SECTION OF RESEARCH PRESENTATIONS

Abstracts

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Contents

1. Follicular activation by ovarian tissue fragmentation in women with premature ovarian insufficiency

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Background: Premature ovarian insufficiency (POI) is a condition that affects women, leading to the loss of ovarian function before the age of 40. It is characterized by amenorrhea, elevated follicle-stimulating hormone (FSH) levels and low estrogen levels. Some risk factors for accommodating POI are chemotherapy and radiation therapy, genetic predisposition and autoimmune disorders, but in the majority of cases the cause is unknown. Only 5% to 10% of women with POI get pregnant without medical intervention after they are diagnosed with POI.

Case presentation: A 37-year-old-female, diagnosed with POI, presented with >4 months of amenorrhea, FSH levels >25 IU/L registered two times in a four-week period (45 and 61, respectively) and undetectable levels of anti-Müllerian hormone (AMH) (<0.16 pmol/L). Previously, the stimulation of ovulation with gonadotropins was attempted to induce follicular growth, but unsuccessfully. Therefore, the laparoscopic unilateral explantation of ovarian tissue, in vitro fragmentation and reimplantation of ovarian tissue strips below the serous sheath of the fallopian tube was proposed to ensure primordial follicle recruitment. The stimulation of ovulation was carried out by using 225 IU follitropin beta and 75 IU menotropin. Pituitary suppression was achieved with ganirelix. Follicular maturity was demonstrated ultrasonographically (follicular diameter – 18 mm) and biochemically (estradiol level 1035 pmol/L). Aspiration of the presented follicle was performed 35-36 hours after the application of choriogonadotropin alfa for the final oocyte maturation. The obtained oocyte was fertilized in vitro by utilizing intracytoplasmic sperm injection. The cleavage-stage embryo was transferred on day 3 after fertilization. Clinical pregnancy was registered ultrasonographically by the presentation of positive embryocardia. The pregnancy was completed at term by cesarean section with the delivery of a live, healthy female child.

Conclusion: Ovarian tissue fragmentation could be a promising treatment option for women with POI when conventional fertility treatment outcomes are unsatisfactory. Routine use of this method requires further research to identify patients who may benefit the most from it.

Key words: premature ovarian insufficiency, ovarian tissue fragmentation, follicular activation.

2 Heart failure in non-hereditary hemochromatosis

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Background: Hemochromatosis is a disease caused by abnormal iron deposition in parenchymal organs, which can be toxic and cause organ dysfunction. It can be congenital or acquired. Cardiac hemochromatosis develops due to the deposition of iron in the heart muscle tissue, leading to both systolic and diastolic heart dysfunction, and ultimately to heart failure.

Case presentation: A 27-year-old female patient was referred to the hospital for treatment because of heart failure in 2013, with elevated serum iron and ferritin levels (4000 mcg/L), as well as the onset of diabetes and amenorrhea. Genetic analysis of the human homeostatic iron regulator protein (HFE) gene indicated a heterozygous mutation in H63D. Since then, the patient has been on insulin therapy and substitution therapy with norgestrel-estradiol valerate. She was also treated with desferrioxamine and therapeutic phlebotomy, but this was discontinued a year ago. In recent months, the patient has shown signs of dyspnea, orthopnea, swollen calves and a distended abdomen. She complains of chest tightness and irregular heartbeats. An electrocardiogram (ECG) demonstrates sinus tachycardia at 110 bpm and frequent multifocal premature ventricular contractions (PVCs). Echocardiography reveals the dilation of both ventricles and atria. Cardiac magnetic resonance imaging (MRI) displays significant iron deposition in the myocardium. Holter ECG monitoring confirms frequent ventricular tachycardia (VT) lasting up to 15 seconds. The N-terminal prohormone of brain natriuretic peptide (NT-proBNP) is 1220. Cardiac function improves with the use of bisoprolol, spironolactone and furosemide. Angiotensin receptor-neprilysin inhibitor (ARNI) is not introduced due to hypotension. SGLT2 inhibitors are not administered due to type 1 diabetes. An implantable cardioverter-defibrillator (ICD) is placed, with frequent detection of VT, and amiodarone is incorporated into treatment.

Following desferrioxamine administration and therapeutic phlebotomy, the ferritin levels decrease and the echocardiographic findings improve.

Conclusion: Cardiac hemochromatosis is a hereditary disease that currently has no cure, but with proper control and monitoring, it can be very well managed. Medication therapy alone may be sufficient, but sometimes the implantation of a pacemaker is required to achieve a good quality of life. As with most other hereditary diseases, early diagnosis and proper disease management are crucial.

Key words: hemochromatosis, heart, hereditary.

3. Polystyrene nanoparticles induce apoptosis and DNA damage in mesenchymal stem cells

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Introduction: The significant increase in the amount of plastic waste is a growing global problem and causes concern for human health. One of the most commonly used types of plastic is polystyrene (PS), a synthetic polymer of styrene. PS has a significant negative impact on the freshwater ecosystem, while current knowledge about the biotoxicity of PS on human stem cells is very limited.

The aim: The aim of this study was to examine the effect of polystyrene nanoparticles (PS-NP) on human stem cells in vitro.

Materials and methods: The effect of two concentrations of PS-NP (0.01 mg/ml and 0.1 mg/ml) with a size of 40 nm and 200 nm was examined on human periodontal ligament mesenchymal stem cells (MSC-PDL). After in vitro treatment for 24 hours, the comet test was used to test the genotoxic effect of PS-NP, while the effect of PS-NP on the induction of apoptosis in treated MSC-PDL was visualized by histological staining with Giemsa or hematoxylin-eosin.

Results: The genetic damage index in treated MSC-PDL was significantly higher compared to untreated cells. Both applied concentrations of PS-NP caused DNA damage in MSC-PDL, while the higher concentration of PS-NP had a more pronounced genotoxic effect. Giemsa and hematoxylin-eosin staining indicated that with a rising PS-NP concentration, the number and volume of stem cells evidently decrease, while the intercellular space increases. In addition, nuclear hyperchromatism, edge aggregation and the formation of dark apoptotic bodies were clearly visible in PS-treated MSC-PDL, suggesting that the cells underwent apoptosis.

Conclusion: PS-NP induce apoptosis and DNA damage in MSC-PDL.

Key words: apoptosis, polystyrene, DNA, stem cells.

4. The impact of subacute treatment with valsartan/sacubitril on the redox status of rats with metabolic syndrome

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Introduction: Simultaneous valsartan/sacubitril administration is considered a more effective therapeutic approach in reducing cardiovascular events (CVE) compared to commercially available therapy. However, in the case of ischemia/reperfusion (I/R) injury, there is an excessive release of reactive oxygen species and the occurrence of oxidative stress, one of the main pathological phenomena leading to CVE.

The aim: The aim was to examine the effect of this treatment with valsartan/sacubitril on the level of prooxidative molecules in coronary venous effluent samples of rats with metabolic syndrome.

Materials and methods: The study included 18 male rats, divided into three groups: a healthy control group (CTRL), animals with metabolic syndrome (MS) and a group with metabolic syndrome treated with valsartan/sacubitril (Val/Sac) per os in a dose of 68 mg/kg for four weeks. The valsartan/sacubitril oral suspension was prepared by dissolving commercially available Val/Sac film tablets in distilled water. After completing the experimental protocol, the rats were sacrificed and the hearts were placed on a Langendorff apparatus to induce an ex vivo I/R injury (30 min global ischemia/60 min reperfusion). The levels of prooxidative molecules O2-., H2O2, NO2- and thiobarbituric acid reactive substance (TBARS) were determined from coronary venous effluent samples using spectrophotometric methods.

Results: The levels of all prooxidative molecules were significantly higher in the MS group compared to the healthy control group of animals ($p<0.05$). The subacute administration of Val/Sac significantly reduced the level of O2-., H2O2 and TBARS compared to the level measured in the MS group ($p<0.05$). However, the applied pharmacological approach increased the level of NO2 in coronary venous effluent samples compared to both control groups of animals ($p<0.05$).

Conclusion: The obtained results will serve to better understand the effect of simultaneous administration of valsartan/sacubitril on the level of oxidative stress and the reduction of myocardial damage due to I/R injury.

Key words: metabolic syndrome, oxidative stress, rat, sacubitril, valsartan.

5. The synthesis of acetylsalicylic acid – an environmentally friendly approach

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Introduction: Acetylsalicylic acid (ASA) is an analgesic, antipyretic and antithrombotic that is widely used around the world. It is administered orally in the form of tablets in different doses. Indications for the use of this drug are short-term symptomatic relief of mild to moderate pain including headache, toothache, sore throat due to colds, menstrual pain, muscle and joint pain and back pain. It is often utilized for the secondary prevention of heart attacks and symptomatic pain relief and fever reduction with colds and flu.

The aim: The aim of this study was to compare the yields of acetylsalicylic acid (ASA) synthesis based on traditional and green chemistry approaches. Green chemistry is one of the most important approaches in pharmaceutical sustainability because the reagents used to synthesize acetylsalicylic acid can be harmful to the environment, so there is a need for a better and safer alternative.

Methods: We performed five syntheses based on the traditional approach and five with the green chemistry one. The synthesis process was the same, except for one part – the traditional synthesis used sulfuric acid, and the green chemistry synthesis utilized phosphoric acid. After synthesis, the theoretical and experimental yields were calculated. The obtained products were tested with high-performance liquid chromatography.

Results: The theoretical yield of acetylsalicylic acid in both reactions was determined to be 3.896 g. The traditional synthesis gave us an average yield of 3.113 g (79.8%). Green chemical synthesis produced an average yield of 3.104 g (79.4%). The quality of both products was confirmed by the above-mentioned chromatographic method. There was no statistically significant difference between the mean values of product masses (<0.05).

Conclusion: Phosphoric acid can be used as a safe alternative to the synthesis of acetylsalicylic acid instead of sulfuric acid. Since phosphoric acid is much safer than sulfuric acid in terms of environmental impact, corrosivity and human health impact, these findings can be utilized in the pharmaceutical industry to provide a better, cleaner and safer alternative to ASA synthesis.

Key words: acetylsalicylic acid, synthesis, green chemistry, medical chemistry.

6. Preparation and evaluation of the anti-inflammatory effect of a hydrogel based on *Galium verum*

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Introduction: Inflammation represents a reaction of living tissue to an injury, i.e., a non-specific adaptive reaction of the organism of a local nature to the harmful action of various noxious agents. Medicinal plants were one of the first therapeutic agents in history, and due to the well-known anti-inflammatory effect of *Galium verum* in traditional medicine, the current research was based on the development of a new topical formulation using this plant extract as a raw material.
The aim: This study aimed to develop a *Galium verum*-based hydrogel and investigate the anti-inflammatory effect in a carrageenan-induced rat paw inflammation model.
Materials and methods: The research included 18 *Wistar albino* rats induced with inflammation and randomly divided into three groups: the first group included animals without treatment (control), while in the second the animals were treated with a hydrogel base and in the third they received hydrogel based on *Galium verum*. The anti-inflammatory potential of the new hydrogel formulation was quantified by measuring the thickness of the paw of the animal in the first, second, third and fourth hours after carrageenan injection.
Results: *Galium verum*-based hydrogel significantly reduced rat paw thickness compared to untreated rats and those treated with the hydrogel base. The most intense anti-inflammatory effects were detected in the third and fourth hours after the injection of carrageenan with percentages of inhibition of 35.1% and 43.6%.
Conclusion: Hydrogel based on *Galium verum* contributes to the alleviation of inflammation, but additional studies are necessary before the introduction of this formulation into clinical practice.
Key words: *Galium verum*, hydrogel, inflammation.

7. Analysis of fenestrations and dehiscences of the alveolar bone using cone-beam computed tomography

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Introduction: Fenestrations and dehiscences are bone resorptions most commonly localized on the vestibular alveolar bone. Dehiscences represent cortical resorptions where the root surface is exposed several millimeters from the cementoenamel junction, or in some cases the entire root surface. Fenestrations are resorptions with preserved marginal ridge. The success of treatment in orthodontics, periodontology and implantology requires the preservation of the alveolar bone to avoid numerous complications. Cone-beam computed tomography (CBCT) represents a reliable diagnostic tool for the morphological analysis of bone resorptions.

The aim: To conduct a morphological analysis of the mandible and maxilla in adult patients of both genders with the aim of determining the presence, frequency and localization of fenestrations and dehiscences.

Materials and methods: The CBCT images from the existing database of 36 patients (18 males [50%] and 18 females [50%], with an average age of 46.36±16.34 years) were analyzed. All scans were performed at the Department of Dentistry, Faculty of Medical Sciences, University of Kragujevac. Exclusion criteria included technically inadequate scans, advanced periodontopathies, children and edentulous patients. The data were statistically processed and analyzed using SPSS software.

Results: The highest prevalence of dehiscences was observed in the maxilla (64.3%), while the presence of dehiscences only in the mandible was noted in three patients (21.4%). Dehiscences were identified in nine male (64.3%) and five female (35.7%) patients. The highest prevalence of fenestrations was in the maxilla (45.0%), while the existence of fenestrations only in the mandible was confirmed in three patients (15.0%). There was no statistically significant difference between genders or age groups regarding the occurrence of dehiscences or fenestrations ($p>0.05$).

Conclusion: This study indicates a high prevalence of fenestrations and dehiscences, emphasizing the need for additional investigations before extensive surgical and periodontal interventions to improve the success of therapeutic measures. Preoperative planning using CBCT can be useful in enhancing treatment success.

Key words: fenestrations, dehiscences, alveolar bone, CBCT.

8. The prevalence of etiological factors of epilepsy in adult patients in Herzegovina

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Introduction: Epilepsy is a chronic neurological disease, which in practice is determined by the appearance of at least two unprovoked epileptic seizures in an interval of more than 24 hours. It is estimated that approximately 70 million people suffer from epilepsy. Depending on the type, epilepsy is divided into focal, generalized and unidentified forms. In 2017, the International League Against Epilepsy defined six etiologic categories for epilepsy: structural, genetic, metabolic, infectious, immunological and unknown.

Objective: The objective of this study was to determine the prevalence of etiological factors of epilepsy in adult patients in Herzegovina.

Methods: The study included all patients with a diagnosis of epilepsy who were older than 18 years and were in the epilepsy outpatient and neurology clinics in the period from January 2023 to December 2023.

Results: Of the 421 patients, 217 were women and 204 were men. The most common etiological factor was structural, and brain tumor was the most common structural factor. An immune factor was the rarest cause of epilepsy. It was found that the biggest difference between women and men exists in the group of patients with brain trauma ($p<0.001$) as the cause of epilepsy. A statistically significant variance in frequency was noted when it comes to structural epilepsies compared to other causes of epilepsy ($p<0.001$). Within the group of structural factors, a statistically significant difference was observed in patients with brain tumor ($p<0.001$) and stroke ($p<0.001$). Men were slightly older than women, but there was no statistically significant difference. Focal epilepsy is the most common type (47.1% of men and 51.2% of women), and subjects with this type are statistically significantly older than those with generalized epilepsy ($p<0.001$).

Conclusion: This retrospectively conducted study provided the first knowledge about the prevalence of etiological factors in our areas. In the studied sample, the most common etiological factor was structural, and the least common was immunological. In subjects with a structural etiology of epilepsy, the most common factor was a tumor, and the rarest was a perinatal insult.

Key words: epilepsy, etiology, prevalence.

9. Development and testing of the stability of a topical formulation based on *Galium verum* and *Potentilla erecta*

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Introduction: Lady's bedstraw (*Galium verum*) and tormentil (*Potentilla erecta*) are plant species that possess a wide range of chemical compounds that play a significant role in traditional medicine. Lady's bedstraw flower extracts are rich in compounds such as flavonoids, iridoids and monoterpenes, which have proven antioxidant and anti-inflammatory properties. On the other hand, extracts of tormentil contain mainly tannins and their condensed forms, which achieve antioxidant activity and help in the healing process of wounds, and therefore, together with lady's bedstraw, are a common ingredient in dermatological preparations. Considering the increasing use of these extracts in topical formulations, it is of the utmost importance to examine the stability of such a preparation.

The aim: To formulate a hydrogel with incorporated extracts of lady's bedstraw and tormentil, as well as testing the stability of the given preparation over a period of one month.

Materials and methods: By dissolving chitosan in an aqueous solution of 1% acetic acid, a chitosan solution was obtained, which was further mixed with a 1% solution of $CaCl_2$ in a ratio of 3:1 in order to formulate a chitosan hydrogel. In the given chitosan hydrogel formulation, extracts of lady's bedstraw and tormentil were incorporated in a concentration of 5% each. In order to evaluate the stability of the produced hydrogel, the pH value, electrical conductivity and organoleptic properties were monitored. The relevant tests were conducted immediately after preparation and were repeated after a month of storage at room temperature.

Results: Through organoleptic examination, it was observed that the given preparation has the appearance of a transparent, homogeneous hydrogel, with a characteristic smell of the incorporated extracts, and that it retained these properties during the storage period. Additionally, during the storage period of one month, there were no statistically significant changes in the pH value and conductivity of the preparation. The measured pH values, initially and after one month, indicate that the given hydrogel formulation meets the requirements for cosmetic preparations.

Conclusion: The tested hydrogel has acceptable organoleptic properties and is physically stable during the tested storage period.

Key words: *Galium verum*, *Potentilla erecta*, hydrogel.

10. Determination of the impact of CT perfusion parameters on the prognosis of patients with acute ischemic stroke

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Introduction: Acute ischemic stroke is a focal or global disorder of the brain function that occurs suddenly, due to a disorder of cerebral circulation or a condition in which blood flow is insufficient to meet the metabolic needs of neurons. As the third leading cause of death in the world, the disease has the highest degree of disability compared to all other neurological diseases. With computed tomography (CT) perfusion as a modern neuroimaging diagnostic procedure and the improvement of therapy, all in an adequate period of time, mortality has been reduced and the chances of recovery increased. CT perfusion shows which areas of the organ or lesion are adequately supplied with blood and provides detailed information about the inflow and outflow of blood to the organ or lesion.

The aim: The main aim of the research is to examine the influence of CT perfusion parameters on the prognosis of patients with acute ischemic stroke and the possibility of indicating the development of hemorrhagic transformation in them.

Materials and methods: Our investigation was designed as a case-control study at the Faculty of Medical Sciences in Kragujevac and Special Hospital for Cerebrovascular Diseases "Sveti Sava" in Belgrade in the period from September to December 2023. The research included patients aged over 18 years with acute ischemic stroke who underwent CT perfusion within the first 12 hours from the onset of symptoms. It was approved by the Ethics Committee.

Results: The study included 50 patients, 27 men and 23 women, of whom nine developed hemorrhagic transformation (18.28%). Among the patients with hemorrhagic transformation, eight acquired a hemorrhagic infarction and one a parenchymal hematoma. The relative cerebral blood volume (rCBV) parameter of the cases was significantly lower (8% lower) compared to the control subjects (10% higher).

Conclusion: The obtained data indicate that CT perfusion (low rCBV) can predict hemorrhagic transformation in patients with acute ischemic stroke.

Key words: CT perfusion, heart attack, brain.

11. The relationship between *Helicobacter pylori* infection and atrial fibrillation

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Introduction: Atrial fibrillation (AF) is the most common rhythm disorder in clinical practice. It is considered that the structural and electrophysiological basis of AF formation is hypertrophy and reentry impulse from the left atrium. Certain studies indicate an elevated C-reactive protein (CRP) level as an independent risk factor for AF, thus highlighting the potential role of chronic inflammation in its development. *Helicobacter pylori* (HBP) colonizes the gastric mucosa of 50% of the world's population with involvement in the pathogenesis of extraintestinal diseases. HBP affects the systemic immune response, which may increase the risk for AF. Recent research suggests that bacterial infections have a role in the pathogenesis of AF, for which HBP and *Chlamydia pneumoniae* have attracted interest.

The aim: The aim of this study is to investigate the relationship between HBP infection and different types of AF, as well as its occurrence and maintenance mechanism.

Materials and methods: This was a single-center retrospective cohort study with 115 patients, encompassing 69 who were hospitalized with AF and 46 in the control group. Patients with AF were divided into two groups: short-term AF (duration <1 year) and long-term AF (duration >1 year). Excluding factors of the AF group included heart failure, acute coronary syndrome and other infectious conditions. All the patients had their CRP level, fecal HBP Ag and cardiac ultrasound (left atrial diameter, LAD) analyzed and the correlation between HBP and AF was examined using logistic regression analysis.

Result: Both AF groups had higher rates of hypertension and HBP than the control subjects. HBP was more frequent with a higher CRP level in long-term AF patients than in the short-term AF and control groups. CRP values >5 mg/L as well as a LAD of 36 mm and HBP rate ≥4‰ in the long-term AF group were significantly higher than in the short-term one.

Conclusion: HBP infection in the group of patients with long-term AF was significantly higher compared to the group with short-term AF and the control group. HBP δ value ≥4‰ is an independent predictor of long-term AF.

Key words: C-reactive protein, HBP infection, left atrial diameter.

12. Psychological distress and quality of life in patients with chronic somatic diseases in family medicine

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Introduction: In 21st-century medicine, comorbidity or multimorbidity is one of the greatest challenges in both scientific research and medical nosology, as well as in everyday clinical practice and treatment. The simultaneous occurrence or presence of two or more diseases, which is essentially what comorbidity represents, is now fundamentally the rule rather than the exception, especially in older age groups, where it is difficult to find an individual without at least two physical and/or mental disorders. One area that is particularly neglected is the comorbidity between mental and physical disorders. Individuals with chronic somatic diseases are relatively more exposed to the risk of psychological issues than physically healthy ones.

Objective: To examine psychological distress and quality of life in patients with chronic somatic diseases in family medicine practices.

Materials/Methods: The demographic data of the participants were collected using a questionnaire constructed for the purposes of this research. The short version of the Symptom Checklist-90 (SCL-90) questionnaire was utilized to determine psychological distress, while the World Health Organization Quality of Life brief version (WHOQOL-BREF) questionnaire was employed to measure quality of life.

Results: The research was conducted on a sample of adult patients from the family medicine practice at HC Mostar which formed the study group. The participants were recruited in the order of their visits until a total of 160 participants was reached. The control group consisted of 74 individuals from the general population, who were also recruited randomly from the Ortiješ neighborhood. Psychological symptoms of somatization and the total number of present psychological symptoms were significantly higher in the study group compared to the control one, while there were no statistically significant differences in the other variables of psychological distress measured by the SCL-90 questionnaire. In the quality-of-life category, the study group scored significantly lower in the domains of physical health, mental health, social functioning and the overall test score, while no statistically significant differences were found in the environment domain between the groups.

Conclusions: Patients in family medicine with chronic somatic diseases experience greater psychological distress and a poorer quality of life compared to the general population.

Key words: chronic somatic diseases, psychological distress, quality of life.

13. The relationship of the mandibular canal with the mandibular third molar

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Introduction: The anatomy of the third molar is described as unpredictable. The extraction of third molars in the lower jaw is the most common intervention in oral and maxillofacial surgery. During the intervention, neurological injury to the inferior alveolar nerve can occur. Nerve damage most commonly happens when the third molar of the lower jaw is in close proximity to the mandibular canal. Due to overlapping with surrounding anatomical details, the analysis of two-dimensional imaging alone is not sufficient. The use of cone-beam computed tomography (CBCT) is thus becoming increasingly common for surgical and implantological interventions as the gold standard.

The aim: To examine the linear distance between the mandibular third molar and the mandibular canal by analyzing CBCT images.

Materials and methods: The recordings of 24 participants – 11 males (45.8%) and 13 females (54.2%) – were analyzed. The average age of the participants was 41.38±12.18 years. The distance from the mandibular canal was measured on cross sections of sagittal and transversal planes using the "measure distance" tool.

Results: The average distance of erupted wisdom teeth from the mandibular canal on the left side was 2.9±1.91 mm, and on the right side it was 3.34±2.11 mm. For impacted wisdom teeth, the values ranged from 3.03±1.91 on the left side to 3.23±2.00 on the right side. There was no statistically significant difference in the distance of the third molars from the mandibular canal between genders on either the left ($p>0.05$) or the right side ($p>0.05$).

Conclusion: The majority of wisdom teeth are located very close to the mandibular canal, which should be taken into consideration during oral surgical and endodontic interventions in this region in order to minimize the risk of injury.

Key words: mandibular third molar, mandibular canal, cone-beam computed tomography.

14. Segmentation of radiographic images of coxarthritis using MATLAB

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Introduction: Osteoarthritis of the hip, also known as coxarthrosis, is a degenerative disease of the hip joint characterized by the gradual deterioration of the cartilage, often resulting in pain, limited mobility and stiffness. The classic diagnosis is usually made on the basis of clinical findings, while radiography of the hip is considered the gold standard.

The aim: The main goal of the research is to examine radiographic images and their segmentation using the MATLAB program environment.

Materials and methods: The research was conducted at the Orthopedic Surgery Clinic of the University Clinical Center in Kragujevac. Our study is a retrospective, cross-sectional observational one that included patients older than 18 years who were diagnosed with coxarthrosis at different stages on radiographic images. Data analysis was performed using the MATLAB program (The MathWorks, Inc, USA, www.mathworks.com) based on defined mathematical models. The key steps of the algorithm encompass preprocessing, segmentation and visualization for a detailed understanding of the development of hip osteoarthritis. The investigation was approved by the Ethics Committee.

Results: The results of this research highlight the potential application of algorithms in the analysis and monitoring of the development of hip osteoarthritis, emphasizing the need for the further development of software solutions in medicine, especially in orthopedics, in order to improve diagnostics and apply appropriate therapy. The segmentation results highlight a high specificity of 0.95, which indicates precision in identifying negative instances. The sensitivity of the algorithm is 0.84, suggesting the efficiency in recognizing positive instances.

Conclusion: The developed algorithm was applied for the precise segmentation of radiographic images of hip osteoarthritis, providing a visual insight into characteristic changes during the analysis of X-ray images.

Key words: coxarthrosis, orthopedics, diagnosis, image segmentation, radiography.

15. The effect of a hydrogel based on *Galium verum* on oxidative stress in a carrageenan-induced rat paw inflammation model

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Introduction: Inflammation is the defense response to tissue injury with the aim of repairing the damaged tissue. It has been shown that the inflammatory process induces the production of prooxidants that can further damage cells. It is believed that the application of plant-based formulations that exhibit antioxidant and anti-inflammatory properties such as *Galium verum* can contribute to the reduction of inflammation.

The aim: This study aimed to investigate the effect of *Galium verum*-based hydrogel on oxidative stress in a carrageenan-induced rat paw inflammation model.

Materials and methods: The study was conducted on 18 *Wistar albino* rats with established inflammation induced by carrageenan that were randomly divided into three groups: the first group included untreated animals (control), the second group contained animals treated with a hydrogel base and the third consisted of rats that received a hydrogel based on *Galium verum*. After sacrificing the animals, paw samples were taken in order to determine markers of oxidative stress: the index of lipid peroxidation measured as thiobarbituric acid reactive substance (TBARS) and the activities of the enzymes catalase (CAT) and superoxide dismutase (SOD).

Results: The application of hydrogel based on *Galium verum* led to a reduction in TBARS levels and an increase in SOD activity, while CAT activity remained unchanged.

Conclusion: Our results indicate that hydrogel based on *Galium verum* improves the redox status in rat paw tissue after induced inflammation.

Key words: *Galium verum*, hydrogel, inflammation, phytotherapy.

16. "ASPECTS" in patients with wake-up stroke

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Introduction: Wake-up stroke is a subgroup of ischemic stroke, occurring in the early hours of the morning. A wake-up stroke is considered more complicated than a stroke while awake. The Alberta Stroke Program Early Computed Tomography Score (ASPECTS) is a quantitative score of up to a maximum of 10 points that evaluates the CT findings of patients with ischemic stroke.

The aim: The main objective of the trial is to investigate the effectiveness of the ASPECTS score in patients with wake-up stroke symptoms, and the difference between the ASPECTS score in patients with a known time of stroke and patients with stroke during sleep.

Materials and methods: The research was conducted at the Faculty of Medical Sciences in Kragujevac and the Special Hospital for Cerebrovascular Diseases "Sveti Sava" in Belgrade in the period from September to December 2023. Our study is retrospective, designed as a case-control one involving patients older than 18 years. It was conducted on two groups of patients. We compared CT head scans using the ASPECTS score in patients with stroke during sleep (case group) with a control group of patients with stroke of known onset time. The investigation was approved by the Ethics Committee.

Results: Twenty-eight patients in the case group and 39 control patients had suitable imaging for the ASPECTS. Baseline demographics and risk factors were similar in both groups. Dichotomized ASPECTS analysis (≤7 versus 8-10) showed no significant differences between groups. In the case group 86.4% had an ASPECTS of 8-10, while in the control group 91.3% scored 8-10 (p= 0.004).

Conclusion: Our study showed that there was a significant difference between the case and control groups in patients with an ASPECTS score of 8-10.

Key words: ASPECTS, wake-up, stroke.

17. The value of the Fibrosis-4 index in patients with acute coronary syndrome

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The aim: To determine the average value of the Fibrosis-4 (FIB-4) index in patients with acute coronary syndrome (ACS).
Method: A cross-sectional study was conducted on a sample of 450 patients at the Internal Medicine Clinic with a dialysis center in the period from April 2, 2018, to February 18, 2023. The research took place from January 1, 2023, to December 31, 2023. Patients with incomplete medical documentation were excluded. The main research parameter was the value of the FIB-4 index, which was obtained from the values of: platelets, as well as AST, ALT and the patient's age. The parameters that were additionally considered in the subjects were gender, treatment outcome, diabetes, statin therapy until the time of admission and the form of coronary syndrome (ST segment elevation myocardial infarction [STEMI], non-ST segment elevation myocardial infarction [NSTEMI] and unstable angina). The data were compiled from the medical documentation from the BIS computer system, Clinic for Internal Diseases with Dialysis Center, University Clinical Hospital Mostar.
Result: The FIB-4 score was elevated in patients with ACS compared to reference values. No difference in FIB-4 scores was observed based on age, gender, treatment outcome, type of ACS or statin therapy at hospital admission. Patients with diabetes were found to have a significantly higher FIB-4 score compared to those without.
Conclusion: Patients with ACS had a statistically significant higher FIB-4 score.
Key words: FIB-4, acute coronary syndrome (ACS), reference values, age, gender, treatment outcome, type of ACS, statin therapy, diabetes.