulatory framework at EU level for the development of new medicinal products for treatment of diabetes mellitus.

Materials and methods: We conducted content and documentary analysis of the guidelines, issued by EMA, FDA, scientific organizations and national pharmacotherapeutic guidelines.

Results and discussion: Patients enrolled in clinical trials should be representative of the target population in terms of demographic characteristics, ethnicity, comorbidities (including cardiovascular disease), duration and severity of diabetes. The primary efficacy endpoint is the change in glycated haemoglobin (HbA1c) level after 6 months of a randomised trial. Short- and long-term effects of the investigational product on serum lipids, body weight, blood pressure, and heart rate should be documented. Parallel-group, randomized, double-blind, placebo-controlled clinical trials are recommended. The effect of the investigational product on the development of macro- and microvascular complications, a determination of its safety with respect to the development of hypoglycemia and its cardiovascular safety profile should be carefully studied.

Conclusion: Having uniform requirements and knowing them ensures the marketing of safe and efficient medicinal products for the treatment of diabetes mellitus.

Keywords: diabetes mellitus, clinical trial, glycated haemoglobin

RECENT THERAPEUTIC APPROACHES FOR THE TREATMENT OF TYPE 2 DIABETES MELLITUS

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The treatment of type 2 diabetes mellitus is complex. Glycemic control is the main focus in combination with achieving target values of blood pressure, serum lipids and body weight. Key approaches include lifestyle modification and appropriately selected pharmacological therapy.

Aim: Analysis of current therapeutic approaches for the treatment of type 2 diabetes mellitus.

Material and methods: We conducted documentary and content analysis of the European Association for the Study of Diabetes (EASD), American Diabetes Association (ADA) and national pharmacotherapy guidelines for treatment of diabetes mellitus.

Results and discussion: Different groups of medicinal products have been introduced into clinical practice for treatment of type 2 diabetes, with glycated haemoglobin (HbA1c) being the leading criterion for selection of glucose-lowering therapy. Metformin is traditionally recommended as first-line therapy in type 2 diabetes due to its high efficacy in lowering HbA1c, minimal risk of hypoglycemia and good safety profile. Comparative meta-analyses have shown that the addition of an oral glucose-lowering product from the new classes to Metformin therapy lowers HbA1c by 0.7-1.0%, and the inclusion of a GLP-1 receptor agonist or Tirzepatide, results in HbA1c lowering up to ≥ 2%. For patients with type 2 diabetes and established atherosclerotic cardiovascular disease, heart failure, or chronic kidney disease, the use of an SGLT2 inhibitor or GLP-1 receptor agonist with proven cardiovascular benefit is recommended.

Conclusion: The treatment of type 2 diabetes involves a holistic, patient-centered approach including management of blood glucose levels, control of body weight and cardiovascular risk factors, cardiorenal protection, and delay in the development of complications.

Keywords: type 2 diabetes mellitus, glycated hemoglobin, SGLT2 inhibitor, GLP-1 receptor agonist

ИЗСЛЕДВАНЕ НА ФАРМАКОГЕНЕТИЧНИ ДЕФЕКТИ ПРИ МЪЖЕ С НЕОБСТРУКТИВНА АЗООСПЕРМИЯ

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Необструктивната азооспермия е тежка форма на безплодие, която засяга между 5% и 10% от инфертилните мъже. Етиологията на това състояние остава неизяснена в 30 – 40% от случаите, в които азооспермията се означава като идиопатична. Резултатите от различни проучвания доказват влиянието на определени фармакогенетични дефекти върху правилното протичане на сперматогенезата и тяхната роля като допринасящ фактор за развитието на необструктивна азооспермия. Целта на настоящото изследване е да се установи корелацията между определени фармакогенетични полиморфизми и развитието на необструктивна азооспермия при пациенти от българската популация. Анализирани са следните фармакогенетични полиморфизми: C3435T в гена *ABCB1* (n=16), C677T и A1289C в гена *MTHFR* (n=71) при мъже с необструктивна азооспермия чрез полимеразна верижна реакция в реално време (RT-PCR). Алелните и генотипните честоти на изследваните пациенти са сравнени с тези в европейската популация. Резултатите показват статистически значима разлика в честотата на генотип T/T за варианта в гена *ABCB1* при изследваните пациенти (56%) в сравнение с европейската контролна популация (10%, $p<0.01$). Установена е и по-висока честота на C/C генотип (17%) за полиморфния вариант A1289C в *MTHFR* в сравнение с европейската популация (10%, $p<0.08$). Генът *ABCB1* кодира ефлуксния транспортер P-гликопротеин, локализиран в червата и в ендотелните клетки, изграждащи кръвно-тестикуларната бариера. P-гликопротеинът участва в детоксикацията на организма от токсини и други ксенобиотици. Метилентетрахидрофолат редуктазата играе ключова роля във фолатния метаболизъм. Промените

във функционалната активност на ензима водят до нарушения в правилното протичане на сперматогенезата. В заключение се посочва, че връзката между полиморфизмите на гените *ABCB1* и *MTHFR* и развитието на необструктивна азооспермия заслужава да е обект на по-задълбочен анализ.

Ключови думи: необструктивна азооспермия, фармакогенетични полиморфизми, метилентетрахидрофолат редуктаза

“Dental Medicine” Session

HISTOLOGICAL REACTION OF THE PULP ON THE 90TH DAY AFTER DIRECT VITAL PULP CAPPING WITH DIFFERENT MATERIALS AND PREPARATION BY ER: YAG DENTAL LASER

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Introduction: The true state of the dental pulp can be determined only histologically, but for obvious reasons this is impossible after vital pulp capping in humans.

Aim: To study and compare the connective tissue histological reaction of the pulp on the 90th day after direct vital pulp capping with different materials and preparation by Er: YAG dental laser.

Material and Methods: The study was carried out on three clinically healthy dogs. The preparations were done on premolars and molars of both jaws distributed in four groups. Cavities are prepared by using the Er:YAG dental laser and settings for Caries Removal – Deep Cavities HT and tips d=0.8mm, l=17mm. Communications with the pulp ≤ 1 mm were done. The cavities with Dycal, MTA and hemostatic sponge (without pulp capping agent) are sealed with glass ionomer cement, and those with Biodentine are filled with it. The histomorphological analysis was performed using Olympus BX 51 light microscope with a built-in camera.

Results: On the 90th day in the samples without pulp capping material there are traces of necrosis; in those with calcium-hydroxide calcium metaplasia is found; for MTA the rate of the healing process is slower, less developed but well filled blood vessels are observed. Data are found for normalization of the structure of the dental pulp in the teeth on which Biodentine has been placed.

Conclusion: Histomorphological evidence of healing process after direct pulp capping in an experiment with animals by forming a dentine bridge are found on the third month in the teeth prepared with Er:YAG dental laser and tricalcium silicate cement (Biodentine).

Keywords: Er: YAG dental laser, direct vital pulp capping, Dycal, MTA, Biodentine

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FEMTOSECOND LASER IRRADIATION OF DENTAL COMPOSITE MATERIAL

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Introduction: Composite materials are widely used for dental fillings because they can mimic the original color and texture of the patient's tooth. Femtosecond laser technology is still in research.

Aim: To study the interactions of femtosecond laser radiation and dental composite surface.

Material and methods: A sample of Clearfil Majesty Esthetic opaque OA3 (Kuraray Noritake Dental Inc., Japan) was used, with dimensions 8x11x1 mm, light cured with standard clinical light source. Laser - Pharos model Ph2-10-1000-02-H0-B (Light Conversion UAB, Lithuania), with an automated harmonic generator was applied as a laser source. The composite polymer sample was treated with the 1030 nm laser wavelength at 100 kHz repetition rate. We processed an area of 0.5 x 0.5 mm using a scanner intelliSCAN se 14 (SCANLAB GmbH), equipped with an F-Theta, at different settings – number of cycles drawn, number of hatches in a cycle and step, at different laser pulse energies. The effects of the treatment were observed with the help of a confocal microscope ZEISS LSM 900. Digital images of x10 magnification were obtained as well as 3D profiles.

Results: The 3D profiles measurements show that the depth of the treated areas increases linearly with the applied pulse energy while keeping all other parameters fixed for given processing preset. The same linear correlation is observed when varying the number of cycles which were performed for given preset.

Conclusion: Further studies of different regimes of the femtosecond laser will be performed to understand the optimal parameters for processing of dental composite materials.

Keywords: femtosecond laser, dental composite materials, 3D profiles measurements

PULP AND ROOT DENTICLES-OBSTACLES FOR SUCCESSFUL ENDODONTIC TREATMENT: A CASE REPORT

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Denticles are defined as calcified masses that can be detected in the coronal or, less frequently, radicular pulp cavity of any deciduous or permanent teeth. They can be found in healthy or impacted teeth and may hinder the access to the root canal or its apex thus worsening the outcome of the endodontic treatment. Incidence of pulpal calcification in older patients is recorded to be ten times higher than in young patients. Pulp canal obliteration occurs commonly following traumatic injuries to teeth. However, we report a case of pulpitis in a 16-year-old boy with no relevant medical history of recent trauma with a few denticles in the pulp chamber and the roots of the left first maxillary molar. The pulp cavity was prepared and the denticles were removed. We conducted endodontic treatment using ultrasonic tip and ProTaper rotary file. The removal of pulpal calcifications from the pulp chamber is difficult and time-consuming process, which requires skill and the right equipment and magnification devices. Also, the knowledge of the distribution of the dentciles can help dentists in the clinical treatment. However, a small number of studies regarding pulp or radicular stones in young pateints have been published. Hence, we believe that our case report will be useful for dental practitioners in their endodontic treatment.

Keywords: denticles, root canal treatment, puplal calcification, pulpitis

THE ROLE OF IMMEDIATE AND DELAYED DENTIN SEALING FOR ADHESIVE CEMENTATION OF INDIRECT RESTORATIONS - SYSTEMATIC REVIEW

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Immediate dentin sealing (IDS) involves applying an adhesive system to dentin directly after tooth preparation for an indirect restoration. This was considered an alternative to delayed dentin sealing (DDS), a technique in which hybridization is performed following the provisional phase and before cementing the indirect restoration. Some studies confirm the risks associated with DDS. This point out the role of not freshly cut dentin surface but polluted by the temporarycement. That could result in hybridization failure and decreased bond strength.

The current review aimed to compare the bond strength of restorations to dentin after applying IDS or DDS. The null hypothesis of the study was that IDS or DDS techniques would provide the same bond strength.

A comprehensive electronic data search was conducted in Google Scholar and PubMed search engines to identify articles discussing the role of IDS and DDS in bond strength of indirect restorations. Comparisons were made by considering the adhesive used for bonding (two-step etch-and-rinse, three step etch-and-rinse, one-step self-etch, two-step self-etch, and universal adhesives) Only original studies and review articles were considered for the following systematic review.

After full-text assessment, for the immediate bond strength, regardless of the adhesive strategy used, the IDS technique improved the bond strength of restorations to the dentin. In addition, this improvement is observed only when a three-step etch-and-rinse adhesive system or when a combination of an adhesive system plus a layer of flowable resin is used.

Keywords: dentin, delayed, immediate, indirect, sealing

AREA OF RESIDUAL GUTTA-PERCHA AFTER RETREATMENT OF ROOT CANALS FILLED BY HYDRAULIC CONDENSATION OF GUTTA-PERCHA AND BIOCERAMIC SEALER

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Introduction: Endodontic retreatment requires thorough removal of the existing root canal filling materials.

The **AIM** of the present research is to evaluate the area of residual gutta-percha, after preparation of root canals, previously filled with hydraulic condensation technique of gutta-percha and BioRoot RCS sealer.

Materials and methods: For this in vitro study samples of 12 mm have been obtained from single rooted human extracted teeth (n=50). The root canals have been prepared and obturated with hydraulic condensation technique and BioRoot RCS sealer with matching gutta-percha points. In group 1 only Pro Taper Retreatment (PTR) files are used. In group 2 ultrasonic tips are used in conjunction with PTR files. In group 3 the Self Adjusting File (SAF) is used in conjunction with PTR files. In group 4 after PTR files, chloroform is added during the preparation with SAF for one minute, and in group 5 – 40% citric acid is used instead of chloroform. Digital optical microscopy and ImageJ® software is used to measure the area of residual gutta-percha for each third of the root canal.

Results and discussion: In the coronal third, residual gutta-percha was absent in most experimental groups, while in the apical third, the highest amount was found in the SAF group without the addition of solvent or chelator. No significant differences were found in between the experimental groups ($p>0.05$).

Conclusion: Gutta-percha cannot be fully removed from the root canal in the course of endodontic retreatment after hydraulic condensation of gutta-percha and BioRoot RCS sealer.

Keywords: gutta-percha, endodontic retreatment, hydraulic condensation, BioRoot RCS, bioceramic sealer

AWARENESS OF DENTAL SPECIALISTS REGARDING THE INFLUENCE OF DENTURE ADHESIVES ON SPEECH FUNCTION

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Restoration with total dentures in patients with severely atrophied alveolar ridges is not always associated with satisfaction, even when the dentures are flawlessly fabricated. Patients mainly complain of problems with the retention and stability of the prosthesis, difficulty in chewing and speech disturbances.

Purpose: The purpose of the present study was to investigate the level of awareness of dental practitioners regarding the impact of full denture adhesives on the retention and patients' speech.

Material and methods: Units of observation are 369 dentists in our country. The survey was conducted for 5 months, and the dentists participating in it are from 70 settlements (67 - cities and 3 – villages). Their participation in the study is random, without prior selection, which determines the representativeness of the sample.

Results: The results of the present study show that 93.40% of dental professionals indicate that overall satisfaction is significantly higher when applying adhesives in patients with alveolar ridge atrophy with conventional full dentures for the purpose of retention and stability, which in turn leads to improvements in speech and masticatory function, as well as a sense of physical and psychological comfort.

Conclusions: There is a need for greater awareness among dental practitioners regarding the use of denture adhesives. Practitioners may keep themselves updated on new materials by taking continuing education courses, thus enhancing the level of care for prosthodontics patients.

Keywords: adhesives, speech function, total dentures

MINIMALLY INVASIVE EXTRACTIONS – HOW FAMILIAR ARE WE?

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Introduction: Tooth extraction is still one of the most common dental procedures, routinely performed for a variety of reasons. Tooth extraction forceps and elevators are well-known and have been the standard tools for tooth extractions for well over a hundred years. However, minimally invasive extractions are slowly becoming the norm, pushed by the rapid development of modern dental implantology.

Methods: The study included 144 dental practitioners, registered in regional dental unions of Plovdiv, Sofia, and Haskovo in Bulgaria in 2023. The survey was conducted online in *Microsoft Forms* and included 12 questions about conventional extraction instruments, Physics forceps and Benex extractor.

Results: Of all 144 participants, 137 extract teeth on a regular basis. 112 (81.8%) have said that the conventional extraction instruments are effective and sufficient. Only 25 of all 137 participants have said that they place dental implants. 58 participants said to be familiar and to have used physics forceps for dental extractions, of which 60% place dental implants. 36 participants said to be familiar and to have used Benex for tooth extractions, of which 60% place dental implants, which is statistically significant with $p < 0.001$ when compared to the number who do not place implants.

Conclusions: Atraumatic extractions allow for more hard and soft tissues to be preserved in the extraction site. The survey demonstrated that dental practitioners who place implants are more familiar with alternative atraumatic instruments for tooth extraction, while the remainder are possibly not entirely familiar with the necessity for atraumatic techniques before implant treatment.

Keywords: minimally invasive, tooth textraction, Benex extractor, physics forceps, dental implantology

STUDY OF 3D PRINTING MATERIALS IN PROSTHETIC DENTAL MEDICINE: "VARSEOSMILE CROWN PLUS" AND "CROWNTEC"

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Introduction: The development of technologies worldwide has a direct impact on dental medicine. The CAD/CAM technology, which has proven itself in the global therapeutic approach and procedures in prosthetics, has evolved into three-dimensional printing. This, in turn, necessitates the development of suitable new materials.

Aim: This study aims to review and critically analyze two of the latest ceramic-inclusive materials available on the market for additive manufacturing of fixed permanent constructions: VarseoSmile Crown Plus (BEGO, Germany) and CROWNTEC (SAREMCO, Switzerland).

Materials and Methods: Over the past year, a literature search on the topic was conducted in the following databases: PubMed, EBSCOhost, MDPI, Wiley Online Library, and others, using keywords in both Bulgarian and English.

Results: In 2020, the hybrid material for 3D printing – VarseoSmile Crown Plus (BEGO, Germany) – was introduced to the dental market for the first time. Later, in 2022, the company SAREMCO (Switzerland) also introduced its material – CROWNTEC. Both materials are intended for the creation of fixed permanent constructions – crowns, inlays, onlays and veneers. The data regarding their mechanical and physical qualities are mainly limited to the technical specifications presented by the companies. There are very few scientific studies conducted on these materials, which do not allow for a comprehensive comparative analysis.

Conclusion: The pace at which additive manufacturing is entering dental medicine and the requirements for materials for fixed permanent prosthetics necessitate further and in-depth research into the mechanical and physical properties of ceramic-inclusive materials.

Keywords: 3D printing in prosthetics, ceramic filled materials for 3D, additive permanent constructions.

MANAGING AESTHETIC RESTORATION THROUGH MULTIDISCIPLINARY APPROACHES UTILIZING 3D SMILE DESIGN

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Introduction: The integration of digital workflows is becoming increasingly prevalent in modern dentistry, revolutionizing traditional approaches. Among these innovations, 3D smile design software stands out for its ability to leverage specific photos and digital analysis. This technology enables clinicians to pre-plan treatment outcomes, considering individual facial characteristics and patient preferences, thus streamlining communication among clinicians, dental laboratories, and patients.

Aim: This study aims to underscore the advantages of incorporating 3D smile design into non-removable esthetic restorations within a multidisciplinary framework.

Materials and Methods: A patient presenting with partial edentulism and anterior maxillary dental crown defects underwent comprehensive multidisciplinary treatment, encompassing periodontal, surgical, therapeutic, and prosthetic interventions. Intraoral scans of the maxillary and mandibular arches were obtained using an OVO scanner (3Disc), while facial scans were acquired utilizing the Bellus 3D Facial Scanner (3Shape). Data were processed using 3Shape design software.

Results: After a well-conducted initial periodontal therapy, a gingivectomy was performed, removing the overgrown gingiva around the available tooth structures in the maxillary front region. This allowed endodontic treatment and the construction of dental structures. A digital model of the future aesthetic construction was created. Working models were printed, from which silicone keys were removed in order to perform a precise preparation, on which a temporary structure was again made using a silicone impression. Electrocautery re-correction of the gingiva was required, guided by digital planning, with the goal of improved harmony and esthetics. The final structure was made of metal-ceramic.

Conclusion: Utilization of 3D smile design enhances teamwork and elevates the quality of prosthetic rehabilitation with aesthetic considerations, fostering seamless communication within a multidisciplinary treatment paradigm.

Keywords: 3D smile design, aesthetics, multidisciplinary approach

Acknowledgments: The software processing was performed in the CAD/CAM Center of Dental Medicine at the Research Institute, Medical University - Plovdiv, Bulgaria.

“Clinical Medicine” Session

EVALUATION OF SERUM SAMPLES FROM PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS AND RHEUMATOID ARTHRITIS TO DETERMINE THE LEVELS OF ANTI-NUCLEOSOME, ANTINUCLEAR, AND DOUBLE-STRANDED AUTOANTIBODIES, ANTIBODIES TO CYCLIC CITRULLINATED PEPTIDES, TOGETHER WITH LEVELS OF COMPLEMENT C3 AND C4 FRACTIONS

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Introduction: This study shows the results of 70 serum samples from a cohort of Rheumatoid arthritis and Systemic Lupus Erythematosus patients.

Aim: My aim is to emphasize the serum levels of anti-nucleosome antibodies, antibodies against cyclic citrullinated peptides and complement fraction levels, in both group of patients.

Materials and methods: The cohort was represented by 15 cases of Systemic Lupus Erythematosu spatients and 55 Rheumatoid arthritis patients. Samples were analyzed by ELISA method, chemiluminescence analysis method and turbidimetric method. Antinuclear antibodies were additionally tested, by indirect immunofluorescence method, at a cut- off titer of 1/160, on a HEp-2 substrate.

Results: A total of 80% of patients with Systemic Lupus Erythematosus were positive for the presence of anti-nucleosome autoantibodies and 26% were positive for antibodies against cyclic citrullinated peptides. Among all patients with rheumatoid arthritis 96% were positive for the presence of anti cyclic citrullinated peptides and 13% were positive for anti-nucleosome autoantibodies. A significantly decrease in serum levels of complement C3 and C4 fractions was observed in 9.09% of patients with rheumatoid arthritis and 20% of patients with Systemic Lupus Erythematosus. The results were described and documented, and patient documentation was retrospectively investigated, and the findings were presented in this report. Including further comparisons, between the results and the studied literature.

Discussion: Anti-nucleosome antibodies and antibodies against cyclic citrullinated peptides, diagnostic parameters with important significance, but

with need for further examinations. Complement component levels are informative about the course of autoimmune conflict.

Keywords: Anti-nucleosome antibodies, citrullinated peptides, Complement fractions, Rheumatoid arthritis, Systemic Lupus Erythematosus

HIV/AIDS AND PNEUMOCYSTIS JEROVECII PNEUMONIA. CLINICAL CASE

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Pneumocystis jerovecii pneumonia (PJP) is an opportunistic infection that mainly affects patients with cell-mediated immunodeficiency, in particular patients with acquired immunodeficiency syndrome (AIDS) caused by the human immunodeficiency virus (HIV). In 60% of HIV-infected patients, PJP is the debut of the disease, and in 80% it appears during the course of the infection. The incidence of PJP in these patients has decreased significantly due to the widespread use of antiretroviral therapy (ART) and PJP prophylaxis. However, PJP remains a major opportunistic infection in patients with advanced immunodeficiency associated with undiagnosed/untreated HIV infection.

BACKGROUND: To present a clinical case of a patient with HIV and PJP in view of clinical manifestations, diagnostic and therapeutic behavior.

MATERIALS AND METHODS: Methods of epidemiological and clinical analysis, ELISA, Western Blot for HIV/AIDS diagnosis and flow cytometry for determination of T cell populations were used for research purposes.

RESULTS: It concerns a 30-year-old patient with newly diagnosed HIV infection, advanced immune deficiency and a clinical picture of pneumonia and respiratory failure. Treatment started according to the recommendations of the European AIDS Clinical Society (EACS).

IN CONCLUSIONS: PJP remains a severe opportunistic infection in HIV-infected patients, despite affordable ART and widespread access to prophylaxis. Verification of the diagnosis of PJP is possible by visualization *of Pneumocystis jerovecii* from respiratory samples, or polymerase chain reaction

(PCR). PCR has high specificity and sensitivity and is becoming the diagnostic method of choice.

Keywords: HIV/AIDS, *Pneumocystis jerovecii* Pneumonia, Late-presenters

EXPRESSION OF ESTROGEN AND PROGESTERONE HORMONE RECEPTORS IN ENDOMETRIAL POLYPS IN PRE- AND POST-MENOPAUSE WOMEN – A LITERATURE REVIEW

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Endometrial polyps are the most common benign neoplasms of the endometrium. They are diagnosed at all ages with the highest frequency in perimenopausal women, most often between 40 and 49 years. Endometrial polyps can be asymptomatic, but in most cases they are the leading cause of abnormal uterine bleeding. In recent years, data have accumulated that classify endometrial polyps as preneoplastic diseases of the uterine body with varying frequency of their malignant potential in women in pre – and postmenopausal with genital bleeding.

A thorough understanding of the hormonal theory as part of the etiopathogenesis of endometrial polyps will reveal new horizons in their diagnosis, treatment and prevention. The literature review presents modern theories about the origin and development of endometrial polyps related to the expression of estrogen and progesterone receptors.

Keywords: endometrial polyp, etiopathogenesis, estrogen and progesterone receptors

SIMULATION-BASED TRAINING IN OBSTETRICS AT THE MEDICAL SIMULATION TRAINING CENTER OF MU PLOVDIV AS A BASIS FOR RESEARCH PROJECT ACTIVITY

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In 2017, an innovative and high-tech educational structure, the Medical Simulation Training Center, was opened at MU Plovdiv, the only training base in Eastern Europe recognized and accredited by the American College of Surgery. The material and technical support of the center includes a wide range of modern simulators, which serve for the training of students and additional qualification of interns, specialists and health specialists in various clinical interventional disciplines, including in the field of midwifery.

The role of simulation-based training in improving the management of obstetric emergencies associated with a high incidence of maternal and neonatal morbidity and mortality worldwide and in our country is leading. Failures in stress-related emergency settings in clinical settings lead to a number of adverse consequences. Studies show that obstetric emergencies associated with high levels of stress have an impact on obstetric gynecological teams. As a result, symptoms of depression, post-traumatic stress disorder and loss of professional confidence can occur, leading to self-doubt, isolation, defensive medicine practice and fear.

Levels of stress induced by emergency obstetric pathology in simulation conditions relative to a real clinical setting are the subject of an inter-university research project. Its main purpose is assessment, prevention, control and preparation of models of behavior and stress management in obstetric emergency.

Keywords: simulation training, obstetric emergencies, stress

TUMOR MICROENVIRONMENT – A NEW TARGET FOR ONCOLOGICAL THERAPY

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Introduction: In recent decades, new methods for tumor control based on impacting the tumor microenvironment have been introduced and used alongside the traditional methods for treatment in oncology.

Goal: To present a modern scientific concept of the tumor microenvironment and the opportunities for therapeutic influence.

Methods: The literature review includes medical literature published in scientific journals in refereed and indexed medical journals in world-renowned databases.

Results and discussion: Tumor microenvironment as a "normal" cell microenvironment is a complex cell group of cells and intercell substance. The cell content is presented by endothelial cells, smooth muscle cells, pericytes, macrophages, fibroblasts, adipocytes, osteogenic precursors and immune cells. In contrast with the tumor cells, stromal cells have genetic stability. Structural proteins, cytokines, chemokines, enzymes and signal molecules are located in the extracellular matrix. Each of these elements has a specific and multifaceted role in the oncogenesis. In their evolution, tumors can modify this microenvironment. Complex interactions are performed via direct cell contact between tumor and stromal cells or molecule signals.

Conclusion: Modern understanding of the tumor microenvironment is based on molecular biology and genetics. Modern technologies offer new treatment opportunities among which the key role belongs to immunotherapy and gene therapy. In oncology, angiogenic inhibitors, checkpoint inhibitors, and anti-inflammatory cytokine inhibitors are successfully incorporated and used alongside traditional antitumor agents.

Keywords: tumor microenvironment, immunotherapy, gene therapy

KIDNEY INJURY ASSOCIATED WITH RHABDOMYOLISIS

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Rhabdomyolysis is a medical condition that leads to the release of intracellular muscle components that can damage the kidneys and therefore can lead to acute and chronic kidney injury. There are different causes for rhabdomyolysis but they can be classified into traumatic and non-traumatic. Our aim is to present two cases of young male patients, one with acute kidney injury and one with chronic kidney disease, both associated with rhabdomyolysis. Pathogenetic mechanisms of renal injury in both patients were discussed and appropriate therapy was prescribed accordingly. In both of them after treatment normal kidney function was restored.

Keywords: rhabdomyolysis, kidney injury

МАГНИТНОРЕЗОНАНСНО ИЗСЛЕДВАНЕ НА СФЕНОИДАЛНИЯ СИНУС И ЗНАЧЕНИЕТО МУ В НЕВРОХИРУРГИЯТА ПРИ ТРАНССФЕНОИДАЛНИ ДОСТЪПИ ДО ЧЕРЕПНАТА БАЗА

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Целта на настоящето проучване е да се покаже значението на размерите и типът на sinus sphenoidalis чрез позоваване на МРТ изследвания. В неврохирургичната практика са приети 6 основни типа на синуса: sphenoid body tipe, lateral tipe, clival tipe, lesser wing type, anterior tipe и combined tipe. Непознаването им може да доведе до увреда на кавернозния синус, Meckel’cave, нервните структури, разположени в средната черепна ямка, planum sphenoidale, супраселарната област, мозъчния ствол.

Диференцираните достъпи до патологични селарни процеси и съседните области се определят на базата на установените анатомични структури от образната диагностика. Директният ендоназален достъп използва като хирургичен коридор сфеноидалния синус. От голямо значение е пневматизацията на синуса и неговите междинни септи, както и наличието на двойна стена под формата на съединителнотъканна мембрана, разположена по дорзалната стена на сфеноидалния синус.

Бяха направени измервания от МРТ образи на 112 пациенти от УМБАЛ „Пълмед“, разпределени в две групи – мъже и жени със средна възраст около 50 години. Измерванията са осъществени посредством използването на две програми за визуализиране на образите RadiAnt и Weasis в сантиметри.

Резултати: бяха направени измервания на сфеноидалния синус в две равнини, в три различни проекции: аксиална, сагитална и коронарна. Получените резултати, изследващи височината, ширината и дълбочината, показаха, че средният размер в аксиалните проекции е между 2,73 – 3,04 см, в сагиталните проекции – от 1,70 – 2,64 см., в коронарните проекции – 2,86 – 3,03 см. Посочените данни имат значение за планиране на хирургичния достъп до селарната и параселарната

област, необходимата костна резекция на задната стена на сфеноидалния синус, както и настъпващите усложнения при по-широка от необходимото костна трепанация.

Ключови думи: сфеноидален синус, магнитно-резонансно изследване на главен мозък, транссфеноидален достъп, морфология на сфеноидалния синус, анатомични вариации

МАГНИТНОРЕЗОНАНСНО ИЗСЛЕДВАНЕ НА ИНТРАКРАНИАЛНАТА ЧАСТ НА A. CAROTIS INTERNA (ICA) И ЗНАЧЕНИЕТО Ѝ ПРИ СЪДОВА ПАТОЛОГИЯ

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Целта на настоящото изследване е да се покаже значението на диаметъра и наличието на каротидни плаки, разположени по стената на интракраниалната част на a. carotis interna, и значението им за съдовата патология на мозъка. Познати са изключително много вариации във Вилизиевия кръг, които в комбинация с атеросклеротични плаки затрудняват мозъчната перфузия и водят до невъзвратими промени по мозъчния паренхим.

Настоящото изследване иска да докаже, че диаметърът на вътрешната каротидна артерия има значение за адекватното мозъчно кръвоснабдяване. По-големият диаметър значително намалява риска от съдова деменция и исхемични поражения на мозъка, локализирани предимно в средната и предната мозъчна циркулация.

Бяха направени измервания от МРТ образи на 112 пациенти от УМБАЛ „Пълмед“, разпределени в две групи – мъже и жени със средна възраст между 50 и 60 години. Измерванията са направени посредством използването на две програми за визуализиране на образите RadiAnt и Weasis в милиметри от един и същи изследовател с цел намаляване на статистическата грешка.

Резултати: бяха направени измервания на лявата и дясна каротидна артерия на нивото на кавернозния сегмент на a. carotis interna. Получените резултати, изследващи диаметъра на двете каротидни артерии, в коронарна проекция, дадоха следните данни: средният диаметър в коронарна проекция на лява каротидна артерия е между 3,95 мм и 5,11 мм и дясна каротидна артерия между 3,84 мм и 5,14 мм. Установено бе, че съществува разлика в площта между лявата и дясна каротидна артерия. Вследствие на тези доказателства може да се направи теоретично заключение, че от страната на по-стенотичната артерия ще

бъдат по-чести исхемичните съдови инциденти. Поради тази причина изследователите обръщаме внимание главно на превантивните мероприятия при съдова патология.

Ключови думи: вътрешна каротидна артерия, магнитнорезонансно изследване на главен мозък, исхемичен мозъчен инсулт, морфология на каротидната артерия, анатомични вариации

ПРЕДРАЗПОЛАГАЩИ СЪРДЕЧНИ СЪСТОЯНИЯ ПРИ ИНФЕКЦИОЗЕН ЕНДОКАРДИТ – 17-ГОДИШЕН, ЕДНОЦЕНТРОВ, РЕТРОСПЕКТИВЕН АНАЛИЗ

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Инфекциозният ендокардит (ИЕ) е заболяване, чийто профил претърпя значителни промени през последните десетилетия. Рутинното имплантиране на клапни протези, протезен материал за реконструкция на клапи и съдове, вътресърдечни устройства и катетри промени значително спектъра на предразполагащите сърдечни състояния днес. Познаването им е от изключително значение както за превенцията, така и за лечението на това животозастрашаващо заболяване.

Цел: Поставихме си за цел да проучим предразполагащите сърдечни състояния за ИЕ.

Материал и методи: Проучването е едноцентрово, ретроспективно и включва 270 пациенти, лекувани в Университетската болница УМБАЛ „Св. Георги“ – ЕАД, гр. Пловдив за периода януари 2005 – декември 2021 г.

Резултати: Предразполагащите сърдечни състояния описахме в 10 категории. В най–голям процент от случаите с ИЕ липсва предразполагащо сърдечно състояние – 44.8%. Най-честата предиспозиция е наличието на сърдечна клапна протеза – 28.2%, следват случаите на понесен ИЕ – 7.4%; вродените сърдечни пороци – бикуспидна аортна клапа и пролапс на митрална клапа заедно – 7.1%; дегенеративен сърдечен порок – 5.6%. Ревматичен сърдечен порок се установи само в 4%; вътресърдечни устройства в 2.2%.

Дискусия: Близо половината от случаите са без известно клапно заболяване и съответно не са били обект на профилактика според действащите ръководства за лечение. Около 1/3 от болните са с протезен ИЕ, при който диагнозата е трудна и често закъснява, лечението е продължително и често безрезултатно, налагащо репротезиране. Ревматичната валвулопатия е силно намаляла. Появи се нов вид ИЕ, свързан с временни и постоянни вътресърдечни устройства и катетри.

Заключение: Познаването на предразполагащите сърдечни състояния е от изключително значение както за превенцията, така и за навременната диагноза и лечението на това животозастрашаващо заболяване.

Ключови думи: инфекциозен ендокардит, предразполагащи сърдечни състояния, клапна протеза

ДИНАМИКА И ПРОГНОСТИЧНО ЗНАЧЕНИЕ НА НЯКОИ РУТИННИ ЛАБОРАТОРНИ ПОКАЗАТЕЛИ ПРИ ПАЦИЕНТИ С ИНФЕКЦИОЗЕН ЕНДОКАРДИТ

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Инфекцозният ендокардит (ИЕ) бележи увеличаваща се заболеваемост и непроменяща се висока смъртност въпреки научния и технологичен напредък в медицината. Ранната идентификация на високорисковите пациенти и по-агресивното терапевтично поведение с решението за ранна хирургична интервенция могат да подобрят близката и далечна прогноза на тези пациенти.

Цел: Поставихме си за цел да проучим рутинни лабораторни показатели и тяхната динамика като предиктори за 30-дневна смъртност при пациенти с ИЕ.

Материал и методи: Проучването е едноцентрово, ретроспективно и включва 270 пациенти, които разделихме на две групи – починали (67) и преживели (203), лекувани в Университетската болница УМБАЛ „Св. Георги“ – ЕАД, гр. Пловдив за периода 2005 – 2021 г. Проучихме следните рутинни лабораторни показатели – хемоглобин (Hb), левкоцити (WBC), скорост на утаяване на еритроцитите (ESR), С-реактивен протеин (CRP), креатенин (Crea). Тяхната динамика е проследена на първи, седми и четиринадесети ден.

Резултати: В сравнителния анализ починали – живи установихме сигнификантно по-нисък Hb 1-ви ден – 97 (29) спрямо 107 (22) (p=0.029); по-високи WBC на 14-и ден 12.56 (12.49) спрямо 7,54 (4.17), (p-0.014). Намираме по-висок CRP 7-ми ден 87.5 (107.3) спрямо 49 (66), (p= 0,027) и CRP 14-и ден 73 (85) спрямо 39 (60), (p=0.022);. по-висок Crea 7-и ден

148.5 (189) спрямо 113,5 (132), (p=0.018) и Crea 14-и ден 378 (288) спрямо 123 (108), (p= 0.001). Липсва сигнификантно намаляване в динамиката на WBC и CRP при починалите. В групата на преживелите се наблюдава сигнификантно намаляване на CRP до 14-и ден. Няма значима разлика в двете групи за ESR при постъпване и в динамика.

Дискусия: Описаните резултати на CRP и WBC в групата на починалите се свързват с персистираща инфекция и висок риск от летален изход. Персистиращата инфекция е една от основните индикации за ранно хирургично лечение, което доказано подобрява прогнозата. Влошената бъбречна функция в тази група също е негативен предиктивен показател.

Заключение: Използването на тези рутинни и достъпни лабораторни показатели може да помогне в клиничната преценка на високорисковите пациенти и вземане на решение за ранна оперативна интервенция.

Ключови думи: инфекциозен ендокардит, предразполагащи сърдечни състояния, клапна протеза

КОМОРБИДНОСТИ ПРИ ИНФЕКЦИОЗЕН ЕНДОКАРДИТ – 17-ГОДИШЕН, ЕДНОЦЕНТРОВ, РЕТРОСПЕКТИВЕН АНАЛИЗ

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Инфекцозният ендокардит (ИЕ) бележи нарастваща заболеваемост и висока 30-дневна смъртност – до 25%. Една от причините е променениият профил на пациентите, които са по-възрастни, с повече придружаващи заболявания, което е в пряка връзка с преживяемостта.

Цел: Поставихме си за цел да проучим придружаващите заболявания при пациентите с ИЕ.

Материал и методи: Проучването е едноцентрово, ретроспективно и включва 270 пациенти, лекувани в Университетската болница УМБАЛ „Св. Георги“ – ЕАД, гр. Пловдив за периода 2005 – 2021 г. (G0). Пациентите разделихме на две групи – G1 (2005 – 2015) и G2 (2016 – 2021) според периода и според преживяемостта – починали G3 (67) и преживели G4 (203).

Резултати: Придружаващите заболявания описваме в 14 категории. Най-чести са артериална хипертония – 63.3%, хронична сърдечна недостатъчност – 45.9%; предхождаща сърдечна хирургия – 35.2%; хронична бъбречна недостатъчност (ХБН) – 25.9%; исхемична болест на сърцето (ИБС) – 23.7%; захарен диабет – 18.9; предсърдно мъждене – 18.1%; състояние след мозъчен инсулт – 14.8%. Установихме статистически значимо увеличение на CCI (p=0.000), ХБН (p=0.001), предсърдното мъждене (p=0.006*) и ИБС (p=0.018*) в групата G2. Между починали и преживели установихме сигнификантно по-висок дял на пациенти с висок CCI (p=0.000); ХБН (p=0.006); предсърдно мъждене (p=0.033) и понесен мозъчен инсулт (p=0.044) в групата на починалите.

Дискусия: Придружаващите заболявания са важна част от характеристиката на пациентите с ИЕ и предиктор за изхода от болестта. Наличието на висок CCI, ХБН, предсърдно мъждене и ИБС се свързва с по-висока смъртност.

Заключение: Познаването на съпътстващите заболявания и тяхното влияние върху преживяемостта е от изключително значение за идентифициране на високорисковите пациенти с ИЕ и избора на по-агресивно лечение на това животозастрашаващо заболяване.

Ключови думи: инфекциозен ендокардит, коморбидности, смъртност

ПРИЛОЖЕНИЕ НА МЕДИКАМЕНТ ИЗЛЪЧВАЩ БАЛОНЕН КАТЕТЪР ПРИ ПАЦИЕНТ С ОСТЪР КОРОНАРЕН СИНДРОМ СЪС ST-ЕЛЕВАЦИЯ

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Перкутанната коронарна интервенция (PCI) с медикамент излъчващ балонен катетър (DEB) е метод на лечение с цел оптимална дилатация на наличната коронарна стеноза и доставка на антипролиферативен медикамент в съдовата стена, без да се имплантира медикамент излъчващ стент (DES). Балонната ангиопластика с DEB е със сравними резултати с използването на DES и се предпочита пред POBA (старата балонна ангиопластика).

Кратката двойна антиагрегантна терапия за период от 4 седмици е основно предимство по отношение на реваскуларизационна стратегия с DEB, което не е приложимо при повечето от използваните на настоящия етап DES-ове. Към настоящия момент обаче болшинството от перкутанните реваскуларизации завършват с имплантирането на медикамент излъчващ стент, позволяващ локална доставка на антипролиферативен медикамент чрез полимер. Това води до по-малък процент на ISR. От друга страна, имплантацията на медикамент излъчващ стент е със субоптимални резултати в малките по калибър съдове – под 2.8 мм, които се срещат при около 20 – 30 % от пациентите със симптоматична ИБС. Късната (над 30 дни) и много късната стент-тромбоза (над 12 месеца) остават все още нерешен проблем, дължащ се на забавената стент-ендотелизация. Това води до по-продължителна употреба на двойна антиагрегантна терапия, което е свързано с повишен риск от кървене, усложнения и смъртност най-вече при по-възрастните пациенти.

С представения клиничен случай илюстрираме възможността за приложение на DEB при пациент с ОКС със ST-елевация, въпреки че на настоящия етап балонната ангиопластика с DEB е индицирана предимно

при пациенти със сигнификантна инстент рестеноза и такива, които са с повишен риск от кървене и невъзможност за продължителна двойна антиагрегантна терапия. Все още липсват убедителни резултати от големи рандомизирани проучвания, които да потвърдят предимствата на DEB пред 2-ро и 3-то поколение DES-ове при пациенти с ОКС със ST-елевация. Въпреки това балонната ангиопластика с DEB при ОКС в определени случаи може да бъде най-правилното решение за пациента.

Ключови думи: медикамент излъчващ стент (DES), балони с лекарствено покритие (DEB), ин стент рестеноза (IRS), остър коронарен синдром (ACS), балонна ангиопластика

THE RHEUMATOID FACTOR AND ANTI-CCP ANTIBODIES - THE ROLE OF LABORATORY TESTS IN THE DIAGNOSIS OF RHEUMATOID ARTHRITIS

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In the 1987 criteria of the American College of Rheumatology, positive rheumatoid factor was one of the seven criteria for the diagnosis of rheumatoid arthritis. Later, antibodies to cyclic citrullinated peptides, which are characterized by high specificity and sensitivity, were included in the diagnostic criteria. The detection of rheumatoid factor or anti-CCP antibodies in the serum of patients with rheumatoid arthritis defines the form of rheumatoid arthritis as seropositive or seronegative. The positivity of each of these markers defines features in relation to the period of initial disease manifestation, to the clinical picture, and the degree of response to therapy, including separate groups of medications, synthetic or biological disease modifiers.

The role of laboratory tests, particularly those of rheumatoid factors and anti-CCP antibodies, is undoubtedly significant in daily medical practice, both for the diagnosis and treatment of patients with rheumatoid arthritis.

Keywords: rheumatoid arthritis, diagnostic criteria, antibodies

GOUT – LABORATORY TESTS FOR DIAGNOSTICS AND THERAPEUTIC MONITORING

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Gout is a chronic and progressive form of inflammatory arthritis. Its main characteristic is the disturbed purine metabolism, inducing hyperuricemia. The deposition of monosodium urate crystals in the tissues leads to changes in the affected joints, organs and tissues. Gout is among the earliest diseases known to mankind and perhaps the oldest known form of arthritis. Literary sources from antiquity associated gout with the intake of purine-rich foods and excessive alcohol consumption, hence its description as "the disease of kings."

In recent decades, the morbidity of gout has been on the rise due to a number of medical conditions and lifestyle factors such as: presence of primary diseases (diabetes, obesity, chronic kidney disease, etc.); taking medications used in transplant patients or for the treatment of heart failure and hypertension; traumatic conditions provoking the development of the disease.

The role of laboratory medicine in the diagnosis and control of diseases has been proven, and gout is no exception. Laboratory tests assist the attending physician in creating a personalized plan for the patient both to prevent new crises and future disability, and to improve the overall health of the patient.

Keywords: gout, arthritis, laboratory tests

MODERN ASPECTS IN THE DIAGNOSIS AND TREATMENT OF DEPRESSIVE DISORDERS

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Introduction: Depression is a common and serious mental disorder that negatively affects the feelings, thoughts and actions of affected individuals. Depression and related mental disorders have a significant impact on all aspects of life, including school performance, work productivity, relationships with the family, social environment and friends. Objective: To identify, research and summarize modern methods of diagnosis and treatment of depressive disorders. To analyze the measures taken to support mental health by the competent authorities at national and international level. Materials and methods: We reviewed a scientific publications and analyzed the current aspects in the diagnosis and treatment of depression. We researched the plans and strategies for improving the mental state of the population, which are implemented by the WHO and the health authorities in Bulgaria. Results: The most frequently applied methods for the treatment of depression are psychological and pharmacological. Between 80% and 90% of people with depression respond well to drug therapy. Psychotherapy is used to treat mild depression. For moderate to severe depression, psychotherapy is often used along with antidepressants. Antidepressants are grouped into five main pharmacological classes – tricyclic antidepressants, selective serotonin reuptake inhibitors, serotonin and norepinephrine reuptake inhibitors, monoamine oxidase inhibitors, and atypical antidepressants. Electroconvulsive therapy is most often used in patients with major depressive disorder who have not responded to other treatments. It is essential to develop global and national strategies to reduce the prevalence and burden of mental illness and improve mental health.

Keywords: Depression, treatment, diagnosis, mental health, self-help

CLINICAL ASSESSMENT OF COGNITIVE FUNCTIONS AND SLEEP IN PATIENTS WITH EARLY PARKINSON'S DISEASE

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Introduction: Cognitive decline and sleep dysfunctions are among non-motor features, significantly contributing to the disability of patients with Parkinson's disease (PD).

Aim: To evaluate the cognitive functions and sleep in newly diagnosed, treatment naïve patients with early PD.

Matherials and Methods: The study comprised 30 newly diagnosed patients with PD according to the Movement Disorder Society – Parkinson's Disease criteria. Unified Parkinson's Disease Rating Scale (UPDRS) was used to determine the severity of motor impairment. Cognitive functions were assessed by Montreal Cognitive Assessment (MOCA) and Mini Mental State Examination (MMSE) tests. Sleep disturbances were evaluated by Parkinson's disease sleep scale (PDSS-2).

Results: More than 2/3 of the patients showed abnormally low score on cognitive tests (93,3% on MOCA and 76,7% on MMSE). Moderate negative correlation was found between MOCA score and the age of the patients (rxy = 0,513, p = 0,004), between MOCA score and the age at the disease onset (rxy = 0,489, p = 0,006), and between MOCA score and UPDRS-total (rxy = 0,407, p = 0,025). According to PDSS-2 53,3% of the patients had sleep disturbances. Individual assessment of sleep disorders based on PDSS-2, shows the highest score on the third item – staying asleep (mean 1,33±), followed by second (specifically difficulty initiating sleep/insomnia) and eight one (nocturia) (mean 1,13±). Strong positive correlation was found between UPDRS-total and PDSS-2 score (rxy = 0,598, p < 0,0001).

Conclusions: A large part of the patients with early PD present different degree of cognitive dysfunctions and sleep abnormalities at the time of diagnosis. The age of the patients and the age at disease onset can contribute to cognitive impairment. Sleep quality and nocturia are the most common.

Keywords: cognitive decline, early Parkinson's disease, sleep abnormalities

A CURRENT APPROACH TO PATIENTS WITH *H. PYLORI* INFECTION

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The role of *H. pylori* as an etiological factor in the genesis of a number of gastric diseases such as functional dyspepsia, chronic atrophic gastritis, and peptic ulcer of the stomach and duodenum, which affects more than 10% of the population, is indisputable. The proven malignant potential of the bacterium is the reason that *H. pylori* is classified as a type I carcinogen by the World Health Organization. As a result of chronic *H. pylori* infection, gastric adenocarcinoma develops, which is the fifth most frequent and third malignant neoplasm globally. *H. pylori* is diagnosed by invasive and non-invasive methods. The current diagnostic and therapeutic approach is challenging due to false negative results and increased antibiotic resistance of the bacterium. The role of *H. pylori* infection in the oral cavity as a source for poor eradication success is debating. *H. pylori* extragastral manifestations are still underestimated, although the variety of examples of correlation of liver, neurological, hematological etc. diseases with the presence of *H. pylori*. We are aiming to address these questions and to give the current approach to this global chronic infection.

Keywords: *H. pylori*, diagnosis, therapy

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THE PARASITOSIS IN BULGARIA – MALARIA

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Malaria is a vector-borne protozoan disease, which is still one of the most widespread diseases with endemic and epidemic distribution, mainly in countries with tropical and subtropical climates. Tropical malaria continues to be a major health problem for global health. There is no local malaria in the European continent, but for a large part of European countries, incl. and Bulgaria, imported malaria represents a potential danger in endemic and epidemic aspects. According to data from the National Center for Infectious and Parasitic Diseases (NCIPD), for the period 2020 - 2022, nineteen (19) cases of imported malaria were registered on the territory of Bulgaria. For the city and region of Plovdiv, there were four (4) cases of malaria for the period 2020-2024. P. falciparum was proven to be the causative agent. In three (3) of the cases, the patients were individuals who had worked in malaria-endemic southern African countries. The fourth case was a patient of African American origin, recently working in Bulgaria, who has suffered from tropical malaria several times in his country. We considered the risks on which we emphasize in two aspects: clinical aspect - development of cerebral malaria with its complications and epidemiological aspect - risk of mosquito infection on the territory of our country in an epidemic season (it was diagnosed in April, 2024). As a result of the conducted anti-epidemic measures, according to the regulatory requirements and treatment of the patients, the parasites were radically destroyed and the potential epidemic risk was prevented.

Malaria imported into our country by our and foreign citizens coming from malaria-endemic areas is a regulated process through legal provisions. Due to rapidly occurring climate changes, the risks for our country are increasing. Anti-malarial measures must be aimed mainly at the source, i.e. sick and parasite carriers, to prevent local spread, as well as Bulgarians and foreigners leaving for endemic countries and arriving from them.

Keywords: parasitosis, imported malaria, antimalarial measures

ВИДОВЕ ЛАПАРОСКОПСКИ КРУРОРАФИИ ПРИ ЛЕЧЕНИЕТО НА ХИАТАЛНИ ХЕРНИИ – НАШИЯТ ОПИТ

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Гастроезофагеалната рефлуксна болест (ГЕРБ) засяга 20% от възрастното население в развитите страни. Една от главните причини за развитието на ГЕРБ е наличието на плъзгаща хиатална херния. От извършването на първата лапароскопска операция по повод хиатална херния през 1992 г. от Cushieri до ден днешен миниинвазивният метод се е утвърдил като златен стандарт за лечението на този тип състояния. Ключови фактори за успеха от операцията са добрата мобилизация на хранопровода, ексцизията на херниалния сак, фундопликацията и пластиката на диафрагмалните крачета без напрежение. Въпреки наличието на различни оперативни методики, дори в днешни дни нивата на рецидивни хернии остават високи. Най-честата причина за рецидив е инсуфициенция на крурорафията. В литературата са описани различни варианти за извършването ѝ – с прекъснати единични или Z-образни сутури, с продължителен шев, със или без използване на платно. Целта на нашето проучване е да анализираме резултатите, получени при пациенти, оперирани лапароскопски по повод хиатална херния. Обследвахме периода от април 2012 до април 2024 година. Болните групирахме по пол, времетраене на операцията, поставяне на дренаж, болничен престой, метод за крурорафия, използвана фундопликация и наличието на рецидиви. Получените данни доказват преимуществото на използвания от нас в последните 3 години продължителен шев с конец тип V-loc™ по отношение на оперативно време, болничен престой,

избягване на дренажи и следоперативна болка, без да показват значими различия по отношение на появата на рецидив.

Ключови думи: хиатална херния, лапароскопия, крурорафия, рецидив

МЯСТО НА ЛАПАРОСКОПИЯТА В ЛЕЧЕНИЕТО НА РЕЦИДИВНИТЕ СЛАБИННИ ХЕРНИИ

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Оперативните интервенции по повод на слабинни хернии са едни от най-често прилаганите хирургични интервенции. По статистически данни годишно се извършват близо 20 млн. оперативни херниопластики. Независимо от развитието на медицинските технологии и подобрените хирургични техники честотата на рецидивите при тези операции остава висока. Цитираните в литературата нива достигат до 15%. Най-голям процент рецидиви се установяват обикновено през първата година от операцията и до около 23% рецидиви до втората година. Оперативните корекции при тези състояния зависят от няколко фактора. Най-важни са видът на първоначалната пластика и опитът на хирургичния екип. Цел на нашето проучване са обследване на случаите на оперативни интервенции по повод на рецидивни слабинни хернии и мястото на миниинвазивните подходи при тяхното лечение. За целта обследвахме 82 пациенти, оперирани в периода 2019 – 2023 година. Основни критерии за оценка на резултатите са пол, вид на първична операция, метод на корекция (отворен и миниинвазивен способ), следоперативна болка и болничен престой. Полученните от нас данни напълно подкрепят изнесените в литературата данни в посока на лапароскопските корекции, съпроводени с по-нисък интензитет на следоперативна болка и по-кратък болничен престой. В заключение смятаме, че при извършени предни пластики и наличието на опитни екипи лапароскопските корекции при установен рецидивни хернии са основен метод на избор.

Ключови думи: ингвинална херния, рецидив, лапароскопия

РЕХАБИЛИТАЦИОННА СТРАТЕГИЯ ЗА ФУНКЦИОНАЛНО ВЪЗСТАНОВЯВАНЕ ПРИ ПАЦИЕНТ С ФРАКТУРА НА БЕДРЕНА КОСТ И ПРИДРУЖАВАЩА КВАДРИПАРЕЗА СЛЕД ОПЕРАТИВНО ЛЕЧЕНИЕ НА ПОЛИТРАВМА

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Целта на този доклад е да представи индивидуалната рехабилитационна програма при пациент с фрактура на бедрена кост в периода на късна реконвалесценция след политравма на гръден кош и сърце с постоперативно развитие на мозъчен инфаркт и последваща квадрипареза.

Материали и методи: Рехабилитацията се провежда на 51-годишен мъж, хоспитализиран в Отделение по физикална и рехабилитационна медицина. През октомври 2022 г. е приет по спешност в Университетска болница – Бърно, Чехия по повод на остра прободна рана в лявата гръдна половина, хемоперикард, пневмоторакс и дихателна недостатъчност. Следоперативно на четвъртия ден развива оклузия на базиларна артерия, извършена е механична тромбектомия и пълна реканализация. Провежда се продължителна механична белодробна вентилация. На този фон пациентът развива исхемичен мозъчен инфаркт с последваща квадрипареза. Провежда рехабилитация от 9-и ден. През 2023 г. на фона на остатъчен неврологичен и функционален дефицит след падане фрактурира лява бедрена кост. Поставен е метален имплант, провежда се ранна болнична рехабилитация в Университетска болница – Стара Загора. Рехабилитацията включва дихателни упражнения, пасивни и активни упражнения, механотерапия, криотерапия, вертикализация и обучение в ходене с проходилка, трениране на дейности от ежедневния живот.

Резултати: Оценени са клиничните симптоми преди и след терапията. Наблюдава се подобрение в обема на движение (SFTR) за лява ТБС от

/S/0°-0°-0° до 0°-0°-90° и /F/0°-0°-0° до /F/0°-0°-5°/, редуцирана спастичност за крайниците и Бартел индекс от тежък дефицит (5) до умерен (45).

Заключение: Съставянето на рехабилитационна програма при пациенти с патологични увреждания на няколко органи и системи изисква прецизна диагностика и правилно поетапно включване на специфични методики за повлияване на увреждания на опорно-двигателния апарат на фона на предхождаща сърдечна, дихателна и централно-нервна патология.

Ключови думи: рехабилитация, функционално възстановяване, фрактура на бедро, квадрипареза, политравма

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“Public Health” Session

CLIMATE CHANGE-RELATED HEAT WAVES – CHALLENGING HEALTHCARE SYSTEMS

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The last decades have recorded a steady change in temperature variability. Most of the world's regions have reported frequently occurring heat waves. Plovdiv region is one of the most affected with temperatures above 40 degrees Celsius remaining for long periods. The elevated temperatures in summertime have a significant impact on public health. This study aims to analyze and present challenges related to heat wave threats to medical assistance to the population. Materials and methods – analyses of available literature data regarding the temperature patterns and emergency medicine in the Plovdiv region were performed. Descriptive and comparative methods were applied to present the close relation between increased temperature and increased demand for medical support during extended summer in the area. Results and discussion – most researchers have reported increased heat strokes and cardiovascular disturbances in elderly people related to the recorded extreme temperatures. Most elderly people have comorbidities that could be exacerbated due to long exposure to high temperatures. Another factor is the relatively low water consumption by these people although the medical advice. In conclusion, based on the performed analyses, the relation between climate change and increased demand for medical assistance especially to the elderly population, must be noted. Heat waves related to the ongoing climate change must be considered a risk factor challenging hospital and pre-hospital healthcare system resilience.

Keywords: climate change, heat waves, healthcare system resilience, cardiovascular diseases

GENERAL PRACTITIONERS AND REMOTE MEDICINE - COVID-19 PANDEMIC CHALLENGES BOTH PREHOSPITAL AND HOSPITAL HEALTHCARE SYSTEMS

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The overloaded hospitals could not diagnose, admit, and treat all those who had been infected or were suspected to be infected with the novel coronavirus. This resulted in an increased burden on general practitioner practices. Due to the real-life and health threats to general practitioners, most countries have issued directives and established procedures for remote patient triage, counselling, and treatment. This study aims to analyse the challenges general practitioners face in remote medicine implementation. Materials and methods- using the descriptive method are analysed and presented governmental and healthcare measures for assuring healthcare professionals and patients in a biological area of damage. Analyses present some major challenges general practitioners face using modern informational technologies for remote patient contact. Results and discussion – performed analyses present several types of information technologies applied in general practitioners' practices. In developed countries, using artificial intelligence for primary premedical triage at dedicated platforms was widely implemented. Telemedicine was another technology also in use in developed countries. The challenges reported by several authors were related to the availability and confidence of the device in use. As a conclusion from the performed analyses, the importance capabilities of contemporary ICT are noted but requirements for increasing healthcare providers' and patients allowance regarding novel methods in medicine are recommended.

Keywords: general practitioners, Covid-19, artificial intelligence in medicine, telemedicine

VITAMIN D SUPPLEMENTATION AND PREGNANCY: RECOMMENDATIONS AND HEALTH OUTCOMES

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Vitamin D deficiency (VDD) is a significant health issue that could have serious implications for the well-being of women and their offspring. Prenatal vitamins are widely used, but deficiency still occurs frequently in the preconception period, during pregnancy, and in breastfed infants.

We analysed the association between maternal VDD during pregnancy and negative health effects by reviewing studies conducted in Europe. The PubMed database was searched for articles published in the past 10 years focusing on preeclampsia, caesarean Session, and gestational diabetes mellitus.

We identified a total of 13 original articles, 18 review articles, and 8 guidelines. During pregnancy, VDD is associated with a higher likelihood of developing gestational diabetes mellitus and preeclampsia. It may also lead to an increase in the number of caesarean Sessions taken. While the official guidelines for vitamin D dosage differ in various countries, health authorities usually recommend a total daily supplement intake of 400–2,000 IU.

In conclusion, this review emphasises the importance of establishing guidelines for vitamin D supplementation as well as the requirement of official standards for the consumption of vitamin D prior to and during pregnancy. Future research should concentrate on developing more unified approaches to vitamin D assessment and establishing preventative measures that can be incorporated into prenatal care programmes.

Keywords: pregnancy, vitamin D supplementation, gestational diabetes mellitus, preeclampsia, caesarean Session

DIETARY PATTERNS AND EFFECT ON BMI AMONG MEDICAL STUDENTS IN PLOVDIV

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Dietary patterns depend on traditions in different population groups. The **aim** of this study is to analyze which dietary habits of medical students affect the BMI. **Materials and methods:** The survey is conducted in 2023 using questionnaire method. The frequency of meal and type of cooking and eating pattern are examined among 145 medical students from different countries. **Results:** 73 from 145 are female, 72 of total are male. 84.9% (n=62) of girls are with normal or underweight BMI compared to 56.9% (n=41) of boys ($\chi 2$ = 13.799, df = 1, p = 0.0001). 26 (61.9%) of the overweight students have breakfast before 6:00 a.m. or after 10:00 a.m., while 64 (62.1%) in the normal or underweight group, have breakfast within 6:00 a.m. to 10:00 a.m. ($\chi 2$ = 6.972, df = 1, p = 0.008).There is no statistically significant difference between BMI and frequency of intake of raw fruits and vegetables, the type of food during breakfast, type of food of intermediate or supporting snacks, what is the main meal of the day (breakfast, lunch or dinner), frequency of night meal, time of the last meal of the day, frequency of eating or skipping lunch or dinner. **Conclusion:** The time of first meal likely affects BMI.

Keywords: BMI, dietary patterns, medical students, Plovdiv

NUTRITION HABITS AMONG MEDICAL STUDENTS OF DIFFERENT NATIONALITIES IN PLOVDIV

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Prolonged residence in a country other than one's home probably affects the eating pattern. The goal of this study was to analyze the relationship between students of different nationalities, their diet and their BMI.

Materials and methods: The survey was conducted in 2023 used questionnaire method. We grouped 119 foreign students at the Medical University of Plovdiv into 2 groups: North and Mediterranean countries due to similarity in dietary regimes.

Results: The mean age of the students was 21.52 ± 2.687 (Mean±SD) years. Of them, 56 (47.1%) are female, 63 (52.9%) are male. 87 students (73.1%) were from North countries and 32 students (26.9%) – from typical Mediterranean countries. We found a statistically significant positive association between geographic area and BMI: 90.6% (n=29) of students from Mediterranean countries were of normal BMI compared to 67.8% (n=59) of students from Northern countries ($\chi 2 = 6.318$, df = 1, p = 0.012). The main meal for participants from North countries was dinner (n=53; 60.9%) compared to 8 (25.0%) of Mediterranean students. 34.48% (n=30) of participants from North countries preferred foods with a high sugar content compared to 12.5% (n=4) from the Mediterranean. Students from Mediterranean countries prefer fruits (n=12; 37.5%), dairy products (n=4; 12.5%) and flour-based foods (n=5; 15.62%) compared to students from North countries: (n=26; 29.89%), (n=5; 5.75%); (n=5; 5.75%) respectively.

Conclusion: Nutrition habits are different between North and Mediterranean students. The type of eating pattern affects BMI.

Keywords: BMI, Mediterranean, medical students, North countries, nutrition habits

RESEARCH AND PREVENTION OF HEALTH CONDITIONS OF HOME AND HYBRID WORKERS IN BULGARIA

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Introduction: The goal of the research is developing a mobile app project (PERSONAL HOMEWORK E-HEALTH) and to make health impairment prevention digitally available to home or hybrid workers who would receive timely guidance, training, exercise, and weekly individual statistics. It also aims to identify risks, as a result of the survey analysis, and develop programs and modules in the app for movement, ergonomics, stress, eye exercises, etc.

Methods: A subjective study was conducted for this purpose and mixed groups including more than 150 employees from the following professions were surveyed: administration, occupational health services, computer technology workers, insurers, pharmacists, etc. These groups have different working arrangements i.e. working from home or hybrid. They were surveyed through 2 instruments using sociological method - questionnaire and statistical method - descriptive statistics.

Conclusion: The practical application of the mobile app could be realized as a database, for work-from-home or hybrid, for institutions such as Ministry of Labour and Social Policy, Ministry of Health, Working Conditions and Labour Fund, employers' unions, etc.

Keywords: hybrid workers, home workers, prevention, occupational health, working conditions

SMALL AIRWAY DYSFUNCTION - THE CHALLENGES OF MODERN DIAGNOSTICS

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According to the World Health Organization in 2019 chronic obstructive pulmonary disease (COPD) was the third leading cause of death worldwide, causing 3.23 million deaths whereas bronchial asthma affected an estimated 262 million people and caused 455 000 deaths. Both diseases are chronic obstructive conditions which need to be diagnosed early in order to prevent or slow down the complications. Consequently, the world requires new effortless methods for diagnosis of airway obstructions, especially for small children and people who cannot perform the spirometry maneuver.

The purpose of this report is to describe the objectives of the forced oscillation technique (FOT) and to establish its applications in the clinical practice.

Studies and clinical cases regarding pulmonary function testing are summarized and analyzed. They are found in the following databases - PubMed, Google Scholar and Science Direct.

Spirometry is the 'gold standard' for the diagnosis of airflow obstruction but it requires effort and can be difficult for patients to perform. Forced oscillation technique (FOT) on the other hand is a relatively new method that may hold the key to the detection of smoking-induced respiratory early alterations and childhood asthma. FOT requires tidal breathing while applying external, small amplitude oscillations in order to determine the response of the respiratory system. Therefore, it is easy for pre-school children to perform. The use of FOT should be considered in patients in whom spirometry or other pulmonary function tests cannot be performed. One of the main advantages of this method is that minimal cooperation of the patient is needed and no respiratory maneuvers are required. This technique may be more sensitive than spirometry in identifying disturbances of peripheral airways or the effectiveness of therapy at the long term.

The Forced oscillation technique has been successfully applied in various pediatric respiratory disorders, such as asthma, cystic fibrosis, and chronic

lung disease. Considering these qualities FOT may be used as an alternative of spirometry in heterogenous ventilatory disturbances of the small airways.

Keywords: diagnostics, small airway diseases, forced oscillation technique

REGULATORY FRAMEWORK FOR MARKET AUTHORIZATION OF GENE THERAPIES IN THE EU AND THE USA

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Gene therapies represent a groundbreaking approach to treating a diverse spectrum of diseases, including genetic disorders and cancers. Despite their immense therapeutic potential, the regulatory landscape surrounding gene therapies poses significant challenges.

This review aims to explore the regulatory frameworks governing the market authorization of gene therapies in the European Union (EU) and the United States (US). We juxtapose the primary processes and procedures employed by the European Medicines Agency (EMA) and the US Food and Drug Administration (FDA).

The Public Health Service Act and the Federal Food, Drug, and Cosmetic Act are primarily responsible for the regulatory oversight of gene therapies in the US. Conversely, in the EU, Regulation (EC) № 1394/2007 on Advanced Therapy Medicinal Products serves as the cornerstone legislation setting up the procedure for market approval of gene therapies. Central to this regulatory process are the Center for Biologics Evaluation and Research (CBER) within the FDA and the EMA's Committee for Advanced Therapies (CAT).

The burgeoning field of gene therapy research and development necessitates proactive collaboration between regulatory agencies. By fostering scientific and regulatory synergy between the EMA and FDA, we can accelerate the advancement of gene therapy innovations and ensure their timely availability to patients in need.

Keywords: gene therapies, market authorization, regulation, EMA, FDA

MEDIATION IN HEALTHCARE CONFLICT RESOLUTION: A PARADIGM SHIFT FROM TRADITIONAL LEGAL PROCESSES

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Alternative dispute resolution (ADR) methods encompass diverse approaches, with mediation standing out as particularly successful. It is a voluntary, flexible, and confidential process where a third party (mediator) assists disputing parties in reaching consensus without court involvement.

The introduction of mediation as an alternative to the judicial process is imperative due to the shortcomings of the traditional legal system in healthcare – slow, expensive, and often unsuccessful in compensating the injured. Conflicts between physicians and patients deteriorate their relationship, and legal processes are complex and costly. Mediation offers a faster, more effective, and more accessible way to resolve disputes in healthcare, emphasizing the importance of trust and collaboration between the parties.

Lawsuits against physicians have a negative impact on their professional and personal lives. An example is the practice of defensive medicine - ordering unnecessary tests and consultations due to the fear of legal action. ADR methods provide more favorable conditions, reducing stress and preserving trust in the physician-patient relationship.

Despite mediation not being widely adopted in Bulgarian healthcare, it proves to be an effective method for conflict resolution, offering faster, more efficient, and relationship-preserving solutions between physicians and patients, underscoring the need for its popularization. The efficiency, cost-effectiveness, and relationship-preserving nature of mediation make it a compelling alternative to traditional legal processes in healthcare conflict resolution.

Keywords: mediation, alternative dispute resolution methods, patient-physician conflict, healthcare conflict

HEALTH RELATED QUALITY OF LIFE IN PATIENTS WITH TUBERCULOSIS

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Tuberculosis (TB) continues to be an important public health problem, and a major cause of morbidity and mortality globally. According to World Health Organization in 2022, 10.6 million new TB cases were detected around the world and a total of 1.3 million people died from this infectious disease. The impact of any illness, especially a chronic like tuberculosis, is often all-encompassing, affecting not only individual's physical health but also his psychological, economic, and social well-being. QoL is a broad and complex multidimensional concept that incorporates physical, social, psychological, economic and other domains. This review was conducted to summarize the various factors influencing health related quality of life (HRQL) among patients with TB. At present, much of the attention of TB programs is focused on outcomes of microbiological cure and mortality, and health related quality of life is undervalued. Evaluation of health-related quality of life among patients with tuberculosis could improve understanding about the burden associated with the diseases. HRQoL may be fundamental in influencing treatment outcome.

Keywords: Health-related Quality of life, tuberculosis, World Health Organization Quality of life-BREF

KNOWLEDGE AND PERCEPTION OF VIDEO-BASED DIRECTLY OBSERVED THERAPY AMONG PATIENTS WITH ACTIVE TUBERCULOSIS

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Introduction: Tuberculosis (TB) is one of the major challenges for health systems worldwide. Every year, TB affects more than 10 million people and kills more than 1.3 million people. According to the report of the World Health Organization (WHO) in Bulgaria, for 2022 there were 1100 (16% per 100,000) newly diagnosed tuberculosis cases under 18 years of age and 2.1% new cases of multidrug-resistant tuberculosis. Non-adherence/non-treatment of TB may prolong transmissibility, increase the risk of drug resistance and lead to patient death. Video-based directly observed therapy (vDOT) is a technological alternative to conventional directly observed treatment (DOT). The pilot study was conducted to assess knowledge and perception of video-based directly observed therapy among patients with active tuberculosis. Methods: A total of 30 patients with active TB were enrolled in this single-center, cross-Sessional study between November 2023 - January 2024 in Sofia, Bulgaria. All the participants completed supplemented WHOQOL – BREF Bulgarian version tool and their demographic and disease characteristics were investigated. Results: The mean age of the participants was 51.5 ± 9 years, 64 were married (38.7%), and 16 were men (51.6%). The duration of disease was less than 6 months in 64 (82.9) patients. Most (80.7%) were live in cities. Education and income were low overall, but most participants had health insurance. Most participants (87.1%) owned smartphones. Conclusion: Further research investigating improving compliance with treatment and quality of life among patients receiving VDOT is now needed.

Keywords: perception, tuberculosis, video-based directly observed therapy (vDOT)

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APPLICATION OF MODERN TECHNOLOGIES IN PUBLIC HEALTH CARE

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The progressive development of science in the last decade has led to the creation of a number of new technologies that are increasingly entering public health care. Robotic systems, telemedicine, artificial intelligence are part of modern medicine and healthcare. The use of innovative technologies in these sensitive areas brings a number of contributions to society and medical professionals. At the same time, a number of questions of an ethical and legal nature arise, which should find an adequate answer and legal regulation in order to guarantee the basic rights and freedoms of citizens. This report will present a brief overview of the main challenges related to the legal regulation of modern technologies in healthcare and medicine, which are faced by national and European authorities and institutions.

Keywords: modern technologies, innovations, public health, challenges, legal regulation

ACTIVE SUBSTANCES FROM HUMAN ORIGIN – THE LEGAL FRAMEWORK ENSURING TRANSPLATATION

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Aim: To analyze the possibilities of treatment of different diseases and conditions by using active substances of human origin – blood, cells, tissues, organs. To analyse the regulatory framework ensuring reliable information and guidelines to optimise the quality and procedures for the provision of this type of active substances. Materials and Methods: We conducted a content analysis and documentary analysis of published guidelines from the EMA, the European Directorate for the Quality of Medicines, and publicly available data from the four directives (2010/45, 2002/98, 2004/23, 2006/17) forming the regulatory framework for active substances of human origin. Results and Discussion: At every point, we need to be sure that all the steps in the chain are carried out properly in order to ensure the optimal effect of the therapy. Some of the most important points are assessing the health status of the potential recipient, evaluating the potential donor and minimizing potential adverse effects and adverse reactions in response to the introduction of transplanted organs/tissues/cells, and assessing the effects associated with immunosuppressive therapy, which is an integral part of these processes.

Keywords: active substances, blood, cells, tissues, organs, transplantation, donor, recipient

ПРЕВЕНЦИЯ СРЕЩУ РАК НА МАТОЧНАТА ШИЙКА ПРИ МЛАДИ МОМИЧЕТА И РОЛЯТА НА ОБЩОПРАКТИКУВАЩИТЕ ЛЕКАРИ И МЕДИЦИНСКИТЕ СПЕЦИАЛИСТИ

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В България обхватът на младите момичета с ваксина срещу човешкия папилома вирус (HPV) е много нисък, а смъртността от рак на маточната шийка (РМШ), който се причинява от вируса – висока. През 2019 г. обхватът е бил 4%, през 2020 – 2021 г. – 2%, а през 2022 г. едва 1% по данни на Министерството на здравеопазването.

Цел: Да се изследва отношението на жените – родители на младите момичета, към превенцията на РМШ и техните нагласи към ваксинирането като съществена част от тази превенция.

Материал и методи: Използвани са документален метод и социологическа анкета. Разработена е авторска анкета. Анкетирани са 44 жени, подбрани на случаен принцип.

Резултати и обсъждане: По-голямата част от анкетираните жени са наясно с първичната профилактика. Данните сочат положително отношение към ваксината. Респондентите са посочили, че биха ваксинирали дъщерите си срещу РМШ. Фактът, че 43% от анкетираните се съмняват в безопасността на ваксините, дава ясен знак, че информационното покритие на родителите е незадоволително.

Изводи: Прицелна група за профилактична дейност трябва да станат 34% от анкетираните, които категорично отказват ваксинация. Усилията на информационните кампании трябва да се насочат към жените, според които ваксините срещу човешки папиломен вирус не са безопасни.

Да бъдеш добре информиран, е първата стъпка в защитата срещу HPV.

Ключови думи: рак на маточната шийка, превенция, ваксинация, млади момичета, медицински специалисти

POPULATION AWARENESS ABOUT PROPER BEHAVIOUR IN CASE OF A FLOOD

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Over the past decades, an increasing number of floods has been observed on the territory of Bulgaria. Regardless of the causes (natural or anthropogenic), floods pose a real danger to human life and health. Therefore, the rules of conduct of the population before, during and after a flood are extremely important. The purpose of this publication is to compare the awareness of the population in different time periods about the rules of proper conduct during a flood. Material and methods: Statistical, comparative and descriptive methods were used. The survey conducted is part of a long-term study and is a comparative analysis covering respondents from 2015 (309) and 2021 (250). The survey data shows that 59.6% of the respondents are aware of the rules of conduct in case of flooding. It is not a small percentage of the remaining 40.4% of respondents for whom continuing education and awareness is needed. Conclusion: Preventive measures among the population and sufficient awareness are a guarantee for good preparation, response and choice of methods to prevent negative consequences among the population during a flood.

Keywords: flood, awareness, rules of conduct, preventive measures

INCLUSION OF PREVENTIVE ACTIVITIES IN THE NATIONAL FRAMEWORK AGREEMENT

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Numerous studies have shown poor health awareness of patients, lack of health culture, visiting a dentist only on the occasion of already occurring diseases, financing by the NHIF of only a small part and even in incomplete amount of the treatment activities. All this leads to complications and tooth loss, periodontal problems and the emergence of DCD. Epidemiological studies show a deterioration of the oral health of Bulgarians. At the same time, discussions are being held by the health authorities on the inclusion of preventive activities in the NHIS package for dental services, and on the need to make the oral health of the population a priority in health policy deterioration of the oral health of Bulgarians. On the other hand, this will lead to a reduction in the funds that the NHIF pays dentists for treatment activities carried out according to the NDA. Action is needed to carefully plan and analyse all actions in this direction.

Keywords: NFA, NHIF, preventive activities, oral health

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