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E. LANDMARKS IN ADVANCED MEDICINE
E.a. THE PRACTITIONER'S TRIBUNE – Medicine
NEPHROLOGY AND RHEUMATOLOGY

1. DETERMINANTS OF RENAL DAMAGE IN GOUT: CLINICAL PERSPECTIVES AND BIOMARKERS FOR EARLY DIAGNOSIS

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Abstract

Introduction: Gout, characterized by chronic hyperuricemia, affects renal function, being the determining factor of the severity of the disease. Deposition of monosodium urate crystals, chronic inflammation, oxidative stress contribute to nephropathy and progressive renal dysfunction. **Objectives:** The study aimed to identify risk factors, characterize renal damage and its impact on quality of life, as well as develop an early diagnosis algorithm. **Materials and methods:** 77 patients with gout (2017–2024), grouped according to renal damage, were analyzed. The assessments included biochemical analyses, urinary biomarkers (NGAL, KIM-1) and imaging investigations. **Results and discussion:** Renal damage was identified in 55.84% (n=43) of the patients, being associated with hyperuricemia (>8 mg/dL) and disease duration (≥8 years). Urinary biomarkers showed increased sensitivity for early diagnosis. Quality of life scores were lower in these patients (p<0.01). **Conclusions:** Urinary biomarkers and the proposed algorithm offer opportunities for early detection and effective management of renal complications, improving the prognosis of patients with gout.

Keywords: renal damage, gout, diagnosis.

2. THE IMPACT OF TELANGIECTASIAS IN PATIENTS WITH SYSTEMIC SCLERODERMA

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Abstract

Introduction. Telangiectasias are a cutaneous manifestation in patients with systemic scleroderma (SS), with not only a cosmetic impact, but also multiple relationships with internal organ damage. **Aim.** To study the association of telangiectasias with the immune, clinical and evolutionary status of patients with SS. **Materials and methods.** 115 patients with SS were studied, of which 4 were male. The diffuse form of the disease was diagnosed in 43 patients. The diagnosis was established according to the 2013 EULAR/ACR criteria. The patients were examined comprehensively. **Results and discussion.** The presence of telangiectasias was detected in 72% of the patients studied, more frequently in those with the limited form of the disease (58%). Patients with telangiectasias were more frequently diagnosed with digital ulcers, cardiac involvement, constipation, biliary cholangitis, pulmonary hypertension, and the presence of anticentromere, antiRo52, and U3RNP antibodies. **Conclusions.** The presence of telangiectasias in patients with SS was associated with the limited

form of the disease, with severe clinical manifestations such as digital ulcers, cardiac involvement, and pulmonary hypertension, but also with a distinct immunological pattern.

Keywords: *scleroderma, telangiectasias, spider veins.*

3. THE EFFECT OF PSYCHOSOCIAL AND ECONOMIC FACTORS ON THE QUALITY OF LIFE OF PATIENTS WITH CHRONIC KIDNEY DISEASE

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Abstract

Introduction. Evaluation of psychosocial and economic factors in patients with chronic kidney disease (CKD). Materials and methods. Cross-sectional study on 989 patients with CKD, examined (laboratory, instrumental), with the establishment of comorbidities, socio-demographic factors, with the assessment of quality of life (KDQOL-SF™ 1.3 questionnaire). Results and discussion. 65% of patients were women and 35% men, average age 58.2 years; of which - 60% with CKD (stages 1-3); 40% with CKD (stage 4-5). 64.9% of patients had a low family income; in 35.1% of patients - medium or high family income. The average scores of the physical and mental component were moderately decreased by 32.3 (± 10.5) ($p < 0.001$). The average score of the mental component was higher, being correlated with a higher level of education, and with a higher monthly income ($p < 0.05$). Conclusions. Psychosocial disorders negatively influence the quality of life of patients with CKD, being more pronounced with the progression of CKD and with the precarious economic status.

Keywords: *chronic kidney disease, Psychosocial disorders, quality of life.*

4. EVOLUTION OF SKIN LESIONS IN PSORIATIC ARTHROPATHY AND THE EFFECTIVENESS OF COMPLEX LASER THERAPY

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Abstract

Introduction: Psoriatic arthropathy (PsA) is a chronic inflammatory disease characterized by joint involvement and psoriatic skin lesions. The evolution of skin lesions can influence the severity of the disease, the quality of life of patients and the response to treatment. Laser therapy has gained ground as an adjuvant method in the management of skin and joint symptoms, due to its anti-inflammatory, immunomodulatory and regenerative effects. Aim: To evaluate the peculiarities of the evolution of skin lesions in patients with PsA and to analyze the effectiveness of complex treatment that includes laser therapy. Materials and methods: The study included 120 patients diagnosed with PsA according to CASPAR criteria. Patients were divided into two groups: Group I (n=60) received conventional therapy combined with low-frequency laser treatment, and Group II (n=60) received conventional therapy only. The evolution of skin lesions was assessed using PASI (Psoriasis Area Severity Index) and serum inflammatory markers (CRP, IL-6).

Results and discussion: Patients in Group I showed a significant improvement in PASI score compared to those in Group II ($p < 0.01$). Also, the levels of inflammatory markers were lower in the group that received laser treatment. Laser therapy demonstrated positive effects on reducing skin erythema, scaling and pruritus. Conclusions: Complex therapy, which includes the use of laser, is an effective and safe method for managing skin lesions in psoriatic arthropathy. It contributes to reducing local inflammation, improving the quality of life of patients and optimizing the overall therapeutic response.

Keywords: *psoriatic arthropathy, chronic inflammatory disease, laser therapy.*

5. EFFECTS OF LASER THERAPY ON INFLAMMATORY MARKERS AND JOINT FUNCTION IN PSORIATIC ARTHRITIS

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Abstract

Introduction: Psoriatic arthritis (PsA) is a chronic inflammatory disease, characterized by joint and skin involvement, with a significant impact on the quality of life of patients. Standard treatment aims to reduce inflammation and slow disease progression, but the use of adjuvant therapies, such as laser therapy, has gained attention due to its anti-inflammatory and regenerative effects. **Aim:** To evaluate the effects of laser therapy on serum inflammatory markers and joint function in patients with psoriatic arthritis. **Materials and methods:** The study included 100 patients diagnosed with PsA according to CASPAR criteria. They were divided into two groups: Group I (n=50) received conventional treatment associated with low-frequency laser therapy, and Group II (n=50) received conventional treatment only. The parameters evaluated included serum levels of CRP, IL-6 and TNF- α , as well as the Disease Activity in Psoriatic Arthritis (DAPSA) and Bath Ankylosing Spondylitis Functional Index (BASFI). **Results and discussion:** The laser therapy group showed a significant reduction in CRP, IL-6 and TNF- α levels compared to the control group ($p < 0.05$). A considerable improvement in joint function was also observed, with a decrease in DAPSA and BASFI values, suggesting a reduction in disease activity and better joint mobility. **Conclusions:** Laser therapy is an effective adjunctive approach in the treatment of psoriatic arthritis, with positive effects on systemic inflammation and joint function. This method may contribute to optimizing therapeutic outcomes and increasing the quality of life of patients with PsA.

Keywords: psoriatic arthritis, chronic inflammatory disease, laser therapy.

6. THE IMPACT OF COMORBIDITIES ON OSTEOARTHRITIS: PREVALENCE AND CLINICAL IMPLICATIONS

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Abstract

Introduction: Osteoarthritis (OA) is the most common form of arthritis, with a significant impact on quality of life and medical costs. The study explores the prevalence of comorbidities associated with OA and their influence on clinical management. **Materials and methods:** The study included a group of 111 patients diagnosed with OA, using administrative and clinical data to identify common comorbidities: hypertension, COPD and depression. The analysis aimed to correlate these comorbidities with symptom severity and use of medical services. **Results and discussion:** At least one comorbidity was identified in 61 patients (54.6%). Hypertension was the most common (29%, 32 patients), followed by COPD (18.6%, 21 patients) and depression (<5%, 5 patients). Comorbidities were more common in women and in patients >65 years of age. **Conclusions:** The study highlights the impact of comorbidities on patients with OA. Integrating personalized and multidisciplinary management is essential to improve quality of life and reduce the economic burden associated with OA.

Keywords: osteoarthritis, comorbidity, hypertension.

7. THE SHADOWS OF COMORBIDITIES IN PSORIATIC ARTHRITIS: A CLINICAL-ULTRASOUND LOOK

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Abstract

Introduction. Patients with psoriatic arthritis (PsA) frequently present with multiple comorbidities, influencing the course of the disease and the therapeutic response. **Aim of the study.** To investigate the relationship between comorbidities and clinical/ultrasound characteristics of PsA. **Materials and methods.** The cohort study included 107 patients with PsA (CASPAR criteria), 61 with ≥ 1 comorbidity and 56 without comorbidities. Clinical and ultrasound examinations assessed synovitis and enthesitis. **Results and discussion.** Clinical enthesitis was more frequent in patients with ≥ 2 comorbidities: painful joints 17.2% ($p=0.0177$); synovitis in the lower limbs 8.1%, significantly higher than in the upper limbs (5.05%, $p=0.00031$). Ultrasound detected synovitis in 19.6% of the joints and inflamed enthesitis in 6.9% of the cases. Enthese vascularization, identified in 19.4% of cases, was an independent marker of disease activity ($p=0.0015$), without correlation with comorbidities. **Conclusions.** Patients with multiple comorbidities are at increased risk of significant ultrasound impairment, highlighting the importance of rigorous monitoring of these patients. Enthese vascularization is a valuable indicator of disease activity, independent of the presence of comorbidities.

Keywords: *psoriatic arthritis, comorbidities, enthesitis.*

8. PARASITIC REACTIVE ARTHRITIS AND PSORIATIC ARTHRITIS: A COMPARATIVE ULTRASONOGRAPHIC PERSPECTIVE

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Abstract

Introduction. Parasitic reactive arthritis (PRA) and psoriatic arthritis (PsA) are distinct rheumatic diseases, but share common immunoinflammatory features. PRA is associated with parasitic infections (Giardia, Echinococcus, Toxocara), with a significant impact on musculoskeletal structures. Ultrasonographic examination reveals characteristic lesions, being a crucial method for differential diagnosis and monitoring. **Materials and methods.** The study included 161 patients with PRA and 103 patients with PsA, evaluating the ultrasonographic features of the affected joints. **Results and discussion.** In PRA, excess synovial fluid was detected in 9.1% of the joints, with knees predominating (48.8%). Synovial proliferation was present in 9.16% of the joints, with reduced echogenicity in most cases. In comparison, PsA revealed more extensive synovial proliferations and more severe enthesopathies, associated with skin lesions. **Conclusions.** ARP and PsA present distinct but overlapping ultrasonographic patterns involving synovial proliferation and enthesopathy. Ultrasonography allows differentiation between these entities and offers insights for personalized therapeutic approaches, underscoring the importance of rigorous monitoring in the management of rheumatic diseases.

Keywords: *Parasitic reactive arthritis, psoriatic arthritis, parasitic infections.*

9. CARDIOVASCULAR RISK IN RHEUMATOID ARTHRITIS

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Abstract

Introduction: Chronic inflammation in rheumatoid arthritis induces severe joint damage and organic changes. **Purpose.** To study cardiovascular risk in rheumatoid arthritis by examining theoretical and clinical-paraclinical data. **Materials and methods.** We examined 196 women with

RA. Anamnestic and clinical data were collected according to the questionnaire developed for the study. Lipidogram data, DAS 28 -PCR were evaluated. Results and discussion. In patients with RA, we attested higher levels of total cholesterol (CholT) and triglycerides, $p < 0.05$, associated with a decrease in HDL cholesterol levels. Determination of the atherogenic coefficient demonstrated higher values in RA (7.96 ± 0.6 vs 5.3 ± 0.4 ; $p < 0.001$). Following the correlation analysis, we found a strong negative correlation of CholT levels ($r = -0.54$, $p < 0.001$) and Tg ($r = -0.39$, $p < 0.001$) with DAS28-PCR disease activity. Conclusions: In patients with rheumatoid arthritis, a proatherogenic lipid status is attested, which correlates strongly with the duration and activity of the disease.

Keywords: *rheumatoid arthritis, cardiovascular risk, chronic inflammation.*

10. POSTMENOPAUSAL OSTEOPOROSIS, A CHALLENGE IN DIAGNOSIS

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Abstract

Introduction. Osteoporosis is one of the most widespread chronic diseases. The aim of the paper is to conduct a literature review from the perspective of determining sensitive clinical and paraclinical markers for osteoporosis in perimenopausal women. Results and discussion: Most women do not qualify for pharmacological treatment of osteoporosis until more than a decade after menopause, by which time they will have lost up to 30% of their bone mass and may already have fractures in their antecedents. The decrease in estradiol levels, especially during the transition to menopause, leads to an increased rate of bone turnover, due to accelerated bone remodeling and more intense osteoclastic activity. Conclusions: Traditional biomarkers for bone remodeling have certain limitations, such as low specificity and sensitivity and contradictory results between different studies. Obtaining specific data on accelerated bone resorption after menopause by determining the hormonal status of women can be used for prognosis, osteoporosis risk and initiation of individualized treatment.

Keywords: *osteoporosis, perimenopausal, bone resorption.*

11. DISEASE DURATION AND JOINT STATUS IN RHEUMATOID ARTHRITIS

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Abstract

Purpose. Determination of joint status in rheumatoid arthritis depending on the duration of the disease. Materials and methods. We examined 196 women with RA, with different duration of the disease. Anamnestic and clinical data were collected according to the questionnaire developed for the study. The number of swollen and painful joints (NAD and NAT), DAS-28-CRP (C-reactive protein), rheumatoid factor and anti-CCP antibodies were evaluated. Results and discussion. The examined patients were divided into 4 groups depending on the duration of the disease: 0-12 weeks, 12 weeks – 1 year, 1-5 years, >5 years. At the onset, the number of affected joints was on average 3.5 ± 1.2 with an increase in the number to 13.6 ± 2.7 over 5 years of the disease. The number of affected joints at the onset of the disease and DAS28-PCR correlated positively with the level of anti-CCP antibodies. After 3 months of methotrexate treatment, a decrease in NAD and NAT is observed. Conclusions: Joint status in RA depends on the degree of immune response, the duration of the disease and the treatment applied.

Keywords: *rheumatoid arthritis, joint status, immune response.*

12. POSTMENOPAUSAL OSTEOPOROSIS - A CHALLENGE FOR WOMEN

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Abstract

Introduction. Postmenopausal osteoporosis is a major public health problem, characterized by reduced bone density and increased risk of fractures. **Purpose of the work.** Estimation of BMD changes and assessment of fracture risk in women during the menopausal period. **Materials and methods.** 98 women aged between 49 and 74 years were analyzed. The assessment was based on anamnesis, BMD was determined by the DXA method. **Results and discussion.** The average age of the patients is 62±5.4 years, 87% with menopause from 50±5.2 years, 13% - early menopause. In 73% the pain was localized to the spine, lumbar pain being a common symptom. According to the DXA results, the average T score = -2.62 SD. A significant number of patients are at risk of osteoporotic fractures. **Conclusions.** The clinical approach, which includes periodic assessment of fracture risk by FRAX, measurement of bone mineral density and identification of risk factors, ensures effective and individualized management of postmenopausal osteoporosis.

Keywords: Postmenopausal osteoporosis, fractures, bone mineral density.

13. MODERN THERAPEUTIC MANAGEMENT IN RHEUMATOID ARTHRITIS

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Abstract

Purpose of the paper. To conduct a literature review on the treatment of rheumatoid arthritis. **Results.** Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by joint inflammation, progressive structural damage, and systemic complications. Disease-modifying antirheumatic drugs (DMARDs) form the cornerstone of RA treatment, aiming to control disease activity and prevent long-term joint damage. Conventional synthetic DMARDs (csDMARDs), such as methotrexate, remain first-line therapy. However, biologic DMARDs (bDMARDs) and targeted synthetic DMARDs (tsDMARDs) are expanding therapeutic options. Recent research has focused on optimizing bDMARD dosing in remission, comparing the efficacy of bDMARDs and tofacitinib, and integrating patient-centered decision-making tools. **Conclusions:** DMARD therapy remains the cornerstone of RA treatment, with personalized approaches gaining increasing importance. Dose reduction of bDMARDs in remission is feasible and cost-effective with appropriate monitoring. Tofacitinib is a viable alternative to bDMARDs, especially for methotrexate-naïve patients.

Keywords: rheumatoid arthritis, chronic autoimmune disease, treatment.

14. SOME ASPECTS OF NEPHROLOGICAL PATHOLOGY IN WOMEN

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Abstract

Introduction: The addressability of patients with chronic pyelonephritis (CPN) is delayed, due to the gradual onset of the disease, and when the diagnosis is already established, it is also associated with renal failure, and, as a result, the need for renal transplantation. **Objectives:** Research on risk factors, variations in bacterial cultures and analysis of etiological treatment according to age in women with CPN. **Materials and methods:** 100 patients with CPN, hospitalized in the IMSP SCR "Timofei Moșneaga", were examined, who were divided into 2 groups: 50 men and 50 women. **Results and discussion:** The most affected age group are patients over 60 years. In women, increased incidence of CPN is observed during the reproductive age period (18-39 years) and the period after

menopause (60-69 years), in men - 60-69 years; in men caused by Proteus 52%, and in women – E.coli 57%. Conclusions: Early diagnosis of risk factors and application of complex treatment could decrease the incidence of PNC.

Keywords: *nephrology, pyelonephritis, treatment.*

15. DIAGNOSIS AND TREATMENT OF ACUTE PYELONEPHRITIS IN PATIENTS WITH DIABETES MELLITUS

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Abstract

Introduction: Patients with diabetes mellitus (DM) have a low immune response, which is a predisposing factor for the onset of acute infectious processes, including acute pyelonephritis (APN). Objectives: Studying patients with APN developed against the background of DM depending on age, sex, underlying pathogens, diagnostic methods and treatment effectiveness. Materials and methods: 60 patients with APN, hospitalized in IMSP SCM "Sfînta Treime" during the years 2020-2023, were examined. Results and discussion: The study included 60 patients, of whom 13 were men and 47 were women. The ratio between the respective categories Women/Men = 3.62/1, the average age being 67.5 years ± 12.57 years. %. PNA with type 1 DM in women – 25.5% (n=47) a ratio that changes at the stage of PNA without DM where men – 23.1% (n=13). Conclusions: For the development of PNA, DM represents a major factor from the top 4 non-communicable diseases with an increased probability of death.

Keywords: *diabetes mellitus, pyelonephritis, diagnostic.*

16. SARCOPENIA IN ANKYLOSING SPONDYLITIS: PREVALENCE AND ASSOCIATED FACTORS

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Abstract

Introduction. Ankylosing spondylitis (SpA) is a common autoinflammatory disease with a significant impact on health, occupational integration and premature mortality. Recent studies suggest a link between sarcopenia and autoimmune inflammation. Aim of the study. To assess muscle involvement and the prevalence of sarcopenia in patients with SpA. Materials and methods. Literature review using PubMed, NCIB and Research4Life, to identify studies on the prevalence and factors associated with sarcopenia in patients with SpA. Results and discussion. The prevalence of sarcopenia in patients with SpA varies between 17% and 32%, being more common in the axial form. Sarcopenia is associated with high disease activity (DAS28 > 3.5), sedentary lifestyle (up to 45% of patients), chronic systemic inflammation and treatment with glucocorticoids (30% of cases). SpA patients also have a 25% reduction in muscle mass and 30% in muscle strength compared to the general population. Conclusions. Sarcopenia is a common comorbidity in SpA patients, aggravated by inflammation, reduced physical activity, and immunosuppressive treatments. Early and individualized management of the underlying disease, along with rehabilitation and physiotherapy programs, can significantly reduce the risk of sarcopenia and improve the quality of life of these patients.

Keywords: *Ankylosing spondylitis, sarcopenia, glucocorticoids.*

17. PHYSIOLOGICAL AND PATHOLOGICAL CHANGES IN THE KIDNEY ASSOCIATED WITH AGING PROCESS IN ELDERLY

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Abstract

The phenomenon of renal aging has gained growing interest in our aging society, as older individuals are at higher risks for several kidney related issues. Renal senescence refers to predictable, age – related changes in the kidney that differ from pathological diseases such diabetic nephropathy, glomerulonephritis, other chronic kidney diseases. Aging kidneys undergo both structural and functional changes. The structural micro-anatomical changes include nephrosclerosis, nephron hypertrophy and decreased number of functional nephrons. And the macro-anatomical changes are a combination of cortical volume decline, kidney parenchymal cysts and some others. The functional abnormalities specifically age related decline in GFR reflects vascular alterations and nephron loss. Aging kidneys are more susceptible to injury, with an increased risk of proteinuria, chronic kidney disease (CKD), and acute kidney injury (AKI). Gender variations, comorbidities, and low protein consumption all contribute to age-related renal alterations with women experiencing slower progression of renal dysfunction due to the protective effects of estrogens on NO production and matrix breakdown.

Keywords: *kidney, nephrosclerosis, elderly.*

18. CAN METOPROLOL BE USEFUL IN THE TREATMENT OF ARDS?

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Abstract

Metoprolol is a beta-blocker that may have a significant role in the treatment of patients with acute respiratory distress syndrome (ARDS). This study explores the efficacy of intravenous administration of 15 mg metoprolol in newly intubated patients with ARDS, focusing on survival and number of days without invasive mechanical ventilation in the first 28 days. Secondary objectives include assessing the impact on blood oxygenation, systemic inflammation, and inflammatory cell profiles. The study also examines $\beta 1$ AR Arg389Gly polymorphisms and transcriptomic signatures associated with long-term prognosis. Despite the promise based on preclinical data and double-blind RCTs, there are limitations and controversies related to the use of metoprolol in ARDS. This research provides insights into the mechanism of action, practical implications, and challenges in integrating metoprolol as an adjunctive therapy in ARDS.

Keywords: *metoprolol, ARDS, intubated patients.*

E. LANDMARKS IN ADVANCED MEDICINE
E.a. THE PRACTITIONER'S TRIBUNE – Medicine
NEUROSCIENCES

1. THE IMPACT OF THE COMPREHENSIVE NATIONAL POLICY ON STROKE MANAGEMENT IN THE REPUBLIC OF MOLDOVA THROUGH THE PRISM OF THE RES-Q REGISTRY

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Abstract

Introduction. The Stroke Quality Registry (RES-Q) was implemented in the Republic of Moldova in 2017. In 2024, the Ministry of Health of the Republic of Moldova initiated multiple activities to promote and implement modern stroke treatment therapy at the national level. **Materials and Methods.** The study assessed the impact of the comprehensive national policy on several stroke treatment performance indicators, thus analyzing the data of ischemic stroke patients entered into the RESQ Registry during the period 2017-2024. **Results and discussion.** Data from 7093 stroke patients were available. The proportion of ischemic stroke patients who benefited from recanalization therapy increased substantially from 1.12% in 2017 to 17% in 2024, and the door-to-needle time decreased from 85 min (2017) to 53 min (2024). Mechanical thrombectomy began to be performed in the Republic of Moldova in 2018, and the rate of stroke patients who were treated with thrombectomy increased significantly from 0.49% in 2019 to 6% in 2024, the door-to-groin puncture time decreased from 228.5 minutes in 2019 to 98 minutes in 2024. In 2024, most patients benefited from secondary prevention recommendations. **Conclusion.** The year 2024 was marked by the implementation of the comprehensive national stroke treatment policy and the significant improvement of key performance indicators in stroke management.

Keywords: *Stroke Quality Registry, ischemic stroke, treatment.*

2. THE IMPACT OF ELECTRICAL INTERFERENCE ON ELECTROENCEPHALOGRAPHIC RECORDINGS IN INTENSIVE CARE

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Abstract

Introduction: Electrical interference is a major technical challenge in intensive care units, where obtaining EEG recordings is crucial for assessing clinical diagnosis and prognosis. We aimed to investigate the effects of electrical interference on the quality of EEG recordings and to explore technical solutions to minimize their effect. **Materials and methods:** A set of 20 EEG recordings performed at the Institute of Emergency Medicine was used in the study. Data preprocessing included digital noise filtering, artifact correction, and spectral analysis. Various noise protection techniques were tested, such as digital filtering, isolated grounding, and disconnection from the continuous power source. **Results and discussion:** The implementation of additional shielding methods, disconnection of additional power sources at the patient's bedside, and limitation of the continuous power source resulted in an average 80% reduction in background noise. The protection methods have been validated in the clinical intensive care environment, demonstrating their

effectiveness in reducing interference. Conclusions: Typical digital filtering approaches together with power supply optimization and EEG amplifier isolation represent effective solutions for minimizing electrical interference in intensive care.

Keywords: *electrical interference, intensive care units, electroencephalographic.*

3. PSYCHOTHERAPY AND IMPROVING THE QUALITY OF LIFE OF PATIENTS WITH 3. EPILEPSY

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Abstract

Introduction. Epilepsy can generate anxiety, depression and decreased self-esteem. Social stigmatization can lead to social isolation. Fear of epileptic seizures affects daily activities and patient autonomy. Purpose of the work. Synthesis of the literature dedicated to psychotherapeutic methods in epilepsy. Materials and Methods. The literature analysis was carried out during the period 2000-2024, using bibliographic sources, including the Medical Scientific Library of the USMF "Nicolae Testemiţeanu", data from the electronic libraries PubMed, MedScape and Hinari. Results and discussions. Psychotherapy can play a significant role in improving the quality of life of patients with epilepsy. This neurological condition has a profound impact not only on physical health, but also on the emotional and social state of the patient, and psychotherapeutic interventions help manage stress, anxiety and stigma associated with the disease. Conclusions. Psychotherapy contributes significantly to improving the quality of life of patients with epilepsy, helping them overcome psychosocial barriers. Psychotherapeutic interventions must be personalized and integrated into a holistic treatment plan, which includes both medical and psychological aspects.

Keywords: *epilepsy, anxiety, psychotherapy.*

4. THE IMPACT OF AGING ON THE RISK OF EPILEPSY

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Abstract

Introduction: Population epidemiological studies have shown a significant increase in the incidence of epilepsy with advancing age. In particular, the incidence of epilepsy in the elderly is approximately twice as high as in children, reaching values of 85.9 cases per 100,000 people in the age group 65–79 years and 135 cases per 100,000 people for those over 80 years of age (Beghi et al., 2018). At the same time, approximately 25% of newly diagnosed cases of epilepsy are reported in people over 65 years of age. This raises the question of whether brain aging constitutes a direct risk factor for epilepsy or whether this association is the result of the high prevalence of comorbid pathologies in this age group, such as cerebrovascular diseases, brain tumors and neurodegenerative conditions, which can favor the occurrence of epileptic seizures. The aim of the study is to assess the impact of brain aging processes on the risk of epilepsy in the elderly, with a focus on the relationship between age-related neurobiological changes and common comorbidities in this population. Methods and materials: The study involved a systematic review of the specialized literature from the last 20 years, focused on the impact of aging on the risk of epilepsy. The articles were selected from the PubMed database, using keywords such as: "epilepsy", "aging", "cerebrovascular", "neurodegenerativ" (in Romanian) and "epilepsy," "aging," "risk factors," "cerebrovascular," "neurodegenerative" (in English). 18 relevant articles were analyzed, of which 14 original articles including a total of 1,175 patients and 4 synthesis articles. Patients included in these studies were followed for varying periods of time,

with the aim of identifying correlations between brain aging processes, the presence of comorbidities, and the risk of epilepsy. Results and discussion: Current research is still in its early stages, with significant gaps in understanding the complex relationships between aging and epilepsy. The aging process of the brain is associated with structural and functional changes, such as reduced neuronal plasticity, subclinical vascular damage, chronic inflammation, and neurodegeneration, which predispose to epilepsy. These processes are similar to those that determine epilepsy, such as increased neuronal excitability and alteration of neuronal networks. Brain aging varies significantly between individuals, and the acceleration of this process is influenced by genetic factors and associated comorbidities. Cardiovascular risk factors, such as hypertension, diabetes, and dyslipidemia, accelerate brain aging by impairing microcirculation and contributing to silent ischemia, a risk factor for epilepsy. In addition, neurodegenerative diseases, such as Alzheimer's disease, are associated with an increased risk of epilepsy. Epilepsy itself can accelerate the aging process, cognitive decline, and cerebrovascular disease. Neuroimaging studies suggest that patients with drug-resistant epilepsy have brains 4–8 years older than their chronological age, indicating an acceleration of brain aging due to epileptic seizures. Conclusion: The relationship between aging and the risk of epilepsy is complex and multifaceted. Physiological processes of brain aging, combined with cardiovascular and neurodegenerative risk factors, may accelerate brain aging and increase the risk of developing epilepsy. This highlights the need for prevention and treatment strategies that address both brain aging and associated comorbidities to reduce the risk of epilepsy in the elderly.

Keywords: *epilepsy, aging, neurodegenerative.*

5. SERUM URIC ACID LEVELS AND ULTRASONOGRAPHIC FEATURES OF CAROTID ATHEROSCLEROSIS IN DIFFERENT TYPES OF OBESITY

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Abstract

Introduction: Existing studies suggest a close relationship between high levels of uric acid (UA), obesity and carotid atherosclerosis. Materials and Methods: Subjects included in the study were examined according to a protocol for estimating cerebrovascular risk factors. Results and discussion: 2076 subjects (mean age 48.1±13.1 years, 1307 women) were included in the study: 59 with general obesity, 616 with central obesity, 715 with mixed obesity (general-central) and 686 non-obese. Thus, the highest levels of UA were observed in subjects with mixed obesity, followed by subjects with central obesity, general obesity and non-obese (309.4±82.2 vs. 301.2±73.1 vs. 272.9±272.9). Intima-media complex values were significantly higher in subjects with elevated UA levels and central obesity. Conclusions: The results of our study indicate that subjects with central obesity require closer monitoring of serum UA levels, given its associated complications.

Keywords: *uric acid, ultrasonographic, carotid atherosclerosis.*

6. PECULIARITIES OF NOTCH3 GENE EXPRESSION IN CLINICAL POLYMORPHISM OF STROKE AND OTHER PATHOLOGIES

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Abstract

Introduction. The NOTCH3 gene is well known for its role in the pathogenesis of cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) and other diseases. According to the Global Burden of Disease Study 2023, the NOTCH3 gene has

been correlated with an increased risk of sporadic stroke, which affects approximately 12.2 million people globally annually. Study objective. The aim of this study is to analyze the clinical and molecular-genetic aspect of NOTCH3 gene expression, emphasizing its role as a risk factor in the development of stroke and other pathologies. Materials and methods. A narrative review was performed using the PubMed database to analyze the role of the NOTCH3 gene in various pathologies. The search included key terms - "NOTCH3" and "stroke genetics", filters for: meta-analyses, systematic reviews and clinical trials from the period 2015-2025. Of the 72 articles identified, 65 were included in the final analysis. Results and discussion. Data analysis highlights that among patients with ischemic or hemorrhagic stroke, the prevalence of NOTCH3 mutations varies between 2% and 5%. Increased gene expression was observed in the pathologies: CADASIL, colorectal cancer, basal-type breast tumors, polycystic kidney disease and in 63% of cases of serous ovarian carcinoma. Biomarkers, such as - neurofilament light chain and molecular pathways involved in maintaining the integrity of the extracellular matrix, were also identified. Conclusions. These findings emphasize the need for monitoring carriers of rare NOTCH3 variants and open new directions for early diagnosis and personalized treatments.

Keywords: NOTCH3, stroke, gene expression.

7. EXPLORING THE PSYCHOLOGICAL PROFILE OF POST-STROKE PATIENTS: IMPLICATIONS FOR RECOVERY AND QUALITY OF LIFE

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Abstract

This paper provides a detailed view of the psychological profile of post-stroke patients and rehabilitation strategies. The results of the research on the psychological characteristics of a sample of 541 men and 554 women, average age 64 years, with stroke are presented, research structured on nine studies derived from the objectives pursued, the final goal being the identification of a psychological profile of post-stroke people. This scientific approach was achieved by combining several assessment methods, including clinical interviews, observations of patient behavior, analysis of medical documents and results obtained from psychological tests. The significant features of the psychological profile were objectively deduced, based on the results of the studies. The conclusions summarize the essential points of this research and emphasize the importance of the detailed psychological assessment of the stroke patient, which can help identify specific needs, facilitating the development of global approaches and personalized recovery strategies, improving the quality of life of the post-stroke patient.

Keywords: post-stroke, recovery, psychological.

8. CONTINUOUS THETA BURST TRANSCRANIAL MAGNETIC STIMULATION (CTBS) IN EPILEPSY PATIENTS

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Abstract

Transcranial theta burst magnetic stimulation (TBS) is a rapidly developing field that holds promise for innovative therapeutic strategies and has shown encouraging clinical outcomes in epilepsy management. Increasing evidence indicates that TBS may modulate pivotal neural circuits involved in seizure generation. Ongoing research is devoted to refining stimulation

protocols and integrating TBS with existing treatments to optimize its therapeutic potential. We conducted a pilot experimental to assess the impact of experimental multifocal continuous TBS protocol in generalized epilepsy patients. In this study, we hypothesized that multifocal cTBS could induce changes in the cortical excitability and impact seizure frequency, quality of life (QOLIE-31), seizure severity (SSQ) compared to baseline, with minimal adverse effects. Participants received six sessions of cTBS on consecutive days, each delivering 1800 pulses divided into three theta-frequency trains at 80% of the resting motor threshold over vertex. Follow-up assessments took place at 4, 8, and 12 weeks.

Keywords: *transcranial theta burst magnetic stimulation, epilepsy, quality of life.*

9. ORGANIZATION OF EMERGENCY MEDICAL ASSISTANCE SERVICE IN ACUTE STROKE IN THE REPUBLIC OF MOLDOVA

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Abstract

Introduction: Stroke (CVA) is one of the leading causes of mortality in the Republic of Moldova (RM), so in 2024 a national acute stroke emergency medical assistance service was established. **Materials and Methods:** The aim of the study was to analyze the data of the first year of activity of the national acute stroke emergency medical assistance service. **Results and discussion:** In accordance with the National Stroke Management Program, a network of stroke centers was established (11 regional centers, 1 comprehensive center, 1 multidisciplinary center). The total number of stroke suspects examined in stroke centers in 2024 was over 7800 patients. The thrombolysis rate in primary centers was 9.9%, in the comprehensive center 19.4% and in the multidisciplinary center 7.9%. The thrombus extraction rate was 15% for the comprehensive center and 12% for the multidisciplinary center. **Conclusions:** Stroke is a national imperative, and the national acute stroke healthcare service is indispensable.

Keywords: *emergency medical assistance service, acute stroke, Republic of Moldova.*

10. MANAGEMENT STRATEGIES IN REFRACTORY STATUS EPILEPTICUS

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Abstract

Refractory status epilepticus (RES) is defined as the persistence of clinical or electroencephalographic seizures despite adequate initial benzodiazepine doses and second-line antiepileptic drugs (AEDs) such as phenytoin/fosphenytoin, valproate, or levetiracetam. Third-line therapy in refractory convulsive SE may involve general anesthesia using intravenous midazolam, propofol, or other agents, while recent evidence supports the use of ketamine to manage RES in both adults and children. However, although these treatment strategies are commonly used in nonconvulsive status epilepticus (NCS), the efficacy of AEDs and anesthetics in NCS has not been adequately investigated. Recent evidence has demonstrated the safety and efficacy of newer AEDs, including levetiracetam and lacosamide, in the treatment of status epilepticus and RES, which also includes NCS. The use of several different intravenous MAE combinations may also be considered in SENC before general anesthesia. In addition, MAE alone has limited efficacy in the management of SE for new-onset SER (NORSE) and its subgroup, infection-related febrile epilepsy syndrome (FIRES). Therefore, in cases of SER, it is imperative

to explore treatment options beyond MAE, including immunotherapy, ketogenic diet, epilepsy surgery. Conclusions: Thus, early treatment and cessation of SE are crucial. However, when implementing aggressive treatment with general anesthesia, it is essential to rely on evidence-based treatment modalities to prevent mortality and complications arising from SER. In refractory SENC, the patient's medical condition should be considered, weighing the benefits and risks of using intravenous anesthetics, but also alternative options, such as non-sedating multiple intravenous MAE therapy. Ketamine is superior in adults with unstable hemodynamic conditions, and ketamine could be used as an adjunct to other GABA-ergic anesthetics. In cases of NORSE, including FIRES, clinicians should consider administering immunotherapy and implementing a ketogenic diet. Management in each subgroup requires a multidisciplinary and individualized approach.

Keywords: *Refractory status epilepticus, antiepileptic drugs, electroencephalographic seizures*

11. NONCONVULSIVE STATUS EPILEPTICUS: CHALLENGES IN DIAGNOSIS AND TREATMENT. CLINICAL CASE

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Abstract

Introduction: Nonconvulsive epileptic status (SENC) is a term that describes a spectrum of conditions in which visible epileptiform activity (EEG) is maintained over a prolonged period, leading to non-convulsive clinical symptoms or changes in the fundamental cognitive processes. These phenomena are associated with continuous epileptiform discharges on EEG, but without obvious convulsive manifestations. **Purpose:** Clinical and electroencephalographic evaluation of patients in the intensive care sections diagnosed with SENC. **Materials and methods:** The present study presents the case of a 68-year-old patient, admitted to the Intensive Care Section with the diagnosis of ischemic stroke in the vertebro-basilar territory, treated by endovascular mechanical thrombectomy. Due to the alteration of the state of consciousness, the patient was investigated by EEG video-monitoring to evaluate the bioelectric cortical activity. **Results and discussion:** The analysis of the EEG route has highlighted generalized periodic discharges (GPDS), with a fronto-central predominance, having a sharp wave complex - slow wave, with a frequency of 1 Hz throughout the registration. These epileptiform discharges impose a differential diagnosis with other conditions, such as post-hypoxic states, metabolic encephalopathies (of liver or renal origin) or post-high pattern. According to the criteria in Salzburg, given that the frequency of discharges was less than 2.5 Hz, the patient was given intravenous diazepam, which led to the disappearance of the GPDS pattern and the confirmation of the SENC diagnosis. So far, there is no consensus on SENC treatment in a patient with alteration of the state of consciousness, to improve the prognosis or withdrawal of treatment, because these EEG patterns could reflect the final stages or an unfavorable prognosis. **Conclusion:** The early diagnosis of SENC in intensive care units, using continuous EEG, is essential for preventing irreversible neurological damage and reducing mortality. Early anticonvulsant interventions can significantly improve patient prognosis. Identifying and managing frequent provocative factors are crucial for optimizing treatment and preventing recurrences.

Keywords: *Nonconvulsive epileptic status, visible epileptiform activity, electroencephalographic evaluation.*

12. PHOTSENSITIVITY IN EPILEPSY: AN INTEGRATIVE MODEL FROM PATHOPHYSIOLOGICAL MECHANISMS TO CLINICAL IMPLICATIONS

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Abstract

Introduction. Photosensitivity occurs most frequently in generalized genetic epilepsies, juvenile myoclonic epilepsy (85%), childhood absence epilepsy (18%), epilepsy with tonic-clonic seizures on awakening (13%). **Materials and methods.** In 2024, 1721 Video-EEG investigations were performed at the National Center for Epileptology. Intermittent light stimulation was performed at frequencies: 1-2-8-10-15-18-20-25-40-50-60Hz. Recordings of 18 patients with epilepsy, sensitivity to eye closure, photoparoxysmal response were selected: 14 women and 4 men. **Results and discussion.** All patients had generalized epilepsy: 26.5% photoparoxysmal response was in people with juvenile myoclonic epilepsy. The photoparoxysmal response was recorded in 15 people with epilepsy (1%) from this population, with a prevalence in women (80%), and with a frequency spectrum of 8-25 Hz. **Conclusions.** Photosensitivity is frequently associated with the onset of generalized epilepsy, is characterized by a female predominance and can be considered a predictive marker of a more severe evolution or of a more difficult therapeutic control of the disease.

Keywords: *Photosensitivity, epilepsy, Video-EEG investigations.*

13. EPILEPTIC SEIZURE OR CONVULSIVE SYNCOPE

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Abstract

Introduction. Epileptic seizure and convulsive syncope can cause transient loss of consciousness (TLC), an imposing symptom, with varied pathophysiological mechanisms and important implications for treatment, psychosocial outcome and prognosis. These two entities represent a frequent reason for presentation in emergency departments (ED) and subsequent hospitalizations. Differentiating them remains a challenge for the clinician. **Objective.** To present a differential diagnostic algorithm between epileptic seizure and convulsive syncope. **Materials and Methods.** Clinical case presentation, based on data obtained from the patient's medical history. **Results and discussion.** A 48-year-old female patient was brought to the ED after being found unconscious at home. During the primary evaluation, she presented with an episode of TLC, similar to an epileptic seizure. She had no history of epilepsy or cardiovascular disease. 8 hours after admission, an electroencephalography was performed that did not reveal epileptic activity. Shortly after, the patient presented two other clinically similar episodes, the last one with cardiorespiratory arrest, the patient successfully resuscitated. Subsequent ECG Holter monitoring revealed repeated episodes of paroxysmal ventricular tachycardia. **Conclusion.** Given the similarity of clinical manifestations between epileptic seizure and convulsive syncope, rapid and correct diagnosis is essential for optimal management and reducing the risk of sudden cardiac death in patients initially suspected of having an epileptic seizure.

Keywords: *epileptic seizure, convulsive syncope, transient loss of consciousness.*

14. GENETIC BIOMARKERS AND EPILEPTIC SYNDROMES

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Abstract

Introduction. Genetic biomarkers represent a major area of interest in epileptology, with the potential to significantly improve the diagnosis, treatment tactics and management of epileptic syndromes. **Purpose of the study.** The purpose of this study is to explore the role of genetic biomarkers in the diagnosis and management of epileptic syndromes, emphasizing the possibilities of personalizing treatment according to individual genetic variability. **Materials and Methods.** For this analysis, the specialized literature and online sources were consulted, including databases such as PubMed, Medline and Medscape. The literature review was performed descriptively and narratively, aiming to extract relevant information from articles published between 2018-2024 and studies exploring the role of the SCN1A, KCNQ2, GABRA1 genes and other genes involved in epileptic syndromes. **Results and discussion.** Recent studies have highlighted the role of monogenic polymorphisms and rare variants in genes such as SCN1A, KCNQ2 and GABRA1, which are associated with various epileptic syndromes. In addition, certain genetic variants, such as those in the CYP2C9 and CYP2C19 genes, have been associated with variable responses to antiepileptic pharmacological treatments. Correlations between genotype and phenotype may help predict clinical outcome in patients, thus facilitating the selection of more appropriate treatment and dose adjustment for more precise management of epileptic syndromes. **Conclusions.** Personalized medicine based on genetic biomarkers plays a key role in early diagnosis and in optimizing treatments in epilepsy. Clinical validation of these biomarkers may significantly reshape the ways in which epileptic syndromes are managed and treated in the long term.

Keywords: epileptic syndromes, genetic biomarkers, diagnosis.

15. COMORBIDITIES IN EPILEPSY, LITERATURE REVIEW

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Abstract

Introduction. The evolution of epilepsy is influenced by the presence of a wide spectrum of comorbid inflammatory, metabolic and neurodegenerative pathologies that modulate neuronal excitability by disrupting microglia activity, hyperproduction of reactive oxygen species, homeostasis disorders with subsequent aberrant remodeling and the formation of epileptogenic networks. **Materials and methods.** The narrative synthesis study of the literature includes 95 publications from the last 5 years of meta-analyses, observational studies, clinical trials from the PubMed and International League Against Epilepsy databases. **Results and discussion.** In the population of patients with epilepsy, a high prevalence of comorbidities is observed compared to subjects in the control group, between 47-69%, due to cardiovascular diseases (hypercholesterolemia - 1.3, hypertension - 2.9), respiratory (chronic obstructive pulmonary disease - 1.29). Also, a major risk is posed by inflammatory diseases, where the prevalence of epilepsy is high (4.6% - 11.6% in systemic lupus, compared to 1% in the control population), and neurodegenerative diseases (the presence of subclinical epileptiform activity in 40-60% in Alzheimer's disease, the advanced form). Some concomitant pathologies may require modification of the epilepsy treatment strategy to reduce adverse reactions due to drug interactions. **Conclusions.** The effective management of epilepsy in patients with comorbid conditions requires a multidisciplinary approach with the implementation of questionnaires for stratifying risk groups and establishing diagnostic

algorithms, biomarker sets, necessary genetic and imaging tests, with the optimization of treatment strategies.

Keywords: *epilepsy, neurodegenerative, comorbidities.*

E. LANDMARKS IN ADVANCED MEDICINE
E.a. THE PRACTITIONER'S TRIBUNE – Medicine
OPHTHALMOLOGY

1. OPHTHALMOLOGICAL CHANGES IN THE DIGITAL AGE

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Abstract

The computer age has brought with it various benefits, but it has also caused an overload of the human body. At the ocular level, the changes caused by the prolonged use of digital screens are numerous. Although it has been proven that the blue light emitted by digital devices does not cause acute retinal damage, chronic exposure and cumulative impact remain an important research topic. Convergence fusion amplitude deficiency (CIFD) is very common in people who, by the nature of their profession, overstrain their near vision and use the computer or laptop screen for a long time. CIFD is also often associated with pain in the neck, shoulders and back. Dry eye syndrome is another pathology that is associated with the prolonged use of digital screens because it frequently happens that while working, focused on the activity in which they are involved, people forget to blink. The introduction of mandatory ophthalmological checks for the early detection of symptoms caused by prolonged use of monitors, as well as the implementation of national programs to inform the population about the side effects caused by the use of electronic devices with digital screens, are measures that should be implemented among the population as soon as possible.

Keywords: *ophthalmology, digital age, convergence fusion amplitude deficiency.*

2. THE OCULAR MICROBIOME

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Abstract

Introduction: The human microbiome contains the genetic material of bacteria, viruses, archaea and eukaryotes from inside and outside the human body. The ocular microbiome is formed by distinct communities of "good" bacteria, which are located on the skin, eyelid margin, conjunctival fornix, bulbar conjunctiva, sclero-corneal limbus, tear film, etc. **Purpose:** Understanding the ocular microbiome is essential to decipher the epidemiology and pathophysiology of various ocular diseases. **Materials and methods:** The work was developed by reviewing specialized articles, using the keywords: human microbiota, ocular microbiome, homeostasis, microorganisms and ocular diseases. **Conclusions:** Knowledge of the ocular microbiome is important in appreciating the homeostatic role of microorganisms, for the development of new therapeutic strategies based on probiotics, with the aim of treating certain ocular diseases.

Keywords: *human microbiota, ocular microbiome, microorganisms, homeostasis, ocular diseases.*

3. MULTIMODAL IMAGING IN OPHTHALMOLOGICAL PATHOLOGY

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Abstract

Ophthalmology has made significant progress thanks to new methods of exploring the visual analyzer. Due to the anatomical peculiarities of the eyeball and the accessibility of visualization of the fundus, changes in neurological, cardiological, rheumatological or endocrinological pathologies have been identified, and aspects of vascularization and retinal structures can be used to identify the onset or progression of a systemic condition. Thus, the analysis of these alterations represents a multidisciplinary interest that requires close collaboration with other specializations. From funduscopy to fluorescein angiography, ocular ultrasound, and subsequently, to angiography - optical coherence tomography, adaptive optics imaging and vascular flow assessment by laser particles, ocular imaging benefits from special attention due to the numerous pathological changes identified at this level. This breadth of medical devices generates numerous information that will be easy to overlook even by an experienced user. Therefore, for the purpose of a comprehensive analysis of the results of these exploration techniques, the need for correlations between examinations has arisen, offering the advantages of personalized medical care for each patient's conditions. Future directions will focus on the integration of artificial intelligence to identify both clinical and preclinical changes, and to interpret the information received to provide a risk report in support of the medical act.

Keywords: *multimodal imaging, ophthalmology, artificial intelligence.*

4. ARTIFICIAL INTELLIGENCE IN THE DIAGNOSIS AND MONITORING OF AGE-RELATED MACULAR DEGENERATION

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Abstract

Age-Related Macular Degeneration (AMD) is the leading cause of severe and irreversible loss of central vision. According to WHO data, in 2020, 198 million people were diagnosed with AMD worldwide, and estimates for 2040 are 288 million people. In addition to significantly affecting the quality of life of patients, AMD constitutes an economic burden for society. All these data justify the interest in researching this potentially disabling condition. Optical coherence tomography (OCT) is a non-invasive imaging method that uses infrared light to obtain high-resolution cross-sectional images of the macular region, similar to histopathological specimens. It is a method that is constantly improving in terms of resolution and the addition of new functions. The primary lesion in AMD is called drusen and has a material similar to that identified in Alzheimer's disease, which is why AMD is also called "Alzheimer's of the retina". The final stages of the disease are represented by either geographic atrophy or choroidal neovascular membrane, sometimes with intricate features identified. The only form of AMD that currently benefits from treatment is neovascular, which consists of intravitreal injections of anti-VEGF (Vascular Endothelial Growth Factor). The challenges in the management of AMD are varied: preventing the conversion from early to advanced stages of the disease, recognizing the moment of conversion to the neovascular form of AMD, and identifying the optimal regimen for administering anti-VEGF injections. In addition, despite correct and timely treatment, some forms of the disease have an unfavorable evolution. The large number of AMD patients who need to be constantly monitored in order to identify those who require treatment represents a burden for ophthalmologists. The solution to the problem comes from the field of artificial intelligence (AI) by identifying those patients who

require treatment and "bringing" them to ophthalmology offices. AI simulates human intelligence processes with the help of computer systems. Applying the deep learning (DL) subtype of AI, it is intended to increase screening efficiency, diagnostic concordance and accuracy, reduce the stress of recurrent examinations and improve individualized therapeutic regimens, with the aim of achieving the goal of precision medicine. The development stages consist of learning known realities from clinical practice, analyzing and interpreting DL models in search of new biomarkers and causal relationships, and validating newly identified models and causal relationships in the context of clinical practice.

Keywords: *macular degeneration, ophthalmology, artificial intelligence.*

5. APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN OPHTHALMOLOGY - FUTURE DIRECTIONS

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Abstract

With multiple applications in medicine, artificial intelligence (AI) tools have also found their way into ophthalmology in detecting abnormalities of visual function, thus playing a key role in diagnosing eye diseases and predicting the course of these common and disabling diseases. AI tools, and especially artificial neural networks (ANNs), are increasingly involved in the diagnosis and personalized management of eye diseases. Various studies in the research literature of the successful use of these AI tools in ophthalmology, in the evaluation of the field, the optic nerve, the retinal nerve fiber layer, thus providing better accuracy in identifying the progression of glaucoma and changes in the visual retina in diabetes, respectively. AI has made significant advances in screening for AMD (age-related macular degeneration), a common disease occurring in an aging population with the potential for disability, including irreversible vision loss, and can help both patients, as well as doctors to make therapeutic decisions. Other AI-based studies have attempted to address issues such as whether and when anti-VEGF therapy is necessary in the treatment of AMD. Conclusions. In ophthalmology, the most common areas of use of AI and classification tools were in diabetic retinopathy, glaucoma and AMD. By using fundus images, OCT images and visual fields used, classification algorithms, early diagnosis of lesions and prediction of their progression could be achieved.

Keywords: *artificial intelligence, ophthalmology, medicine.*

E. LANDMARKS IN ADVANCED MEDICINE

E.a. THE PRACTITIONER'S TRIBUNE - medicine RHEUMATOLOGY

1. HAND OSTEOARTHRITIS - CLINICAL, IMAGING AND FUNCTIONAL STUDY TO OPTIMIZE MANAGEMENT

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Abstract

Introduction: Hand osteoarthritis (OA) is one of the most common forms of osteoarthritis, affecting up to 20% of the general population, with a higher prevalence in postmenopausal women. It leads to chronic pain, joint stiffness and loss of hand functionality, significantly affecting quality

of life. Objective: The study aimed to evaluate the clinical, imaging and functional characteristics of hand osteoarthritis, identify risk factors and establish correlations between pain, mobility and radiological changes. Materials and methods: 150 patients diagnosed with hand OA according to ACR/EULAR criteria were included. Patients were evaluated clinically (VAS pain, morning stiffness, joint mobility), imaging (radiography, joint ultrasound) and functionally (HAQ and AUSCAN scores). The data were statistically analyzed using SPSS v22.0. Results: The prevalence of OA was 72% in women and 28% in men, with a mean age of 62.4 ± 7.8 years. The most affected joints were the distal interphalangeal (DIP) (65%) and trapezio-metacarpal (43%). The mean pain reported on the VAS scale was 6.7 ± 1.9 , and morning stiffness was present in 82% of cases. Imaging, 55% of patients presented osteophytes, and 47% presented joint space narrowing. Hand functionality, measured by the AUSCAN score, was significantly affected (mean score 32.8 ± 5.6). A strong correlation ($p < 0.001$) was observed between pain, the degree of radiological damage, and functional scores. Conclusions: The study highlights the increased prevalence of hand osteoarthritis in women and the major impact on functionality. Correlating clinical, imaging, and functional indicators can contribute to personalized management and improve the quality of life of patients with hand osteoarthritis.

Keywords: *Hand osteoarthritis, mobility, imaging indicators.*

2. AXIAL SPONDYLITIS AND INFLAMMATORY BOWEL DISEASE - CLINICAL INTERSECTIONS

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Abstract

Introduction. Axial spondylitis, a chronic inflammatory disease, affects the axial skeleton and peripheral joints, and is frequently associated with inflammatory bowel diseases. They share common pathogenetic mechanisms, falling within the concept of "immune-mediated inflammatory diseases". The study analyzes the prevalence and characteristics of inflammatory bowel diseases in patients with axial spondylitis. Objective. To describe the characteristics of patients with axial spondylitis, evaluate the prevalence of inflammatory bowel diseases and identify correlations between the two conditions. Materials and methods. The prospective observational study included 257 patients followed for two years. The evaluations included clinical analyses, laboratory tests and imaging investigations. Results. Of the 257 patients (168 men, 89 women, mean age 48.2 ± 13.1 years), 13.2% were recently diagnosed with axial spondylitis. Inflammatory bowel diseases were present in 5.1% of patients: Crohn's disease (3.1%), ulcerative colitis (1.2%), and nonspecific colitis (0.8%). In 53.8% of cases, inflammatory bowel diseases preceded axial spondylitis. Conclusions. The study highlights the high prevalence of inflammatory bowel diseases in patients with axial spondylitis, highlighting the importance of rigorous monitoring and a multidisciplinary approach to optimize prognosis and quality of life.

Keywords: *axial spondylitis, bowel disease, inflammation.*

3. THE INFLUENCE OF HLA PROFILE ON CLINICAL AND IMMUNOLOGICAL MANIFESTATIONS IN PSORIATIC ARTHRITIS: PERSPECTIVES FROM THE POPULATION OF THE REPUBLIC OF MOLDOVA

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Abstract

Introduction. Psoriatic arthritis (PsA) is an autoimmune disease associated with HLA alleles, and the role of the HLA-B27 antigen, in combination with other alleles, remains insufficiently explored. The study analyzes the HLA profile in PsA and its correlations with immunological parameters. **Aim.** To investigate the correlations between HLA alleles and immunocellular profiles to understand the pathogenesis and clinical phenotypes of PsA.

Materials and methods. 103 PsA patients were divided into PsA with cutaneous psoriasis (n=76) and without cutaneous psoriasis (n=27). HLA typing, lymphocyte analysis and immunoglobulin levels were statistically evaluated. **Results.** HLA-B27 and its combinations (HLA-B27/B62, HLA-B27/B32) were associated with severe forms of PsA and systemic inflammation, while HLA-A2/A3 and HLA-A2/A8 were protective. Elevated levels of IgG and immune complexes indicated systemic immune hyperactivation. **Conclusions.** HLA-B27 is a major risk factor for severe forms of PsA, while HLA-A2/A3 and HLA-A2/A8 are protective. Stratification of patients based on immunogenetic profile may optimize diagnosis and treatment.

Keywords: HLA profile, immunological, psoriatic arthritis.

4. ENTHESTITIS: AN EARLY SIGN OF PSORIATIC ARTHRITIS

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Abstract

Introduction: Psoriatic arthritis (PsA) is an inflammatory joint disease with significant socioeconomic impact, in which enthesitis can serve as an early indicator. **Aim:** To evaluate the role of enthesitis as an early marker in PsA. **Materials and methods:** The study included 50 patients with PsA (CASPAR criteria): group 1 (disease duration <2 years, n=24) and group 2 (>2 years, n=26), mean age 51.0±3.4 years. The MASES score was used to assess enthesitis. **Results:** Enthesitis was present in 41.6% of patients with early PsA and 45.8% with late PsA (p>0.05). MASES was higher in late PsA (4.03±0.8 vs. 2.6±0.5, p=0.0032). In early PsA, MASES correlated with painful joints (r=0.31, p=0.03), swollen joints (r=0.29, p=0.04), BASDAI (r=0.34, p=0.02) and ASDAS-PCR (r=0.44, p=0.021). In late PsA, MASES correlated only with BASFI (r=0.35, p=0.02). **Conclusions:** Enthesitis, present in 40% of patients with early PsA, is a characteristic marker of the early stage, being associated with the severity of clinical manifestations, especially painful and swollen joints.

Keywords: psoriatic arthritis, inflammatory, enthesitis.

5. EVOLUTION OF ACUTE RENAL FAILURE TO CHRONIC KIDNEY DISEASE IN HOSPITALIZED PATIENTS WITH COVID-19: PREDICTIVE FACTORS AND CLINICAL IMPLICATIONS

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Abstract

Introduction: COVID-19, initially considered a respiratory disease, is now recognized as a multisystem disease. One of the most severe complications is acute renal failure (ARF), which carries a significant risk of progression to chronic kidney disease (CKD). Progression to CKD represents a major challenge, with implications for the long-term prognosis of patients. **Aim:** The aim of the study was to analyze the types of ARI and the predictive factors of progression to CKD in hospitalized

patients with COVID-19. Material and methods: The study included 723 patients hospitalized in the COVID-19 ward of the Republican Clinical Hospital "Timofei Moșneaga" during 2020–2022. A retrospective and prospective analysis of renal function, inflammatory markers (CRP, ASAT/ALAT) and clinical parameters involved in the progression to CKD was performed. Results: 30.4% of patients developed AKI, and of these, 45% progressed to CKD within 6 months. Predictive factors for progression to CKD included elevated AST/ALT >1.6, hematuria on admission, hypertension, Charlson comorbidity index >4, and elevated D-dimer levels (>250 ng/mL). Mortality in patients who developed CKD post-COVID-19 was significantly higher compared to those without chronic kidney disease ($p < 0.001$). Conclusions: Progression to chronic kidney disease (CKD) is one of the most severe complications post-AKI in patients with COVID-19. Early identification of predictive markers and careful monitoring of renal function are essential to prevent progression to CKD and reduce its associated mortality.

Keywords: renal failure, chronic kidney disease, COVID-19.

6. THE EYE IN THE SHADOW OF INFLAMMATION: OCULAR MANIFESTATIONS IN RHEUMATOID ARTHRITIS

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Abstract

Introduction: Rheumatoid arthritis (RA) is a systemic inflammatory disease associated with extra-articular, including ocular, lesions, such as keratoconjunctivitis sicca, episcleritis, scleritis, sclerotic keratitis and, rarely, retinal vasculitis. Aim: To evaluate the frequency and type of ocular involvement in patients with RA in early stages (I and II). Materials and methods: 115 patients were evaluated, according to the criteria of the American College of Rheumatology. Ophthalmological examinations included: visual acuity (Snellen), biomicroscopy, Schirmer test, tear film break-up time (BUT), tonometry and indirect ophthalmoscopy. Results: The most frequent ocular manifestation was keratoconjunctivitis sicca. Episcleritis was diagnosed in 6 patients (5.06%), and scleritis in 2 patients (2.06%). Sclerotic keratitis was present only in women, and retinal vasculitis was observed in 1 patient (0.45%). In total, 31 patients (27.2%) presented with ocular manifestations. Conclusions: Ocular involvement is present in 27.2% of patients with RA, with a higher frequency in women. Early detection and appropriate treatment are essential to prevent complications and maintain visual function

Keywords: inflammation, ocular, rheumatoid arthritis.

7. CORRELATION BETWEEN DISEASE ACTIVITY AND SEROLOGICAL MARKERS WITH OCULAR MANIFESTATIONS IN RHEUMATOID ARTHRITIS: IMPLICATIONS FOR PROGNOSIS AND THERAPEUTIC MANAGEMENT

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Abstract

Introduction: Rheumatoid arthritis (RA) is a systemic autoimmune disease characterized by chronic inflammation, progressive joint damage, and multiple extra-articular manifestations, including ocular involvement such as keratoconjunctivitis sicca, episcleritis, scleritis, and retinal vasculitis. Factors such as disease activity (DAS28), C-reactive protein (CRP) levels, anti-CCP

antibodies, and rheumatoid factor (RF) may influence the severity and typology of ocular involvement. Aim: The aim of this study was to analyze the correlation between DAS28 score, CRP levels, anti-CCP antibodies, and RF with the frequency and severity of ocular manifestations in patients with RA. Materials and methods: The study included 130 patients diagnosed with RA according to EULAR/ACR criteria. The assessment included the DAS28 disease activity score, analysis of serum CRP, anti-CCP and RF levels by standard laboratory methods, as well as detailed ophthalmological examinations (biomicroscopy, Schirmer test, tonometry and indirect fundoscopy). Results: Patients with a DAS28 score >5.1 had a significantly increased risk of scleritis and sclerotic keratitis. Elevated CRP levels (>10 mg/L) were associated with keratoconjunctivitis sicca and episcleritis. Elevated anti-CCP antibody titers (>50 U/mL) were correlated with retinal vasculitis, and RF values >40 IU/mL were associated with multiple and severe ocular manifestations. Conclusions: Systemic inflammatory activity and immunological profile play an essential role in the onset and evolution of ocular manifestations in RA. Rigorous monitoring of DAS28, CRP, anti-CCP and RF may contribute to early diagnosis and prevention of severe ocular complications. These factors represent valuable tools for optimizing therapeutic strategies and improving the quality of life of patients with RA.

Keywords: *rheumatoid arthritis, autoimmune disease, ocular.*

8. PREGNANCY AFTER KIDNEY TRANSPLANTATION IN A PATIENT WITH LUPUS NEPHRITIS. CLINICAL CASE

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Abstract

Introduction. The incidence of patients who become pregnant after kidney transplantation for lupus nephritis (LN) is not fully recorded. **Purpose of the work.** The importance of strict evidence of fertile patients after kidney transplantation with LN and pregnancy planning. **Interdisciplinary monitoring of pregnant women with kidney transplantation after LN.** **Material and methods.** Retrospectively and prospectively we examined a pregnant woman, aged 34, with a history of LN for 19 years and a kidney transplant for 9 years (from a living donor), who is registered at the SCR "Timofei Moșneaga" consultative department. **Results.** The patient was evaluated at the 28th week of pregnancy, the third pregnancy, with negative evolution of LN, with the appearance of Preeclampsia. Through Consilium Medical with gynecologists, nephrologists, rheumatologists, it was decided to resolve the pregnancy at 30 weeks, to prevent complications. Historically, the first pregnancy resulted in a full-term birth, and the second in a low-term miscarriage. Currently, after birth (cesarean section), semi-pulse therapy (3 days) with Methylprednisolone was performed, with positive dynamics (71% decrease in proteinuria). The child survived. The patient was discharged after a month, with the child at home with the extension of immunosuppressive treatment. **Conclusions.** Pregnancy in NL with renal transplantation is possible, but requires strict monitoring and education of the patient to avoid complications.

Keywords: *lupus nephritis, pregnancy, transplantation.*

9. PECULIARITIES OF CLINICAL MANIFESTATIONS IN WOMEN WITH POLYCYSTIC KIDNEY DISEASE

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Abstract

The incidence of patients with polycystic kidney disease is 1 in 400-1,000. Purpose of the work. Research on clinical manifestations in women with polycystic kidney disease. Material and methods.

Retrospectively and prospectively, 50 patients (30 women (F) and 20 men (B). Results. The period of onset of the disease in childhood $15.0 \pm 7.98\%$ in B and $16.7 \pm 6.81\%$ in F, $p > 0.05$, for adulthood $85.0 \pm 7.98\%$ in B and $83.3 \pm 6.81\%$ in F, $p > 0.05$. Viral hepatitis - 70% in B and 62% in F, pancreatitis - 42% in F and 22% in B; arterial hypertension in 90% of cases (B and F). On USG of internal organs - in 14% F (liver), in 12% F (thyroid gland), in 6% F (ovaries), in 6% F (pancreas); kidneys in 32% of F (2-4 cysts), in 62% of F (multiple cysts), at 6% of F (polycystic kidney disease). Conclusions. Polycystic kidney disease in women has a more progressive evolution with major clinical manifestations.

Keywords: *polycystic, kidney disease, clinical manifestations.*

10. ASSESSING THE INCIDENCE AND IMPACT OF COMORBIDITIES IN RHEUMATOID ARTHRITIS: CLINICAL AND PROGNOSTIC ANALYSIS

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Abstract

Introduction: The prevalence of rheumatoid arthritis (RA) is estimated to be between 0.6-2.3%, and common comorbidities include hypertension, coronary artery disease, and gastrointestinal disorders. There is a direct relationship between inflammatory activity in RA and the risk of cardiovascular disease (CVD), but cohort studies remain insufficient.

Aim: To assess the incidence of comorbidities in patients with RA. **Materials and methods:** The study included 165 patients, with a mean age of 57.2 ± 4.9 years and a disease duration between 20 months and 19 years (mean 9.1 ± 3.2 years). Women predominated (132 – 80%). The main complications were secondary osteoarthritis (50.9%), osteoporosis (34.2%), and joint contracture (22.5%). **Results:** Comorbidities were identified in 119 patients (72.1%). The distribution was: 59 patients with one comorbidity, 30 patients with two, 18 patients with three and 12 patients with four. Patients over 56 years of age presented the highest average (2.5-3.5 comorbidities/patient). The most common conditions were hypertension, coronary artery disease, type 2 diabetes mellitus, hepatitis and atrophic gastritis. **Conclusions:** Patients with RA present a high incidence of comorbidities, of which hypertension and coronary artery disease predominate. Chronic gastrointestinal and urinary diseases complicate therapeutic management and increase the risk of polypharmacy.

Keywords: *rheumatoid arthritis, comorbidities, prognosis.*

11. THE IMPACT OF RENAL INVOLVEMENT IN GOUT: A CLINICAL AND DIAGNOSTIC PERSPECTIVE

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Abstract

Introduction: Gout is a chronic metabolic disease characterized by hyperuricemia and urate crystal deposition, which contribute to inflammation and renal dysfunction. Monitoring renal damage is crucial to improve prognosis. **Objectives:** To assess the prevalence of renal damage in gout and to identify predictive biomarkers for early diagnosis. **Methods:** 81 patients with gout (64% men, mean age 56.7 ± 9.8 years) were analyzed, of which 52% had renal damage. Investigations included estimated glomerular filtration rate (eGFR), serum creatinine, urinary biomarkers (NGAL, KIM-1) and renal imaging. **Results:** Patients with renal damage presented with a reduced eGFR (48.5 ± 11.9 mL/min/1.73m²), elevated NGAL and KIM-1 levels and gouty tophi in 79% of cases.

Hypertension (65%) and type 2 diabetes mellitus (28%) were common comorbidities. Conclusions: Renal involvement in gout is a severe complication (52%), and urinary biomarkers provide a valuable tool for early diagnosis and treatment optimization.

Keywords: *gout, renal damage, prognosis.*

12. SERONEGATIVE RHEUMATOID ARTHRITIS: A JOURNEY AMONG TRIGGERS AND JOINT MAPS OF EARLY DIAGNOSIS

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Abstract

Introduction. Seronegative rheumatoid arthritis (SRA) is characterized by the absence of anti-CCP antibodies and rheumatoid factor (RF), with distinct clinical features that influence prognosis and quality of life. **Aim.** To evaluate the onset characteristics of SRA compared to seropositive rheumatoid arthritis (SPAR), identifying triggering factors and patterns of joint evolution. **Materials and methods.** Patients with SRA and SPAR were analyzed for the distribution of joint involvement, triggering factors and radiological evolution. **Results.** Monoarticular (56%) and oligoarticular (16%) onset is more frequent in SRA than in SPAR. Trigger factors include viral respiratory infections, intense physical stress and exposure to cold. SRA predominantly affects the large and medium joints of the lower limbs, evolving towards polyarthritis. **Conclusions.** SRA presents a specific onset and particular triggering factors, influencing the clinical picture and disease evolution. Early diagnosis and personalized approach are essential for optimizing the prognosis and quality of life of patients.

Keywords: *Seronegative rheumatoid arthritis, rheumatoid factor, diagnosis.*

E. LANDMARKS IN ADVANCED MEDICINE E.a. THE PRACTITIONER'S TRIBUNE - Nursing

1. QUALITY OF LIFE IN THE DEAF PATIENT

Assoc. Prof. PhD Cornelia Ursu¹, Assist. Prof. PhD Otilia Eva¹, Prof. PhD Simona Slatineanu¹, Assist. Prof. PhD Cornel Botez¹, Assist. Prof. PhD Anca Bivoleanu¹, Assist. Prof. PhD Oana Caunii¹

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Abstract

Hearing loss can affect people of all ages, becoming a burden for patients and those around them. It causes social isolation and has a negative impact on quality of life (QOL) although encouraging results are obtained from the use of hearing aids. Disease-specific measures for people with hearing loss (HL), such as the Speech, Spatial, and Hearing Quality Scale, focus primarily on auditory capabilities (i.e., auditory performance) in everyday situations. Consequently, they are primarily based on what a person can hear, the quality of hearing, or the quality of sound, such as the Hearing Implant Sound Quality Index.

Keywords: *quality of life, hearing loss, auditory.*

2. THE PLACE OF AROMATHERAPY IN SURGERY AND THE EVALUATION OF NURSE'S ATTITUDES AND EXPERIENCES ABOUT AROMATHERAPY

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Abstract

This study consisted of two stages: a systematic review and a cross-sectional descriptive study aimed at examining the role of aromatherapy in surgery and exploring surgical nurses' attitudes and experiences. In the first stage, a systematic review was conducted by searching 10 databases for studies published from 2000 to 2019. The second stage involved a questionnaire with 27 questions developed by the researchers.

The review included 73 studies, revealing that aromatherapy can reduce preoperative anxiety, manage postoperative pain, and improve patient satisfaction and relaxation. However, the descriptive research found that while nurses valued aromatherapy, they felt ineffective in its application due to legal restrictions and a lack of information. They requested more education on the subject. The study recommends enhancing nurses' knowledge of aromatherapy, advocating for their involvement in legal regulations, and encouraging further multidisciplinary research on its beneficial effects for surgical patients.

Keywords: *Aromatherapy, Surgery, Essential Oil, Nursing, Preoperative, Postoperative.*

E. LANDMARKS IN ADVANCED MEDICINE E.a. THE PRACTITIONER'S TRIBUNE - Balneophysiokinetotherapy and recovery

1. CONGENITAL SCOLIOSIS AND BURNEI CLASSIFICATION

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Abstract

Congenital scoliosis represents a spinal malformation due to defects of formation, segmentation or mixed ones. It is characterized by a longitudinal and rotational imbalance.

69 patients were analyzed and 48 out of them were operated by various approaches with anterior and posterior instrumentations during 2000 and 2024. The impossibility to appoint some patients encountered in the daily practice into the known classifications, allowed us to purpose two categories of congenital scoliosis related to the predominance of spinal deviances in the coronal and transversal views. This classification was initially known by a double name, but the person with the second name has no character and no contribution. As such, I reserve the right to call it Burnei's classification. The diagnosis requires a thorough clinical and imaging examination in order to establish an individualized therapeutic strategy. Surgery is indicated when the curve progression is >10 degrees/year and the Cobb angle is 30-40 degrees.

Keywords: *Congenital scoliosis, Burnei's classification, spinal malformation.*

2. ANATOMICAL NOMENCLATURE IN HEALTHCARE PROFESSIONALS

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Abstract

Medical terminology is an ancient set of words whose use is not self-serving. On the contrary, it is a deeply pragmatic process – naming individual parts, organs of the human body, diseases, injuries, interventions, examinations treatment methods, treatment procedures, laboratory techniques and drugs. It is exposed on classical philologies, Latin and Greek, and can be divided into anatomical nomenclature and clinical medical terminology. Anatomical nomenclature refers to the standardized language used to describe the positions, structures, and features of the human body, which aids in clear and precise communication among healthcare professionals.

Keywords: *anatomical nomenclature, healthcare, medical terminology.*

3. SENSORY INTEGRATION OF CHILDREN/ADULTS WITH AUTISM - FUNDAMENTAL TO LEARNING

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Abstract

Adults and children with autism and/or other developmental disorders (approximately 90% of these people) have problems in accumulating and selecting information from the environment through the sensory organs, and in processing sensory information correctly, so that they can adapt to the environment and function naturally in everyday life. Sometimes one or more senses are hypo-sensitive: sensory stimuli are perceived too weakly, inconsistency in the perception of stimuli, fragmented perception of stimuli, perception of parts instead of the whole, slow reaction to stimuli or hyperactivity to stimulation (certain stimuli are perceived too strongly). These sensory problems could be the cause of some behaviors such as: rocking, spinning and waving hands. Sensory integration focuses its attention initially on three basic senses: vestibular, tactile, and proprioceptive. The interconnection between these 3 senses begins to form before birth and continues to develop as the child grows and interacts with the environment.

Keywords: *autism, developmental disorders, sensory information.*

4. MODERN SOCIETY'S DEPENDENCE ON FOOD ADDITIVES (TOXIC FACTORS AND IMMUNE MODIFIERS)

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Abstract

The 21st century society, through the development of civilization, has brought many good things through biotechnology, chemistry, biochemistry, the discovery of DNA, genetic and epigenetic studies. The people of this society have apparently improved their lives, gained time and "pleasures" but have become addicted to all of these. Addiction, doctors from all specialties note, has led to diseases. Diet is one of these causes. And since it is considered today that "diet is the third medicine", this is very important. The future of a society is given by children and adolescents, young adults. In them, addiction and side effects are more visible through the appearance of behavioral changes, states of excessive nervousness, obesity, hormonal disorders. Studies of the molecular bases have found epigenetic changes, proving that DNA methylation is sensitive to environmental factors such as chemicals, nutritional factors, hormonal disturbances and can lead to neurological diseases, psychiatric, metabolic, immuno-allergic disorders, and cancers. Apparently harmless to health, they produce toxicity and allergy in subsequent findings and more obviously in children but also in adults, through overdose. Today, multiple negative but greater effects on the CNS are demonstrated. Addiction today is evident and the most frequently used additives are: preservatives, dyes, taste modifiers and the daily use of a multitude of additives and overdose is actually the rule. Medical culture, food education and information, is necessary to eliminate educational deficiencies, for early detection.

Keywords: *immuno-allergic, toxicity, food additives.*

5. INTERDISCIPLINARITY FROM EINSTEIN'S IDEAL TO THE DIGITAL AND NANOTECHNOLOGY ERA

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Abstract

Interdisciplinarity is a new concept according to the projects initiated by UNESCO, at the beginning of the seventies, in various countries, it was established according to the "integrated sciences". Transdisciplinarity is a superior form of interdisciplinarity assuming universal concepts and language. Interdisciplinarity is "establishing a relationship between several sciences or disciplines". "Interdisciplinarity, pluridisciplinarity and multidisciplinary mean the simultaneity of several disciplines". The "integrated sciences" projects led to interdisciplinarity. The "Interdisciplinary Research Group" carries out its activity within the Romanian Academy. "Interdisciplinarity is a transfer of methods from one discipline to another". Albert Einstein noted regarding interdisciplinarity: "the ideal of scientific achievements is interdisciplinarity. The unity of science is superior to the isolated experiments of the Ego; cybernetics is the expression of interdisciplinarity. In Iași, in 1988, acad. Gh.C. Marinescu, together with prof. dr. Rene Duda, edited the volume "Interdisciplinarity and dialogue in medical and medical-social sciences". Pluridisciplinary and interdisciplinary initiation was viewed through the works of some personalities from the perspective of multiple disciplines. Allergology is a specialty in which genetic, biochemical and nanomolecular data contribute today and in the future to good diagnosis and treatment. Interdisciplinarity, practiced even years ago, is all the more necessary today. In today's society and in the future, we are moving from the old, eminently clinical medicine, to mechanistic and digital medicine, which can lead to a more prompt, finer, more accurate diagnosis.

Keywords: *interdisciplinarity, Einstein, nanotechnology.*

6. INTERDISCIPLINARITY IN GERIATRICS

MD Elena Marinescu

Abstract

Geriatrics, the medicine of the elderly, is the specialty that deals with the treatment of pathology specific to the 3rd age.

Gerontology, is the specialty that deals with the research of aging phenomena.

The elderly are the patients who accumulate the most diagnoses for the various diseases they accumulate due to inherent physical degradation.

Geriatrics is the specialty where collaboration, cooperation in interdisciplinary teams made up of, family doctor, geriatrician, nutritionist, physiotherapist, psychologist and other specialists such as, ENT, ophthalmologist, neurologist, etc. is mandatory.

Romania is the pioneer country, where for the first time in the world, an institute dedicated to the research and treatment of diseases specific to geriatric age was established, namely, the Ana Aslan National Institute of Geriatrics and Gerontology in Bucharest.

Keywords: *interdisciplinarity, geriatrics, gerontology.*

7. DRIVER PHYSIOLOGICAL PARAMETERS MONITORING SYSTEM WITH SENSORS INTEGRATED INTO THE STEERING WHEEL COVER

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Abstract

The driver's physiological parameters monitoring system with sensors integrated into the steering wheel cover is a device designed to warn the driver if parameters such as pulse, blood oxygen

saturation or galvanic skin resistance are outside normal limits, also signaling a possible decrease in the ability to drive the car. Operating through sensors integrated into the steering wheel cover, the device monitors these parameters in real time, contributing to the prevention of incidents and improving road safety. The system can warn the driver both acoustically and visually, and through a device connected via Bluetooth, both the values of the monitored parameters and the warnings issued can be transmitted, thus ensuring fast and efficient information. By continuously assessing the driver's health, including a derivative of the electrocardiogram, the system helps to identify early situations that may affect the ability to drive, thus reducing the risk of accidents.

Keywords: *driver, steering wheel cover, sensors.*

E. LANDMARKS IN ADVANCED MEDICINE

E.b. INTERDISCIPLINARY APPROACHES IN MEDICINE

Biomedical updates

1. PRINCIPLES FOR AI-BASED CONSULTANCY FOR MEDICAL TECHNOLOGY

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Abstract

AI has the potential of revolutionizing the generation of new medical knowledge and of combining extant knowledge in new forms that serve specific purposes. The paper examines potential directions in medical knowledge AI-based production, especially related to hardware and software medical technology. Several principles are presented for investigation and combining of data, facts, and regulations into the equivalent of an AI-based consultant for medical technology. A novel med-tech consultancy system based on AI – GPT that will soon be commercially available is revealed and its usages are presented. The system is useful in the medical practice by providing medical practitioners with information on the EU and US regulations on and known limitations of the medical devices, such as prostheses, that they use in surgery and treatment.

Keywords: *artificial intelligence, medical technology, principles.*

2. THE FUNDAMENTAL ROLE OF BIOSTATISTICS IN THE DEVELOPMENT AND VALIDATION OF MEDICAL STUDIES

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Abstract

The presentation summarizes the essential role of statistical analysis in the scientific research process in the medical field, highlighting how it contributes to the formulation and validation of research hypotheses, the design of the experiment, the statistical analysis of data and the obtaining of rigorously substantiated conclusions, which can confirm or refute the initial hypotheses. The process of testing statistical hypotheses in particular and even statistical inference in general do not lead to the proof of any hypothesis, but only indicate the situation in which a certain statistical hypothesis is supported or not by the data available at the level of the studied sample. Any scientific research can be affected by statistical errors, methodological limitations or unknown factors, which can influence the research results in varying proportions. A single study can be carried out on a limited sample or in a specific context, aspects that make it difficult to extrapolate the results obtained for populations of a higher volume or for research that was carried out under different conditions.

Regardless of the conclusions of the scientific process, very rarely are the results of a single study considered conclusive. Consequently, a particular result can only be considered relevant when multiple independent studies reach similar results, which converge towards a certain conclusion. This complex process ultimately leads to the formation of a scientific consensus on the research topic, which provides a more solid basis for knowledge and at the same time ensures the validity, reliability and applicability in a wider context of the various results.

Keywords: *the scientific research, statistical analysis, biostatistics.*

3. STATISTICAL STUDY ON THE CORRELATION BETWEEN TSH AND LIPID PROFILE

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Abstract

The paper is a study that aims to retrospectively investigate the correlation between TSH and lipid profile (Total Cholesterol, HDL Cholesterol, LDL Cholesterol) in patients hospitalized in the "Dr. Iacob Czihaç" Military Emergency Hospital in Iași in order to correlate hypothyroidism with increased cardiovascular risk through the consequent impairment of lipid metabolism. The determination of the analytes was performed within the Medical Analysis Laboratory of the "Dr. Iacob Czihaç" Military Emergency Hospital in Iași. The statistical study of the results of the mentioned analytes demonstrates the positive and statistically significant correlation ($p < 0.05$) between TSH and Total Cholesterol and between TSH and LDL Cholesterol for patients with TSH above the upper limit of the reference values ($TSH > 4.94$ mIU/L). Also, the level of Total Cholesterol is significantly higher in these patients. No significant correlations were found between TSH and HDL.

Keywords: *statistical study, TSH, lipid profile.*

4. THEORETICAL STUDY ON THE RELEVANCE OF IRON OXIDE NANOPARTICLES ADMINISTRATION IN ALZHEIMER'S DISEASE

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Abstract

This study presents the most recent scientific articles in the specialized literature regarding the administration of iron oxide nanoparticles in neurodegenerative Alzheimer's disease, as well as their neurotoxic potential presented in selected in vivo studies. Thus, this paper aims to provide an overview of the properties of iron oxide nanoparticles, their applications in the field of neurology, presenting an overview of their potential in ameliorating and remedying the pathological processes of Alzheimer's disease and in improving experimental results, but also of the neurotoxic potential, through previous studies.

Keywords: *iron oxide, nanoparticles, Alzheimer's disease.*

5. BEHAVIORAL IMPAIRMENTS IN ZEBRAFISH (DANIO RERIO) FOLLOWING ACUTE MERCURIC CHLORIDE (HGCL₂) EXPOSURE

PhD Student Viorica Rarinca^{1,2}, PhD Student Mlina Visternicu^{1,2}, Ctalina Ionescu^{1,2}, Prof. PhD Alin Ciobica^{1,2}, Prof. PhD Vasile Burlui²

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Abstract

Mercury (Hg) is a well-known neurotoxin and environmental contaminant that poses significant risks to aquatic organisms. This study investigated the behavioral effects of acute exposure to mercury (HgCl₂) in zebrafish (*Danio rerio*) over 96 hours. Zebrafish were exposed to two environmentally relevant concentrations of HgCl₂ (1 µg/L and 15 µg/L), alongside a control group. Behavioral endpoints, including swimming performance and social interaction, were assessed at multiple times (6, 12, 24, 48, 72, and 96 hours). Acute exposure to HgCl₂ resulted in concentration-dependent impairments in locomotion and social behavior, highlighting mercury's disruptive impact on neurobehavioral functions. These findings align with previous studies demonstrating mercury's neurotoxic and bioaccumulative effects, further emphasizing the utility of zebrafish as a model for ecotoxicological research. The results underscore the need for regulatory measures to mitigate mercury pollution and its detrimental effects on aquatic ecosystems.

Keywords: Zebrafish, Mercuric Chloride, *Danio rerio*.

6. THE INFLUENCE OF FOOD DYES ON NEURODEVELOPMENTAL DISORDERS

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Abstract

Autism and related disorders, such as attention deficit hyperactivity disorder (ADHD), are complex neurodevelopmental disorders influenced by both genetic and environmental factors, including exposure to food additives, especially artificial food colors. Studies suggest that these additives, including tartrazine, sodium benzoate, and aspartame, can induce neurobehavioral changes such as hyperactivity, especially in children with autism and ADHD. The mechanisms by which they affect neurocognitive development are still being studied, but there is evidence that exposure at levels exceeding recommended limits can have significant negative effects. Recent research, including in zebrafish, suggests that food additives can cause neurodevelopmental changes, with long-term effects on behavior and cognitive health. In this context, there is a need to implement stricter policies on artificial food colors, while promoting a more natural diet rich in essential nutrients. Likewise, the education of parents and healthcare professionals is crucial to reduce exposure to additives and to support appropriate management of neurodevelopmental disorders. Therefore, we will focus on exploring the biological mechanisms involved, the existing scientific evidence, and the controversies surrounding this topic, providing a deeper understanding of the influence of artificial food dyes on neurocognitive development.

Keywords: food dyes, Autism, neurodevelopmental, disorders.

7. BARIATRIC SURGERY AND PERIODONTAL HEALTH: PERSPECTIVES ON DMFT AND PDI INDICES

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Abstract

Bariatric surgery has a significant impact on oral health, especially on the DMFT (Decayed, Missing, Filled Teeth) and PDI (Periodontal Disease Index) indices. The study included 20 postoperative hospitalized patients, analyzing the relationship between obesity, oral hygiene and periodontal disease. The results highlight a direct association between obesity and an increased risk of periodontal diseases, exacerbated by factors such as age, smoking and reduced frequency of dental hygiene. Patients with

severe obesity (BMI ≥ 40) have a 60% higher predisposition to periodontitis compared to those with moderate obesity. Also, post-intervention nutrient deficiency and metabolic changes contribute to the deterioration of dental health. The conclusions emphasize the need for personalized preventive and therapeutic measures for bariatric patients, including long-term oral monitoring. These findings support the integration of the dental team in the global management of bariatric patients.

Keywords: *Bariatric surgery, oral health, DMFT, PDI.*

8. INTERACTIONS BETWEEN NEUROPSYCHIATRIC DISORDERS AND CANCER RISK: COMMON MECHANISMS AND CLINICAL IMPLICATIONS

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Abstract

Neuropsychiatric disorders including depression, anxiety, chronic stress and affective disorders have been associated with biological and behavioral changes that may influence cancer susceptibility. This article reviews the connections between these disorders and cancer, exploring underlying mechanisms such as hypothalamic-pituitary-adrenal axis dysfunction, systemic inflammation, oxidative stress and immune dysregulation. We will also discuss the role of genetic, epigenetic and environmental factors in mediating these interactions. By synthesizing the specialized literature, this manuscript emphasizes the need to integrate psychosocial interventions into the oncological approach and highlights current gaps in research, providing directions for future studies.

Keywords: *neuropsychiatric disorders, cancer, anxiety.*

9. BEHAVIORAL RELEVANCE OF MODERN THERAPEUTIC APPROACHES IN THE MANAGEMENT OF AUTISM: STUDIES ON ANIMAL MODELS

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Abstract

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental disorder whose diagnostic prevalence is increasing alarmingly from year to year. The ASD spectrum is based on causes that remain complex and unclear (Tayanloo-Beik et al., 2022). ASD does not have a treatment that combats the cause, but symptoms are improved through clinical treatment and therapeutic counseling (Tayanloo-Beik et al., 2022). Drug treatment regimens and recovery activities differ depending on the level of severity. Thus, over time, several substances have been tested to verify their potential as therapeutic agents. Following clinical trials and studies on animal models (zebra fish and rats), it was observed that the happiness molecule - oxytocin (OT); tetrahydrobiopterin (BH4) and memantine (M) have beneficial effects on the symptomatology of ASD. The beneficial effects of OT and BH4 administration on aggression have been observed in both animal models and human patients (Rahmati-Holasoo et al., 2023); while M administration had no major effects on typical aggression, but suppressed chronic stress-induced aggression and improved memory (Bartsch & Nodman, 2022).

Keywords: *Autism Spectrum Disorder, neurodevelopmental disorder, animal models.*

10. THE EFFECT OF MICROALGAE OIL ADMINISTRATION ON METABOLIC SYNDROME

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Abstract

Metabolic syndrome (MeTS) is the coexistence of metabolic risk factors, such as insulin resistance, hyperinsulinemia, impaired glucose tolerance, type 2 diabetes, visceral obesity, atherogenic dyslipidemia and/or hypertension, which lead to the development of cardiovascular diseases. Microalgae oil, especially from omega-3-rich microalgae (e.g. Schizochytrium and Crypthecodinium), has been studied for its potential benefits on MeTS. Recent studies conducted on the Danio rerio species have highlighted positive effects of its administration on MeTS. These fish are used as an animal model due to their genetic and physiological characteristics similar to those of humans. In the case of zebrafish, it was found that microalgae oil contributed to improving the lipid profile, reducing insulin sensitivity, oxidative stress due to its antioxidant properties, reducing inflammation, reducing visceral fat, and improving cardiovascular function. These effects suggest that microalgae oil could represent a promising therapeutic option in the prevention and treatment of MeTS.

Keywords: metabolic syndrome, Microalgae oil, Danio rerio.

11. INFLUENCE OF MICRONUTRIENTS ON NEUROTRANSMITTERS, OXIDATIVE STRESS AND NEURONAL PLASTICITY

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Abstract

Micronutrients play a crucial role in supporting brain health, with significant influences on neurotransmitters, oxidative stress and neuronal plasticity. The study explores how vitamins (B, D, E), minerals (zinc, magnesium, iron) and antioxidants contribute to the functioning of the central nervous system. Micronutrients facilitate the synthesis and regulation of essential neurotransmitters, such as serotonin, dopamine and GABA, which influence mood, cognition and sleep. They also protect neuronal cells by combating oxidative stress, reducing the accumulation of reactive oxygen species that can cause neuronal degeneration. Furthermore, the study highlights the link between optimal micronutrient intake and synaptic plasticity, a critical process for learning and memory. The findings suggest that a balanced diet rich in micronutrients can improve cognitive functions, prevent neurodegenerative disorders and support long-term mental health. Further research is recommended to better understand the complex interactions between these compounds and the brain.

Keywords: micronutrients, neurotransmitters, oxidative stress.

12. THE EFFECT OF RISPERIDONE AND HALOPERIDOL ON COGNITIVE FUNCTIONS IN A MODEL OF SCHIZOPHRENIA (DANIO RERIO)

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Abstract

Schizophrenia is a psychiatric disorder that massively affects the lives of patients. Scientists are continuously working to improve positive and negative symptoms, as well as cognitive dysfunction. Purpose: This study aimed to explore the effects of haloperidol and risperidone on cognitive function

in an animal model of schizophrenia. Discussion: The results obtained showed positive cognitive and social differences between the control and treatment groups in the three behavioral tests performed. Conclusion: Treatment with the antipsychotics haloperidol and risperidone helps cognitive and social behaviors in zebrafish, behaviors such as: responding to a stimulus, movement, exploration and interaction with the rest of the school, showed changes following treatment with these antipsychotics.

Keywords: *schizophrenia, risperidone, haloperidol.*

13. THE EFFECTS OF CHRONIC ARSENIC EXPOSURE ON ZEBRAFISH: NEUROLOGICAL, BIOCHEMICAL, AND HISTOLOGICAL IMPLICATIONS

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Abstract

The zebrafish (*Danio rerio*) model has gained significant interest in cancer research due to its genetic similarities to humans, transparency during early development, and rapid life cycle. It is an ideal organism for studying the effects of environmental toxins, including arsenic (As), on cancer progression. Arsenic, a known carcinogen, has been implicated in various cancers, including skin, lung, and bladder cancers. Researchers use zebrafish to investigate the impact of arsenic exposure on tumor initiation, progression, and metastasis, owing to the fish's ability to develop tumors in response to toxic stimuli. Studies have utilized different arsenic dosages, ranging from low (1-5 µg/L) to high (50-300 µg/L), to understand its genotoxic effects. Arsenic exposure in zebrafish has been shown to cause DNA damage, alter gene expression, and promote tumor formation. Furthermore, arsenic exposure leads to neurological impairments, such as behavioral changes and motor dysfunction, and triggers biochemical alterations that may contribute to cancer development, such as oxidative stress. Histologically, arsenic exposure results in tissue abnormalities and tumor development in various organs. These findings are crucial for understanding the molecular mechanisms by which arsenic contributes to carcinogenesis and for evaluating potential therapeutic strategies.

Keywords: *schizophrenia, risperidone, haloperidol.*

E. HIGHLIGHTS IN ADVANCED MEDICINE
E.c. RECENT DEVELOPMENTS IN NANOMEDICINE

1. A CHEMICAL SUBSTANCE THAT CONQUERED THE WORLD

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Abstract

This substance is hydrogen peroxide (PH), which is a versatile compound with extensive applications in nature, medicine, industry and household use. The presentation synthesizes over 50 years of the author's research on this topic, highlighting the unique properties of PH and its impact on the environment and human health. Its primary role as a biogenic oxidant before the appearance of atmospheric oxygen 2.3 billion years ago, its polar molecular structure, the instability of the O-O bond and the mechanisms of decomposition under the influence of light and transition metal ions are emphasized. Its oxidizing and reducing properties are analyzed in the context of various chemical and biological processes. The spread of PH in the atmosphere, hydrosphere and living organisms is correlated with its ecological and biological importance, including its immunological function. The presentation details the uses of PH in medicine, from antiseptic and therapeutic agent to its role in strengthening the immune system. In industry, PH is used for bleaching, the production of porous materials and in technological processes, and in household and agricultural use, for disinfection and maintaining plant and animal health.

The presentation highlights both the extensive benefits of PH and the risks associated with the use of concentrated solutions, emphasizing the importance of responsible and innovative use of this essential compound.

Keywords: *hydrogen peroxide, biogenic oxidant, medicine.*

2. BIOLOGICAL CONTROL OF MYCOTOXINS IN AGRI-FOOD PRODUCTION

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Abstract

In the Republic of Moldova, the area of grape plantations is 115.1 thousand hectares, and the wine industry is one of the main economic branches and is an important source of income for the state budget. Grape production is influenced by various fungal infections, which can develop both in the field and after harvest. Against the background of climate change and the increasing impact of phytopathogenic agents of fungal origin on the vine, the emergence and toxicity of mycotoxins in must and wine are favored. The main diseases of grapes include Downy mildew (*Plasmopara viticola*), Powdery mildew (*Uncinula necator*) and Gray rot (*Botrytis cinerea*), as well as other fungal and bacterial pathogens, the expansion of the frequency of attack and the intensity of development of which causes serious technological problems, including through the accumulation of toxins synthesized by toxigenic fungi. Some microbial pathogens (various species of the genera *Alternaria*, *Cladosporium*, *Penicillium*, *Mucor* and *Aspergillus*) contribute to the deterioration of wine raw materials, causing secondary rot. Particularly dangerous in raw material processing technologies is ochratoxin produced by some species of the genera *Aspergillus* and *Penicillium*, which become particularly dangerous, manifesting themselves through nephrotoxic, immunotoxic, teratogenic, hepatotoxic and carcinogenic effects on animals and humans. Given the negative impact of chemical control systems on both the environment and human health, currently strategies aimed at controlling

these pathogens are based on the use of chemical elements and compounds (fungicides) in the implementation of technological processes for the production of raw materials and during pre-harvest operations and the application of technological means in the post-harvest period. A promising alternative for a safer and more effective control strategy is the use of environmentally friendly means of controlling harmful organisms, in particular microbial fungicides based on biological control agents, such as beneficial microscopic bacteria and fungi. Several strains of bacteria and microscopic fungi have been selected, which exhibit considerable biological activity in vitro and in combating the pathogen of gray rot. This publication includes information on the peculiarities of the synthesis and contamination of different grape varieties and types of wine. The evolution of mycotoxigenic phytopathogens and the increase in the risk of mycotoxin contamination of wine products determine the need to develop and establish means and methods to reduce the risks of mycotoxin contamination. Determining the action of microbiological means to combat phytopathogenic agents of mycotic origin (Trichodermin, Gliocladin), applying measures to inhibit mycotoxin-producing fungi and developing effective ecological methods to combat phytopathogenic agents, represent the foundation of contamination prevention and decontamination systems in must and wine. These means have demonstrated the ability to reduce the patulin content in the composition of the winemaking material, which increases the safety of pathogen control and the maintenance of human health.

Keywords: *mycotoxins, agri-food production, Republic of Moldova.*

3. PULLULAN MICROSPHERES SENSITIVE TO TEMPERATURE CHANGES

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Abstract

Poly(N-isopropylacrylamide) (poly(NIPAAm)) is well-known as the polymer with the highest thermosensitivity, having an abrupt phase transition at a temperature close to that of the human body. Unfortunately, the biggest disadvantage of this polymer used in biomedical applications is the lack of biodegradability. As a result, in this study, biodegradable pullulan microgels with a higher temperature sensitivity than that of the poly(NIPAAm) hydrogel were synthesized. To replicate the macromolecular structure of poly(NIPAAm) (acrylamide and isopropyl sequences), carboxylic groups were first introduced on pullulan by succinylation, then they were amidated with isopropylamine. Previously, molecular dynamics simulations were performed to predict an optimal degree of amidation with isopropylamine, necessary to obtain the desired thermosensitivity. The resulting microgels showed very high swelling/collapse rates (several seconds), moreover, in the collapsed state, the volume of the swollen microspheres was almost equal to that of the dried ones. The transition temperature of the microgels was precisely tuned by the progressive ionization of the non-amidated COOH groups.

Keywords: *thermosensitivity, polymer, pullulan microgels.*

4. CHITOSAN NANOFIBERS FOR WOUND DRESSINGS

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Abstract

The aim of the study was to obtain chitosan nanofibers doubly functionalized with two aldehydes with different characteristics, with improved properties and applicability as wound dressings. NMR and FTIR spectroscopic investigation demonstrated the success of chitosan imination with both aldehydes and allowed the estimation of the degree of conversion of amine groups into imine bonds.

UV-Vis spectroscopy demonstrated the dynamic character of the new materials, which released both aldehydes in an environment simulating the physiological environment. The fibers exhibited birefringence in polarized light, nanometric diameter and formed matrices with micrometric interfibrillar pores, a morphology that favored rapid swelling in PBS and enzymatic degradation in lysozyme medium. The fibers exhibited biocompatibility on normal human dermal fibroblasts and antimicrobial activity against pathogens, *S. aureus*, *E. coli*, *C. albicans*, *C. glabrata* and *A. braziliensis*. The results obtained recommend the development of these materials as biodegradable bandages with self-defense properties for applications in wound healing.

Keywords: *chitosan nanofibers, wound dressings, polymer.*

5. NANOCOMPOSITE HYDROGELS BASED ON BIOPOLYMERS AND SILVER NANOPARTICLES WITH ANTIOXIDANT AND ANTIMICROBIAL PROPERTIES FOR WOUND TREATMENT

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Abstract

Nanocomposite hydrogels based on biopolymers and silver nanoparticles (AgNPs) can be used in wound treatment because their composition mimics the extracellular matrix, and the presence of silver imparts an antimicrobial effect. In this study, gum arabic was oxidized to be used both for the chemical crosslinking of gelatin and for the production of AgNPs. Thus, AgNPs with a diameter of approximately 60 nm were obtained in the presence of oxidized gum arabic (OGA), which acts both as a reducer of silver ions and as a stabilizer of nanoparticles. Hydrogels were obtained by crosslinking the amine groups of gelatin with aldehyde groups from OGA or from AgNPs coated with OGA. The hydrogels were washed and characterized by determining the gel fraction, the degree of crosslinking, porosity, swelling degree and mechanical properties. AgNPs hydrogels were found to partially quench [ABTS]⁺ free radicals, and demonstrated antibacterial activity against *S. aureus* and *E. coli* strains.

Keywords: *AgNPs, nanocomposite hydrogels, biopolymers*

6. PEPTIDE DUAL-FUNCTIONALIZED CATIONIC LIPOSOMES LOADED WITH DEXAMETHASONE: IN VITRO STUDIES ON HEI-OC1 CELL CULTURES

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Abstract

To date, diseases of the inner ear have known several types of treatments: systemic administration, intratympanic administration and, more recently, the administration of nanosystems capable of transporting and releasing drugs directly into the inner ear for a sustained period of time. The main aim of this study was to prepare, in a first step, two series of liposomes: cationic liposomes coated with double-functionalized chitosan carboxylate with peptides (CLCP) and cationic magnetic liposomes coated with double-functionalized chitosan carboxylate with peptides (CLCPM). The liposomes thus obtained were characterized from the morphological point of view and the capacity to load and release a hydrophilic active principle. Dexamethasone phosphate was used as a model hydrophilic active principle, since it is often used in the treatment of inner

ear diseases. The effect of the viability of HEI-OC1 auditory cell cultures was also monitored both in the presence of the two series of liposomes and in the presence of magnetic nanoparticles.

Keywords: *peptide, liposomes, dexamethasone.*

7. DEVELOPMENT AND IN VITRO EVALUATION OF PEPTIDE FUNCTIONALIZED MICROCAPSULES CONTAINING MAGNETIC NANOPARTICLES AND DEXAMETHASONE

Delia M. Rață¹, Anca N. Cadinoiu¹, Leonard I. Atanase^{1,2}, Gabriela Vochita³, Marcel Popa^{1,2} ¹"Acad. Ioan Hăulică" Research Institute, "Apollonia" University of Iași

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Abstract

Inflammation is an essential immune response as part of a complex biological response of vascular tissues to noxious stimuli, but which in some disease conditions becomes damaging. Inflammation chronic will induce the appearance of various pathologies (atherosclerosis, rheumatoid arthritis, inflammatory disease). The aim of this study was to prepare and characterize peptides-functionalized microcapsules by the interfacial condensation method using oligochitosan, carboxymethyl chitosan functionalized with peptides and poly NVPAl. Two peptides Tet1 and TAT were used for the functionalization of microcapsules. Microcapsules diameter was found in the micrometer range. The obtained results indicated that release efficiency of dexamethasone was between 74% and 99.8% and microcapsules showed hemolysis degrees lower than 3%, which demonstrated their non-hemolytic character. Cellular viability on V79-4 normal cells depended on the administered dose of capsules and it was observed that after a 48-hour treatment, all analyzed capsules showed a non-toxic, weak or moderately cytotoxic.

Keywords: *peptide, microcapsules, magnetic nanoparticles, dexamethasone.*

8. HYDROGELS WITH HYDROPHOBIC DOMAINS OBTAINED FROM CURDLAN DERIVATIVES FOR BIOMEDICAL APPLICATIONS

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Abstract

The treatment of skin lesions continues to face major challenges, especially those caused by drug-resistant pathogens. Effective treatment must accelerate the wound healing process while preventing bacterial contamination. Hydrogels, due to their biochemical, absorption and mechanical properties, present numerous advantages that make them attractive for use in the field of dressings. In this context, the present work presents the preparation of new hydrogels, through a simple covalent crosslinking process, at ambient temperature, based on a curdlan derivative with 2-hydroxypropyl dimethyl octyl ammonium groups. The morphology of the hydrogels investigated by SEM revealed well-defined pores with an average diameter between 50 and 55 μm and hydrophobic domains of approximately 5 μm . The swelling degree of 21-24 g/g hydrogel, the elastic modulus of 7-14 kPa, and the ability to retain/release an anti-inflammatory drug recommend these hydrogels for use in various medical fields as dressings. In addition, the new materials were shown to have anti-microbial properties, showing bacteriostatic effect after 48 hours against *S. aureus*, *E. coli*, and *P. aeruginosa*.

Keywords: *hydrogels, hydrophobic, curdlan, biomedical.*

9. LIGAND-FUNCTIONALIZED DRUG DELIVERY SYSTEMS: BENEFITS AND CHALLENGES

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Abstract

In recent years, the use of ligand-functionalized drug delivery systems (LDDSs) has received special attention, as nanotechnology offers a wide range of opportunities for improving patient compliance, drug bioavailability and reducing side effects. In the last two decades, various nanoparticulate systems have been investigated for medical applications, including liposomes, polymeric micelles, dendrimers, mesoporous silica nanoparticles, nanostructured lipid carriers, polymeric micro/nanoparticles. The best strategy to achieve an improved and controlled concentration of the drug in the desired area is to use active targeting. Active drug targeting can be achieved by attaching specific ligands to the surface of nanocarriers that bind to specific molecules or cellular receptors. In recent research, specific ligands such as: aptamers, antibodies, folic acid or peptides have been used. In our studies, we have identified, in the case of LDDSs, both the benefits brought in the case of cellular internalization of nanocarriers and some challenges related to their cytotoxicity.

Keywords: LDDSs, nanotechnology, ligands.

10. FUNCTIONALIZED MAGNETIC NANOPARTICLES FOR MEDICAL APPLICATIONS

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Abstract

Magnetic nanoparticles are extremely used in different applications including environmental protection, energy related application or medicine. A special attention is paid to magnetic nanoparticles considering their specific characteristics: magnetic field control, hyperthermia generation, biocompatibility; high chemical surface functionalization capacity, etc. For medical applications, magnetite should be stabilized and one of the most common stabilization way is by PEG-ylation while for internalization the functionalization with folic acid is probably the most used way found in the literature. But, the surface modification with different classes of substances could be of interest because, in this way, a proper hydrophil-hydrophobe ratio can be obtained, a proper and selective bioaccumulation in the specific tissues can be obtained and also, very important a targeted internalization in the desired cells. In this work, the surface modification of the magnetic nanoparticles with aminoacids is presented considering their specific characteristics and properties including photocatalytic, antimicrobial activity, their internalization capacity and their antitumoral activity.

Keywords: magnetic nanoparticles, medical applications, biocompatibility.

11. ABLATIVE TECHNOLOGY USED IN MINIMALLY INVASIVE INTERVENTIONAL CARDIOLOGY

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Abstract

Radiofrequency ablation technology used in the treatment of cardiac arrhythmias combines thermal energy with advanced imaging techniques to identify and treat the tissues responsible for irregular heart rhythms. It employs a three-dimensional heart reconstruction system, based on a magnetic field, which creates a detailed and dynamic map of the cardiac structure and electrical activity. Special catheters equipped with magnetic sensors are inserted through blood vessels and positioned inside the heart. The system enables precise localization of the catheter's position and real-time recording of electrical activity on an interactive 3D map. Radiofrequency energy is then applied directly to the affected areas, destroying the abnormal cardiac tissue. This technology offers high precision, minimizes the risk of damage to healthy tissue, and enhances the safety and effectiveness of the minimally invasive procedure.

Keywords: radiofrequency ablation technology, cardiac arrhythmias, magnetic sensors.

12. DEVELOPMENT OF AN HPLC METHOD THROUGH THE QBD APPROACH FOR THE QUANTIFICATION OF HONOKIOL AND METFORMIN HYDROCHLORIDE

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Abstract

To optimize the chromatographic conditions for the quantitative detection of honokiol and metformin hydrochloride by HPLC from formulations and from dissolution studies, a QbD approach employing a three factors-three levels design was used. 3D response surface plots were created in order to examine the effects of each variable on the peak area of both compounds and the retention time of the final compound eluted. A Thermoscientific ODS Hypersyl™ (250 x 4.6 mm, 5 μm) column maintained at 35 °C was used to separate honokiol and metformin. The mobile phase used was 0.02 M acetate buffer (pH = 3) / methanol (15/85, v/v) at a flow rate of 1 mL/min. The ICH criteria were followed in the validation of the optimized assay conditions. Therefore, it was evident from the results that the QbD methodology could be used to optimize the HPLC method for honokiol and metformin hydrochloride quantification. The environmentally friendly nature of the method was confirmed by the evaluation of the method's greenness. The proposed method was applied for the determination of honokiol and metformin from oral dosage forms and in dissolution studies.

Keywords: metformin, honokiol, chromatography.

13. NOVEL QUATS BASED ON APPLE PECTIN

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Abstract

New quats based on apple pectin, QPAs, were synthesized by the chemical modification of native polysaccharides (PA) with various quaternization mixtures containing epichlorohydrin and a tertiary amine. Pectin derivatives were studied by elemental analysis, conductometric titration, Fourier-transform infrared spectroscopy, and ¹³C nuclear magnetic resonance. Dynamic light scattering analysis revealed that the PA and its quats formed aggregates in an aqueous solution with either a

unimodal or bimodal distribution. Scanning transmission electron microscopy analysis of the PA and its derivatives demonstrated the presence of individual polymeric chains and aggregates in aqueous solution, with the smallest sizes being specific to amphiphilic polymers. Thermal stability, as well as wide-angle X-ray diffraction studies, generally indicated a lower thermal stability and crystallinity of the QPAs compared with those of the PA. Antipathogenic activity demonstrated that the PA and its derivatives exhibited effectiveness against *S. aureus* ATCC 25923 bacterium and *C. albicans* ATCC 10231 pathogenic yeast.

Keywords: *quats, polysaccharides, apple pectin.*

14. RELEASE OF ROSA CANINA EXTRACT FROM POLYMER MATRICES

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Abstract

The objective of this study was the design and characterization of materials based on guar/dextran sulfate as a polymeric matrix, in which lignin and/or Rosa Canina extract were added as additives. The formation of intra- or intermolecular bonds between the matrix components and additives led to an increase in the rigidity of the materials. The presence of additives improved the anti-inflammatory activity (>50%) and the biocompatibility of the obtained systems (>80%). SEM images revealed a variable morphology of the materials, depending on the composition. The controlled release of Rosa Canina extract correlated with the Korsmeyer-Peppas model ($R^2 > 0.941$), the value of the coefficient n (< 0.5) indicating a quasi-Fickian diffusion. Lignin slowed down the release of the active principle due to the formation of intramolecular interactions (hydrogen bonds, van der Waals forces) between the extract molecules and the matrix components, which limited the diffusion process. The results of the study led to the conclusion that the analyzed materials represent promising candidates in topical applications.

Keywords: *Rosa Canina extract, polymeric matrix, topical applications.*

15. EMERGING CHEMISTRY FOR TAILORING CONJUGATED POLYMER BASED INTERFACE TOWARD INNOVATIVE BIOAPPLICATIONS

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Abstract

Nowadays we are witnessing the translation of electroconductive conjugated polymers (CPs) into increasingly diverse biomedical applications, mainly based on their particular mechanism of electrical conductivity involving mutual activity of electronic and ionic charge carriers which allow for the successful interfacing with biological systems, improving signal transfer and cell communications. The present report focuses on a CP having a "rod-graft-coil" architecture, a topology that offers from the stage of the molecular design the opportunity to program, optimize and control the processing-structure-properties relationship in order to adapt to the complexity and dynamicity of the biological milieu. The results revealed that the new synthesized material based on oligothiophene backbone grafted with short oligo-(D, L-lactide) side chains forms biocompatible and biodegradable films on rigid or flexible supports, the topography of which depends on the used solvents' quality and concentration. Using quartz crystal microbalance (QCM-D) technique it also has been found that those films' interaction with proteins can be modulated by the simple doping process, forming either an adherent surface or an antifouling one.

Keywords: *electroconductive, polymers, biomedical applications*

16. NEW BIOMATERIALS BASED ON CHITOSAN FUNCTIONALIZED WITH THIOUREA AND HYPERICUM PERFORATUM L. EXTRACT FOR BIOMEDICAL APPLICATIONS

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Abstract

The inclusion of plant extracts in porous hydrogels has gained increasing interest in recent years, with studies mainly targeting biomedical applications. In this context, the present research aimed at designing new hybrid biomaterials based on thiourea-functionalized chitosan (CSTU) and *Hypericum perforatum* L. extract (HYPE) by cryogelification. The incorporation of HYPE was confirmed by structural (FTIR) and morphological (SEM) analysis. CSTU-HYPE cryogels showed high water retention capacity (up to 4146%), dependent on the pH of the environment. At the same time, the materials were distinguished by their exceptional mechanical properties, especially the ability to return to their initial shape after removing the applied compression force. In addition, the presence of the extract improves both antioxidant and antimicrobial activity. The cytocompatibility of CSTU-HYPE cryogels towards the NHDF cell line was also highlighted (viability >85%). The results indicate the potential of these biomaterials as wound dressings.

Keywords: *Hypericum perforatum* L. extract, hydrogels, chitosan.

17. MICRODOSING ANABOLIC STEROIDS FOR MUSCLE REGENERATION AFTER INJURY: A DOUBLE EDGED SWORD

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Abstract

This literature review analyzes the application of anabolic steroids, namely microdosing, in promoting muscle regeneration post-injury. This investigation examines the molecular processes by which anabolic steroids engage androgen receptors, thereby upregulating critical signaling pathways like mTOR (mechanistic target of rapamycin) and protein synthesis, so promoting muscle repair. The review presents data indicating that anabolic steroid administration can enhance muscle protein synthesis rates by 20-30% in animal models. Particular studies, such as glycerol-induced muscle damage in rodents, exhibited a 50% accelerated recovery in muscle mass in the treated subjects. Moreover, research on human trials indicates that low-dose anabolic steroid administration led to a 15-20% enhancement in strength recovery following injury, albeit with potential detrimental consequences including tendon degradation and cardiovascular issues. The review highlights the potential of microdosing to mitigate these dangers and enhance muscle regeneration, however it advocates for additional study to refine therapeutic methods and limit side effects.

Keywords: *anabolic steroids, microdosing, muscle regeneration.*

E. HIGHLIGHTS IN ADVANCED MEDICINE
C. RECENT DEVELOPMENTS IN NANOMEDICINE
Poster Session

Thursday, February 27, 2025

P01. ZWITTERIONIC SEMI-INTERPENETRATING NETWORKS AS CARRIERS FOR ANTIBIOTIC DRUGS

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Abstract

Zwitterionic semi-interpenetrating networks (Zwitt-IPNs) were obtained by radical cross-linking copolymerization of hydroxyethyl methacrylate with three dimethacrylic cross-linking agents (mono-, di- and triethylene glycol dimethacrylate) in the absence or presence of linear polycarboxybetaines based on poly(4-vinylpyridine), using a redox system consisting of ammonium persulfate and N,N,N',N'-tetramethylethylenediamine. The Zwitt-IPNs were characterized by FTIR spectroscopy, scanning electron microscopy and swelling capacity. The optimal conditions for tetracycline loading onto Zwitt-IPNs were established by studying the influence of different parameters (contact time, drug concentration and temperature). Tetracycline release studies from Zwitt-IPNs – drug systems were performed in buffer solutions at pH = 1.2 and pH = 7.4 and were carried out only for systems containing the highest amount of immobilized tetracycline. The various mathematical models were used to describe the release studies. In vitro release studies of tetracycline reveal that the release mechanism is represented by non-Fickian diffusion being controlled by both diffusion and swelling processes.

Keywords: Zwitt-IPNs, cross-linking copolymerization, antibiotic drugs.

P02. ANTHOCYANIN-BASED INTELLIGENT PH-SENSITIVE FILMS FOR REALTIME FOOD FRESHNESS MONITORING

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Abstract

Ensuring health safety has become a critical challenge due to the risks associated with food spoilage and contamination. Controlling foodborne infections is thus a top priority in the context of food safety. Recently, pH-responsive packaging systems have garnered significant attention for their ability to enable simple and rapid detection of food freshness. Among natural color indicators, anthocyanins stand out for their vibrant color variations and beneficial functional properties, including antioxidant activity, anti-carcinogenic, and anti-inflammatory effects. In this study, we developed bioactive, pH-responsive, color-changing polymer-based films using the casting method. These films were produced by incorporating anthocyanins extracted from red cabbage into a

biopolymer blend of polyvinylpyrrolidone (PVP) and alginate, further reinforced with zinc oxide nanoparticles. The resulting films demonstrated excellent antioxidant properties, providing added functionality beyond pH sensitivity. Notably, a distinct color change was observed in response to variations in pH, highlighting their potential as an effective visual indicator for monitoring food freshness.

Keywords: *anthocyanin, intelligent films, food freshness monitoring.*

P03. MECHANICAL CHARACTERIZATION OF A PVA/GO HYDROGEL LOADED WITH VITAMIN A PALMITATE FOR WOUND HEALING

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Abstract

The skin is the largest organ of the human body and performs important functions; therefore, any disease or injury that affects its integrity poses a risk to quality of life. In this study, six hydrogels based on polyvinyl alcohol (PVA) were synthesized, incorporating different concentrations of graphene oxide (GO) and vitamin A palmitate (VAP). The mechanical properties were characterized through compression tests; the elastic modulus was calculated, and stress-strain curves for each material were plotted. The results indicated that the hydrogels exhibit good mechanical properties, making them potential candidates for application as wound dressings.

Keywords: *PVA/GO hydrogel, vitamin A palmitate, wound healing.*

P04. AN INNOVATIVE STRATEGY FOR WOUND HEALING: USING COLLAGEN BASED CONDUCTIVE HYDROGELS

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Abstract

Wound healing is a physiological process involving platelets, growth factors and other mediators, and the properties of the dressing used determine the rate of tissue regeneration. One strategy is to restore the electrical conductivity of the skin using conductive hydrogels. In this context, biocomposite hydrogels of collagen (COL) and reduced graphene oxide (rGO) were synthesized. The materials were prepared by dopamine polymerization and enzymatic crosslinking using horseradish peroxidase (HRP). The successful interaction between the components was demonstrated by techniques such as FTIR and XPS. The results showed that increasing the concentration of rGO increased the conductivity and absorption capacity of the hydrogels, reaching 215 g/g. In vitro assays showed a wound closure rate of 84.5% in human dermal fibroblasts within 48 hours. In addition, the hydrogels demonstrated biocompatibility and resistance to enzymatic degradation by collagenase type 1. These hydrogels represent a promising approach for applications in wound treatment.

Keywords: *collagen, wound healing, hydrogels.*

P05. MICROWAVE-ASSISTED CHEMICAL EXFOLIATION OF MoS_2 WITH DIFFERENT SOLVENTS COMBINATIONS: STRUCTURAL CHARACTERIZATION AND CYTOTOXICITY EVALUATION

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Abstract

Exfoliation methods can integrate chemical and physical processes, enabling the study of interactions between electromagnetic waves and polar molecules within the material, which leads to localized and rapid heating. One approach to achieving the delamination of MoS_2 layers involves exfoliation in various solvents using microwave irradiation. In this study, different solvents were evaluated based on Hansen Solubility Parameters and Gibbs Free Energy to identify the most suitable solvents for exfoliation, with promising results observed for mixtures of acetone, water, and butanediol. Furthermore, exfoliation was confirmed by X-ray diffraction, where the crystal structure and interlayer spacing validated the success of the delamination process. Cellular viability was also tested in human dermal fibroblasts using the MTT assay, showing values above 80%, which indicate the compounds' non-cytotoxic nature and their potential for biomedical applications.

Keywords: chemical exfoliation, MoS_2 , cytotoxicity.

P07. ENGINEERING ANTIMICROBIAL FIBROUS MATS WITH METAL-ORGANIC FRAMEWORKS

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Abstract

The development of different strategies for incorporating Metal-Organic Frameworks (MOFs, particularly ZIF-8) into poly(ϵ -caprolactone) (PCL) electrospun fibers is presented. First, the synthesis of the nanomaterial in methanol was carried out by reacting 2-imidazole and zinc nitrate, yielding particles in the range of 200–300 nm. Second, the electrohydrodynamic processing of PCL was optimized using different solvent ratios (methanol:chloroform) with the inclusion of dried nanoparticles, achieving a dispersion prior to electrospinning. Another approach involved the spraying of MOFs onto preformed electrospun PCL fibers. All materials (composite fibers within the nano- to microscale range) were characterized using electron microscopy, XRD, thermal analysis techniques, and water contact angle measurements. Currently, the antibacterial inhibition capacity of the composites is being evaluated against pathogenic strains. These materials show promise for applications in antimicrobial fields, potentially replacing antibiotics and combating multidrug-resistant infections.

Keywords: antimicrobial, metal-organic frameworks, nanomaterial.

P08. ORAL SELF-NANOEMULSIFYING SYSTEMS FOR THE COMBINED DELIVERY OF REMDESIVIR AND BARICITINIB WITH NATURAL BIOACTIVE OILS: A NOVEL THERAPEUTIC APPROACH FOR COVID-19 AND CANCER TREATMENT

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Abstract

The development of effective pharmacotherapies for COVID-19, with low aqueous solubility, erratic and limited absorption from the GIT, food influence on absorption, and high first-pass effects, among other advantages, is posing many problems with nontargeted delivery plus many other systemic and local adverse effects. Recently, much interest has been drawn to self-nanoemulsifying drug delivery systems that use lipid-based excipients within nanomedicines to overcome the challenges mentioned above. This study developed new SNEDDSs to combine the antiviral drugs remdesivir and baricitinib with natural bioactive oils to assure activity for COVID-19 treatment. In addition, this study aimed to evaluate the protective effects of SNEDDS formulations in combination with remdesivir and baricitinib on cyclophosphamide-induced thrombocytopenia in Wistar rats. GC-MS was used to analyze the bioactive constituents of the pure natural oils used in the preparation of the formulations. Preliminary evaluations of each formulation included self-emulsification, particle size analysis, zeta potential determination, viscosity measurement, and transmission electron microscopy (TEM). The anticancer effects of remdesivir and baricitinib, both individually and in combination, were evaluated via various SNEDDS formulations in MDA-MB-231 breast cancer and A549 lung cancer cell lines. The effects of the drug-loaded SNEDDS on the platelet count in vivo were examined in an albino Wistar rat model. The selected SNEDDSs were relatively homogenous, with a nanosize of 151.60 ± 1.51 nm and a zeta potential of +29 mV. The viscosity of the SNEDDS was within 0.69 Cp. TEM examination revealed uniformity in the spherical droplets with aqueous dispersions. GC-MS analysis of the bioactive black seed & fenugreek seed oils identified pharmacologically active components, including thymoquinone, isoborneol, paeonol, p-cymenene, and squalene. Drug-free SNEDDSs and those loaded with remdesivir and baricitinib (in combination) demonstrated enhanced anticancer activity, with IC₅₀ values ranging from 1.9–4.2 µg/mL for breast cancer, 2.4–5.8 µg/mL for lung cancer, and 3.05–5.44 µg/mL for human fibroblast lines. The findings from the in vivo animal studies demonstrated that both formulations significantly mitigated the adverse effects of cyclophosphamide, particularly in reducing bleeding and clotting times, which are critical indicators of thrombocytopenia. The combination treatments also markedly improved the platelet counts and overall leukocyte profiles, indicating enhanced immune function and recovery. It can be concluded that the SNEDDSs developed are good candidates for combination therapy to enhance the therapeutic performance of remdesivir with baricitinib to fight not only COVID-19 but also anticancer efficacy.

Keywords: *remdesivir, baricitinib, bioactive oil, COVID-19.*

P09. A NANOSYSTEM DEVELOPED FOR TARGETED DRUG DELIVERY BASED ON FUNCTIONALIZED HUMAN SERUM ALBUMIN CROSS-LINKED WITH OXIDIZED GELLAN DESIGNED TO TREAT BRAIN TUMORS

Camelia Elena Tincu (Iurciuc)^{1,2}, Silvia Vasiliu³, Ștefania Racoviță³, Gabriela Vochița⁴, Daniela Gherghel⁴, Marcel Popa^{1,5,6}, Lăcrămioara Ochiuz²

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Abstract

Nanoparticles were developed using human serum albumin (HSA) functionalized with low molecular weight protamine (LMWP), cross-linked with oxidized gellan, containing curcumin and temozolomide co-encapsulated able to overcome the blood-brain barrier and treat brain tumors. The FT-IR and NMR spectroscopy have confirmed that LMWP can be functionalized with HSA at the free SH group of Cys34 residue. HSA disulfide bonds were reduced using β -mercaptoethanol, exposing hydrophobic domains to interact with hydrophobic drugs, resulting in self-assembled NPs of up to 200 nm size, confirmed by SEM and laser diffractometry. FT-IR spectroscopy indicated Schiff base formation. Curcumin has higher immobilization efficiency than temozolomide, which decreases when the cross-linking degree increases. The study evaluated the release kinetics in two different pH environments (7.4 and 4), normal and tumoral cell line viability in the presence of nanoparticles, and the antioxidant activity of free and encapsulated curcumin, proving the protective role of the polymer matrix.

Keywords: *drug delivery, brain tumors, oxidized gellan, human serum albumin.*

P10. CHEMICAL VALORIZATION OF PET: A ROAD TOWARDS INNOVATIVE AND ECOLOGICAL COPOLYESTERAMIDES

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Abstract

The use of polyesteramides (PEAs) derived from natural monomers, which can combine the properties of polyesters with those of polyamides appears a priori very interesting. In the context of the valorization of plastic waste, this work focuses on the development of new semi-aromatic polyesteramides from poly(ethylene terephthalate) (PET) waste. Using an innovative melt polycondensation approach. Bis(hydroxyethyl)terephthalate (BHET), obtained by glycolysis of PET waste, can be combined with β -alanine, a natural amino acid, thus leading to innovative ecological copolyesteramides.

A series of copolyesteramides was synthesized by melt polycondensation of BHET and β -alanine. These materials were characterized by structural spectroscopic techniques such as FTIR and ¹H NMR. The thermal properties of these PEAs were evaluated by differential scanning calorimetry and thermogravimetric analysis. The results obtained reveal promising thermal and structural properties, positioning these new materials as potential candidates for applications in the fields of technical textiles and tissue engineering.

Keywords: *PET, ecological, copolyesteramides.*

P11. INNOVATION IN BIO-BASED POLYESTERAMIDES: FROM THE SYNTHESIS OF MATERIALS TO THE DESIGN OF NANOPARTICLES FOR DRUG DELIVERY SYSTEMS

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Abstract

The combination of polyesters and polyamides can open avenues in the design of new scalable biomaterials. Polyesteramides (PEAs), can combine the excellent mechanical and thermal properties and exceptional biocompatibility and biodegradability.

A series of PEAs were synthesized by melt polycondensation of ϵ -caprolactone and β -alanine, PEAs are characterized using FTIR, ^1H -NMR, ^{13}C -NMR, DSC, ATG and SEC techniques. Due to their biocompatibility, these copolymers are used in the development of drug-loaded nanoparticles (NPs). NPs are particles whose size is between 1 and 1000 nm and which can be loaded with active compounds trapped inside or adsorbed on the surface on the polymeric core. NPs have shown great potential for targeted drug delivery for the treatment of several diseases.

In this work, we discuss the elaboration of NPs using the emulsion-solvent evaporation method. These NPs were characterized by DLS, cytotoxicity tests as well as the drug encapsulation rate were also studied.

Keywords: *polyesteramides, nanoparticles, drug delivery systems.*

P12. ADVANCED HYDROGELS LOADED WITH HEPARIN FOR THE TREATMENT OF VARICOSE ULCERS

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Abstract

Hybrid hydrogels enhanced with fibers or polymeric microparticles loaded with drugs offer innovative solutions for the treatment of varicose ulcers, a chronic condition associated with venous insufficiency. This technology supports healing through controlled drug release, infection reduction, and the maintenance of an optimal environment for tissue regeneration. The use of natural and synthetic polymers contributes to advanced biocompatibility and functionality, while maintaining a moist environment and appropriate pH optimizes the treatment process. Preventing dressing adhesion and tailoring treatments to individual needs provide additional benefits. Preliminary results indicate a significant reduction in healing time and a considerable improvement in patients' quality of life, opening new perspectives for the effective management of this complex condition.

Keywords: *hydrogels, heparin, varicose ulcers.*

P13. ELECTROCHEMICAL CHARACTERIZATION OF REDUCED GRAPHENE OXIDE ALGINATE HYDROGELS BY ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY TECHNIQUE

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Abstract

Advanced hydrogel-based dressings are a promising innovation for wound treatment, thanks to their high water absorption and similarity to the cellular microenvironment. Alginate (ALG) is a key biomaterial for its anti-inflammatory properties, which promote healing, while reduced graphene oxide (rGO) enhances cell migration due to its conductive properties. This study analyzed the electrochemical behavior of alginate hydrogels with different concentrations of rGO by electrical impedance spectroscopy (EIS). Samples with rGO and TA were prepared and tested in a potentiostat with an equivalent circuit model to evaluate resistances and capacitances. The

results showed that the sample with 9% rGO and 4.8% TA presented the best conductivity and charge storage capacity, standing out as the most stable and suitable for electrochemical applications.

Keywords: *graphene oxide alginate, hydrogels, electrochemical.*

P14. POLYMERIC MICRO/NANOFIBERS BASED ON MODIFIED CHITOSAN/ PVA FOR WOUND HEALING APPLICATIONS

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Abstract

The development of advanced wound healing materials has gained attention due to the need for effective, biocompatible solutions for injuries and tissue regeneration. Electrospun nanofibers have emerged as a promising class of materials due to their unique properties, including high surface-area-to-volume ratio, tunable porosity, and structural similarity to the extracellular matrix, which enhances cellular adhesion and proliferation. Poly (vinyl alcohol) (PVA) and chitosan (CS) are recognized as biocompatible and biodegradable polymers, making them ideal candidates for fabricating nanofibers. PVA contributes excellent mechanical properties and water solubility, while CS offers intrinsic antimicrobial activity useful for wound healing processes such as hemostasis and tissue remodeling. This work employs the preparation of micro/nanofibers based on modified CS with poly (ethylene glycol) methyl ether acrylate (PEGA) and PVA for wound healing applications. The prepared micro/nanofibers were characterized structurally and morphologically via FT-IR, SEM, and rheology. The micro/nanofibers water uptake and drug loading/releasing capacity was studied.

Keywords: *polymers, nanofibers, chitosan, wound healing.*

Friday, February 28, 2025

P01. CHARACTERIZATION AND PERFORMANCE OF HYDROGEL BASED ON GELATIN CROSS-LINKED WITH OXIDIZED ALGINATE FOR BIOMEDICAL APPLICATIONS

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Abstract

This research aim is, to synthesize biocompatible gelatin-based hydrogels through the cross-linking of protein-free amino groups with aldehyde groups derived from the oxidation of sodium alginate. This dual cross-linking method combines both covalent and ionic bonds for the immobilization of propolis. The covalent bonds are formed by Schiff base bonds between the free amino groups (NH₂) of gelatin and the aldehyde groups (CHO) generated by the oxidation of sodium alginate using NaIO₂. Ionic bonds are created using Mg²⁺ ions. Hydrogel films were synthesized by varying the molar ratios of -CHO to -NH₂ under different pH (3.7 and 5.5). As the hydrogel's cross-linking degree increases, the efficiency of propolis encapsulation and release diminishes. UV

irradiation boosted the antioxidant activity of both free and encapsulated propolis. These results provide valuable insights into the design of biocompatible hydrogels for propolis immobilization, highlighting their potential for controlled release applications in the biomedical sectors.

Keywords: *hydrogel, gelatin, oxidized alginate, biomedical applications.*

P02. SYNTHESIS CONTROL OF P4VP-PCL COPOLYMERS WITH LINEAR AND MULTI-BRANCH ABX ARCHITECTURES: FROM SELF-ASSEMBLY TO TAILORED NANO-AGGREGATE FORMATION FOR ADVANCED APPLICATIONS

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Abstract

This study investigates the synthesis and characterization of amphiphilic block copolymers with varying ABX architectures composed of P4VP and PCL, with the goal of forming tailored nano-aggregates. Various controlled polymerization techniques, including RAFT polymerization and ring-opening polymerization, were explored to understand the self-assembly behavior of these copolymers. The physicochemical properties and morphology of the resulting structures were analyzed using transmission electron microscopy (TEM) and light scattering techniques (DLS, SLS). The research particularly focuses on the supramolecular association of multi-branched PCL copolymers in different solvent systems. The impact of copolymer architecture and branch number on the nature of nano-aggregates, ranging from micelles to complex structures like vesicles and polymersomes, was investigated. Multi-branched topologies were found to destabilize micelle formation, promoting the formation of the desired nano-aggregates. These findings offer valuable insights into the design of advanced materials for applications in medicine, cosmetics, and nanotechnology by controlling copolymer architecture and self-assembly behavior.

Keywords: *copolymers, ABX architectureS, P4VP-PCL .*

P03. STRUCTURAL DESIGN AND FUNCTIONAL APPLICATIONS OF PEGPCL COPOLYMERS: FROM TOXIC SUBSTANCE REMOVAL TO SOL-GEL TRANSITIONS AND NANOSTRUCTURED DRUG DELIVERY SYSTEMS

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Abstract

This study investigates the structure-function relationships of PEG-PCL copolymers, focusing on different architectures, such as linear diblock, triblock, and multi-branched structures. Multi-branched PEG-PCL copolymers exhibit unique sol-gel transitions, enabling the encapsulation and controlled release of active ingredients like limonene and ascorbic acid. These systems are injectable at room temperature and transition to gels at body temperature (37°C), offering biodegradable and prolonged drug release without requiring surgical removal. Additionally, the study explores low-water-soluble PEG-PCL copolymers for dye removal from aqueous solutions, showing exceptional adsorption capacities (256 mg/g) due to hydrogen bonding and hydrophobic interactions. Furthermore, a new approach to fabricating cationic micelles using PCL-PEG-P4VP

copolymers is introduced, with these micelles efficiently encapsulating quercetin, demonstrating antioxidant properties, high stability, and controlled release for therapeutic use. This research advances polymer design by linking structural variations to functional applications, enabling innovations in toxic substance removal, sol-gel transitions, and nanostructured drug delivery systems.

Keywords: *copolymers, nanostructured, drug delivery systems.*

P04. EFFECT OF THE DISPERSING AGENT „BYK W-9010“ ON THE PROPERTIES OF SPENT COFFEE GROUNDS-BASED BIOCOMPOSITES

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Abstract

Coffee, as one of the most popular beverages globally, generates significant daily waste, known as spent coffee grounds (SCG). In this study, a sustainable bio-based plastic was developed by combining polycaprolactone (PCL) with SCG. Biocomposites were elaborated using solvent casting with SCG at 5–25 wt.%. The effect of treating oil-extracted SCG (ESCG) with BYK W-9010 was analyzed and compared to untreated samples, in terms of thermal, morphological, and mechanical properties. Although adding ESCG reduced the material's mechanical and thermal stability, the PCL/ESCG-1% BYK W-9010 composite exhibited enhanced thermal stability and mechanical performance. Additionally, incorporating BYK W-9010 with 25 wt.% ESCG significantly boosted the Young's modulus of the composites. Morphological analysis revealed that these improvements were attributed to better ESCG-1% BYK dispersion in the PCL matrix.

Keywords: *coffee, biocomposites, BYK W-9010.*

P05. EFFICIENT HYDROTHERMAL SYNTHESIS OF CARBON DOTS FROM GREEN PRECURSORS: A COMPARATIVE STUDY AND POTENTIAL APPLICATIONS

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Abstract

Carbon dots (CDs) are a promising alternative to traditional quantum dots due to their inexpensive synthesis, excellent biocompatibility, vibrant photoluminescence, and cost-effectiveness. In this work, CDs were synthesized hydrothermally using three green precursors: *Argania spinosa* L. fruit cake, *Cistus Creticus* leaves, and *Forsskaolea Tenacissima* leaves. The process consists of heating each precursor at 180°C for 12 hours in an autoclave. These CDs exhibit blue fluorescence under UV excitation at 365 nm. They are highly soluble in water due to functional groups, like hydroxyl and carbonyl groups, as confirmed by FTIR and EDX analysis. The photoluminescence analyses revealed a wavelength-dependent excitation behavior and significant wavelength shift $\Delta\lambda = 146$ nm at an excitation wavelength of 310 nm for CDs-FT. The TEM micrography confirmed the nanometric size of the prepared CDs. The CDs prepared can be a promising material for many future applications, including bioimaging, sensing, catalysis, and energy conversion processes.

Keywords: *hydrothermal synthesis, carbon dots, green precursors.*

P06. PHOTOCATALYTIC CERAMIC FOAMS FOR THE REMOVAL OF EMERGING CONTAMINANTS IN WATER

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Abstract

Novel photocatalytic ceramic foams have been developed using biogenic silica extracted from rice husks and pure and copper-doped titanium dioxide nanoparticles (EC0 and EC1, respectively). The enhancement in the photocatalytic activity of EC1 is attributed to a lower charge recombination rate and a longer lifetime of the photogenerated charges since copper can induce some doping states near the top of the valence band, thereby enhancing the visible absorption via the Cu 3d-Ti 3d optical transition. Complete degradation (100%) of acetaminophen was achieved within 33 min using a loading of 1.5 g/L of photocatalytic ceramic foam (EC1) and under solar irradiation of 924 W/m². This result has positive implications for the photodegradation of emerging contaminants and provides valuable insights into the potential use of photocatalytic materials in water pollution remediation.

Keywords: *ceramic foams, photocatalytic, water.*

P07. SYNTHESIS AND CHARACTERIZATION OF SHAPE MEMORY POLYMERS BASED ON ISOBORNYL ACRYLATE

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Abstract

Polymeric materials are essential for the development of medical devices. Depending on the specific application, these polymers must demonstrate suitable functionalities, such as mechanical strength or the ability to perform active movements. Shape memory polymers (SMPs), a prominent class of smart materials, have attracted significant attention due to their potential biomedical

applications. These polymers can temporarily change their shape when exposed to an appropriate glass transition temperature and subsequently return to their original form. This study investigates the properties of shape memory polymers based on isobornyl acrylate, focusing on structural analysis, thermo-mechanical behavior, and the shape memory effect. A series of photopolymerizable copolymers was synthesized through radical polymerization under an inert atmosphere.

Keywords: *polymers, shape memory, isobornyl.*

P08. STUDY OF THE PHYSICO-CHEMICAL AND MECHANICAL PROPERTIES OF ACRYLIC POLYMERS

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Abstract

Pressure-sensitive adhesives offer a promising solution for a number of applications, such as adhesive tapes, the display, automotive and electronics industries, and in the medical sector for dressings and transdermal delivery systems. This work focuses on the development of these materials by photopolymerisation and their characterisation by physico-chemical and mechanical analyses.

Fourier Transform Infrared Spectroscopy (FTIR-ATR) was used to identify the chemical composition and the successful polymerisation with the disappearance of the acrylic bond at 810 cm⁻¹. Wettability analysis enabled us to determine the surface energy of the polymer materials, finally, rheological studies and shear tests provided key information on their viscoelastic and mechanical behaviour.

Keywords: *physico-chemical, mechanical, acrylic polymers.*

P09. INVESTIGATION OF SOLVENT INTERACTION BEHAVIOR OF AN ACRYLIC HYBRID MATERIAL IN ETHANOL AND TOLUENE

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Abstract

This study investigates the swelling behavior of hybrid materials composed of isobornyl acrylate and various metal-organic frameworks (MOFs), synthesized via photopolymerization. The incorporation of MOFs enhances the material's properties, aiming for applications in separation and adsorption. Swelling kinetics and equilibrium swelling ratios were analyzed in ethanol and toluene, emphasizing the effects of MOF type and loading. Results demonstrated that solvent polarity plays a critical role, with toluene inducing greater swelling compared to ethanol due to its compatibility with the polymer matrix. Additionally, the structural and surface properties of different MOFs significantly influenced the material's interaction with each solvent, altering the swelling response. These findings highlight the interplay between solvent type, polymer matrix, and MOF characteristics, contributing to the design of hybrid materials with tailored swelling behavior for advanced applications such as responsive membranes and selective adsorption technologies.

Keywords: *acrylic hybrid, ethanol, toluene, solvent.*

P10. CELL MORPHOLOGY MODULATION AFTER TREATMENTS WITH DIFFERENT PEPTIDE FUNCTIONALIZED NANOCAPSULES CONTAINING MAGNETIC PARTICLES

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Abstract

In the last decades, nanoparticles have been intensively investigated as drug carriers, most being used in cancer therapy and diagnosis. Nanocapsules have enjoyed increased interest due to their multiple benefits such as continuous and controlled release of drugs, protecting the drug from early degradation, and decreased drug toxicity.

The objective of this study was the in vitro evaluation of the morphological changes determined by some new nanocapsules in EA.hy926 human endothelial cells. A treatment of 24 and 48 hours was applied, the dose range of the tested nanocapsules being between 3.125 and 25 µg/mL. The cytomorphological characteristics were evaluated by Nikon Eclipse TS100 inverted microscope equipped with MshOt MS60 digital camera.

It was found that treatment with increasing doses of tested nanocapsules reduced the cells ability to form the cell monolayer. At the maximum dose, intracellular vesicles were identified, leading to the assumption of endocytosis process.

Keywords: *cell morphology, peptide, nanocapsules, magnetic particles.*

P11. CELLULAR RESPONSE TO THE ACTION OF SOME NOVEL PEPTIDES FUNCTIONALIZED LIPOSOMES LOADED WITH DEXAMETHASONE

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Abstract

A promising therapeutic strategy is the one based on liposomes, which, due to their major properties, namely biocompatibility and biodegradability, are widely used in anti-inflammatory, antiviral and anti-tumor therapies. Liposomes are nanocarriers composed of single self-assembled units, mostly of phospholipids and cholesterol. Liposomes allow coating with chitosan, with notable advantages: preventing premature drug degradation, prolonging its release, increasing stability and cellular absorption. In addition, the functionalization of liposomes with peptides can improve cell membrane penetration.

This study aimed to evaluate the interference degree of different cationic liposomes, during 24 and 48 hours, in doses between 3.125-25 µg/mL, with the structures of EA.hy926 human endothelial cells, using the cell morphology assay. The results revealed changes in cell membrane integrity, vesicle formation (possible endocytosis), identification of droplet-shaped inclusions (proving the internalization of the tested liposomes), membrane contractions and a reduction in nuclear size, showing the potential existence of apoptotic mechanism.

Keywords: *peptides, liposomes, dexamethasone.*

P13. TAILORING ANTIMICROBIAL PROPERTIES OF POLYETHERSULFONE MEMBRANES BY SILVER-LOADED ZEOLITE DOPPING

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Abstract

This study presents the preparation of antimicrobial films based on polyethersulfone (PES) with zeolite exchanged with silver (Ze-Ag) at varying concentrations. The silver-modified zeolite was characterized using X-ray diffraction and scanning electron microscopy. PES films containing Ze-Ag were produced via wet-casting, with zeolite contents in the films matching certain percentages. The thermal stability of the samples was analyzed through differential scanning calorimetry and thermogravimetric analysis. The glass transition temperatures (T_g) revealed that a low concentration of Ze-Ag increased T_g , indicating that Ze-Ag acts as a reinforcing agent, enhancing the rigidity of the polymer matrix. However, higher Ze-Ag content reduced T_g , likely due to a plasticizing effect where excess filler disrupts polymer chain mobility or creates a more heterogeneous network. The T_{max} values showed the most significant improvement at 1 wt.% Ze-Ag, suggesting optimal dispersion and strong interaction with the polymer matrix. The antimicrobial activity of the PES membranes loaded with Ze-Ag was evaluated against *Escherichia coli* and *Staphylococcus aureus*, demonstrating the material's potential for bio-related applications.

Keywords: antimicrobial properties, polyethersulfone, silver, zeolite.

P14. PREPARATION AND CHARACTERIZATION OF A BIOCOMPATIBLE HYDROGEL OBTAINED BY CROSSLINKING CHITOSAN/LACTALBUMIN WITH OXIDIZED CARBOXYMETHYLCELLULOSE FOR POTENTIAL BIOMEDICAL APPLICATIONS

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Abstract

The objectives of our study was to obtain a new hydrogels in the form of films intended for use in the biomedical field, from natural (biodegradable) polymers such as chitosan (CS), oxidized carboxymethylcellulose (CMCOx) and proteins (α -lactalbumin). We obtained the (CMCOx) by oxidation of CMC in the presence of sodium periodate in order to create a new functional group, respectively the aldehyde function ($-\text{CH}=\text{O}$) capable of to react with the amine groups ($-\text{NH}_2$) of chitosan (CS) and proteins (α -La) by forming covalent bridges of the Schiff base type ($-\text{C}=\text{N}$) between the chains of three polymers. The existence of aldehyde groups in CMCOx was demonstrated by FT-IR and NMR spectroscopy. Hydrogel films were prepared based on CS/ α -LA/CMCOx by crosslinking using different molar ratios between the aldehyde groups of CMCOx and the amine groups of CS and α -LA. The conversion index of amine groups into Schiff bases from the hydrogel films obtained and the swelling capacity were determined. Inclusion complexes of curcumin with β -cyclodextrin to increase its water solubility have been obtained, these being subsequently immobilized in co-reticulated hydrogel films based on polysaccharides (CS/CMCOx) and proteins (α -La) in order to treat especially dermatological diseases. The stability tests of curcumin immobilized to light and to pH confirm that the polymer matrix of the hydrogels obtained based on CS/LA/CMCOx loaded with the inclusion complex has a protective role for curcumin against degradation. The release kinetics of immobilized curcumin from CS / LA / CMCOx films was studied in two mediums of different pH (5.5 and 7.4).

Keywords: hydrogel, crosslinking, chitosan, carboxymethylcellulose, biomedical.

Saturday, March 1, 2025

P01. DEVELOPMENT OF MODIFIED DRUG DELIVERY SYSTEMS WITH METFORMIN LOADED IN MESOPOROUS SILICA MATRICES

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Abstract

Mesoporous materials, particularly MCM-48, with their distinctive pore structures and versatility, represent a promising advancement in the development of efficient drug delivery systems, offering new possibilities for the treatment of chronic conditions such as type 2 diabetes mellitus. In this study we described the preparation and characterization of MCM-48 silica matrix followed by loading with metformin hydrochloride, an important oral antidiabetic drug. SEM-EDX analysis showed a marked increase in carbon and nitrogen content, reflecting optimal loading efficiency, confirmed by HPLC quantification (maximum load of 160.978 mg/g matrix). The in vitro dissolution study reflected that the silica matrix's pore structure significantly influences the modified release profile of metformin in gastro-intestinal simulated fluids. Metformin delivery was successfully improved by MCM-48 mesoporous silica, which provides a controlled release profile ideal for the treatment of type 2 diabetes.

Keywords: *drug delivery systems, metformin, mesoporous silica matrices.*

P02. EXPERIMENTAL AND THEORETICAL DESIGN ON THE DEVELOPMENT OF MATRIX TABLETS WITH METFORMIN AND HONOKIOL

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Abstract

Diabetes is a developing worldwide health emergency that necessitates efficient therapeutic approaches to maximize therapeutic results. By creating and evaluating extended-release polymeric matrix tablets with metformin, a first-line medication for type 2 diabetes, and honokiol, a bioactive substance with possible therapeutic advantages, this work seeks to overcome this difficulty. Hydrophilic polymers, including Noveon® AA-1 and Carbopol® 71G NF, were used in the formulation of the tablets. The objective was the pharmacotechnical characterization of the matrix tablets and the release profile for honokiol and metformin. Advanced mathematical models, such as fractal and multifractal dynamics, were used to study the release kinetics of metformin and honokiol in order to capture the non-linear and time-dependent release processes. The goal is to improve overall therapeutic results and glycemic control by using a novel dual-drug delivery system.

Keywords: *metformin, honokiol, tablets.*

P05. DESIGN AND CHARACTERIZATION OF MICROCAPSULES BASED ON ALGINATE AND POLY(METHYL VINYL ETHER-ALT-CALCIUM MALEAT) FOR DRUG DELIVERY APPLICATIONS

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Abstract

Natural polymers, such as alginate (Alg), have the necessary modification and processing capacity to make them suitable vehicles for the controlled release of pharmaceuticals and biomolecules. This study evaluates the advantages, components, release processes, preparation methods and applications of microcapsules in drug delivery systems. Our team developed microcapsules by combining Alg and poly(methyl vinyl ether-alt-calcium maleate) (P(MVE-alt-CaM)). This study is distinguished by the fact that P(MVE-alt-CaM) is obtained by mixing eggshell powder (EGP) with 3% poly(methyl vinyl ether-alt-maleic acid). The microcapsules were analyzed by scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR). The mechanical strength of the prepared capsules was evaluated by compression tests. The release behavior of the model drug propranolol (Prp) was examined for three types of capsules with different crosslinking densities. The results indicated that the drug loading capacity and water absorption ratio were directly proportional to the amount of EGP used during the preparation of P(MVE-alt-CaM).

Keywords: *microcapsules, alginate, drug delivery, calcium maleat.*

P06. STUDYING BIOMEDICAL APPLICATIONS OF BAFE12O19 (BA-CA) TIO3 MAGNETOELECTRIC NANOPARTICLES FOR ANTI-CANCER DRUG DELIVERY

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Abstract

The recent development of nanoparticles which combine strain coupled magnetostrictive and piezoelectric phases, has attracted a lot of attention due to their ability to yield strong magnetoelectric effect even at room temperature, thus making them a promising tool to enable biomedical applications. In this study we chose Barium hexaferrite BaFe₁₂O₁₉ and Barium Calcium Titanite (Ba-Ca)TiO₃ powders as magnetoelectric nanoparticles, both of them were synthesized by Sol-Gel process Sintered at 1050oC for 2h. The characterization of the two composites investigated by different technique, XRD, SEM, EDX, and FTIR reveled the phases, crystalline structure and surface morphology. The magnetization properties and the dielectric behavior of the prepared samples, dielectric loss (ϵ'') are measured. Finally, the biological behavior is assessed for PH, and cyto-toxicity and that showed promising results for the anti-cancer drug delivery applications.

Keywords: *biomedical, magnetoelectric, nanoparticles, anti-cancer drug delivery.*

P09. DESIGN OF FIBROUS MEMBRANES BASED ON CELLULOSE ACETATE/POLYVINYLIDENE FLUORIDE/SILVER NANOPARTICLES WITH SPECIFIC PROPERTIES FOR APPLICATION IN MEDICAL FIELD

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Abstract

The present study addresses new ways for obtaining fibrous membranes with improved hydrophobicity, antibacterial/antibiofouling characteristics for being used in the biomedical field as protective masks. In this regard, the cellulose acetate (CA) was blended with polyvinylidene fluoride (PVDF) and silver nitrate (AgNO₃). The study is focused on two directions: (i) the determination, from rheological studies, of the optimal parameters for the electrospinning solutions (e.g., solvent, concentration, polymers mixing ratio), in order to obtain defects free fibers, and (ii) the establishment through different analysis techniques (Fourier transform infrared spectroscopy, UV-Vis spectroscopy, Scanning electron microscopy, (SEM)) and also studies concerning the surface properties, mechanical resistance, and ability to inhibit different bacterial species of the most suitable membranes for the targeted application. The results showed that the membranes with the best physical, chemical, and biological properties that could be recommended for obtaining of protective masks were those achieved from solution of 18 g/mL concentration, in 2:1 Acetone/Dimethylacetamide, and a polymer mixture of 50/50 wt./wt. CA/PVDF, at which a quantity of 0.01 AgNO₃ was added.

Keywords: *fibrous membranes, cellulose acetate, silver nanoparticles.*

P10. DEVELOPMENT OF NEW NANOCELLULOSE-BASED MATERIALS FOR BIOMEDICAL APPLICATIONS

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Abstract

At present, nanocellulose is considered a promising nanomaterial with unique qualities, which although has properties similar to those of cellulose, is still much more versatile, being able to be used for various applications (medicine, cosmetics, food industry, aerospace industry, etc.). Given these premises and taking into account the fact that nanocellulose is a material with remarkable properties, such as biocompatibility, biodegradability and superior mechanical properties, in this study we aimed to obtain pullulan nanofibers reinforced with nanocellulose. The obtained nanofibers proved effective for the encapsulation and release of salicylic acid, and can be successfully used for biomedical applications.

Keywords: *polymers, biomedical applications, nanocellulose.*

P11. NEW 3D ARCHITECTURES WITH ANTI-FREEZING, ELECTRICAL CONDUCTIVITY, AND IMPRESSIVE MECHANICAL PROPERTIES FOR MEDICAL APPLICATIONS

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Abstract

Conductive hydrogels are a class of materials that are gaining increasing importance for sensor applications due to their excellent conductivity and mechanical properties. However, conventional conductive hydrogels lack anti-freezing and hydration properties, making them unsuitable for use as sensors under relatively harsh conditions, as they use pure water as the dispersion medium. Furthermore, conventional hydrogels cannot generate electricity, an essential requirement for practical applications of hydrogel-based sensors. Given these limitations, we synthesized new types of conductive hydrogels by incorporating magnetic fluids into a polymer matrix based on hydroxypropyl cellulose, polyvinyl alcohol, and glycerin.

Keywords: *3D architectures, mechanical properties, electrical conductivity.*

P12. EVALUATION OF THE CONJUNCTIVAL VASCULAR NETWORK AND MICROCIRCULATION IN INDIVIDUALS WITH TYPE 1 DIABETES

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Abstract

Objective techniques can be used to assess conjunctival microcirculation, and the results could advance the knowledge of the characteristics of in vivo microcirculation in the diabetic population. Our goal was to elaborate a system for assessment of vascular network and microcirculation in the bulbar conjunctiva characteristics in patients with type 1 diabetes. Using a widely available slit-lamp connected to an image recording device provided the opportunity to obtain images and videos of conjunctival microcirculation. Subsequently, density of the microvascular web and skeletization can be performed and assessed, successive evaluation of arterioles and venules diameter and length, as well as tortuosity and blood flow are accessible for evaluation. The possibility of obtaining and analysing parameters of the conjunctival microvascular network could serve as an easy, accessible and non-invasive biomarker to estimate the impact of vascular complications in persons with diabetes.

Keywords: *conjunctival vascular network, microcirculation, diabetes.*

P13. DEVELOPMENT OF BIOCOMPATIBLE SUPERPARAMAGNETIC NANOPARTICLES BASED ON CHITOSAN FOR TARGETED DELIVERY OF 5-FLUOROURACIL

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Abstract

Nowadays, the Magnetically Targeted Drug Delivery System (MTDDS) is among the most attractive and promising strategies for delivering drugs to the target site. Superparamagnetic nanoparticles have gained significant attention as potential drug delivery carriers due to their ability to be guided by an external magnetic field, enhancing targeted therapy. In this study, we focused our research on the development of hybrid magnetic nanospheres based on chitosan obtained by double crosslinking (ionic and covalent) technique in reverse emulsion, which ensures the mechanical stability of the polymer support, the magnetic material (magnetite (Fe₃O₄)) is dispersed on polymeric matrix. The original hybrid nanospheres (NSMs) loaded with biologically active principles (the 5-Fluorouracil (5-FU)) as a potential treatment for cancer. The particles formed were characterized in terms of structure (FT-IR), size (DLS), morphology (SEM), swelling, and 5-FU entrapment/release properties, which were dependent on the synthesis parameters (polymer concentration, dispersion speed, and amount of ionic crosslinking agent). SEM analysis results revealed that NSMs presented a spherical shape and are homogeneous. Moreover, NSMs' ability to load/release 5-FU was tested in vitro, the results confirming, as expected, their dependence on the varied synthesis process and NSM swelling ability in physiological liquids. These results suggest that hybrid nanospheres based on chitosan obtained are a promising platform for targeted chemotherapy application.

Keywords: *superparamagnetic nanoparticles, chitosan, targeted delivery.*

P15. COMPARISON BETWEEN IMRT EXTERNAL BEAM RADIOTHERAPY AND BRACHYTHERAPY TREATMENTS FOR SOME PELVIC TUMORS

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Abstract

For the treatment of many cancers, radiation therapy (RT) plays a vital role. RT can be administered either externally or internally, depending on the tumored organ. This study focuses on pelvic cancers that have had internal RT (brachytherapy) or external RT. This work compares the planning performance of brachytherapy and intensity modulated radiation therapy (IMRT). A sample of 30 patients with pelvic malignancies who have had brachytherapy and radical IMRT treatment have their RT planning completed using the Monaco treatment planning system (TPS). Dosimetric evaluation metrics are estimated to compare the two methods in terms of HI, CI, CN, PITV, TCI, and QF in the context of physical parameters assessment. Both methods give better dose homogeneity and conformity to the tumor. In addition, brachytherapy coverage targets cells with radiation doses higher than IMRT treatment. Statistically, the calculated metrics showed good significance between IMRT EBRT and brachytherapy methods. The outcomes have made it possible to safely employ brachytherapy techniques that can be expanded to treat various tumors.

Keywords: *IMRT, radiotherapy, brachytherapy, pelvic tumors.*