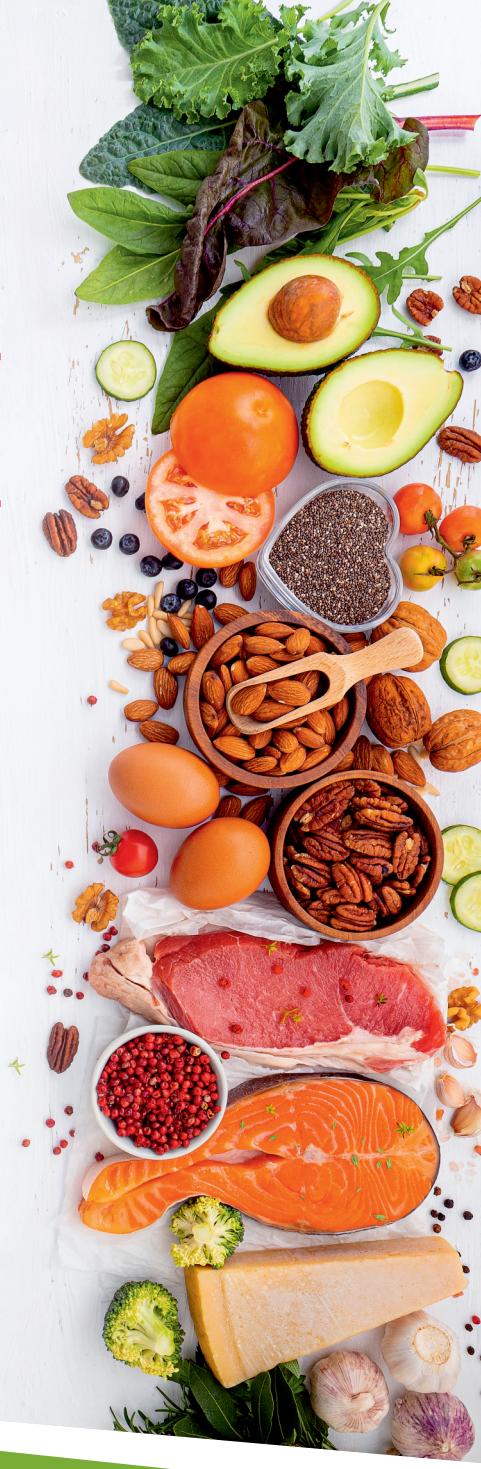
14 hranom do zdravlja with food to health



14th International Scientific and Professional Conference
WITH FOOD TO HEALTH

14. međunarodni znanstveno-stručni skup
HRANOM DO ZDRAVLJA

KNJIGA SAŽETAKA
BOOK OF ABSTRACTS

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NUTRICIONIZAM / *NUTRITION*

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PLENARNA PREDAVANJA / *PLENARY LECTURES*

NEW TECHNOLOGICAL TRENDS IN PHARMACEUTICAL DRUG FORMULATIONS

Rita Ambrus*

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plenary lecture

Modern pharmaceutical technology is focused on formulations that are targeted to the exact site at the appropriate time, with maximum efficiency and with reduced side effects. Nanoparticulate technology offers increased bioavailability, improved absorption, and the potential for drug targeting. The main question of our work is, how can we use and apply the prepared nanosized systems (as predispersions) in drug formulation (to reach local or systemic effect) to get effective therapies. Therefore, we should find cost-effective production containing the most important technological and material parameters. In this work, different methods were used to decrease particle size into the micro- or the nanosize range. They can be divided into two main categories: bottom-up and top-down techniques. Basically, we focused on the following methods: research and development of dry/wet milling; ultrasonic-assisted nanoprecipitation and preparation of nanocarriers by nano spray drying. We developed modern per os and alternative formulations. Characterization of micrometric and physicochemical properties, structure, compatibility, stability, in vitro, ex vivo and in silico properties were part of the scientific evaluations.The innovative formulations could play a significant role in modern therapies.

Keywords: nanoparticle engineering, per os, nasal and pulmonary application, milling, Sonication, nano spray drying

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CAN NANOMATERIALS UPLIFT FOOD SAFETY AND PRODUCTION?

Ivana Borišev*, Aleksandar Djordjevic, Danica Jović

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plenary lecture

Nanomaterials-related products have gained significant market share in the last twenty years due to the rapid development of nanotechnology. Nanomaterials can be divided into several groups depending on their composition, origin and physicochemical properties. Carbon- and metal-based nanomaterials, nanocomposites, and polymer nanomaterials are widely present in various products in different life spheres (medicine, pharmacy, electronics, everyday consumables and many more). One of the most potent applications of nanomaterials is in the fields of agriculture and the food industry (nano fertilizers, biocides, food additives…). Acting as substances able to alleviate mycotoxin production, decrease levels of heavy metals and other pollutants, capable of increasing photodegradation of dyes, pesticides and drugs, nanomaterials have the potential to contribute to better quality and improved safety of water and soil, and generally food. Furthermore, climate changes cause up to a third annual variability in yields. Evidence is derived from several studies indicating that nanomaterials can improve plant resilience to drought stress, which can help crops thrive in water-deprived areas leading to elevated food production. The overwhelming opportunities and challenges regarding using various nanomaterials raise numerous questions aiming to provide deeper insight into possibilities, better understanding, and usage of nanomaterials for food safety and production.

Keywords: nanomaterials, agriculture, climate changes, food safety and production

THE EFFECT OF PROBIOTICS ON THE ELDERLY

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plenary lecture

Population ageing has become a critical topic in the future social development of many countries, presenting significant medical and socio-demographic challenges globally. Aging is a key risk factor for chronic diseases such as cardiovascular, stroke, cancer, osteoarthritis, and dementia. Adjusting healthcare systems to demographic changes is crucial due to the financial burden caused by diagnostics and treatment. Research highlights the link between inflammation, oxidative stress, gut microbiota, and diet, suggesting dietary interventions could delay age-related changes. Specific probiotic strains can improve ulcerative colitis and irritable bowel syndrome and reduce inflammation. Ageing alters gut flora, particularly reducing bifidobacteria associated with intestinal motility and stool transit. Elderly microbiomes show more variability than younger adults, influenced by gender, location, physical activity, and medications. Increased Fusobacterium, Propionibacterium, and Clostridia in aging microbiomes are observed. Microbiota imbalances impact gut function and immune responses, releasing mediators affecting the brain, behaviour, and cognition. Stress disrupts gut mucosa's immunity, causing dysfunction. Conditions involving the gut-brain axis encompass stress, depression, anxiety, IBS, visceral pain, obesity, autism, and Parkinson's. Changes in gut flora affect diverse functions, including reduced short-chain fatty acids. Probiotics suppress pathogens and regulate gut immunity and epithelial function. Adjusting diets and adding probiotics, prebiotics, and synbiotics could potentially enhance microbiota balance in elderly people, improving their quality of life.

Keywords: probiotic, elderly, ageing

PROCESSED AND ULTRA-PROCESSED FOOD CONSUMPTION AMONG CHILDREN

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plenary lecture

Consuming a variety of unprocessed foods is considered one of the basic principles of a healthy diet. There are a growing number of food-based dietary guidelines that include recommendations for preferring unprocessed or minimally processed foods over ultra-processed foods (UPF). The identification and quantification of UPF requires a clear definition of foods in terms of their degree of processing. To date, the food classification system NOVA has attracted most scientific attention, although there is no definitive consensus on its relevance, purpose, and way forward. There is growing evidence that high consumption of UPF is associated with poorer nutritional quality and an increase in chronic diseases in both adults and children. According to the studies conducted in the city of Zagreb, it was found that toddlers have an approximately equal proportion of their daily energy intake from unprocessed or minimally processed foods (46.1% kcal) and UPF (43.4% kcal). A similar trend was observed in primary school-aged children, although the proportion was slightly lower at 38.1%. Addressing all factors that influence UPF intake requires a multi-faceted approach involving parents, schools, governments, and the food industry to promote healthier food environments and provide children with the knowledge and tools to make better food choices.

Keywords: children, toddlers, ultra-procesed food, NOVA

POZVANA PREDAVANJA /
INVITED LECTURES

DIAGNOSTIC BIOMARKERS AND CLINICAL ASSESSMENT OF OBESITY

Tatjana Bačun[1,2]

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invited lecture

The need for obesity treatment is based on the fact that obesity is a serious, chronic, and progressive disease associated with health risks such as arterial hypertension, type 2 diabetes, dyslipidemia, coronary disease, cancers, and increased mortality. While most cases of obesity are linked to a sedentary lifestyle and increased calorie intake, it is important to consider and rule out secondary causes of obesity. After establishing obesity (body mass index and waist circumference) and assessing risk, it is necessary to exclude the most common endocrine causes of obesity, such as hypothyroidism and Cushing's syndrome (by controlling TSH and cortisol in an overweight dexamethasone suppression test). Depending on the clinical examination and basic laboratory findings, other endocrine disorders that may be associated with obesity should also be investigated (polycystic ovary syndrome, hypogonadism, growth hormone deficiency, hypopituitarism, hypothalamic diseases and insulinoma). Causes of weight gain may include medications (insulin, glucocorticoids, antipsychotics) and smoking cessation. Routine genetic testing is not recommended, but may be considered in cases where herediraty disorders linked with obesity are suspected. All patients should receive advice on diet, physical activity, weight management goals, and develop a personalised treatment plan. It is necessary to monitor lipids, glucose, urates, and arterial blood pressure, as well as other conditions that are more common in obese patients.

Keywords: obesity, hypothyroidism, Cushing's syndrome, hypopituitarism, insulinoma

WHY SHOULD EVERYONE EAT MUSHROOMS?

Artur Gryszkin*

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invited lecture

Mushrooms are among five of the well-known "kingdoms" of organisms growing on the Earth. This kingdom is the largest and the most diverse, estimated to comprise nearly 13 million of fungi species, yet the least known group of species. Mushrooms are low in calories because they consist of 90% water. They have a relative high content of fiber, which makes them an excellent food for those who want to stay slim. Consumption of mushrooms ensures the sensation of satiety and at the same time accelerates metabolism and thus improves digestion. The fiber fractions found in mushrooms are chitin and beta-glucans, which reduce appetite, decrease cholesterol levels, and minimize sugar absorption, thereby reducing the risk of obesity development. Mushrooms are also rich in vitamins and minerals and their certain species are not inferior in terms of vitamin content compared to grain products or meat. Hence, they are an excellent option for vegetarians and vegans. Moreover, they are one of the few products that naturally contain vitamin D. Mushrooms relieve stress, ensure the proper course of memory processes and learning, regulate the circadian rhythm, cause proper muscle tone, and increase body performance. Few people know that mushrooms can, among other things, help reduce the risk of development of various types of cancer. Served with favorite additions, they can be a real delight for the palate and a great variety of culinary dishes. Mushrooms are not only tasty, but also a very healthy product that should permanently appear in our diet. However, it is important to obtain them from reliable sources.

Keywords: mushrooms, fiber, vitamins and minerals

NATIONAL QUALITY SYSTEM FOR AGRICULTURAL AND FOOD PRODUCTS “DOKAZANA KVALITETA”/"PROVEN QUALITY"

Sanja Kolarić Kravar*

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invited lecture

National quality system for agricultural and food products „Dokazana kvaliteta“ is a voluntary system intended for the labelling of agricultural and food products with special characteristics from different food production sectors (e.g. milk and dairy products, meat production, fruit and vegetables production, egg production etc.) which are produced in accordance with the approved product Specifications. The procedure of verification of product conformity with the Specification shall be carried out by the authorised control body. Every producer or processor of an agricultural and food product who wants to use the label ‘Dokazana kvaliteta’ shall initiate a procedure for verification of product conformity with the Specification. The authorised control body shall carry out the procedure of verification of product conformity with the Specification in accordance with the official Control Plan for the product in question. The label ‘Dokazana kvaliteta’ with indication of country of origin can be applied only on agricultural and food products for which the Certificate of Conformity has been issued, and for which the country indicated on the label is the country where the product was produced and/or processed and which is also the country of origin of the main ingredient. The label ‘Dokazana kvaliteta’ without indication of country of origin can be applied only on agricultural and food products for which the Certificate of Conformity has been issued, and for which the country of origin of the main ingredient is not the same country where the product was produced and/or processed.

Keywords: quality, food, nacional quality system, „Dokazana kvaliteta“

ACTIVE AND INACTIVE LIFESTYLES

Danijela Kuna*

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invited lecture

Regular physical activity has numerous benefits, including reducing the risk of developing many diseases, improving mental health, and enhancing overall well-being. A balanced approach to physical and mental health is an essential part of a healthy lifestyle. The degree to which someone will engage in physical activity depends on individual characteristics and social environment influence. These include, among other factors, the individual's lifestyle habits, attitudes, tendencies, and motivation, as well as any opportunities or limitations. According to a number of variables, including age, level of fitness, and particular health objectives, various amounts of physical activity may be advised. As a general guideline, adults should strive to do at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity aerobic activity per week, along with muscle-strengthening activities on two or more days per week. Nevertheless, insufficient levels of physical activity or high levels of physical inactivity have emerged as one of the major global public health issues, despite all the established advantages of physical activity. According to the latest results of the global assessment of physical activity levels, more than three-quarters (81%) of adolescents and one out of four adults (27.5%) do not reach the recommendations for aerobic exercises, as stated in the 2010 Global Recommendations on Physical Activity for Health. National data consistently show inequalities in participation by age, gender, disability, pregnancy, socioeconomic status, and geographical location, highlighting the need for intensified investments in physical activity. Furthermore, numerous previous studies have shown that the COVID-19 pandemic has further decreased the population's levels of physical activity, leading to discouraging outcomes and future consequences. In conclusion, society has a compelling interest in encouraging a healthy, active lifestyle and increasing physical activity levels. These measures can promote physical and mental health, productivity, and community cohesion while lowering healthcare expenses and environmental impact.

Keywords: physical activity, mental and physical health, motivation

THE INFLUENCE OF FOOD ON THE PHARMACOKINETICS OF PAEDIATRIC MEDICINES

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invited lecture

Pharmacokinetics consists of absorption, distribution, metabolism and elimination of a drug. Each can be influenced by various factors that can ultimately affect concentration of the drug in the blood. Different food ingredients can alter pharmacokinetics of certain drugs, most notably the absorption from digestive system into the blood. There are important differences in absorption from digestive system in paediatric patients in comparison to adults. Also, paediatric drugs often include liquid formulations (oral suspensions) and some excipients used in the elderly are forbidden for the children. In neonates gastric pH is less acidic and acordingly, the absoption of acid labile drugs or weak alkaline drugs can be changed. Differences in gastric emtptying could affect the pharmacokinetic profile of e.g., paracetamol or ampicillin. Oral penicillin V should be used in fasted state as the food reduces its Cmax and exposure. Crushed tablets of anticonvulsives levetiracetam and clobazam can be used with apple juice because the absorption rate and extent is not changed. Paracetamol is often used for its analgesic and antipyretic properties and the food prolongs the onset of therapeutic effect. During the drug development it is always mandatory to evaluate the potential interactions with food in order to optimize drug effects.

Keywords: drug formulations, paediatric drugs, food, drug-food interactions

BIOAVAILABILITY AND INCREMENT IN RESORPTION CAPACITY OF HIGH-VALUE PROTEINS AND MINERALS FROM WHEAT GRASS; CELLULAR MODEL

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invited lecture

Wheatgrass (*Triticum aestivum*) known as "living food" possess a wide array of biological active ingredients. It is rich source of amino acids, vitamins, antioxidants, and especially minerals like Ca, Fe, Mn, Mg, Se, P, K, Zn, B and Mo. Due to its high nutritional value, wheatgrass is considered a functional food - food that, in addition to its basic nutritional value, positively and satisfactorily affects one or more targeted functions of the body, reducing the risk of developing certain diseases. Wheatgrass is a common health supplement, consumed in the form of fresh juice, powder or tablet to boost up the health and vitality. Since most of supplements are orally ingested, big question is active concentration of components absorbed cross the intestinal barrier. A small portion of nutrients is available for absorption into the body, and an even smaller amount is available for assimilation and absorption in the cells of the intestinal epithelium (bioavailable). Caco-2 cell system is intestinal *in vitro* model which enables evaluation of compound transport mechanism and ability to pass through enterocyte membrane. Permeability values estimated with Caco-2 model correlate well with human *in vivo* absorption.

Keywords: absorption, bioavailability, Caco-2 cell system, wheatgrass

IMPACT OF FOOD WITH SEDATIVE INGREDIENTS ON THE LEVEL OF NUTRITIONAL STATUS

Azra Sinanović[1*], Midhat Jašić[2], Drago Šubarić[3], Ivana Flanjak[3], Damir Alihodžić[4], Benjamin Čaušević[1]

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invited lecture

There are numerous of food ingredients that can have some sedative properties, such as gluten exorphin from white bread and pie, magnesium from water rich in magnesium and kernels and seeds, tryptophan and phenylalanine from white chicken meat, casomorphine from milk and dairy products, soyamorphine from soybean, and rubiscolin from spinach. The aim of this paper was to determine the effect of foods with sedative ingredients on the level of nutritional status. The research included the analysis of data obtained through a specially created questionnaire. The results showed that there is a correilation between the level of nutritional status and the frequency of consumption for white bread, pies and other pastry dishes, water rich in magnesium, kernels and seeds, white chicken meat, milk and dairy products. The correlation of the impact of food with sedative ingredients on stress and depresion levels was found in the area of emotional states such as sadness, pleasure, sleep, and fatigue. There is also a correlation between the level of nutritional status and the defined emotional state. The level of the stress and depression for the examination group and women was higher. Body mass index and stress and depression level increasing with age. Food ingredients which were investigated in this study have an effect on nutritional status and partly on depression and stress. More detailed prospective design studies need to be done and a more precise effect of these types of foods on the degree of stress reduction and weight gain should be determined.

Keywords: foods with sedative ingredients, nutritional status

CANNABIDIOL - HIGH-VALUE BIOACTIVE SUBSTANCE FROM HEMP, APPLICATION AS MEDICINE, FOOD SUPPLEMENT AND MEDICAL COSMETICS

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invited lecture

During the past decade, globally, it is a significant change considering the legal status of Cannabis plants, both hemp and marijuana, i.e. varieties that are Cannabidiol (CBD) or Tetrahydrocannabinol (THC) rich. Cannabis sativa THC rich plants and products that contain THC are strictly controlled and allowed only for medical purposes, while Cannabis plants CBD rich, known as hemp, and products that contain CBD are no longer considered controlled substances. Cannabidiol is one of the main constituents of cannabis and hemp plants. According to the scientific knowledge the CBD does not have any psychotropic neither harmful effect on human health. In this presentation the focus will be on application of CBD in medical purposes, as food supplement and in cosmetics.

CBD for medical purposes

A respectable number of publications on medical cannabidiol are published, and the number of conducted clinical studies is continuously increasing for confirm the therapeutic efficacy and safety of CBD in treating some diseases and conditions such as epilepsy, anxiety, pain/inflammation, post-traumatic stress disorder, and others.

CBD as food supplement

In a non-medical setting, the European Commission considers that CBD qualifies as a novel food under EU legislation.

Even though CBD was not given NF status by the EFSA, many products categorized as food supplements are launched on the market in many countries.

CBD cosmetic application

Natural cannabidiol is officially recognised and included in the reference document for cosmetic raw materials. There is also data that topical application of CBD may be efficacious for some skin disorders.

Keywords: Cannabis, cannabidiol, food supplement, medical purposes, skin, cosmetic

NUTRICIONIZAM / *NUTRITION*

NUTRITION

CHOCOLATE – IN-BETWEEN THE HEALTH AND HEDONISM

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poster presentation

The origin of the chocolate is Mesoamerica, however, that chocolate was not the one we know today. Mayans, Aztecs and Olmecs were preparing a sugarless drink *Quetzalcoatl*. It was consumed as a religious and medicinal potion. High content of cocoa, cinnamon, chilli peppers and other spices, rich in antioxiants, indeed had a beneficial effect on health. When the cocoa drink was introduced in Europe, the sugar was added and it became a drink for pleasure, loosing both religios and medical note. The subsequent development of the chocolate from the drink, extensivelly consumed in so-called chocolate houses in Europe, to the solid bar was directed towards the sensory properties and palatability. During the Great depression in the USA chocolate was advertised as a perfect breakfast, ensuring sufficient energy intake and long satiety due to high contents of sugar and fat. Afterwards, chocolate had been considered solely as the confectionary. In the 80s, with raising problems of obesity and cardiovascular health issues in Western countries, chocolate became regarded as a food that should be avoided. However, in the 21st Century, the benefits of cocoa polyphenols are being emphasised and linked to cardiovascular health, placing chocolate in-between the sweet and functional food.

Keywords: chocolate, calories, antioxidants, health

NUTRITION

BREASTFEEDING AND COMPLIMENTARY FEEDING PRACTICES IN GROUP OF INFANTS

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poster presentation

Exclusive breastfeeding (EBF) should be prompted for at least 17 weeks and exclusive or predominant breastfeeding for approximately 6 moths is a desirable goal. Complimentary feeding (CF) has been defined as "the process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk." Complementary foods should not be introduced before 4 months (17 weeks) but should not be delayed beyond 6 months (26 week).cThe aim of this cross-sectional study was to get an insight into breastfeeding and CF practices of group of infants and to compare them with current guidelines. Study encompassed 1254 healthy subjects. For data gathering anonimous on-line questionairre was used. Results have shown that EBF is practiced for the first month by 84% of mothers, but only 39% of mothers continues EBF for 6 months. 63% of mothers starts CF at the age of 6 months. Most of mothers are practicing to introduce vegetables first (59.4%), while fruits and cereals are introduced as first by 25% and 14%, respectively. New food types are introduced one by one, with few days in between. 80.7% of mothers declared to prepare them selves foods for their kids. At the beginning meals are offered as smoothly blended while finger food is introduced at the age of 8 – 12 months. At the age of one year, 82.7% kids are included in family meals. Along with the introduction of other foods and liquids breastfeeding was reduced.

Keywords: breastfeeding, complimentary feeding, weaning food, infants

NUTRITION

BEVERAGE CONSUMPTION AMONG SCHOOL-AGED CHILDREN: CONTRIBUTION TO DAILY ENERGY AND ADDED SUGAR INTAKE

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poster presentation

Low fluid intake and consumption of sugar-sweetened beverages are among the risk behaviours in children that promote the development of non-communicable diseases. The aim of this study was to determine the beverage consumption of school-aged children and its contribution to daily intake of energy and added sugars. Dietary intake was observed from dietary records on three non-consecutive days of 195 primary school children (52% boys) from city of Zagreb. Total fluid intake included fluid from foods and beverages and was compared with Dietary Reference Values for the EU. The average daily fluid intake of children was 1168 mL (859 - 1563), of which 59.6% was from beverages. Only 14.4% of children reached the reference value for total daily fluid intake. Of the beverages, water (34.7%) contributes the most to daily fluid intake, followed by soft drinks (6.3%) and milk (6.1%). Milk and soft drinks contribute most to the daily energy intake from beverages. Added sugars account for about 9.4% of children's daily energy intake. Beverage consumption contributes to 26.5% of daily intake of added sugars, mainly soft drinks. In conclusion, children do not consume enough fluids, especially water. Although food is the main source of energy and added sugars in children's diets, it is necessary to reduce the consumption of soft drinks.

Keywords: beverage, childhood, fluid intake, soft drinks, water

NUTRITION

THE ROLE, SIGNIFICANCE, AND PREVENTION OF VITAMIN B9 DEFICIENCY IN UNA-SANA CANTON CONSUMERS

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poster presentation

Vitamin B9 plays a role in numerous cellular reactions that include amino acid metabolism, purine and pyrimidine biosynthesis, and DNA methylation. Folate deficiency affects the rate of division of cells that have a great need for purine and pyrimidine bases, resulting in megaloblastic anaemia and hyperhomocysteinemia, which is characterized as an important risk factor for the development of cardiovascular diseases. The most common birth defects associated with folic acid deficiency in the periconceptional period are neural tube defects (NTD). The aim of this paper was to examine and analyse the attitudes and knowledge of Una-Sana Canton consumers towards vitamin B9, and to examine the frequency of use of this vitamin supplements among the respondents. The most significant methods used in the work are the sample method, surveying and statistical method, and the research instrument was an anonymous closed questionnaire. The following scientific methods were used in the work: synthesis method, analysis method, deductive method, inductive methods (incomplete, predicative and causal induction), concretization method, generalization method, specialization method, classification method, description method, compilation method, empirical-non-experimental (survey) method, statistical method, sample method and survey method (Radeka, 2018). The 136 respondents of both sexes were included in the research, and the results showed that 31% of them had never heard of the term "folic acid" or "folates", which mostly applied to men. The 61% of the respondents had once used folic acid supplements, while only 33% of the respondents received a recommendation from a doctor to consume these supplements.

Keywords: vitamin B9, folic acid, folates, periconception, neural tube defects (NTD)

NUTRITION

FRONT-OF-PACK NUTRITION LABELLING

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poster presentation

The vast majority of prepackaged foods have a nutritional declaration, which is often found on the back of the packaging and is not easy accesible for the average consumer. According labelling regulations, basic nutritional information can be repeated and additionally supplemented in the main visual field (front-of-pack, FOP). Several different types of front-of-pack nutrition labeling have been proposed, however the different approaches and formats used can further confuse consumers and obstruct the purpose of such schemes. By the end of 2022, the European Commission was supposed to come up with harmonized nutrition labels for food products that would be mandatory in all member states to make it easier for consumers to choose healthy and sustainable food based on reliable information. Becaus there are big differences among Member States in relation of on front-of-pack labeling systems, the European Comission needs more time for additional regulation of nutrition labelling than it planned. The aim of this work is to provide an overview of the regulations the and current situation to the topic of front-of-pack nutrition food labeling within the member states of European union and plans for next period.

Keywords: food labelling, nutrional lebelling, front-of-pack labelling, food regulation

NUTRITION

PROMOTING PROPER NUTRITION AMONG HIGH SCHOOL STUDENTS THROUGH INTERNATIONAL ETWINNING PROJECTS

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poster presentation

Only proper nutrition, based on variety and moderation, can ensure adequate growth and development, or good physical and mental health of children and young people. Proper eating habits adopted in childhood and youth usually remain unchanged in adulthood, so their adoption is a good foundation for health in adulthood. However, research data on the number of overweight/obese children and young people tell us that the measures we are taking are not enough and that they need to be implemented in different ways, in different segments of young people's lives. Since high school students were denied international mobility projects during the pandemic, international cooperation mainly took place via the eTwinning platform. Students, nutritionist technicians and food technicians of the *School of Construction, Natural Science and Mining*, with their teachers, in the school years 2020/21. and 2021/22 actively participated in three international eTwinning projects *Foods of Countries*, *Let's stop the climate crisis* and *Webclassroom 2.0*, together with peers from Italy, Portugal, Turkey, Georgia, Romania, Bosnia and Herzegovina, North Macedonia and Serbia. As part of the projects, the students surveyed the eating habits of high school students from different European countries, created educational materials related to the promotion of proper nutrition, shared experiences on how to improve their eating habits and ways to promote proper nutrition in the local community. The aim of the work is to present the educational materials and ways of promoting proper nutrition in the local community, based on the exchange of experiences of high school students from different European countries.

Keywords: proper nutrition, high school students, eTwinning project, educational materials

NUTRITION

SUSTAINABLE AQUACULTURE FROM STUDENTS' PERSPECTIVES

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poster presentation

Due to its nutritional value and health benefits, regular consumption of fish should be encouraged at all stages of life. Considering that the majority of the world's marine fish stocks are being exploited, aquaculture is the only way to ensure an adequate supply. Aquaculture production should be sustainable and it should integrate environmental, social, and economic dimensions. Students, as a valuable segment of consumers are future decision makers in the society and can contribute to sustainable development as agents of change. In this study, 224 students from the University of Rijeka (68 males and 156 females) with an average age of 21.5±1.4 were included. The aim was to obtain information about the most important aspects of sustainable aquaculture from their point of view. Obtained results confirmed that the most important features of sustainable aquaculture were: minimal use of hormones and drugs, no environmental pollution and production close to nature. Female participants consider more important protection of endangered species ($p=0.04$) and respect of fish welfare ($p=0.01$), while male participants are much more aware of supporting of rural areas ($p=0.04$). In future, nutrition education provided by institutions could be an important tool in preparing future generations for the sustainable society.

Keywords: aquaculture, seafood, sustainability, students

NUTRITION

DESIGNING AND COMPARING DIET PLANS FOR FOOTBALL PLAYERS IN DIFFERENT POSITIONS OF THE GAME

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poster presentation

Given the different requirements in the game, each footballer has different energy consumption and energy consumption dynamics and, as a result, different needs for intake of macro- and micronutrients. Using the computer program "OPPR_Jelovnik.xlsm" three diet plans for footballers in different positions (goalkeeper, defensive midfielder, and wing-back player) were optimized. The computer program offers the possibility to select supplies from the USDA database, and for the production of a diet plan, foods that can be procured in domestic supply chains have been used. The nutritional values of individual meals and daily and weekly intake compared and aligned with RDA values. Comparisons of energy needs described for each player and differences in nutrition plans due to anthropometric measures, physical activity, and recommendations. The goalkeeper has at least (41 kcal/kg) and the side and midfielder have the exact energy needs (45 kcal/kg). However, due to anthropometric measures, the maximum calculated energy input required by the lateral player (3600 kcal) is calculated.

Keywords: football, diet plan, goalkeeper, defensive midfielder, wing-back player

NUTRITION

DIET PLANNING FOR ELDERLY IN NURSING HOMES

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oral presentation

The normal aging process leads to various bodily changes that affect the eating habits of the elderly, and thus their nutritional status. In the elderly, a decrease in muscle mass and an increase in adipose tissue is evident, especially in the abdominal region, and the result of these changes is a change in body composition with a negative effect on overall health. Nutritional problems disrupt the general health of the elderly, and nutritional status disorders are associated with increased and early mortality rates. This study of the nutritional status conducted in the elderly population living in their own apartment / house and those living in nursing homes showed that people living in nursing homes have a lower level of nutrition, have a lower physical status, lack of intracellular and extracellular fluid which indicates lower hydration, more severe form of protein malnutrition, lower values of bone and non-bone minerals, which is closely related to their weaker values of muscle mass; greater weakness of the extremities, which indicates reduced physical activity, lower values of basal metabolism indicate a possible energy deficit in the collective diet. There is no "dietary scheme" of nutrition in homes for the elderly, they do not have norms with the composition of nutrients and protective substances and continuous medical and nutritional monitoring of users and dietary regime of nutrition is not provided. The contribution of this paper is reflected in the recommendations: nutritional composition assessment, as an important component of geriatric testing, should be a mandatory part of nursing home management; it is necessary to define the specific nutritional needs of each individual depending on the assessment of the nutritional status and health status of the home user; caloric and protein nutritional needs must be determined individually; it is necessary to create a "dietary scheme" by a professional nutrition team; food norms and recipes must have tables of the composition of nutrients and protective substances in order to comply with the dietary recommendations of the elderly population; the taste, smell, texture, temperature and appearance of the dish itself must meet the needs of each individual in order to positively influence the overall food intake; the hygienic aspect needs to be met through the HACCP system. Everything points to the need for a nutritionist as part of the system management and coordinator of the entire chain of nutrition planning and implementation in a home for elderly.

Keywords: elderly, nutrition, nutritional therapy, bioimpedance, nutritionist

NUTRITION

NECESSITY FOR NUTRITIONAL EDUCATION IN MEDICAL STUDENTS

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poster presentation

The escalating literature indicates a discernible deficit in nutritional knowladge among medical students. Aim of this study is to assess the knowledge about nutrition and awareness of medical students about necessity to supplement the curriculum of medical studies with subjects dealing with nutrition. This cross-sectional study was conducted using an anonymous online-based questionnaire that took place in July 2022. 48 fifth-year medical students from Faculty of Medicine Osijek completed a 10-question survey. The findings elucidate prevalent misconceptions within the purview of nutritional science where 39% believe that simple sugars (glucose, fructose) are the preferred form of carbohydrate. Furthermore, 20% think that carbohydrates contain the most calories per gram and 37% believe that consuming less than 5 portions of fruits and vegetables per day is enough. Taking into account attitudes regarding the necessity for curricular modifications, 98% of respondents believe it is necessary to integrate a more comprehensive nutrition education within the curriculum, while 89% advocate for the inclusion of a dedicated nutrition course during their educational journey. Students od medicine are insuficiently knowledgeable about nutrition and burderned with commom misconseptions about it, but still aware about curricular failure to meet their needs.

Keywords: nutrition, medical students, curriculum

NUTRITION

ANTIOXIDANT DIETARY INTAKE AND SMOKING STATUS IN ADULTS FROM CROATIA AND BOSNIA AND HERZEGOVINA: A CROSS-SECTIONAL STUDY

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poster presentation

This cross-sectional study aimed to investigate the dietary antioxidant intake related to smoking status in adult population from Croatia and Bosnia and Herzegovina. From April to July 2022 an anonymous online questionnaire was self-administered to 292 adults, 28.1% males and 71.9% females, aged 17 to 72 years from Croatia and Bosnia and Herzegovina. In a study sample there were 56.8% of non-smokers, 10.6% of former smokers, 9.9% of occasional and 22,6 of current smokers. Current and occasional smokers tended to be males, but this difference was not statistically significant. In comparison with a university degree, subjects with the high school have a higher prevalence of smokers (51.5% vs 24.7%). Smokers and occasional smokers had more answers than expected with physical activity that is done rarely in comparison to non-smokers and former smokers. Generally, the intake of fruit, vegetables, nuts, and whole grains was not different between smoking status groups. Smokers and occasional smokers consumed fish less frequently, but this difference is not significant ($p = 0.08$). Nevertheless, a significantly higher intake of alcohol and coffee was observed in the smoking group ($p < 0.05$). These findings suggest no significant differences in antioxidant intake between studied groups.

Keywords: adult smokers, antioxidant, vitamin, mineral, oxidative stress

NUTRITION

MEAL PLANNING AND FREQUENCY OF FRUIT AND VEGETABLE CONSUMPTION IN ORGANISED LIVING COMMUNITIES FOR PEOPLE WITH MENTAL DISORDERS

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poster presentation

Mental disorders include several symptoms and impediments and are characterized by psychological, biological, and social dysfunction of the individual. In addition to institutions such as hospitals, people with this type of disorder often live in communities, or units of organised housing. The aim of this study was to assess how nutrition is organised in this type of community and to assess the frequency of fruit and vegetable consumption. Study encompassed twenty organised living communities. Across three levels of care, 75 people with mental disorders, beneficiaries, lived in selected communities. 90% of meals are shared meals and 95% of them is planned on a weekly basis. Both, beneficiaries and caregivers, are involved in meal planning and grocery shopping. 36% of meals are planned based on alterantion of the same dishes. Limited financial resources (65%) and lack of knowledge (25%) were confirmed as challenges when it comes to meal planning. The majority of communities consumed fresh fruit and vegetables few times a week (75% and 60%, respectively). Only 20% of communities consumed fresh fruit on a daily basis. 10% of communities consumed fresh vegetables, as salad, and 20% cooked vegetables, as a side dish or vegetable stew, on a daily basis. For both, fruits and vegetables, among daily consumers few times a day consumption was highly represented. Based on the observed low frequency of fruit and vegetable consumption, there is a need for nutritional education and support for people who participate in meal planning in organized living communities.

Keywords: meal planning, organised living, mental disorders, fruits, vegetables

NUTRITION

DIFFERENCE IN NUTRITION KNOWLEDGE BETWEEN PROFESSIONAL AND RECREATIONAL ATHLETES

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poster presentation

Nutrition knowledge is one of the factors influencing an individual's nutritional intake. Looking at the population of athletes, a lack of knowledge about proper nutrition can result in an inferior diet and ultimately affect sports performance. This study aimed to assess the nutrition knowledge of professional and recreational athletes, using the last revised version of the Abridged version of The Nutrition for Sport Knowledge Questionnaire (A-NSKQ) validated in the sports population, which evaluates knowledge as bad, average, good, or excellent. The research included 114 respondents who participated in the survey, average age of 29.9 ± 10.5 years, of whom 51.8% were men and 48.2% were women. Furthermore, 60% of participants were recreational, and 40% professional athletes. The results showed that 63.2% of respondents had poor and only 0.9% excellent nutrition knowledge. No difference was determined in the respondents' knowledge regarding gender ($p=0.729$), nor was there a correlation between respondents' knowledge and their age ($p=0.731$). Also, there was no difference in knowledge between professional and recreational athletes ($p=0.643$). Education about proper nutrition with a special target on determined knowledge gaps is necessary among the population of recreational and professional athletes to ensure adequate nutritional intake and to enable optimal sports performance.

Keywords: nutrition, knowledge, athletes, A-NSKQ

DIJETETIKA I DIJETOTERAPIJA /
DIETETICS AND DIET THERAPY

DIETETICS AND DIET THERAPY

THE ROLE OF B-COMPLEX VITAMINS IN ORAL HEALTH

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poster presentation

Vitamins play an important role in maintaining general and oral health. Most vitamins can not be synthesized by the human body and must be obtained through dietary sources. Deficiencies in vitamins may develop from reduced intake or impaired absorption. The B-complex vitamins are vital for cell metabolism. Vitamin B2 is found in yeast extract, milk, eggs, and meat. Deficiency causes oral symptoms like cheilitis and glossitis. Vitamin B3 is a crucial component of the oxidation-reduction reaction and its deficiency can be linked to caries and gingival redness. Vitamin B6 regulates heme biosynthesis, fatty acid metabolism, gluconeogenesis, and the production of neurotransmitters. Sources of this vitamin include mushrooms, cabbage, and organ meats. Oral epithelial turnover is dependent on vitamin B9, found in organ meats, asparagus, and spinach. Low vitamin B9 diets may be linked to an increased risk of orofacial clefts and oral cavity cancer. Vitamin B12 is obtained from meats, fish, and dairy. Generalized stomatitis, taste difficulties, and a red tongue with a bald appearance are symptoms of vitamin B12 deficiency. Recognizing the significance of vitamins for both prevention and treatment of oral diseases is vital for promoting optimal nutrition contributing to the broader goal of improving overall health outcomes.

Keywords: oral health, vitamin deficiency, vitamin B, oral disease

DIETETICS AND DIET THERAPY

INITIAL NUTRITIONAL AND HEALTH STATUS OF PATIENTS WITH COLORECTAL CANCER

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poster presentation

Colorectal cancer is the third most common cancer in the world, and it is one of the most common tumors in western countries. It is known that body mass in cancer patients affects the outcome of treatment. Malnutrition, like excess body weight, can impair treatment outcomes and tolerance, promote the development of early and late complications of treatment, and worsen quality of life. The aim of this study was to examine initial nutritional and health status of patients with colorectal cancer. Basic anthropometric measurements were collected from a total of 45 colorectal cancer patients at the initial nutritional counselling and prior to the start of treatment. At the same time, health-related quality of life was examined using a 36-Item Short Form Survey (SF-36). Mean scores were as follows: physical functioning 71.11, role functioning/physical 46.11, role functioning-emotional 73.48, energy/fatigue 49.67, emotional well-being 56.44, social functioning 62.61, pain 63.11, general health 45.40, health change 22.95. There was no statistically significant difference in health status with regard to gender ($p>.05$). Out of all participants, 24.4% were overweight and 15.6% of patients were obese. In the three months prior to the first nutrition counselling, 68.9% of patients lost weight, and 15.6% of patients gained weight. Early nutritional assessment and implementation of nutritional support can contribute to the quality of life and maintenance of normal nutritional status in patients with colorectal cancer.

Keywords: colorectal cancer, nutritional status, health status, nutritional support

DIETETICS AND DIET THERAPY

THE INFLUENCE OF TYPE AND QUANTITIES OF FERMENTED MILK PRODUCTS, IN PERSONS WITH HYPERINSULINEMIA AND ELEVATED BODY MASS, ON THE DEGREE OF INSULIN RESISTANCE

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poster presentation

Fermented dairy products with a low percentage of fat play a role in modulating the function of β-cells of the pancreas and increased sensitivity to insulin. The purpose of this research is to verify the influence of the type and quantity, of consumed fermented milk products (yogurt and kefir), on the degree of insulin resistance, through Homeostatic Model Assessment for Insulin Resistance (HOMA-IR). The research was conducted on 175 people, from whom 103 women and 73 men, aged 25 to 75 years, with hyperinsulinemia and have increased body mass. Respondents were interviewed with a survey questionnaire that refers to the frequency, quantity and type of consumed fermented milk products with different percentages of fats. From the obtained results, 56 (32%) have a habit of daily consumption, the most frequently used daily amount is 250 ml in 127(74.70%), and fermented milk products with 3.2% fats are used by 73(43%). Statistical significance ($p = 0.014$) was determined between the frequency of consumption and HOMA-IR. Those who have a higher value of the index tend to consume them more often, which leads to the conclusion that type and quantity, of consumed fermented milk products can have an impact on HOMA-IR.

Keywords: hiperinsulinemia, diet, fermented dairy products, insulin resistance

DIETETICS AND DIET THERAPY

EPICATECHIN AS A POTENTIAL HEPATOPROTECTIVE AGENT IN NAFLD

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poster presentation

Non-alcoholic fatty liver disease (NAFLD) is a multifactiorial disease, progressively becoming a global health problem due to an increase in the prevalence of both obesity and type 2 diabetes, which are closely interrelated with the patophisiology of NAFLD. A large amount of evidence has shown a potential of noumerous therapeutic options for this disease. However, further research is required in order to elucidate their hepatoprotective effects. Epicatechin, a polyphenol usually found in cocoa beans, has demonstrated hepatoprotective effects in previous studies. The aim of this study was to investigate the hepatoprotective effect of epicatechin in an *in vitro* model of NAFLD. Methods: NAFLD cell culture model was established by incubating HepG2 hepatocytes with 1-2 mM oleic acid for 24 hours. The cells were pretreated with 10-50 μM solutions of epicatechin to assess its potential hepatoprotective effect. Colorimetric MTS assay was used to determine the metabolic viability of the cells. In the oleic acid-induced NAFLD cell culture model, metabolic viability of HepG2 cells after 24-hour incubation was significantly decreased, compared to the cells pretreated with epicatechin where the metabolic viability was increased. These results suggest that epicatechin exerts significant hepatoprotective effects which could potentially aid in amelioration of hepatic steatosis in NAFLD and other diseases.

Keywords: liver diseases, NAFLD, polyphenols, epicatechin

DIETETICS AND DIET THERAPY

FUTURE PROSPECTIVE STUDY TO EVALUATE THE EFFECT OF SODIUM AND GLUCOSE COTRANSPORTER 2 INHIBITORS USE ON LIVER STATUS IN PATIENTS WITH TYPE 2 DIABETES

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poster presentation

SGLT2 (sodium-glucose cotransporter 2) inhibitors are antidiabetic drugs which indicate significant beneficial effects in patients with non-alcoholic fatty liver disease (NAFLD) for which there is no approved pharmacotherapy. Unhealthy life style, obesity, metabolic syndrome and diabetes type 2 are the main risk factors for NAFLD. Hence, the aim of this prospective observational cohort study is to evaluate the assocciation between SGLT2 inhibitors and biomarkers of liver injury. It is planned to include more than 60 patients who have been prescribed SGLT2 inhibitors for the first time in general medical practices in Osijek. Before starting therapy with SGLT2 inhibitors and 6 months after the therapy start liver stiffness measurement (LSM) with elastography will be performed and blood of the patients will be collected to determine serum levels of markers of liver injury and to isolate RNA for gene expression identification involved in the process of lipogenesis and mitochondrial dysfunction. This study will determine the potential od SGLT2 inhibitors as possible future therapy for patients with NAFLD in assocciation with type 2 diabetes.

Keywords: non-alcoholic fatty liver disease, sodium and glucose cotransporter 2 inhibitors, biomarkers, elastography, liver injury

DIETETICS AND DIET THERAPY

PRETREATMENT WITH GARLIC OIL EXTRACTS INHIBITS THE DAMAGE CAUSED BY BILE SALT IN A HUMAN GASTRIC CELL MODEL OF ULCER DISEASE

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poster presentation

A cellular model of peptic ulcer disease (PUD) can be established in human gastric cells by bile salt (NaT). The aim of this research was to investigate the effects of 24, 48 and 72 hours pretreatment with garlic oil extracts (GOE) on oxidative stress and to examine the morphological changes in cell membrane structure caused by the addition of NaT. The ability of GOE to protect the gastric cells against the damage induced by NaT was performed by determining glutathione (GSH), prostaglandin E2 (PGE2) levels by ELISA, and visualization of the cell membrane structure by semi-quantification using cholesterol (CL) and phospholipids (PH) specific stains. Pretreatment with GOE for 24, 48 and 72 hours showed significant recovery of GSH and PGE2 levels compared to the cells treated with NaT only ($p<0.001$). After 24, 48 and 72 hours, cells damaged with NaT significantly decreased integrated density values of CL and PL ($p<0.001$). Pretretments with GOE exposed to NaT did not save the PL and CH completely, but the trend of preservation of CH and PL within the membrane was observed despite being washed out with NaT. This research suggests that garlic has a significant gastroprotective role as preventive agent for PUD, although further pharmacological studies are needed to fully elucidate its protective role in PUD.

Keywords: garlic oil extracts, human gastric cell line, peptic ulcer disease, sodium taurocholate

DIETETICS AND DIET THERAPY

THE IMPORTANCE OF EDUCATION ON CALCIUM SUPPLEMENTATION THROUGH DIET IN THE TREATMENT OF OSTEOPOROSIS – CASE REPORT

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poster presentation

Osteoporosis is a skeletal condition characterized by low bone mass, decreased bone strength, and an increased risk of fractures. A 70-year-old female patient presented, whose mother had diabetes and a hip fracture was examined for lumboischialgia. Osteoporosis with multiple compression fractures of the vertebrae was found. The therapy included teriparatide, cholecalciferol (1000IU), and a diet rich in calcium, 1200mg through food and dietary supplements (dairy products, kale, broccoli, flax, sesame, chia seeds, oatmeal). Laboratory findings revealed a vitamin D deficiency (12 µg/L, the target value is >30 µg/L; with control every three months, the dose of cholecalciferol was increased to 4000IU). Additionally, vertebroplasty and operative interlaminectomy were carried out. After a year, she had two additional compression fractures of the vertebrae, denosumab was included in the therapy. Daughters also had pain in the spine, densitometry was performed on them, which pointed to osteopenia, and vitamin D deficiency was determined. Individual and familial approaches to patients with osteoporosis, as well as nutrition education, combining person's eating habits and dietary supplements if nessesary, as well as monitoring laboratory findings, is often necessary.

Keywords: osteoporosis, vitamin D deficinecy, nutrition, diatery supplements

DIETETICS AND DIET THERAPY

THE IMPORTANCE OF IDENTIFIYING SECONDARY CAUSES OF OBESITY AND EDUCATION ABOUT REGULAR BALANCED NUTRITION - CASE REPORT

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poster presentation

Obesity is a serious, chronic, and progressive disease that is associated with numerous health risks and increased mortality. A 39-year-old man with a BMI of 42.25kg/m2 is presented, who, despite a reduction in diet and physical activity, has not been able to lose weight. His father had diabetes and died at the age of 60, the mother died suddenly at the age of 40. Examination revealed he experienced fatigue, general weakness, and for 18 months, blurred vision with occasional headaches. Laboratory findings revealed hyperprolactinemia and hypogonadotropic hypogonadism. MRI revealed a 5.4cm pituitary macroadenoma, probably prolactinoma, and cabergoline was included in the therapy. Other conditions identified include arterial hypertension and mixed hyperlipoproteinemia. A regular balanced diet with reduced animal fat and salt, physical activity, and antihypertensive therapy were recommended; during follow-up, antihypertensive therapy was reduced, and statins were added. There was a decrease in prolactin and pituitary tumors, an increase in testosterone, a decrease in body weight, blood pressure, and lipids. In the management of obesity, it is necessary to conduct a thorough clinical examination to exclude secondary causes of obesity, including endocrine causes, investigate them and provide appropriate treatment.

Keywords: obesity, hyperprolactinemia, arterial hypertension, hyperlipoproteinemia, nutrition

DIETETICS AND DIET THERAPY

ARTERIAL HYPERTENSION: THE IMPORTANCE OF NUTRITION EDUCATION IN THE TREATMENT OF ARTERIAL HYPERTENSION AND PREVENTION OF COMPLICATIONS

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poster presentation

Arterial hypertension (AH) is a serious medical condition that increases the risk of organ damage (brain, heart, kidneys, eyes). It is estimated that improper nutrition is responsible for 50% of cases. A 55-year-old man with hypertension is presented. Further examination revealed obesity and dyslipidemia were determined. His father had unregulated hypertension, experienced strokes, and died at the age of 57. A regular balanced diet with reduced salt intake, triple hypertension therapy, physical activity, and weight reduction were recommended. After one year, blood pressure target values were not achieved. Additionally, impaired fasting glucose tolerance and increased sodium in the urine were revealed. He stated that he has a stressful job and irregular high-energy meals. He was included in education on nutrition, stress management, and weight reduction. He reduced salt intake and engaged in aerobic physical activity. After one year, he had 16kg less, the normal value of fasting glycemia and sodium in 24-hour urine, and antihypertensive therapy was reduced. LDL-cholesterol was not satisfactory and statins were recommended. A diet rich in fresh fruits and vegetables, avoiding processed food, knowing one's blood pressure values, and controlling it through lifestyle changes and medication can reduce the risk of complications associated with arterial hypertension.

Keywords: arterial hypertension, myocardial infarction, stroke, education, nutrition

DIETETICS AND DIET THERAPY

INTERMITTENT FASTING AND CARDIOVASCULAR RISK FACTORS

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oral presentation

By reviewing the current literature, we will try to find out whether intermittent fasting has a positive or negative effect on cardiovascular risk factors and which form of fasting would be ideal for reducing cardiovaslular mortality. We will list studies concerning LDL, elevated blood pressure, and excess body weight with a review of studies concerning circadian rhythm, amount of sleep, melatonin, as well as changes in dietary habits over the last few decades that are reflected in the incidence of diabetes and coronary heart disease. We will mention recent studies that touch on the intake of saturated fatty acids and the unexpected impact on the lipid profile. We will analyze studies that analyzed the impact of the keto diet on cardiovascular risk factors, as well as studies on excessive and insufficient salt intake in cardiovascular patients.

Keywords: intermittent fasting and cardiovascular risk factors, LDL

DIETETICS AND DIET THERAPY

EFFECT OF BLUEBERRY ON OBESITY RELATED NAFLD

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poster presentation

Nonalcoholic fatty liver disease (NAFLD) is one of the most common diseases worldwide, and its pathogenesis is caused by multiple factors, so NAFLD is currently considered a metabolic disorder. Since the main cause of NAFLD is not recognized at the beginning and the first symptoms are often hidden, the incidence of NAFLD caused by obesity and its associated morbidity can be considered as one of the most important public health problems of our time. Obesity nowadays must be associated not only with steatosis, but also with steatohepatitis, cirrhosis, and even hepatocellular carcinoma. Since there are no approved medications for the treatment of obesity-related NAFLD, this paper reviews the literature on natural treatments, focusing on the benefits of blueberry consumption. Blueberry (*Vaccinium* spp.) is a perennial flowering plant in the *Ericaceae* family that has antioxidant and antifibrotic effects, reduces insulin resistance and hepatocyte disfunction. It can also be used to prevent and regulate various diseases such as atherosclerosis, glaucoma, hypertension, diabetes, diabetic retinopathy, and various digestive problems. Blueberries are a rich source of vitamins and minerals, but most of their health benefits are attributed to the flavonoid anthocyanin which has shown beneficial effect in the treatment of NAFLD.

Keywords: nonalcoholic fatty liver disease, obesity, blueberry

DIETETICS AND DIET THERAPY

A POTENTIAL NEUROPROTECTIVE EFFECT OF GRAŠEVINA WINE

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poster presentation

The most common dementia, Alzheimer's disease (AD), is characterized by a progressive and irreversible decline in memory and cognitive function as a consequence of neuronal dysfunction. Acetylcholinesterase (AChE) enzyme degrades acetylcholine, an important neurotransmitter in the central nervous system. The decrease in the levels of acetylcholine released at cholinergic synapses in certain areas of the brain is associated with the appearance of Alzheimer's disease. The drugs authorized for the treatment of AD are AChE inhibitors that provide symptomatic relief in the early stages of the disease. Previous studies have indicated that moderate wine intake might reduce the risk of neurodegenerative diseases such as Alzheimer's disease and dementia. Wine's neuroprotective effect is related to its polyphenols, especially quercetin, procyanidins, and *trans*-resveratrol. Our recent study [1] showed that Graševina wine is rich in polyphenols, especially gallic acid and quercetin. In order to investigate the potentially neuroprotective effect of Graševina wine, we have performed AChE inhibition assay by utilizing the Ellman's method [2]. Six different samples of graševina were tested, both in raw concentrations and solutions diluted by 50%, respectively. The highest AChE inhibition rates were observed in raw samples, with the highest inhibition percentage of 62.98%. The biggest challenge lies in the yellow hue of the samples which resemble the coloration of the end product of the enzymatic reaction, 5-thio-2-nitrobenzoate.

Keywords: wine Graševina, acetylcholinesterase, Alzheimer's disease, polyphenols, inhibition

[1] Mihaljević, Z.; Kujundžić, T.; Jukić, V.; Stupin. A.; Drenjančević, M.; Drenjančević, I. Antioxidants, 2022, 11, 94.
[2] Ellman, G.L.; Courtney, K.D.; Andres, V.; Featherstone, R.M. A new and rapid colorimetric determination of acetylcholin-esterase activity. Biochem. Pharmacol. 1961, 7, 88-95.

FUNKCIONALNA HRANA I DODACI PREHRANI / *FUNCTIONAL FOOD AND FOOD SUPPLEMENTS*

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

A COMPARISON OF PHYSICO-CHEMICAL, MICROBIOLOGICAL AND SENSORY PROPERTIES OF BEVERAGES PRODUCED FROM WATER (*TIBICOS*) AND KEFIR GRAINS DEPENDING ON THE PRODUCTION TECHNOLOGY

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poster presentation

The increasing emphasis on a healthy lifestyle and the connection of the health condition through the intestinal microbiome with kefir drinks confronts people with the question of whether to consume traditional milk kefir, which is excluded due to lactose, or a fruit fermented drink following the norms/trends. The aim of the work was to point out the importance of lactobacilli, to determine the similarities and differences theoretically and experimentally with different lengths of inoculations and to see sensorial which one is actually more acceptable. In addition, to define differences physical-chemical composition, yeast population and microbiological safety were determined. After analysis, it was determined that the content of lactobacilli in water kefir was higher after 48 hours of inoculation, but the traditional milk kefir after 24 hours of inoculation was more acceptable to the panellists. Both beverages were inoculated in a ratio of 1:4. It is important to point out the importance of variations in the origin of the grains as well as the start composition of the milk/water suspension, which significantly affect the end result of the product. Since everything depends on the recipe, it is up to consumers to decide which fermented beverage is more suitable for their health condition.

Keywords: kefir, Lactobacillus, gut microbiome, milk, water

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

BIGELS AS POTENTIAL CARRIERS OF PHENOLIC COMPOUNDS FROM CITRUS PEEL

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poster presentation

Bigels are novel biphasic systems characterized by two gelled phases, usually the oil phase (oleogel) and the aqueous phase (hydrogel). Bigels were prepared by mixing the oleogel with the hydrogel in proportions of 50/50 with stirring at 30 °C trough 1 h, while oleogel and hydrogel were prepared separately. Namely, the hydrogel was prepared by mixing the 3% w/w of carboxymethylcellulose (900 mPas) with distilled water and 1% w/w of citrus peel bioflavonoids. The mixture was stirred at room temperature until complete dissolution was achieved (6 h). Oleogels were prepared by mixing the different concentrations of beeswax (8,10 and 12% w/w) with almond cold-pressed oil. The mixture was heated above the melting point of beeswax and stirred (300 rpm) for 15 min. Obtained bigels are tested for encapsulation efficiency (total phenolic content), binding capacity and spreadability. Encapsulation efficiency increased with the addition of thickener from 75.91 to 92.34% while spreadability and binding capacity decreased from 0.84 to 0.52 gcm/s and 13.36 to 9.89% respectively. This study successfully proved that prepared bigels could be used as drug delivery vehicles for citrus peel phenolic compounds. Obtained formulations present promising potential for further investigations and the development of vehicles for topical and oral drug delivery systems.

Keywords: citrus peel, bigels, oleogels, hydrogels

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

BROWN ONION SKIN AS A SOURCE OF QUERCETIN

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poster presentation

Large amounts of bioactive compounds of the flavonol group remain in the brown onion skin, which represents waste biomass in an amount slightly greater than one-third of the mass of the processed red onion. Quercetin 4'-glucoside and quercetin 3,4'-diglucoside are the major flavonols (flavonoid subgroup) of the brown onion skin. In view of this, brown onion skin was tested as a potential source of high value bioactive components by performing a subcritical sequential batch extraction. Ethanol at concentrations of 96%, 75%, and 50%, and water were used to extract the components from brown onion skin. Prior to subcritical extraction, the brown onion skin samples were defatted with an automated extraction device (SoxROC) using n-hexane as solvent and 1.26 ± 0.30 g/100 g dry weight was extracted from the brown onion skin. The extracts from the brown onion skin after subcritical sequential batch extraction were analyzed for percent dry matter, with a total of 15% extracted, as indirectly indicated by the colours of the extracts obtained. A total of 8.40 ± 0.38 g/100 g polyphenols, 8.16 ± 0.47 g/100 g flavonoids, 3.47 ± 0.11 g/100 g soluble proteins, and 4.11 ± 0.10 g/100 g sugars were determined. Ethanol and water extracts of brown onion skin were analyzed for their polyphenolic profile using the HPLC-PDA method. It was found that the most abundant flavonol of brown onion skin is quercetin.

Keywords: subcritical extraction, brown onion skin, biactive components, quercetin

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FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

PLANT TAXA AND THEIR APPLICATION IN THE SETTLEMENT OF FERIČANCI

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poster presentation

Plant taxa and their application and usage in the Feričanci settlement were researched during June 2023. The study included a field survey and questionnaire given to the local residents. In total, 22 local residents participated in the study. The age of the respondents ranged from 41 to 79 years and 18 of them were women. The respondents stated the use of a total of 64 plant species belonging to 31 families. The most frequent plant families were Rosaceae (14 species), Asteraceae (10 species), and Lamiaceae (7 species). The most frequently mentioned plants were *Sambucus nigra* L. (17 respondents), *Chamomilla recutita* (L.) Rauschert (16 respondents), *Urtica dioica* L. (13 respondents), and *Rosmarinus officinalis* L. (12 respondents). Leaves and flowers were the most commonly used plant parts while tea, liquor, syrup, tincture, and ointment were the most widely used form of preparation. Most of the plants used by the respondents are cultivated (40), although some of them, such as lemon and carob, are not native plants of the investigated area. The respondents mostly used them for the skin and for digestive and respiratory disorders.

Keywords: health problems, medicinal preparations, wild and cultivated plants

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

PREPARATION OF NOVEL FOOD INGREDIENTS BY ENCAPSULATION OF CHOKEBERRY POLYPHENOLS ON CITRUS FIBER/XANTHAN IN THE PRESENCE OF DISACCHARIDES

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poster presentation

Chokeberry is abundant in polyphenols and its consumption is associated with a positive impact on human health. These compounds are very sensitive to extreme environmental conditions, and encapsulation is used to achieve their preservation. Freeze-drying is a common technique for encapsulation of polyphenols. In this study, citrus fibers/xanthan was used as carrier material for chokeberry juice polyphenols. Additionally, disaccharides (sucrose and trehalose) were added to examine their impact. On obtained samples, spectrophotometric measurements and HPLC analysis were done. Infrared spectra were recorded to confirm encapsulation. The highest values for total polyphenols (66.61 mg/g) and proanthocyanidins (18.87 mg/g) contents were observed for the sample without disaccharides addition. The total anthocyanins, as well as individual anthocyanins (cyanidin-3-galactoside, cyanidin-3-glucoside and cyanidin-3-arabinoside), had the highest values in the sample with trehalose. The same trend was observed for inhibition of α-amylase enzyme. Neocholorogenic and chlorogenic acids were the most represented compounds with the highest concentration in sample without disaccharides (726.35 mg/kg and 814.97 mg/kg, respectively). The results showed that antioxidant activity measured by ABTS, FRAP and CUPRAC assays decreased in samples with disaccharides. These results contribute to insight into polyphenols' behavior during the designing of novel food ingredients in systems with disaccharides and fibers.

Keywords: polyphenols, chokeberry juice, citrus fiber/xanthan, disaccharides, freeze-drying

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FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

OPTIMIZATION OF MICROENCAPSULATION OF *LACTIPLANTIBACILLUS PLANTARUM* MB18 FOR IMPROVED GASTROINTESTINAL DELIVERY OF PROBIOTIC

Katarina Butorac[1*], Nina Čuljak[1], Jasna Novak[1], Andreja Leboš Pavunc[1], Martina Banić[1], Jagoda Šušković[1], Blaženka Kos[1]

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poster presentation

The main criterion for selecting probiotics is survival in gastrointestinal conditions in order to exert beneficial effects at the target site of action. Our research group has established a rich collection of industrially important lactic acid bacteria. Particular representatives, although robust and highly adapted to various micro- or industrial environments, are still being investigated to improve their efficiency. The microencapsulation approaches have been implemented in our research strategies to enhance the targeted delivery and sustainability of the production through improved cell viability. Here, the goal was to develop an efficient delivery system, by optimizing ratios of alginate and gelatine, in order to improve the viability of *Lactiplantibacillus plantarum* MB18 cells reaching the colon. The microencapsulation in applied coatings were proved to be efficient. Furthermore, to sustain a high count of metabolically active bacterial cells of MB18 strain, a lyophilization process was carried out. The approaches of freeze-drying of the microencapsulated MB18 cells showed a protective function during exposure of the strain to simulated conditions of the gastrointestinal tract, while the stability of the produced microcapsules in equal ratios of alginate and gelatine was the most effective. The produced microformulations retained their proteolytic activity, supporting their potential as functional starter cultures.

Keywords: probiotics, microencapsulation, lyophilization, functional starter culture

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

EFFECT OF DIETARY FIBERS ADDITION ON RETENTION OF VANILLIN IN CARBOXYMETHYLCELLULOSE HYDROGELS

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poster presentation

Vanillin is occurring naturally in tropical specie *Vanilla planifolia* and is one of the most widely used flavor enhancers in food products such as ice creams, confectioneries and liqueurs. Its commercial application has been well established but investigations regarding its antioxidant potential are in deficit. Hydrogels prepared from carboxymethylcellulose are used as delivery systems of bioactives since their application ensures the stability of unstable compounds. Currently in the food industry, the development of plant-based foods containing dietary fibers is on the rise. Bearing in mind mentioned facts, in the present study we prepared carboxymethylcellulose hydrogels for the delivery of vanillin and examined their antioxidant activity using FRAP, CUPRAC, DPPH and ABTS assays. The concentration of vanillin in hydrogels was determined using HPLC analysis. The effect of dietary fibers addition (10% of citrus or apple fibers) was evaluated as well. The results showed that the addition of dietary fibers had a positive effect on the retention of vanillin as hydrogels without dietary fibers contained 2483.91 mg/kg of vanillin and hydrogels with apple and citrus fibers contained 3756.46 mg/kg and 3178.95 mg/kg of vanillin, respectively. In the development of novel foods, extensive attention should be focused on their proper formulation.

Keywords: vanillin, hydrogels, carboxymethycellulose, apple fibers, citrus fibers

Acknowledgement
This work was supported by the Croatian Science Foundation under the project (IP-2019-04-5749) "Design, fabrication and testing of biopolymer gels as delivery systems for bioactive and volatile compounds in innovative functional foods (bioACTIVEgels)", and Young Researchers' Career Development Project—Training New Doctoral Students (DOK-2020-01-4205).

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

THE INFLUENCE OF OMEGA-3 FATTY ACIDS ON DEPRESSION

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poster presentation

Depression is a common and debilitating illness that affects people from adolescence to old age. It negatively affects the mental and physical health, as well as the social and financial well being of the individual and society. The aim of this work was to collect and analyze literature data on the influence of omega-3 fatty acids on depression and to describe the mechanism by which omega-3 fatty acids affect depression. Omega-3 fatty acids as essential fatty acids crucial for various aspects of human health, including brain function, gained more interest on their inovlvement in the mental health. A growing amount of evidence from epidemiological, laboratory and randomized placebo-controlled studies suggest that dietary omega-3 fatty acids deficiency may contribute to the development of mood disorders, and their supplementation may provide a new treatment option. In the central nervous system, omega-3 fats modulate cell signaling and affect dopaminergic and serotonergic pathways. Animal and human studies suggest that omega-3 fatty acids deficiency is involved in several inflammatory, autoimmune and neuropsychiatric disorders. Specifically, the relationship between omega-3 fatty acids and depression has been repeatedly suggested in observational and experimental studies on populations affected by major depression, depressed mood or postpartum depression. Considering that a significant procentage of depressed patients do not respond to the use of conventional therapy, there is an urgency to find new approaches. Current evidence suggest that omega-3 fatty acids are important for the prevention of mood disorder, but can also be considered as adjuvant therapy.

Keywords: omega-3 fatty acids, depression, mood disorder, diet

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

IMPROVING THE FUNCTIONAL CHARACTERISTICS OF YOGURTS WITH FRUITS

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oral presentation

The interest of consumers in the development of new functional or/and health-enhancing foods and their incorporation into a healthy diet is increasing. At the top of consumers' preferences, among the functional foods, are dairy products, which are considered the ideal host of functional ingredients. Fruits are excellent candidates for the enrichment of dairy products because of their desired taste, color, aroma, fibers, and vitamin content. In addition, they may act as potential dairy product stabilizing agents due to their desirable functional properties, such as water binding and holding, gelling, and thickening ability. In the present study, fruit juices (blueberry, aronia, and grape) and apple pulp were supplemented into yogurt as functional ingredients. The main physicochemical characteristics, total phenolic content, antioxidant activity, and viability of yogurt starters were monitored during production and storage. The addition of juices resulted in increased red color, while juices and apple pulp led to increased total phenolic content and antioxidant activity. Starter culture retained high viable counts during storage (4 °C, four weeks), revealing the potential beneficial effect of fruits. The results present the importance of functional beverages and describe the suitability of fruit supplementation to increase functional characteristics.

Keywords: total phenolic content, antioxidant activity, yogurt, functional foods, fruits

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

CHARACTERISATION OF SELECTED MACROALGAL SPECIES FROM THE ADRIATIC SEA FROM THE ASPECT OF FATTY ACIDS

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poster presentation

The aim of this research was to determine the fatty acids profile of certain types of macroalgae from the Adriatic Sea (*Cystoseira corniculata*, *Ericaria amentacea*, *Dictyota fasciola*, *Sargassum hornschuchii*, *Codium vermilara*) in order to discover their potential in nutrition and the food industry. Total lipids were extracted using the Folch method, after which they were converted into fatty acid methyl esters (FAME), and as such were analysed using gas chromatography with flame-ionization detector (GC-FID). Palmitic acid (C16:0) was the most represented in all species, followed by isomers of oleic acid (C18:1n9*c*+*t*) in most species. Only one of the two most important n-3 was identified, eicosapentaenoic acid (20:5n3), while docosahexaenoic acid (C22:6n6) was not detected in analysed samples. The highest percentage of C20:5n3 was found in the *D. fasciola* species, and the lowest in the *C. vermilara* species. The results of this work indicate the best content of polyunsaturated fatty acids (PUFA), polyunsaturated and saturated fatty acids ratio (PUFA/SFA), and unsaturation index (IU) in the species *S. hornschuchii*, while the most favourable atherogenic index (IA) was found in *C. vermilara*, thrombogenic index (IT) in *D. fasciola* and the most favourable hypocholesterolemic/hypercholesterolemic ratio (HH) in the species *C. corniculata*. The results of the conducted experimental work indicate very small differences in the fatty acid profile of the tested species and therefore they are found to have similar potential in nutrition and the food industry.

Keywords: fatty acids, polyunsaturated fatty acids, saturated fatty acids, macroalgae, nutritional indices

Acknowledgment
We would like to thank Croatian Government and the European Union through the European Regional Development Fund - the Competitiveness and Cohesion Operational Programme (KK.01.1.1.01) for funding The Scientific Centre of Excellence for Marine Bioprospecting - BioProCro.

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

APPLICATION OPPORTUNITIES OF ENCAPSULATED PLANT EXTRACTS IN FUNCTIONAL PRODUCTS

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poster presentation

Plant extracts are obtained from plant parts such as leaves, flowers, fruits, seeds, bark and roots or whole plants. The effectiveness of plant extracts depends on their physical-chemical properties, profile and concentration of bioactive compounds that contain and their bioavailability. Bioactive compounds of plant extracts are a significant location of polyphenols. Because the stability of polyphenols of compounds is conditioned by numerous factors (oxygen exposure, light, humidity, temperature change and pH) that affect the reduction or complete loss of their biological activity is carried out by their stabilization of encapsulation methods. In addition to increasing stability, the incapsulation of plant extracts rich in polyphenols also increases the possibility of their application and is achieved by preserving their biological activity. Encapsulated herbal extracts rich in polyphenols can be used in phytomedicine and the food industry as an alternative substitute for synthetic preservatives and as biologically active supplements in new functional products.

Keywords: plant extract, encapsulation, polyphenols, functional food, alternative food preservatives

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

UNSATURATED FATTY ACIDS IMPROVE HEALTH

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poster presentation

Meat as an important part of human diet belongs to the so-called "functional food", with benefit on physiological processes in humans. After proteins, fats are the most abundant in meat. Meat contains a combination of SFA and UFA. From a health point of view, UFA are particularly important, positively reduce cholesterol in the blood and improve the functioning of the cardiovascular system in the human body. A diet high in SFA increases LDL cholesterol. Both MUFA and PUFA can help lower LDL cholesterol and increase HDL. Lamb and goat meat contains 17% n-$_6$ and 19% n-$_3$ PUFA. Linolenic acid ($C_{18:2n-6}$) and Alpha linolenic acid ($C_{18:3n-3}$) represent essential fatty acids that the human body cannot synthesize on its own and it is necessary to get them through the diet. In order to increase the useful amount of UFA in meat, lately, % of SFA in meat has gradually decreased as a result of the selection of animals for slaughter as well as the application of appropriate modified nutrition that enables the creation of adipose tissue that is rich in UFA. The paper is a review of the literary data on the importance of UFA and SFA on the quality of human health.

Keywords: meat, unsaturated fatty acids, saturated fatty acids, health, functional food

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

ELECTROCHEMICAL CHARACTERIZATION OF VITAMIN B12 AND SEROTONIN

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poster presentation

Vitamin B12 is an essential water-soluble B complex vitamin that acts as a cofactor in the synthesis of neurotransmitters such as serotonin and dopamine. A deficiency of vitamin B12 affects mood, emotions, and sleeping and can lead to psychiatric disorders. Serotonin is found in many parts of the human body (in the digestive system, blood platelets, and in the entire central nervous system.). It is produced from the essential amino acid tryptophan and enters the human body through food. Electrochemical characterization of vitamin B12 and serotonin was performed with cyclic and differential pulse voltammetry, in a three-electrode voltammetric cell with a working glassy carbon, reference Ag/AgCl, and platinum wire counter electrode. Cyclic voltammogram showed one oxidation and one reduction peak of serotonin which increased with the increase of scan rate. The oxidation peak was the most pronounced at pH = 5 and it decreased in a more acidic and alkaline medium. Differential pulse voltammogram showed one oxidation peak of vitamin B12, which was the most pronounced at pH = 2 and decreased with the increase of pH. Adsorption of serotonin on the glassy carbon electrode surface was also observed with differential pulse voltammetry, while adsorption of vitamin B12 was not detected. The obtained results have shown that both investigated compounds are electroactive and can be detected in model systems. This electrochemical study could be applied to the detection of serotonin and vitamin B12 in real samples.

Keywords: vitamin B12, serotonin, differential pulse voltammetry, cyclic voltammetry

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

THE ACCEPTANCE AND NUTRITIONAL VALUE OF ENRICHED CRACKERS

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poster presentation

The aim of the work was to carry out a sensory evaluation of enriched crackers, create a nutritional declaration for the best-rated product, and check whether the product can bear nutritional and/or health claims. Six samples of enriched crackers were prepared using raw materials: spelt whole grain flour, water, olive oil and salt as basic raw materials and pumpkin seeds, sunflower seeds, chia seeds, sesame seeds, flax seeds and psyllium flakes as good sources of dietary fibre and proteins. The products contained different proportions of salt and olive oil. The samples were evaluated in one day in the Laboratory for Cereal Chemistry and Technology by 20 inexperienced members between the ages of 20 and 52 (students and teachers of Food Technology department). The following properties of the cracker product were evaluated: appearance (shape, size, surface, colour), texture (structure, brittleness and chewiness, crispness), aroma (smell, taste) and general acceptability of the product. According to the data from the prepared nutritional declaration for the best-rated sample and the terms for placing nutritional and health claims on the product, the product can carry certain nutritional and health claims. Considering the raw materials, the product can also be intended for vegans.

Keywords: enriched cracker, functional food, sensory evaluation, nutritional value

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

POLYPHENOLS AND ANTIOXIDANT ACTIVITY OF DIETARY SUPPLEMENTS FOR THE TREATMENT OF INFLAMMATORY BOWEL DISEASE

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poster presentation

Inflammatory bowel diseases (IBD), Crohn's disease and ulcerative colitis, are chronic relapsing diseases affecting millions worldwide and disrupting their daily lives. Since polyphenols have an antioxidant effect, this work aimed to evaluate the quality of dietary supplements for the treatment of IBD with regard to the content of polyphenols and to determine their antioxidant activity. The content of total polyphenols in the analyzed samples was determined by the spectrophotometric method using the Folin-Ciocalteu reagent, while the antioxidant activity was assessed by the DPPH, ABTS and RPA test. The concentrations of curcuminoid compounds, boswellic acids, andrographolides and piperine were determined by HPLC. Dietary supplements prepared from turmeric, Indian frankincense, green chiretta, and black pepper were obtained from local pharmacies, health food stores, and online shops. Samples were classified as mono-herbal and multi-herbal dietary supplement. The content of polyphenols in turmeric monopreparations was higher than in other analyzed monopreparations. The obtained results point to the exceptional quality of dietary supplements for the treatment of IBD, and the studied samples can be considered a good source of polyphenolic components, while the antioxidant activity of the tested dietary supplements is in accordance with the content of these biologically active components.

Keywords: polyphenols, antioxidant activity, dietary supplements, inflammatory bowel disease

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

THE BENEFITS OF CURCUMIN IN THE REGULATION OF OBESITY

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poster presentation

In recent years, obesity has become a major public health problem. It is one of the crucial factors in the development of numerous chronic diseases such as diabetes, cardiovascular diseases, and various other metabolic disorders. The search for natural sources that could help prevent excessive body weight and its undesirable consequences is becoming increasingly important. Among these natural sources is turmeric, a spice now widely used in the diet. Curcumin, the active ingredient in the turmeric plant, has attracted considerable research interest, as its many other beneficial effects prevent and regulate obesity and all associated comorbidities. An interesting discovery is that the efficacy of curcumin is significantly enhanced in combination with black pepper, whose active ingredient, piperine, increases the bioavailability of curcumin by 2000%. Although research on the role of curcumin in obesity is still in its infancy, it is known that it has significant antioxidant and anti-inflammatory effects. This polyphenol has shown its beneficial effects on adipose tissue by reducing intracellular oxidative stress and inflammation and inhibiting adipogenesis and lipogenesis. Due to these multiple beneficial effects, in the future, curcumin may become a natural therapeutic agent for obesity treatment.

Keywords: anti-inflammatory, antioxidant, curcumin, natural, obesity

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

GREEN METHODS FOR PROTEIN ISOLATION: SUSTAINABLE APPROACHES FOR ENHANCED PROTEIN RECOVERY

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poster presentation

Protein isolation is a crucial step in obtaining pure and functional proteins for various applications. Traditional protein isolation methods often involve the use of harsh chemicals, high energy consumption, and generate significant amounts of waste. In contrast, green methods employ environmentally friendly techniques that minimize the use of hazardous chemicals, conserve energy, and promote the efficient utilization of resources. Several innovative green approaches for protein isolation have emerged, including enzyme-assisted extraction, aqueous two-phase systems, and membrane-based separation techniques. These methods offer numerous advantages such as higher selectivity, improved protein recovery, and reduced environmental footprint. Enzyme-assisted extraction utilizes proteolytic enzymes to selectively cleave proteins from their matrix, enabling gentle and efficient protein isolation. Aqueous two-phase systems exploit the phase separation of two immiscible aqueous phases to partition proteins based on their physicochemical properties, facilitating their separation. Membrane-based separation techniques employ membranes with specific pore sizes or affinity ligands to selectively isolate proteins from complex mixtures. By adopting green methods, researchers and industries can contribute to sustainable protein production, reduce waste generation, and minimize the use of hazardous chemicals. Additionally, the recovered proteins can be used in various applications, including food, pharmaceuticals, and biotechnology, ensuring their valuable utilization.

Keywords: protein isolation, green methods, enzyme-assisted extraction, aqueous two-phase systems, membrane-based separation techniques

Acknowledgment
This work was financially supported by the Ministry of Science, Technological Development and Innovations, Republic of Serbia (Contract No. 451-03-47/2023-01/200222), as well as by the Science Fund of the Republic of Serbia, Grant No 6673, PROTein from Rapeseed Oil Processing Waste: Application in Food and Wastewater Treatment – PROTOPOWER.

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

LOW TEMPERATURE AFFECTS ANTIOXIDANT ACTIVITY OF MICROGREENS

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poster presentation

Microgreens are immature green vegetables, which stand out due to their simple cultivation and increased content of bioactive substances, compared to mature vegetables. The quality of microgreens after storage is affected by various abiotic factors, such as temperature and light, due to the regulation of functional metabolic processes. This investigation was conducted on two cultivars of radish (*Raphanus sativus* L.): daikon and red radish, grown in chambers with controlled conditions (24 °C, photoperiod of 16/8 h) under two types of artificial LED light, white and purple. The aim of the study was to examine the influence of 14-day storage at low temperature (+4 °C) on the antioxidant activity of two cultivars of radish microgreens by measuring the antioxidant activity, content of polyphenols, ascorbic acid, pigments, anthocyanins, and lipid peroxidation products. The results showed that 14-day storage at low temperature led to inhibition of most metabolic pathways what led to stable antioxidant activity and unchanged content of polyphenols. Low temperature also triggered anthocyanin biosynthesis, preventing oxidative stress in the red radish cultivar, which indicates more stable physiological reactions compared to the daikon cultivar.

Keywords: radish, storage, physiological response, oxidative stress

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

INFLUENCE OF HARVEST LOCATION ON PHENOLIC COMPOSITION AND ANTIOXIDANT ACTIVITY OF SEA FENNEL

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poster presentation

Halophytes are terrestrial plants that thrive in saline conditions. One of the most widespread Mediterranean halophytes is sea fennel, which is widely used for its nutritional value and health benefitial properties. The aim of this study was to investigate the differences in phenolic composition and biological properties of sea fennel collected from three different sites (river, estuary, and sea coastal zone) where it was exposed to different salinity levels. The extracts were prepared by microwave-assisted extraction (MAE) and analysed for total phenolics, flavonoids, and tannins, while the content of dominant chlorogenic acid was detected by high-performance liquid chromatographic-diode array (HPLC-DAD). Antioxidant activity was tested by the FRAP assay and against two free radicals; Nitric Oxide ($NO^{\bullet}$) and 2,2-diphenyl-1-picrilhydrazil ($DPPH^{\bullet}$). The highest content of total phenolics (3051 mg CAE/L) and flavonoids (225.7 mg QE/L) was found in sea fennel collected from the river coast, while the highest concentration of chlorogenic acid (163.5 mg/L) and highest FRAP and $DPPH^{\bullet}$ antioxidant activities were found in the samples growing near brackish water. This study confirmed the influence of plant`s habitat on its phenolic composition, as well as the influence of individual compound/phenolic group on total antioxidant activity of the samples. This research is supported by the PRIMA programme (supported by the European Union) under project SEAFENNEL4MED.

Keywords: *Crithmum maritimum* L., harvest location, MAE, chlorogenic acid, antioxidant activity

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

CONSUMERS ATTIDUTES AND NUTRITIONAL PROFILE OF WITH FRUIT BY-PRODUCTS AND EDIBLE FILMS ENRICHED COOKIES

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poster presentation

Cookies are a popular but often avoided food due to their low nutritional value. The aim of this study was to investigate the attitude of Croatian consumers and the nutritional profile of whole grain cookies enriched with fruit by-products (grape and aronia pomace, GAP) and edible films based on chitosan and gum arabic enriched with grape seed extract (GAP with KGAE). An online questionnaire was used to collect data from Croatian consumers (n=500; 82% women, 20 - 60 years). The nutritional profile and starch digestibility of cookies were studied *in vitro*. Most consumers eat cookies once per week (n=172), typically 60 to 150 g of cookies per month (n=145), and prefer chocolate-covered cookies (n=143). Consumers are interested in purchasing sustainable cookies (n=478) and cookies with fruit by-products (n=379). The addition of fruit by-products and edible film did not affect the nutritional profile and *in vitro* starch digestibility. However, slowly digestible starch prevealed, indicating a lower glycemic response and a longer feeling of satiety after consumption. Whole grain cookies fortified with fruit by-products could therefore play a role in protecting the environment and consumers health.

Keywords: cookies, edible films, fruit by-products, starch digestibility, consumers attitudes

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

INFLUENCE OF HOMOGENIZATION ON THE ENCAPSULATION EFFICIENCY OF GRAPE POMACE EXTRACT WITH GOAT WHEY

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poster presentation

The influence of feed solution homogenization parameters on the encapsulation efficiency (EE) of phenol-rich grape pomace extract (PRE) in the spray-drying process using goat whey as coating material was studied. The PRE was obtained by solid-liquid extraction using 50% ethanol as solvent. A magnetic stirrer (MS) and an ultrasonic bath (UB) were used to homogenize the feed solution before spray drying (PRE : goat whey = 1 : 2 w/w). Response surface methodology and Box-Behnken design were used to investigate the influence of MS homogenization parameters (temperature: 25 – 50 °C; time: 10 – 60 min; speed: 600 – 1200 rpm) and UB homogenization parameters (temperature: 30 – 50 °C; time: 5 – 30 min; feed stabilization time after homogenization: 15 – 45 min) on EE of PRE. Numerical optimization showed that the optimum homogenization conditions were 50 °C, 10 min, 600 rpm for MS when the maximum EE was 94.7%, and 40 °C, 17.5 min, 30 min for UB when 95.17% maximum EE was reached.

Keywords: spray drying, grape pomace, goat whey, phenolic compounds, response surface methodology

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

CRANBERRIES – A WONDER FRUIT IN THE SERVICE OF ORAL HEALTH

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poster presentation

Cranberry (*Vaccinium macrocarpon*) is a functional food known for its antioxidant, antibacterial, and antiviral effects which are attributed to the rich source of the antioxidant compounds, such as polyphenols (flavonoids, phenolic acids, tannins), ascorbic acid, and triterpenes. The consumption of cranberries has many benefits for human health including the prevention of many chronic diseases and oral diseases. Studies have shown that people who regularly consume a diet rich in phytonutrients have better oral health. Cranberry juice and cranberry phenol extracts inhibit Streptococcus mutans and Streptococcus sorbinus activity, reduce adhesion to epithelial cells, reduce acidity, and prevent bacterial coaggregation and dental plaque accumulation. Cranberry polyphenols also modulate the immune system by reducing the production of cytokines and metalloproteinases (MMPs). As a cariostatic natural product, cranberry polyphenols can be added to mouthwash or toothpaste as an additive to eliminate a large number of oral pathogens without disrupting the oral microenvironment and serve as a new potential antimicrobial adjunct in the prevention and treatment of oral diseases.

Keywords: functional food, oral health, polyphenols, vaccinium macrocarpon

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

THE IMPACT OF DIETARY SUPPLEMENTS ON DEMENTIA PREVENTION

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poster presentation

It is well known that the population of older adults is increasing, as well as the number of people suffering from neurodegenerative diseases. In psychiatric clinics, we are increasingly encountering patients with psychogeriatric changes, with a common goal of slowing down the progression of such changes. According to the report from the Croatian Agency for Medicinal Products and Medical Devices (HALMED) from 2021, the overall consumption of medications in the Republic of Croatia can be observed based on the method of dispensing, namely whether the medication is prescribed (R) or belongs to the over-the-counter (OTC) category of drugs (BR, BRX). According to the reported data, in 2021, the consumption of prescription medications amounted to 1,289.83 DDD/1000/day (92.9%), corresponding to a total financial expenditure of 9,298,932,745 kuna (94.1%). The consumption of over-the-counter medications (BR, BRX) was 98.5 DDD/1000/day (7.1%), corresponding to a total financial expenditure of 577,872,815 kuna (5.9%). Observing the ratio of medication consumption between prescription (R) and over-the-counter (BR, BRX) medications from 2005 to 2021, it can be concluded that the distribution ratio between them is very similar. The purpose of this systematic review is to present recent findings regarding the consumption of specific foods, dietary supplements, or the implementation of dietary restrictions that promote healthy brain aging or potentially delay the onset of diseases.

Keywords: dietary supplement, neurodegenerative disease, dementia, prevention, mental disorder

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

ANTIBACTERIAL PROPERTIES OF DONKEY MILK AGAINST *KLEBSIELLA PNEUMONIAE*: INSIGHTS INTO ACTIVITY AND FACTORS INFLUENCING EFFICACY

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poster presentation

Numerous studies have highlighted the unique protein profile of donkey milk, with high levels of lysozyme, lactoferrin, and immunoglobulins, which contribute to its immune-modulating and antimicrobial properties. This study aimed to investigate the antibacterial properties of raw donkey milk against a clinical strain of *Klebsiella pneumoniae* tested by intentional contamination of milk samples. The antibacterial assays were conducted at different temperatures to assess the temperature-dependent effects on the antibacterial activity. The role of specific components in donkey milk was also examined to determine their contribution to the antibacterial properties. Additionally, the study explored the impact of contamination level and incubation period on the antibacterial activity. Through the investigation, it was observed that there is a synergistic effect between lysozyme and lactoferrin in inhibiting the growth of *Klebsiella pneumoniae*. Milk samples with higher lactoferrin content (ranging from 22.8 to 40.8 mg/L) and higher concentration of lysozyme (ranging from 2.47 to 3.99 g/L), exhibited a more pronounced antibacterial activity. Although the results of this study are very promisinig, clinical effectiveness of donkey milk against pneumonia caused by *Klebsiella pneumoniae* would be necessary to validate the potential effects of donkey milk as a therapeutic or preventive agent for pneumonia.

Keywords: Donkey milk, antibacterial activity, *Klebsiella pneumoniae,* lactoferrin, lyzozyme

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

FORMULATING GUMMY BEARS WITH VARYING SUGAR CONTENT AS FOOD DELIVERY SYSTEMS FOR MOUNTAIN GERMANDER (*TEUCRIUM MONTANUM* L.) POLYPHENOLS

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poster presentation

Following trends in the food industry in creating food products that are health-beneficial and adaptive to ever-changing nutritional preferences, sugar confectioneries offer the advantage of intense sweeteness and a variety of sensory sensations that can enhance the acceptability of functional ingredients. Mountain germander is a wild-growing herb known by a folk saying "it brings back to life", associated to its medicinal properties. However, its wider use is hindered by intense bitterness. Therefore, the aim of this work was to formulate gummy bears with various sugar content as potentially functional products delivering polyphenols. Upon defining parameters of extraction, the gummy bears were prepared using mountain germander extract as the liquid phase. Three levels of sugar content were defined: high sugar (HS), low sugar (LS), and no sugar (NS), containing sucrose, sucrose partially exchanged by xylitol and completely replaced by xylitol and maltitol as main sweetners, respectively. The HPLC analysis revealed the presence of phenyl-ethanoid glycosides, of which echinacoside and verbascoside could be identified. With respect to sensory acceptance, HS and LS formulations have shown similarly high overall acceptability (7.5/9 and 7.2/9), resulting from moderate sweetness, bitterness and hardness, supported also by the presence of a linden honey-like flavour.

Keywords: mountain germander, gummies, phenylethanoid glycosides, polyols

Acknowledgement
This work was supported by the Croatian Science Foundation under the project: "Formulating encapsulated systems of bioactive ingredients from traditional plants: mountain germander and ground ivy for the development of innovative functional food products" (IP-2019-04-5879).

FUNCTIONAL FOOD AND FOOD SUPPLEMENTS

BENZOXAZINOIDS: NEGLECTED COMPOUNDS IN GERMINATED GRAINS

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oral presentation

Germination of cereals is considered a method of "green food engineering" to increase content of natural bioactive compounds in seeds and sprouts that can be used as functional foods. In addition to well-known secondary metabolites such as phenolic acids, flavonoids and vitamins, there are other often neglected compounds in cereal grains, such as benzoxazinoids. These molecules are usually referred to as allelochemicals with inhibitory effects on weeds, insects, plant pathogenic fungi, bacteria, and nematodes. Benzoxazinoids may also be additional factors contributing to the health benefits of grain products. Pharmacological and health-promoting properties of benzoxazinoids, including anti-inflammatory, anti-cancer, antimicrobial, appetite suppressant, and reproductive system stimulant effects have been reported. In our study, we investigated the effects of germination on the secondary metabolites composition in spelt. Germination significantly increased the content of various metabolites in free and bound forms. Benzoxazinoids were the most important compounds in the free fraction of germinated spelt. The accumulation of secondary metabolites significantly increased the antioxidant activity of germinated spelt. According to our data, germinated spelt could be a valuable source of bioactive compounds and a potential ingredient for the production of functional foods.

Keywords: benzoxazinoids, germination, spelt, secondary metabolites, health benefits

ZDRAVSTVENA SIGURNOST HRANE / *FOOD SAFETY*

FOOD SAFETY

CONTROL OF REGULATED MARINE BIOTOXINS IN NATURAL AND HARVESTED MUSSEL SAMPLES

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poster presentation

Algal species in the marine environment represent the basis of the aquatic food web. However, some species of microalgae can be harmful. These algae produce a whole range of toxic organic substances known as biotoxins, which can be found in the filter-feeding organisms such as mollusks as they accumulate particles from the surrounding water. Biotoxins are not harmful to mollusks, but when consumed, depending on accumulated level, can pose a risk not only to marine organisms but also to human health due to their thermostability. Therefore, it is important to highlight the importance of proper seafood control to prevent the consumption of contaminated products. The objective was to determine the levels of hydrophilic and lipophilic biotoxins in natural and harvested mussel populations of *Mytilus galloprovincialis* using chromatographic and spectrometric methods. Mussels were collected from January 2021 to December 2022 in the estuary of the Neretva River and in the Mali Ston Bay. The sampling stations were located in an area with natural eutrophication and thus are an important habitat for mussels. The maximum levels for analysed biotoxins specified in Regulation (EC) No.853/2004 were not exceeded in any of the samples, indicating that the analysed mussels are safe for public health.

Keywords: seafood, biotoxins, breeding area, estuary, algae

FOOD SAFETY

MICROBIOLOGICAL STATUS OF SANDWICHES FROM FAST FOOD ESTABLISHMENTS IN THE AREA OF ZENICA-DOBOJ CANTON

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poster presentation

Sandwiches are popular meals that are often consumed outside the home. They represent a combination of different ingredients, including meat and salad, cheese, sauce, which makes them potentially risky. The aim of this article is to provide an overview of research on the microbiological status of sandwiches with meat and salad in order to consider the potential danger to the health of consumers. 196 samples (n=196) of sandwiches with meat, cheese and salad were analyzed using standard ISO methods. The research was carried out in fast food restaurants, and it showed that the most common parameter that does not comply with the reference values of the Silent and Quiet Guidelines are species from the genus Enterobacteriacea. Similar results were obtained in other studies that dealt with the microbiological status of sandwiches. Out of the total number of samples, 20% of sandwiches had an increased number of Enterobacteriacae. Many factors can affect the microbiological status of sandwiches, including: storage temperature of raw materials, hygienic practices during preparation and contamination of raw materials, environmental hygiene such as contamination of work surfaces, utensils and hands of employees also significantly contribute to the deteriorating microbiological status of sandwiches. The microbiological status of sandwiches with meat and salad, cheese and sauce represents an important issue for public health. Although this research did not prove the presence of pathogenic microorganisms, the increased number of Enterobacteriaceae indicates the existing danger of the presence of pathogenic species. Therefore, it is necessary to adhere to proper hygiene practices during preparation.

Keywords: fast food, public health, microbiology, pathogens,sandwich

FOOD SAFETY

MICROBIOLOGICAL SPOILAGE AND SAFETY RISKS IN BEER PRODUCTION

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poster presentation

Even though beer is considered to be a safe beverage in terms of spoilage microorganisms, it is also a very nutritious and prone to spoilage if not being subjected to proper hygienic measures during production. In brewing companies, contamination can happen either during production (primary contaminations) or at the filling of the product (secondary contaminations). Secondary contaminations are responsible for at least one-half of the incidents of microbiological spoilage in breweries not using tunnel pasteurization. Thus, all points with direct or indirect contact with product are possible sources of microbiological contamination. Automated cleaning and disinfection strategies (such as cleaning-in-place systems) are used to remove undesired microorganisms; however, microbes have developed survival strategies that allow them to resist these cleaning procedures, so employee education must be conducted as well as continuous monitoring of each plant segment. The aim of this work is describing the bacterial and fungal beer contaminant and the challenges for the breweries, both industrial and craft; in order to successfully detect potential contaminants and ensure the microbiological safety of beer in all stages of the production.

Keywords: beer, contamination, microbiological spoilage, safety risk

FOOD SAFETY

CONTENT OF AFLATOXIN B1, CHLORIDE, NITRITE AND HEAVY METALS IN MEAT PRODUCTS IN THE AREA OF ZENICA-DOBOJ CANTON, BOSNIA AND HERZEGOVINA

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oral presentation

Many additives are of essential importance for the taste and quality of products, however, many of them pose a danger to human health, and are subject to daily routine quality control of products intended for human consumption. In addition to additives, residues represent a major challenge as possible contaminants of products from the field to the dining table. Determination of aflatoxin B1 (AFLB1) was performed using the immunoenzymatic method on an ELISA device in accordance with the manufacturer's specification. Chlorides and nitrites were analyzed in accordance with the standards BAS ISO 1841-1:2007 and BAS ISO 2918:2007. Heavy metals were detected using atomic spectrophotometry (AAS) in accordance with the BAS ISO 14084:2005 standard. Through the research, 85 samples of meat products (salami, sausages, dried meat products) were processed and all were analyzed for the presence of aflatoxin B1, as well as for chlorides, nitrites and heavy metals (cadmium and lead). The average content of AFL B1 in the meat samples was 0.048 µg/kg (with a range of 0.019 to 0.105 µg/kg). Chloride content was detected in the range from 0 to 9.955 %m/m (average concentration 2.377 %m/m). The average nitrite content was 8,330 mg/kg (min. 0,550 – max. 45,705 mg/kg). Among the 85 processed samples, lead and cadmium were detected in 79 and 29 products (92.94% and 34.11%), with an average of 0.136 and 0.042 mg/kg. Lead was detected in the range from 0 to 3,474 mg/kg, and cadmium from 0 to 2,544 mg/kg. The results show the need for continuous monitoring of the amount of additives in meet products on the market, and regular monitoring of residues in products intended for human consumption. It is necessary to stick to proper hygienic practices during the preparation of the product at all stages from the field to the dining table.

Keywords: residues, additives, public health, lead, cadmium

FOOD SAFETY

ANTIGENOTOXIC EFFECT OF *CASTANEA SATIVA* LEAF EXTRACT INDUCED BY AFLATOXIN B_1 AND OCHRATOXIN A

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poster presentation

Mycotoxins are low-molecular metabolites formed by certain strains of mold species from the genera *Aspergillus, Penicillium, Fusarium*, and others. They can enter the food chain by direct or indirect contamination of food. The real danger of mycotoxins is reflected in their delayed action because they can cause various mutagenic and cancerous changes at the cellular level. At the same time, it is impossible to avoid their presence in food, and thus exposure. Plant polyphenols are relatively well known for their antioxidant, anti-mutagenic, anticancer, anti-inflammatory, antiangiogenic, antiulcer and antimicrobial properties. Based on preliminary studies of the antigenotoxicity of extracts of various plant species, it was observed that those species that are rich in polyphenols have a significant antigenotoxic effect based on the prevention of oxidative damage caused by cytostatics in the culture of human lymphocytes. In addition, as one of the most economical raw materials rich in polyphenols, so far primarily used for nutrition and obtaining tannic extracts, chestnut (*Castanea sativa* Mill.), whose extracts have been poorly tested, can be used. The addition of such extracts of potential antigenotoxic effect to food could reduce the toxic effect due to exposure to mycotoxins. The *in vitro* antigenotoxic effect of aqueous and alcoholic extracts of *Castanea sativa* Mill. was tested. The results determined the specific effect of aqueous and alcoholic extracts of the most dominant components, and tannin polyphenols of C. *sativa* leaves, after treatment of cells with aflatoxin B1 and ochratoxin A. Furthermore, the content of polyphenols was examined in extracts of *Castanea sativa* Mill. species and the antioxidant effect was determined using electron spin resonance and the colorimetric DPPH method, since the antioxidant activity of extracts could be one of the indicators of the antigenotoxic effect, considering the possibility of DNA damage caused by the action of free radicals. The antigenotoxic potential of extracts was determined using the alkaline comet assay on human leukocytes *ex situ*. The content of total polyphenols was 6.74%. The chestnut leaf extract was the richest in tannins and flavonoids, while the most abundant were ellagic and gallic acid derivatives. The strong antioxidant activity of the dominant components was also determined, which points to ellagic acid as the component that contributes the most to the effect of the extract. Suppression of the genotoxic effect of AFB1 and OTA was determined by the comet assay, where a significant reduction in tail length, tail intensity and tail moment was found in leukocytes simultaneously treated with mycotoxins and different concentrations of extracts.

Keywords: antioxidant activity, Comet assay, *Castanea sativa*, genotoxicity, polyphenols

FOOD SAFETY

DO WE KNOW WHAT WE ARE EATING?

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oral presentation

Food safety and nutritional quality is a prerequisite to maintain good health. Food safety means safe and healthy food along the entire food chain, without harmful substances that could endanger human health. As foreseen by the Law on Health Care (NN 100/2018), the implementation of environmental monitoring, including food safety risks is essential in order to assess its safety and quality. Therefore, the monitoring of food samples from the County is being carried out by the Teaching Institute for Public Health in collaboration with Split and Dalmatian County. In recent years, attention has been focused on the products of smaller local producers, since their products usually do not undergo any controls before being put on the market. During monitoring in 2022 out of a total of 179 food samples, 89 samples (50%) were not in compliance with legal regulations according to the chemical indicators. Among the different food groups, according to the number of non-conforming samples, three categories of food sampled at city markets from local producers were distinguished. It concerns food with additional nutritive value, such as olive oil, honey and dried fruit. Namely, this food is commonly recommended in the prevention of chronic non-communicable diseases. A large number of non-compliant samples indicate the need for increased control, precisely those products that are officially insufficiently controlled. Food safety education should be ensured for both producers and consumers.

Keywords: food safety, prevention of chronic diseases, honey, olive oil, nutritive value

FOOD SAFETY

PESTICIDE RESIDUES IN POTATOES ON CROATIAN MARKET FROM 2016 TO 2022

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oral presentation

Potato is after maize, rice and wheat one of the most important crops and its global production is constantly increasing. It grows in temperate climate and is used as a source of starch, food, and in breeding industry. Since it can be affected by insects, weeds, fungi, and viruses' potato cultivation requires application of numerous agrotechnical products, including pesticides. In the European Union, the most frequently used pesticides in potato cultivations check are: Thiamethoxam, Lambda-cyhalothrin and Deltamethrin (insecticides), Rimsulfuron (herbicide) and Metalaxyl (fungicide). 123 potato samples were collected in Croatia and analyzed during period 2016 to 2022. Samples were prepared by Quick Easy Cheap Effective Rugged Safe method (QuEChERS). In total, 567 active substances were analyzed using liquid chromatography (UPLC-MS/MS) and gas chromatography (GC-MS/MS) with triple quadrupole mass spectrometry. In 22 samples (17.9%), pesticide residues were found. In 2 samples (1.6%) the concentration exceeded the MRL and were reported as non-compliant considering the measurement uncertainty. Multiple residues were reported in 2 samples. In an individual sample, 3 different pesticides Flutolanil=0.011±0.006 mg/kg (MRL 0.1 mg/kg); Metalaksyl and Metalaksyl M=0.019±0.009 mg/kg (MRL 0.02 mg/kg) were found. Chlorpropham, Dithiocarbamates, Fludioxonil, Thiamethoxam, Clothianidin, Propamocarb, Flutolanil were reported. Oxamyl and Chlorpiryphos were detected and quantified above the MRL 0.024±0.012 mg/kg (MRL 0.01 mg/kg) and 0.05±0.025 mg/kg (MRL 0.01 mg/kg), respectively.

Keywords: potato, pesticide residues, Croatia, LC-MS/MS, GC-MS/MS

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FOOD SAFETY

CROATIAN CONSUMERS' EXPOSURE TO PHYCOTOXINS

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poster presentation

Due to their high nutritional value, bivalves and ascidians are beneficial as part of a healthy diet. However, due to their specific nutritional behaviour - the filtration of large amounts of water - they can accumulate pollutants in their tissues, including phycotoxins. In this study, the concentration of phycotoxins was determined in mussels (n = 416), oysters (n = 104), scallops (n = 52) and ascidians *Microcosus* spp. (n = 104) from the northern Adriatic Sea (around the Istrian Peninsula), collected in the period from April 2018 to March 2019. Exposure to phycotoxins was assessed based on the determined phycotoxin concentrations and food consumption data of Croatian consumers. Of the phycotoxins whose maximum level (ML) is set by Regulation (EC) 853/2004 and were included in this study, domoic acid, gonyautoxin 2,3, gonyautoxin 1,4, okadaic acid, yessotoxin and azaspiracid 1 and 2 were quantified. Most samples had a low phycotoxin concentrations, except for the six samples with content above the ML. No acute toxic effect was expected for most of the phycotoxins tested, apart from the okadaic acid and paralytic shellfish toxins, one of the most toxic phycotoxins. Obtained results indicate the importance of continuous monitoring of phycotoxins, aiming to minimize the risk those pollutants pose to Croatian consumers.

Keywords: phycotoxins, bivalves, ascidians, exposure assessment

FOOD SAFETY

ENERGY DRINKS –COMPOSITION AND THE FREQUENCY OF CONSUMPTION AMONG UNIVERSITY STUDENTS

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poster presentation

Energy drinks are high caffeine-containing beverages that are used to boost energy, improve concentration, increase physical performance and maintain wakefulness. Since their introduction in 1987, energy drinks have become increasingly popular and the market and degree of consumption of energy drinks is increasing every year. These are particularly popular among the younger population, children and adolescents. Energy drinks contain ingredients that, in large quantities or in combination with other factors, can have a harmful effect on human health. Some of these ingredients are sugars or artificial sweeteners and caffeine. The aim of this study was to examine potential differences between labeled and measured caffeine and sugar concentrations in energy drinks according to the brands available on the Croatian market. Also, the aim of this study was undertaken to assess the energy drinks consumption pattern among the university students and investigate their preference of such drinks. Aggressive advertising of energy drinks, which is mostly aimed at the young population, as well as their insufficient legal regulation, may lead to a public health problem in the future.

Keywords: energy drink, sugar, caffeine, consumption, health

FOOD SAFETY

ANALYSIS OF RESIDUES OF VETERINARY DRUGS - NITROIMIDAZOLES IN CHIKEN EGGS

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poster presentation

Antibiotics used in the treatment of infections caused by anaerobic bacteria and parasites, to which nitroimidazoles belong, are not allowed in edible hen's eggs. Eggs as a highly nutritious food, a good source of proteins and other nutrients, due to the various methods of preparation, are often used in the diet as a quality meal, either independently or as an essential ingredient in meals and desserts. The aim of this research was to determine the presence and concentration of residues of veterinary drugs from the nitroimidazole group using the method of high performance liquid chromatography tandem mass detection, on 20 egg samples commercially available. In all samples, the concentration of nitroimidazole was below the ccα values obtained by method validation, and they comply with the current regulations of the Republic of Croatia regarding the residues of these veterinary drugs. The purpose is to prove the safety of chicken eggs sampled randomly from commercially available sources, and to confirm the importance of analyses on residues of veterinary medicinal products for consumer health protection.

Keywords: nitroimidazoles, eggs, health safety

FOOD SAFETY

FISH CONSUMPTION PREFERENCES IN CROATIA AND ELEMENT LEVELS IN SIX DEMERSAL FISH SPECIES FROM THE ADRIATIC SEA

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poster presentation

Fish is an important component of healthy diet. Because some predatory and demersal fish species may accumulate higher levels of contaminants, including toxic Hg, species suitable for consummation should be carefully selected. This study investigates consumer preferences on fish consumption in Croatia and levels of selected elements (Fe, Zn, Cu, Se, Hg) in six demersal fish species (hake, seabream, seabass, red mullet, whiting, common pandora) from the Adriatic Sea to evaluate related benefits and risks for consumers health. A survey on fish consumption was conducted online. Results showed that 94% of respondents (n=160) ate fish. On average, fish was consumed 1.4 times per week. Among consumers, 52% preferred fresh and 64% wild fish. The most commonly consumed species were hake (28%), seabream (25%) and seabass (22%). Average element levels in analysed fish (ICP-MS method) were (mg/kg ww): Zn 2.6–3.9, Fe 0.89–2.3, Cu 0.12–0.20, Se 0.19–0.45, Hg 0.07–1.2. For all species, one serving is a good source of essential elements, especially of Se (55–98% DRV), and can be safely consumed 1-2 times per week without risk of elevated Hg exposure. Only common pandora had Hg levels above the regulatory limit, and should be monitored continuously.

Keywords: marine fish, essential elements, mercury, fish consumption habits

FOOD SAFETY

ARTIFICIAL SWEETENERS IN SOFT DRINKS AND ITS INFLUENCE ON THE HEALTH OF THE STUDENT POPULATION

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poster presentation

Artificial sweeteners are food additives that replace sugar and have no caloric value. Some studies link their consumption to the occurrence of various diseases. The aim of this study was to measure the concentrations of artificial sweeteners (acesulfame K, saccharin and aspartame) in soft drinks and to investigate the frequency of their consumption among the student population in Osijek. The concentrations of artificial sweeteners were determined by high-pressure liquid chromatography, while the consumption of soft drinks was estimated through an anonymous cross-sectional questionnaire in March 2022. The mean concentrations of artificial sweeteners were 50.1 mg/L for acesulfame K, 19.8 mg/L for saccharin, and 22.7 mg/L for aspartame. Of the 792 students who completed the questionnaire (40.3% women and 59.7% men), 85.7% reported consuming soft drinks. The average consumption was 0.2 L of soft drinks per day, which included the daily intake of acesulfame K of 10.0 mg, saccharin of 4.0 mg, and aspartame of 4.5 mg, depending on the drink content. The research revealed prevalent consumption of soft drinks that contain artificial sweeteners among the student population of Osijek. Due to this widespread consumption, further research are needed to raise awareness of the possible effects of artificial sweeteners.

Keywords: artificial sweeteners, acesulfame K, saccharin, aspartame, consumption

FOOD SAFETY

HEALTH SAFETY OF WELL WATER FOR HUMAN CONSUMPTION ON THE TERRITORY OF VUKOVAR - SRIJEM COUNTY

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poster presentation

People use water for drinking, hygiene, cooking, irrigation, etc. Along with waterworks, wells serve as the most common source of drinking water, and their number in Vukovar-Srijem County is still large. Ensuring the health safety of water for human consumption is one of the basic criterion to protect human health. Microbiological analysis of water for human consumption from wells was performed on the following parameters: number of colonies at 22 °C and 36 °C, total coliforms, *Escherichia coli*, enterococci and *Pseudomonas aeruginosa*. A total of 274 samples of water for human consumption from wells were analyzed, according to the Ordinance on compliance parameters, monitoring and safety rules of water for human consumption and the way of keeping a register of legal entities that perform the activity of public water supply (OG 125/17; OG 39/20) and Rulebook on Amendments to the Rulebook on Compliance Parameters, Analysis Methods, Monitoring and Safety Plans for Water for Human Consumption and the Method of Keeping the Register of Legal Entities Performing Public Water Supply Activities (Official Gazette 125/17; Official Gazette 39/20), microbiologically, it was not in accordance with 33, 58% of samples. In the largest number of samples (30.66%), the presence of coliform bacteria was determined as an indicator of fecal pollution. The results of the analysis indicate the need for regular control of water from wells in order to protect people's health, because despite the existence of public water supply, people still use wells as a source drinking water.

Keywords: water for human consumption, well, microbiology, human health

FOOD SAFETY

AFLATOXINS IN THE FOOD AND FEED CHAIN: FROM MAIZE TO MILK

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poster presentation

Contamination of the food chain and animal feed with mycotoxins in Serbia is causing increasing concern due to previous, current, and predicted climate change. More and more often recorded drought conditions represent the greatest challenge, in the first place for the aflatoxins occurrence. In Serbia, during the previous decade, frequent occurrences of aflatoxins were recorded, first of all in maize and maize products, and then in milk and dairy products. All of the above affected: the quality, safety and yield of maize; large economic losses; mismatches between Serbian and European Union regulations for maximum levels of aflatoxins; confusion among consumers, etc. Analysis of maize, milk, and dairy products in the period from October 2022 to May 2023 indicates that Serbia again faced a significant problem related to aflatoxins occurrence. The frequent presence of aflatoxins in maize and milk is of great concern for contamination of the whole food and feed chain since maize represents the basic food for dairy animals, while milk and dairy products represent the main foodstuffs in human nutrition, especially for children. Since the aflatoxins problem in Serbia has lasted for more than a decade, there is a need to implement the necessary measures to improve resistance to the effects of climate change.

Keywords: Aflatoxins, milk, maize, Serbia

Acknowledgments
This work was financially supported by the Ministry of Science, Technological Development and Innovations, Republic of Serbia (Contract No. 451-03-47/2023-01/200222).

FOOD SAFETY

BISPHENOL A REDUCES ANTIOXIDATIVE ACTIVITY OF COMMON ONION (*ALLIUM CEPA* L.)

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poster presentation

Antioxidant, anti-inflammatory and antibacterial properties of common onion (*Allium cepa* L.) are well established. Due to increased use of plastic products worldwide, bisphenol A (4,4'-(Propane-2,2-diyl)diphenol; BPA) that is used in production of plastic, invariably accumulates in the environment. The aim of our study was to investigate accumulation of BPA in onion bulbs and its effect on their antioxidative activity. Onions roots were exposed to BPA solutions (0, 1, 5, 10, 25 and 50 mg/L) for three days. The presence of BPA in bulbs was determined using Fourier Transformed Infrared (FT-IR) spectroscopy while antioxidant activity of onion bulbs was established using DPPH and FRAP methods. In region 3500-3100 cm^{-1} (phenolic hydroxyl group region) control bulbs had transmittance of 93%, while bulbs of onions exposed to BPA had lower transmittance (from 85 to 75%) and the decrease in transmittance was dose-dependent. This indicates that BPA accumulates in onion bulbs. In bulbs exposed to BPA a significant decrease of antioxidant activity in comparison to the control bulbs was observed. It can be concluded that exposure of onions to BPA leads to accumulation of BPA in bulbs that consequently lowers onions' antioxidative capacity. These results are important since humans readily consume onions.

Keywords: *Allium cepa* L. bisphenol A, DPPH, FRAP, FT-IR

ANALIZA HRANE /
FOOD ANALYSIS

FOOD ANALYSIS

VALIDATION OF MEAT PRODUCTS WITHOUT NITRITE AND NITRATE SALTS

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poster presentation

Salts of nitrates and nitrites are among the most commonly used food additives in the meat industry due to their antimicrobial effect, in particular to prevent the growth of pathogenic bacteria *Clostridium botulinum* and its spores. Additionally, they provide specific sensory attributes, primarily the inherent pink color of meat products. In this paper two new recipes were studied: one without nitrites or nitrates and one with nitrates from natural source. Samples were raw pork meat, cooked ham and fermented sausage. Focus was placed on determination of nitrate, nitrite, phosphate and ascorbate content, microbiology and sensory properties of new recipes. Other parameters were determined such as pH, water, protein, fat, salt and water activity. The statistical analysis of the results of additives for cooked ham and fermented sausage showed a *p*-value <0.05 between recipes with added nitrite salt and new recipes that confirms the hypothesis for replacement of mentioned salts with new concepts. Phosphates were not added in the samples obtained by the new recipes which is evident in comparison with the results of the raw pork meat. In addition, the products were characterized as compact and homogeneous, with an uniform red color.

Keywords: sodium nitrate, sodium nitrite, replacement of additives, meat products

FOOD ANALYSIS

MINERAL COMPOSITION OF PUMPKIN AND ITS BY-PRODUCTS

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poster presentation

Fruits and vegetables are often rich in minerals because they are important nutrients for plant growth and development. Minerals are stored in different parts of the plant to protect it from environmental stressors such as physical damage. The objective of the present work was to determine the content of minerals in raw and dried pumpkin pulp, peel and seeds. Since the drying process can affect mineral content because some of them are heat sensitive, mineral composition in dried pumpkin was of particular interest. The mineral composition of the samples was determined using high-resolution inductively coupled plasma mass spectrometry. The results indicate that both, raw and dried pumpkin can be a good source of important minerals such as calcium, magnesium, manganese, zinc, and potassium, which are essential for various physiological functions in the body. In the samples studied, the peel was the most mineral-rich part. Thus, the consumption of pumpkin and its by-products can be an effective strategy to obtain these minerals and contribute to a balanced diet that promotes optimal health and well-being. By including pumpkin, especially dried pumpkin, and its by-products in daily meals, individuals can have access to a wide range of minerals important for various physiological functions.

Keywords: pumpkin, by-products, minerals, vacuum drying, hot air drying

Acknowledgement
This work was supported by means of the Croatian Science Foundation, project IP-2019-04-9750.

FOOD ANALYSIS

DETERMINATION OF AMYGDALIN IN DEEP EUTECTIC SOLVENTS EXTRACTS OF *PRUNUS LAUROCERASUS*

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poster presentation

Prunus laurocerasus L., from *Rosaceae* family, is native to the regions bordering the Black Sea in Southwestern Asia and Southeastern Europe where the fresh leaves are used in folk medicine because of their antispasmodic, narcotic and sedative properties. This properties are related with components such as phenolic acids, flavonoids and terpenes. In addition, the plant also contains cyanogenic glycosides, such as prunasin and amygdalin. Since there is a possibility of cyanide poisoning, the content of amygdalin in plants from four different locations was tested using six deep eutectic solvents (DESs) with 20% water (*w*/*w*). The extraction took place at 50 °C for an hour, and the obtained extracts were analyzed using high performance liquid chromatography (HPLC). In addition to the location, the influence of the type of drying on the amount of amygdalin in the extract was also examined. According to the obtained results, the most suitable solvent for the extraction of amygdalin was choline chloride: lactic acid (1:2) with 20% water (*w*/*w*). Also, there is a difference in the amygdalin content depending on the location and type of drying. The use of DESs proved to be a simple, fast and effective method of extracting amygdalin from *Prunus laurocerasus* L.

Keywords: extraction, hplc, amygdalin, deep eutectic solvents

FOOD ANALYSIS

ELECTROCHEMICAL CHARACTERIZATION AND DETECTION OF VITAMIN E IN REAL SAMPLES

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poster presentation

Vitamin E is an important antioxidant for the body and plays an essential role in cellular respiration. At room temperature, it exists in the form of viscous oil and is highly soluble in fat. Vitamin E comprises a group of eight compounds: four tocopherols and four tocotrienols. In this study α-tocopherol was characterized with cyclic and differential pulse voltammetry and was detected with HPLC in real samples (kale, parsley and powdered dietary supplement). Electrochemical research was performed in a three-electrode voltammetric cell with a working glassy carbon electrode, reference Ag/AgCl electrode and platinum wire counter electrode. Chromatographic measurements were carried out by means of HPLC. Ratio of sample : extraction mixture was 1:50 for kale and parsley and 1:1.25 for powdered dietary supplement. Cyclic and differential pulse voltammograms have shown one oxidation peak which corresponds to the oxidation of α-tocopherol. It was also determined that the anodic peak current of a-tocopherol increases with the increase of its concentration (linear response was obtained in the concentration range from 0.43 mg/dm^3 to 70.21 mg/dm^3). Obtained values of α-tocopherol were 8.25 mg/kg for parsley, 1.50 mg/kg for kale and 0.07 mg/kg for powdered dietary supplement.

Keywords: Vitamin E, α-tocopherol, cyclic voltammetry, differential pulse voltammetry, HPLC

FOOD ANALYSIS

CONTRIBUTION TO THE SAGE (*Salvia officinalis* L.) HONEY CHARACTERISATION: AMINO ACIDS PROFILE

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poster presentation

When determining the botanical origin of honey, the final judgement of confirmation of uniflorality is done based on the results of melissopalynological analysis, selected physicochemical parameters and sensory analysis. Nowadays, scientific studies are focused to find specific components or group of them that could be used as markers of botanical origin of specific honey type. Sage (*S. officinalis* L.) honey is unifloral honey characteristic for the Mediterranean part of Croatia and one of the most appreciated honey types among consumers. Although many characteristics of sage honey are described in the literature, the amino acid profile of this specific honey is not documented yet. The aim of this study was to determine composition and content of amino acids in four samples of sage honey. Amino acids profile was determined using high performance liquid chromatographic (HPLC) method with fluorescence detection after derivatisation procedure. The results showed that the dominant amino acid in sage honey was phenylalanine, unlike for the majority of honey types where proline (Pro) is the dominant amino acid. The average value of Phe content was 1978.41 ± 383.59 mg/kg that is considerably higher than in other honey types, even in comparison with honey types that are rich in Phe (e.g. lavender, rosemary or heather honey). After Phe, the most abundant amino acids in sage honey were Pro, tyrosine (Tyr) and cysteine (Cys) with average values 41.14 ± 7.81, 33.19 ± 7.47 and 23.11 ± 5.73 mg/kg, respectively.

Keywords: sage honey, characterisation, amino acids

FOOD ANALYSIS

TECHNOLOGICAL QUALITY OF WHEAT INFLUENCED BY NITROGEN FERTILIZATION

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poster presentation

Taking into consideration the increased awareness of environmental protection and sustainable production, this study compared the technological characteristics of three wheat cultivars (*Triticum aestivum* L.) grown under low and high nitrogen levels at the Osijek location. On average, the protein and wet gluten content of the wheat cultivars were lower when grown under low nitrogen rates compared to high ones, with reductions of 7.8% and 8.2%, respectively. However, the gluten index and falling number showed improvements of 2.4% and 16.4%, respectively, under low-nitrogen conditions. Taking into account the potential harmful effects of nitrogen fertilization on the environment, it can be concluded that the desired technological quality of wheat grain and flour can still be achieved by reducing nitrogen fertilization. This can be accomplished by using wheat cultivars with a greater genetic potential for protein synthesis and good viscoelastic properties of gluten.

Keywords: wheat, cultivar, nitrogen fertilization, baking quality

FOOD ANALYSIS

ASSESSMENT OF ANTIBACTERIAL AND ANTIRADICAL ACTIVITY IN *ALCHEMILLA VULGARIS* L. EXTRACT TREATED WITH MACROPOROUS RESINS

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poster presentation

Medicinal plants, such as common lady's mantle (*Alchemilla vulgaris* L.), are an important source of biologically active components, leading to the numerous possibilities of their application in the form of medical treatments or as novel drug formulations. Phenolic acids (ellagic and gallic acid) and hydrolyzable tannins (HT) from lady's mantle were extracted using deep eutectic solvents, where the most suitable solvent was choline chloride:urea (1:2) with 50% addition of water (*v*/*v*). Given that the main problem with the application of deep eutectic solvents in the extraction is the recovery of target compounds, different macroporous resins were used for purification and isolation of components from extracts. The objectives of this study were focused on finding an appropriate macroporous resin for recovery of components, as well as a suitable "green" desorbent. Content of ellagic and gallic acid and HT in the sample was analyzed by chromatography and spectrometry. Also, the antiradical and antibacterial activity for the obtained sample were determined. Based on the static isolation results, XAD16N was selected as a suitable resin for obtaining an extract with high antioxidant and antibacterial activity and aqueous ethanol solutions (30-70 %) as a suitable desorbent for gallic, ellagic acid and hydrolyzable tannins enrichment.

Keywords: deep eutectic solvents, green extraction, macroporous resins, dpph assay, hplc

FOOD ANALYSIS

PROPERTIES OF STARCH PASTES AND GELS OF DIFFERENT POTATO VARIETIES

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poster presentation

The aim of this study was to determine the properties of starch pastes and gels isolated from 8 different potato varieties. Starch was isolated from about 25 kg of every potato varieties, and dry matter content of isolated starches was first determined. Then, the following analyzes were carried out: determination of the clarity of starch pastes, determination of paste properties by Brabender's micro visco-amylograph and determination of the texture of starch gels. The results showed that starch from the variety *SL 13-25* had the smallest proportion of dry matter (83.51 ± 0.13%), and starch from the *Dartiest* variety had the largest proportion of dry matter (85.69 ± 0.02). The maximum value of paste viscosity had the *Scala* potato variety (1673.5 ± 20.5 BU), while the lowest value had the *Stilleto* potato variety (1410.0 ± 2.8). Shearing at a high temperature resulted in a decrease in the viscosity of all pastes, with the *Saprodi* variety showing the most significant decrease. As a result of cooling, the *Saprodi* variety had the greatest increase in viscosity, which resulted in an increase in retrogradation tendency. The *Dartiest* variety had the highest paste clarity, hardness and adhesiveness (55.90 ± 2.83% T (650 nm), 3.30 ± 0.16 g and -73.02 ± 9.50 g sec, respectively), while the potato starch gel of the *Sereno* variety had the highest fracturability (998.99 ± 10.61 g).

Keywords: starch, potato, isolation, properties of starch pastes and gels

FOOD ANALYSIS

QUALITIY OF APPLE JUICE PRODUCED FROM TRADITIONAL APPLE CULTIVARS

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poster presentation

The Republic of Croatia has a strong tradition of fruit growing, particularly apple cultivation, due to its favourable geographical location, climate, and high-quality fruit crops. While conventional apple cultivars such as 'Jonagold', 'Idared', 'Golden Delicious', 'Fuji', and 'Granny Smith' are commonly grown in Europe, traditional apple cultivars are gaining popularity and demand in the Croatian market. Supplying apples to the domestic market is an important sector of production in Croatia, with these apples being particularly suitable for juice production due to their distinct taste and aroma. A recent study aimed to evaluate and compare the juices produced from different traditional apple cultivars ('Wagener', 'Ilzer Rosenapfel', 'Winter Banane', 'Ivanlija', 'Mašanka') with juices produced from conventional apple cultivars. Several parameters were analyzed, including antioxidant activity, total polyphenols, total acidity, pH, and total soluble solids. The pH values of the traditional and conventional cultivars showed no clear distinction in acidity levels, with ranges of 3.36 to 3.40 and 3.28 to 3.82, respectively. However, traditional cultivars like 'Mašanka' and 'Ilzer Rosenapfel' exhibited higher total acid content compared to conventional cultivars. Total soluble solids, representing the content of sugars and acids, did not significantly differ between the two groups. Traditional cultivars demonstrated higher DPPH values, indicating stronger antioxidant properties, especially 'Ilzer Rosenapfel' and 'Winter Banane'. Similarly, traditional cultivars 'Mašanka' and 'Winter Banane' had higher total polyphenol content, suggesting elevated levels of beneficial polyphenols. The sugar content did not show a clear distinction between traditional and conventional cultivars, as it varied within both groups. In conclusion, traditional apple cultivars generally exhibited higher total acid content, DPPH values, and total polyphenol content compared to conventional cultivars. This suggests that traditional cultivars may possess stronger antioxidant properties and potentially higher levels of beneficial polyphenols. However, there were no significant differences in pH, total soluble solids, and sugar content between the two groups. This research was funded by the Croatian Science Foundation (UIP-2020-02-8461).

Keywords: apple juice quality, traditional Croatian apple cultivars, sugar profile

FOOD ANALYSIS

DETERMINATION OF HOMOGENITY OF TRUFFLE DISTRIBUTION IN CHEESE USING DIGITAL IMAGE ANALYSIS

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poster presentation

The aim of this study was to determine the homogeneity of the additive in semi-hard cheese using the method of computer analysis. The correct distribution of the additives in products is important due to their appearance, the uniform taste and the overall acceptability of customers. Six cheeses with truffles, different Croatian producers selected for the samples and purchased in retail trade chains. The samples sliced into slices, which then digitized by photographing in a lighting chamber and stored images onto a computer. The images translated into a suitable graphic account and isolated areas of interest for surface analysis. The results of the analysis of the image processed statistically and the samples compared and ranked according to homogeneity. The measured and calculated homogeneity of the truffle distribution in the cheese, on a scale of 0 to 5, was in the range of 0.53 to 3.54. The most homogeneous sample was the cheese sample of producer Zigante truffles d.o.o., Buje, RH.

Keywords: semi-hard cheese, truffles, digital image analysis, homogeneity of distribution

FOOD ANALYSIS

VOLATILE COMPOUNDS IN GIN

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poster presentation

Gin is a strong alcoholic beverage with a minimum alcohol content of 37.5% vol, obtained by flavoring ethyl alcohol of agricultural origin with juniper berries (*Juniperus communis*) and other aromatic substances. The aim of this work was to identify and compare the profile of volatile compounds of gin obtained from four different producers. Volatile compounds were isolated by solid phase microextraction (HS-SPME), using two fibers of different polarity, and identified by the coupled technique of gas chromatography-mass spectrometry (GC-MS). A total of 37 volatile compounds belonging to the chemical groups of terpenes, terpenoids, esters and phenylpropanes were identified. Among them, limonene, *trans*-anethole, *α*-terpenyl acetate and *α*-pinene were predominant and they are characteristic of the essential oil of juniper (*Juniperus communis*). The differences in the aromatic profiles of the investigated samples are the result of different recipes and the specifics of the production process.

Keywords: gin, volatile compounds, HS-SPME, GC-MS

FOOD ANALYSIS

POMOLOGICAL AND PHYSICOCHEMICAL CHARACTERISATION OF THE TRADITIONAL SLAVONIAN PEAR VARIETY *MOŠTENKA*

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poster presentation

This study was performed to analyse some pomological (firmness, shape, fruit mass and dimensions) and physicochemical properties, including colour, titratable acidity, sugar content, and total and soluble solids of the traditional old pear variety Moštenka, grown in the Slavonia region of Croatia. The content of phenolic compounds (HPLC analysis) and antioxidant activity (DPPH and ABTS assays) were determined in different fruit parts, as well as the content of ascorbic acid. The average flesh firmness of the pears was 154.07g, and the total and soluble solids contents were 22.05% and 15.7%, respectively. The peel had higher antioxidant activity and ascorbic acid content, and total phenolic compounds (TPC) content (0.429g/L) than pulp (0.183g/L). The TPC content of the whole fruit was 0.247g/L. Arbutin was the predominant phenolic glucoside in the peel and whole pear, accounting for 38-66% of the TPC content. Its content was higher in the peel (328.7mg/kg) than in the pear pulp (27.1% of its peel content). Pear pulp had a higher content of chlorogenic acid (94.7mg/kg). It is extremely important to preserve old varieties as they represent a traditional rural landscape and great biodiversity, but they are also a valuable source of genetic material, i.e., the characteristics exhibited by certain varieties.

Keywords: pear, Moštenka, peel, pulp, biodiversity

FOOD ANALYSIS

VOLATILE COMPOUNDS OF FLAVORED OLIVE OILS

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poster presentation

Olive (*Olea europea* L.) is one of the most important agricultural plants in the Adriatic part of Croatia, which is grown mainly for the production of olive oil. Olive oil has a specific aroma, which is why some consumers dislike it. Lately, more often olive oils have been flavored by adding various aromatic plants and citrus fruits. Flavored olive oils offer a range of new tastes and aromas, in an attempt to attract those consumers who do not like the original taste of olive oil. In the present study volatile aroma compounds were isolated from olive oil and olive oils flavored with lemon, bitter orange, oregano and rosemary by headspace solid-phase microextraction (HS-SPME) and analyzed by gas chromatography-mass spectrometry (GC-MS). The main components in the headspace of the olive oil were volatile C_6 compounds, *(E)*-heks-2-enal and heksan-1-ol, known as green aroma compounds. The headspaces of the flavored olive oils are characterized by a high content of terpenes, the compounds that come mainly from the plant (fruit) with which the olive oil is flavored. The headspaces of the lemon and bitter orange flavored olive oils were qualitatively and quantitatively similar, with the monoterpene hydrocarbon limonene being the dominant compound. In the headspace of the olive oil flavored with oregano, the monoterpene compounds, the hydrocarbons limonene, *p*-cimene and *γ*-terpinene and the phenol thymol predominated. The main constituents of the rosemary flavored olive oil headspace were the monoterpene hydrocarbons limonene and *p*-cimene and the monoterpene ether 1,8-cineole.

Keywords: olive oil, flavored olive oils, volatile compounds, HS-SPME/GC-MS

FOOD ANALYSIS

PHENOLIC ANTIOXIDANTS FROM ADRIATIC SEA FENNEL WILD-GROWN POPULATIONS

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poster presentation

The halophytic plant, sea fennel (lat. *Crithmum maritimum* L.) is widely distributed along the coastal area of Dalmatia region (Croatia). Since ancient times it has been used as food and for the prevention of various diseases due to its pronounced antioxidant properties. In this work, phenolic profile and antioxidant properties of vegetative (leaves) and generative (flowers) parts of sea fennel were determined. Samples were collected during the flowering season at 10 different locations along the Adriatic coast. Total phenolics and flavonoids were determined spectrophotometrically, while chlorogenic acids were detected by HPLC. Antioxidant properties were tested using FRAP and DPPH assay. The results showed a pronounced phenolic content and antioxidant activity of the samples. Large differences among obtained results were observed, related to the plant sampling location and used plant part. The results confirmed a statistically significant positive correlation between the phenolic composition of the extracts and their antioxidant potential. Despite the observed differences, the high content of phenolics, especially the dominance of biologically active chlorogenic acid, and the good antioxidant activity of all samples indicate the potential use of sea fennel in various industries. This research is supported by the PRIMA programme (supported by the European Union) under project SEAFENNEL4MED.

Keywords: *Crithmum maritimum* L., phenolic compounds, antioxidants, chlorogenic acid, FRAP, DPPH

FOOD ANALYSIS

ENERGY AND NUTRITIONAL VALUE OF DRIED MEAT PRODUCTS AT SANSKI MOST

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oral presentation

Meat is a highly valued food product for human consumption because it is a good source of energy, fat, protein, essential amino acids, vitamins and minerals. Cured meat products mean products obtained by processes that include salting or brining, and drying or heat treatment with or without smoking beef, sheep, goats, pigs and ungulates. The research was carried out in the laboratory for testing chemical and biological residues and food quality at the Veterinary Faculty of the University of Sarajevo. The established energy values of samples of beef prosciutto (4.19 kJ/100 g), dried sausage (sudžuk) was 4.16 kJ/100 g) and dry lamb meat "stelja" 4.14 kJ/100 g). It can be said that the difference in energy value was not significant between the samples. Looking at the aggregate results, the chemical composition varied among the samples, so the highest moisture values were the sample of dry meat (52.05%), dry lamb meat "stelja" (35%) and dried sausage (38.95%). The same happened with dry matter, the highest value was the sample of dry lamb meat "stelja" (65%), followed by the sample of dried sausage (61%) and finally the sample of dry meat (47.95%). The total protein values ranged from: dry meat 32.25%, dried sausage 39.88% and finally dry lamb meat "stelja" 21.85%. The percentage of lipids (fats) in the analyzed samples was 61% in dried sausage, 38.11% in dry lamb meat "stelja", and 10% in the dry meat sample. The results obtained in our work on the nutritional values of the analyzed dried meat products match or coincide with the data used in the literature for this researched area. The aim of this research was to determine the energy-nutritional value of Bosnian dried sausage, s dry lamb meat "stelja", and prosciutto (dried meat) in the area of Sanski Most municipality.

Keywords: dried meat, nutritional value, fermented and dried sausages, dry lamb meat "stelja"

FOOD ANALYSIS

AROMA PROFILE OF TRADITIONAL CROATIAN SWEET EASTER BREAD – *PINCA* (*SIRNICA*)

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poster presentation

Pinca (Sirnica) is a sweet bread that is traditionally made in Croatia for Easter. It is usually served with spring onions, dyed hard-boiled eggs, ham and other cakes. This round sweet bread has a light crumb and a golden crust and is topped with sugar and marked by a singular cross on the surface. In Dalmatia, it is called "s*irnica*" which refers to cheese although cheese is not an ingredient used in the preparation. That name is probably associated with traditionally preparing dough with a sourdough starter. Generally, the main ingredients in making *pinca* are wheat flour, butter or lard, egg yolks and some flavourings like citrus peel (orange and lemon), vanilla, grape brandy, rose liqueur, etc. The aim of this work was to characterize the volatile compounds of *pinca* purchased from several producers. Volatile compounds were isolated by headspace solid-phase microextraction and analyzed by gas chromatography coupled with mass spectrometry (GC-MS). The identified volatile compounds belong to the following chemical groups: alcohols, acids, esters, aldehydes, ketones, hydrocarbons, phenols and terpenes. In our research, terpenes were the most dominant group of volatiles. The most abundant compound in all samples was limonene, which is typical for citrus fruits. Other identified compounds found in all samples were ethanol, acetoin, 2,3-butanediol, α-pinene, β-pinene, β-myrcene, γ-terpinene, geraniol, linalool, etc. According to the obtained results, it could be concluded the existence of differences in the aromatic profile between the samples, which was expected considering that each producer has its own recipe and specificity in the technological production process.

Keywords: *pinca*, sirnica, aroma profile, HS-SPME/GC-MS

FOOD ANALYSIS

DETERMINATION OF TEXTURAL PROPERTIES OF DIFFERENT FILLINGS BY FORWARD EXTRUSION TESTING METHOD

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poster presentation

Defining textural properties and their relative magnitude is an essential criterion for the production of high quality foods and their successful introduction to the market. The texture of a filling can have a strong impact on consumer perception, satisfaction, and acceptance, and the textural properties of fillings can affect the functionality and stability of the product. Among texture properties, firmness is one of the most important parameters. To determine the firmness and homogeneity by extrusion, six different fillings (chocolate, vanilla, apple, apricot, cherry and strudel) were studied in this work. Their textural properties were determined using the Texture Analyser, with forward extrusion set and Exponent software. The analysis was performed using an extrusion cell that measures the compressive force required for a piston disc to extrude a product through a 3 mm hole in the bottom of the sample container. The actual extrusion force was read in the force-time coordinate system. The average extrusion force was calculated and interpreted as firmness. The maximum and minimum extrusion forces were determined, and their deviation from the average force indicated the degree of homogeneity of the sample. The results showed that the samples of chocolate and vanilla were the most homogeneous; the samples of apple, strudel and cherry were the least homogeneous, and the homogeneity of apricot was intermediate between these values. By carefully analysing and controlling these characteristics, manufacturers can develop health products that meet both sensory and functional requirements, ultimately contributing to improved product quality and consumer well-being.

Keywords: texture analysis, extrusion, firmness, homogeneity, fillings

Acknowledgement
This work was supported by the project "Increasing the development of new products and services arising from research and development activities - phase II\": Development of innovative products to increase food quality \"- KK.01.2.1.02.0282.

FOOD ANALYSIS

DEEP EUTECTIC SOLVENTS (DES) AS CAFFEINE EXTRACTANTS FROM FOOD AND BEVERAGE SAMPLES

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oral presentation

Deep eutectic solvents (DES) are considered excellent substitutes for traditional organic solvents, which can be applied for the extraction of phytochemicals from various materials. The aim of the work was to examine the use of DES as caffeine extractants from various commercial food and beverage preparations. 9 samples of commercial food and beverage preparations were tested. Extraction was performed using two types of DES (a mixture of menthol and methylsalicylate (1:1) and a mixture of menthol and dodecanoic acid (2:1)), as well as ultrasonic and microwave extraction. The caffeine content in the tested preparations was determined using high-performance liquid chromatography (HPLC). The results showed that the most effective extraction method for all samples was extraction with DESs, and the least effective was ultrasound extractiom. Extraction with DESs provided amounts of caffeine which correspond to the declared values of the products while the other extraction methods gave significantly lower values. This can be attributed to the fact that hydrophobic DES is an excellent extractive media capable of extracting non-polar organic substances. DES could be widely used as an effective solvent for caffeine extraction from food and beverages, especially considering its environment-friendly nature and low cost.

Keyword: DES, green solvents, caffeine, extraction

Acknowledgement
This work is financially supported by Provincial Secretariat for Higher Education and Scientific Research, grant number: 142-451-2545/2021-01.

PROIZVODNJA ZDRAVSTVENO SIGURNE I NUTRITIVNO VRIJEDNE HRANE / *PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE*

PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

PSEUDOLATEX ZEIN FILMS WITH ANTIMICROBIAL ACTIVITY

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poster presentation

Pseudolatex technology represents an innovative approach to the preparation of films and coatings. It has been already used in pharmaceutical industry, to a certain extent, but it has not been enough explored within food science applications. Zein is water–insoluble plant protein with film–forming properties, which can be used for the preparation of biodegradable films with great potential for sustainable food packaging. In this study, zein films (zFc) were prepared from dispersions of zein nanocapsules (zNC) encapsulating carvacrol, using pseudolatex technology. Carvacrol is a phenolic monoterpene, with antimicrobial and antioxidant properties, and it was used as a model lipophilic antimicrobial agent. Influence of carvacrol on zFc water resistance and optical and mechanical properties was tested. Encapsulation efficiency and release curves of carvacrol were determined. Antimicrobial activity of zFc with the highest carvacrol concentration was tested under dynamic conditions. It was shown that continuous zein films can be prepared by coalescence of zNC, using pseudolatex technology. Results showed that tested carvacrol concentrations have little to no effect on zFc properties. Antimicrobial activity of zFc was found to be sufficient to block the growth of gram-positive bacteria.

Keywords: zein, pseudolatex, antimicrobial, films, biodegradable

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

FERMENTATION OF COCONUT WATER AND BACTERIAL NANOCELLULOSE BIOSYNTHESIS USING WATER KEFIR GRAINS AN *KOMBUCHA* COCULTURE

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poster presentation

Fermentation is an ancient food and beverage preservation form and has been practiced for millennia. *Kombucha* and kefir are traditional fermented drinks produced by adding symbiotic cultures of lactic and acetic acids and yeasts to medium. Such microbiota acts like microscopic cell factories producing beneficial nutrients with antimicrobial and anticancer effects. This work studies the cultivation of coculture of water kefir grains and *kombucha* in aerobic static conditions for up to 14 days of fermentation in coconut water, at room temperature, with different sucrose concentrations added. Changes in pH value, ethanol, acetic acid, gluconic acid, and lactic acid were observed, as well as the yield of bacterial nanocellulose (BNC) in coculture. The properties, crystallinity, and structural characterization of BNC produced from coculture were evaluated by X-ray diffractometry, FT-IR, and SEM. The antimicrobial activity of BNC was tested against bacteria *Staphylococcus aureus* and *Bacillus subtilis*, as well as yeasts *Candida albicans* and *Schizosaccharomyces pombe*. The water holding capacity (WHC) and release rate (WRR) were calculated, and the results supported its anticipated use as antimicrobial wound dressing material. Bacterial nanocellulose (BNC) produced from coculture of water kefir grains and *kombucha* shows its unique microfibril characteristic properties, which make it a versatile biomaterial for application in various domains.

Keywords: *kombucha*, water kefir, coculture, fermentation, bacterial nanocellulose

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

PHOTOSYNTHESIS LESSONS FROM THE STUDY OF WHEAT GENOTYPES UNDER CONTRASTING PRODUCTION YEARS

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oral presentation

Wheat (*Triticum aestivum* L.) is one of the key staple crops providing daily calories and protein intake. It is expected that food demand will increase due to the growing human population, whereas wheat production might be decreased due to environmental stresses associated with climate change. Further, climate change is increasing the frequency of drought occurrence as a result of global warming which will result in a decline of overall food production. Therefore, wheat breeders have a task to ensure the production of wheat genotypes with tolerance to drought. One of the ways to insure this goal is the improvement of photosynthesis to increase grain yields within climate change scenarios. The current research aimed to measure the chlorophyll *a* fluorescence of wheat plants through two vegetative seasons in the field conditions and thus obtain possible correlations between the photosynthesis of flag leaf and data on wheat grain yield and quality. According to some investigations enhancing photosynthesis is widely accepted as critical for upgrading the grain yield of wheat. Our investigation is particularly interesting in terms of grain yield stability and quality parameters under contrasting production years whereas the 2022 year was under drought influence while the 2023 year has excessive rainfall amount that enhanced flag leaf diseases.

Keywords: environmental stress, grain yield, photosynthesis, wheat

Acknowledgement
The work of doctoral student Jurica Duvnjak has been supported in part by the "Young researchers' career development project – training of doctoral students" of the Croatian Science Foundation.

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

POWDERED OAT HUSK AS A VALUABLE BY-PRODUCT FOR COOKIES ENRICHMENT

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oral presentation

Oat (*Avena sativa*) stands out from other cereals due to its unique characteristics and nutritional composition. Recent progress in the field of food and nutrition has shed light on the significance of the different oat components. The objective of this study was to explore the potential use of powdered oat husk (OH) as a substitute for wheat flour in the production of shortbread cookies. The researchers investigated the physicochemical and sensory properties of both the regular and enriched cookies. Incorporating OH into the shortbread led to an increase in fiber and ash content, while reducing the available carbohydrates. The enriched shortbread exhibited noticeable changes in color, with a significant difference ranging from 4.76 to 11.00 compared to the regular cookies. Additionally, the total phenolics content and antioxidant activity of the cookies showed a linear increase with the percentage of husk used. Importantly, the addition of 20% OH had minimal impact on the sensory acceptability of the cookies. However, when wheat flour was replaced by more than 10%, the texture of the cookies became harder, resulting in lower scores for this attribute. In conclusion, this study demonstrated that powdered OH can serve as a valuable additive for fortifying cookies.

Keywords: oat, husk, hull, cookies, quality

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

SAFETY ASSESSMENT OF PROTEINS FROM RAPESEED PRESS CAKE AS NOVEL FOOD

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poster presentation

The presence of antinutrients and toxicants in rapeseed press cake highlights the importance to thoroughly assess their levels and impacts to ensure compliance of isolated proteins with novel food approval requirements. Glucosinolates, as the primary antinutrients in rapeseed press cake, undergo rigorous evaluation due to their potential negative impact on human health. Phytic acid can hinder mineral absorption and contribute to mineral deficiencies while erucic acid is subject to novel food regulations due to its potential adverse effects on cardiovascular health. Tannins, although not extensively studied as novel food components, require attention due to their potential interactions with proteins and bioactive compounds. Their inclusion in novel food formulations must be considered regarding their effects on taste, texture, and bioavailability of other nutrients. Effective measures to reduce glucosinolate, phytic acid and tannin content, and control levels of potential toxicants such as erucic acid are essential for promoting the utilization of rapeseed protein isolates as a valuable food ingredient. Novel green techniques such as heat treatment, enzymatic treatment, or microbial fermentation, as well as their combination with green solvents could contribute to the production of high-quality rapeseed protein isolates that would meet the requirements for novel food approval.

Keywords: Rapeseed press cake, antinutrients, toxicants, novel food

Acknowledgement
This work was financially supported by the Ministry of Science, Technological Development and Innovations, Republic of Serbia (Contract No. 451-03-47/2023-01/200222), as well as by the Science Fund of the Republic of Serbia, Grant No 6673, PROTein from Rapeseed Oil Processing Waste: Application in Food and Wastewater Treatment – PROTOPOWER.

PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

INFLUENCE OF LEAD ON CHIA OXIDATIVE STRESS LEVELS (*Salvia hispanica* L.)

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poster presentation

Chia (*Salvia hispanica* L.) is one of the key dietary components in Central America and has been given the title of "superfood". It is believed that its high nutritional value, antioxidant, anti-inflammatory effects prevents different diseases. The soil in Mexico and Argentina have high concentrations of heavy metals due to industrial pollution which increase concentrations of reactive oxygen species, resulting in oxidative stress that causes changes in the growth, development and yield of plants. Mexico and Argentina are among the largest exporters of chia seeds and seeds from these countries are often found on European markets. We investigated the influence of 0.2 and 0.4 mM concentrations of lead acetate on chia microgreens for two weeks. The plants were grown in glass containers and treated every 2-3 days. Concentrations of hydrogen peroxide and ascorbic acid slightly decreased in plants treated with 0.2 mM lead acetate. The obtained results indicate that lower concentrations of acetate could have a beneficial effect, helping the plant to defend against oxidative stress. The concentrations of lead acetate were not high enough to significantly increase the levels of oxidative stress, which we assume is related to the protective role of the gelatinous coat secreted by the seeds.

Keywords: haevy metals, antioxidant, ascorbic acid, microgreens

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

OATMEAL AND WHEAT FLOUR AS THE SOURCES OF THYROID PEROXIDASE (TPO), LIPOXYGENASE (LOX) AND XANTHINE OXIDASE (XO) MODULATORS POTENTIALLY APPLICABLE IN THE PREVENTION OF INFLAMMATORY THYROID DISEASES

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poster presentation

The research aimed to estimate the mode of modulation of thyroid peroxidase (TPO), lipoxygenase (LOX) and xanthine oxidase (XO) activity by potentially bioaccessible compounds from oatmeal (OM) and wheat flour (WF) (selected as rich sources of dietary ferulic acid), type and strength of interactions between them, as well as influence on thyroid cancer development. Interaction studies were performed in vitro and in silico using isobolographic analysis and combination index (CI) estimation, antitumor potential studies were performed *in vitro* using Human thyroid cancer B-CPAP and 8505C cells. Potentially bioaccessible compounds activated TPO and acted synergistically (CI=0.18±0.02). Strong synergism (CI=0.25±0.01) between LOX inhibitors and synergism (CI=0.45±0.02) between potentially bioaccessible XO inhibitors was determined. The cytostatic effects of control extracts from WF and OM on thyroid cancer cells were observed. Simulated digestion augments the bioavailability of protective/pro-invasive compounds of oatmeal, while retaining cytostatic activity of the extracts. To the best of our knowledge, there is no data on correlated pro-TPO and anti-LOX/XO activity in the current literature. The potential pro-health effects are intensified by the interaction of bioactive compounds, which indicates the possibility of designing food products dedicated to people suffering from hypothyroidism / Hashimoto's disease.

Keywords: thyroid peroxidase (TPO), lipoxygenase (LOX), xanthine oxidase (XO), activation, ferulic acid, antioxidant activity, interactions

Acknowledgment
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PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

APPLICATION OF WHEY-BASED ENCAPSULANTS IN FOOD PRODUCTION – A REVIEW

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poster presentation

Encapsulation has become one of the most important applications in food industry. It is defined as a process of incorporating various food ingredients into small capsules that are later used for food production. A lot of materials can be used in the formulation of capsules for capturing bioactive components (antioxidants, minerals, vitamins, phytosterols, probiotics, polyunsaturated fatty acids, etc.) such as starch, pectin, gluten, carrageenan, alginate, dextran, chitosan, plant exudates (gum Arabic), waxes, fatty acids, glycerides, etc. However, great attention is paid to whey-based wall materials due to their low cost, availability, wide application, and safety of use. This paper focuses on a review of the literature related to the properties, encapsulation methods, and the possibilities of using whey protein as an encapsulant in food production and processing.

Keywords: whey, encapsulation, functional food, nutraceuticals

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

ANTIFUNGAL POTENTIAL OF LACTIC ACID BACTERIA ON SOYBEAN SEEDS

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poster presentation

Fungi, it is well known, cause great damage to agricultural producers as the causative agent of plant mycosis. Fungi are often present in storage conditions as well. Some fungi genera are producers of mycotoxins of different toxicity that remain on the seed material and represent food safety hazards. The fungi prevention as well as their decontamination is the subject of numerous studies. Safe food and animal feed without agrochemicals and toxigenic fungi are considered to be important issues, therefore scientific study in the field of the biocontrol potential of biological agents, such as microorganisms and their metabolites in suppressing the fungi growth are necessary. Lactic acid bacteria possess antifungal properties, and this research aimed to determine the biocontrol potential of *Lactobacillus brevis* and *Lactobacillus casei* in suppressing the mycelial growth of *Fusarium verticillioides* and *Penicillium chrysogenum* on a natural substrate-soybeans seeds. The results determined a statistically significant inhibition of the growth of both tested fungi, with the inhibition of the mycelial growth of *F. verticillioides* ranging from 71 to 79%, while the inhibition of *P. chrysogenum* was 88 to 91%. Further research should determine in more detail the metabolites that are responsible for the established antifungal inhibition, as well as determine the inhibition of mycotoxin synthesis and establish the effectiveness of lactic acid bacteria on other phytopathogenic fungi.

Keywords: biocontrol, *Lactobacillus*, *Fusarium verticillioides*, *Penicillium chrysogenum*, soybean

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

PRODUCTION OF RESISTANT STARCH BY POTATO STARCH ROASTING WITH UNRIPE APPLE JUICE CONCENTRATE AND ANALYSIS OF ITS PROPERTIES

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poster presentation

The use of chemicals in the food industry raises concerns among an increasing number of consumers. The application of organic acids, occurring naturally in plant materials, for starch esterification may represent an alternative to the methods of its chemical modifications. The present study aimed to produce starch esters from potato starch roasted with unripe apple juice concentrate at several temperatures: 70 °C, 80 °C, 100 °C, 120 °C, and 140 °C. Afterwards, the esters were determined for the following parameters: the content of substituted acids (after base de-esterification) with liquid chromatography (HPLC); swelling power and solubility in water having a temperature of 80 °C; pasting parameters based on DSC thermal characteristics; rheology of the pastes based on flow curves plotted; pastes resistance to amyloglucosidase; and color changes using a colorimeter. The roasting at temperatures up to 100 °C enabled producing preparations with a low degree of substitution, whereas higher roasting temperatures produced high-substituted preparations. The degree of substitution had a significant effect on the properties of the malates produced. The esters with a low degree of substitution featured higher solubility in water and swelling power, higher initial and final pasting temperatures, and higher viscosity compared to those with a low degree of substitution. An increase in the substitution degree was accompanied by a decline in starch esters susceptibility to amylolysis. Production of starch esters using a natural apple concentrate may prove a viable alternative to typical chemical modifications applied in the food industry and an environmentally-friendly method for producing modified starch preparations to manufacture low-energy foods eliciting potential health benefits.

Keywords: starch, esterification, roasting, apple juice concentrate

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

SUSTAINABLE EXPLOITATION OF GRAPE POMACE AS AN IMMOBILIZATION CARRIER OF *LACTIPLANTIBACILLUS PLANTARUM* 2035

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poster presentation

Grape pomace (GP) consists the major by-product of winemaking. Despite its great potential as a value-adding material, applications for its reutilization until recently can be characterized as conventional, ignoring innovative sustainable applications. Within this context, the present study focused on the use of GP as an immobilization carrier for lactic acid bacteria (*Lactiplantibacillus plantarum* 2035), for the subsequent use in industrial fermentation processes, including malolactic fermentation. The effects of GP variety (Assyrtiko – white, Xinomavro – red) and carrier dosage (35, 70, 145 g/L) on the efficiency of immobilization were examined. The addition of GP at a concentration of 70 g/L produced the highest immobilization yield, while no significant differences were observed between the different varieties employed. During freeze-drying, GP provided sufficient protection to *L. plantarum* cells, while no significant changes were observed during storage of freeze-dried immobilized cells, especially at low temperatures (4^{o}C and -18^{o}C). The results are very promising for the sustainable exploitation of GP in winemaking following the concept of circular economy.

Keywords: grape pomace, freeze-drying, immobilization, winemaking, malolactic fermentation

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PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

EDIBLE COATINGS BASED ON CITRUS PEEL PECTIN AND OREGANO ESSENTIAL OIL FOR ACTIVE PACKAGING OF FRESH/FRESH-CUT FRUITS

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oral presentation

Active films and coatings based on biopolymers, as an eco-friendly alternative to petroleum-based materials, can successfully protect perishable food products from environmental factors resulting in their extended shelf life. The aim of this study was to develop edible coatings based on citrus peel pectin and different concentrations of oregano essential oil (OEO) for an active fresh/fresh-cut fruits packaging. Films casted from pectin-OEO formulations were characterized regarding their microstructural and water barrier properties, as well as antimicrobial and antioxidant activity. The effect of various concentrations of OEO on intermolecular interactions within pectin matrix was perceived by FTIR spectra analysis. Prepared coatings were applied on fresh/cut apples and monitoring was set during five days. Final results showed that with addition of 0.5% and 1% OEO, films with less moisture sensitivity and great antioxidant, antibacterial and antifungal activity were produced. Fresh-cut apples coated with pectin-oil formulations remained fresher compared to the uncoated ones during storage. The best retention of apple slices color and freshness was observed in case of coatings containing lower oil content (0.05 and 0.1%). Results indicated great potential of coatings based on pectin and oregano oil to be used as an edible active packaging material for fresh/fresh-cut fruits.

Keywords: active packaging, edible films and coatings, pectin, oregano essential oil, fresh-cut fruits

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

THE INFLUENCE OF CAROB SEED FLOUR ON THE FERMENTATION OF GOAT MILK AND THE PHYSICAL-CHEMICAL CHARACTERISTICS OF THE PRODUCED YOGHURTS

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poster presentation

Yoghurt, considered one of the most popular dairy products, is produced by fermentation of *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus* as starters, resulting in healthy food due to rich sources of vitamins, minerals, hydrolyzed carbohydrates, and bioactive proteins. Goat milk has lower allergenic and higher digestibility properties than bovine milk, and also have function of certain therapeutic values, which make it attractive to consumers. Carob seed gum is mostly used in the food industry as stabilizing and thickening additive in food processing. This research aimed to produce yoghurt from goat milk with the addition of carob gum (0.05%, 0.15% and 0.25%) by fermentation at two different temperatures (37 °C and 43 °C) in order to enhance yoghurt properties. Active and titration acidity, colour, syneresis, water retention capacity, lactose content, dry matter and ash content, viscosity, and microbiological and sensory evaluation were determined for all samples. Obtained results indicated that carob gum had positively affected the final product in all tested properties at both fermentation temperatures, while sensory analyses showed more acceptable products fermented at a lower temperature.

Keywords: goat yoghurt, carob seed gum, fermentation, viscosity

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

THE IMPACT OF PROTEINS OF DIFFERENT ORIGIN ON THE VISCOSITY AND PARTICLE SIZE DISTRIBUTION OF DARK CHOCOLATE

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poster presentation

In addition to the high content of carbohydrates and fats, chocolate is rich in minerals and polyphenolic compounds, where the proportion of these micronutrients increases with the increase in the proportion of dark cocoa solids in chocolate. White and milk chocolates usually contain 6-8% of proteins, while dark chocolates with a high proportion of cocoa solids can also contain up to 10% proteins. However, dark chocolates with a lower proportion of cocoa solids contain lower protein content. In this work, black chocolate was produced with the addition of 5, 10 and 15% of protein isolates originating from soy, milk and collagen, in order to increase the protein content in enriched chocolates. The particle sizes in the obtained chocolates increased in accordance with the added concentrations, whereby enriched chocolates with collagen protein had the largest mean volume diameter. Due to a decrease in the amount of cocoa butter, the yield stress and viscosity increased in enriched chocolates with an increase in the amount of all applied proteins. Milk isolate had the greatest effect on increasing the yield stress at all applied amounts, while the chocolate with 15% of soy isolate had the highest value of Casson viscosity.

Keywords: dark chocolate, proteins, particle size distribution, rheology

PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

SENSORY CHARACTERISTICS OF TURMERIC POWDER ICE CREAM

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poster presentation

The aim of this study was to investigate the effect of turmeric powder on the sensory properties and acceptability of functional ice creams. Ice cream samples were prepared with three different concentrations of turmeric powder: 0.5%, 1.0%, and 2.0%, using standard milk ice cream as a control. Ice cream consumers (n = 71) rated their overall liking and liking of attributes using a hedonic scale; intensity of attributes using JAR (Just-about-Right) test; and purchase intention using a questionnaire. The participants only received a list of ingredients used in the production of ice cream. The addition of turmeric powder significantly ($p<0.05$) affected the overall liking of ice cream and evaluated sensory attributes. Control ice cream as well as ice cream with the addition of 0.5% turmeric powder received the highest scores for overall liking about 7.0 (moderately like). Penalty analysis of the JAR data verify that all flavoured samples were penalized for too much taste, aftertaste, aroma, and bitterness. Nevertheless, more than 50% of participants reported that they would definitely or probably purchase ice cream with 0.5% of turmeric. The obtained results showed turmeric powder in proportion of 0.5% can be used as functional ingredients to create functional ice cream, without adversely affecting the tested sensory properties.

Keywords: functional ice cream, turmeric powder, sensory acceptance, just-about-right (JAR), purchase intention

PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

APPLICATION OF REGRESSION AND CHEMOMETRICS METHODS IN MODELING PROPERTIES OF INDUSTRIALLY PRODUCED BISCUITS

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poster presentation

In the paper, the polynomial regression method and the chemometrics method of data analysis applied. The input sizes of the receiving basket and the baking process in the industrial production of biscuits analyzed in order to determine the dependence of the weight and dimensions of the biscuits on the properties of the dough and the input process sizes. After the collected data in industrial conditions, the method of polynomial regression and analysis of the main components carried out. Using polynomial regression, a mathematical model of the dependence of the mass of the shaped dough on the speed of rotation of the feeder roller created, which is almost 100% accurate. Since there are many input variables in the baking process, the PCA method and data processing in the "Statistica" program applied, number of variables reduced and they grouped into clusters. It established that only a few input sizes have a significant influence on the output sizes and that by regulating them, it would be possible to control the production of biscuits while meeting the manufacturer's requirements. Conclusions drawn about the created model and the influence of input sizes on the variability of the finished product.

Keywords: biscuit, industrial production, polynomial model, PCA

PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

MONITORING TOMATO CONCENTRATE PRODUCTION: NUTRITIVE AND SENSORY PROPERTIES OF TOMATO CONCENTRATE PRODUCED IN TWO DIFFERENT WAYS

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poster presentation

According to the Republican Bureau of Statistics data from 2021 year the total tomato yield was 135.108 t and it is well known that preservation of the tomato in a form of tomato concentrate is very popular type of processing in Serbian industry. Nutritive and sensory properties of the final product depend on many parameters, but mostly on the type of the processing technique. Two methods of processing that differ from each other in the temperature they use are hot and cold processing. Hot processing considers temperature 85 °C for tomato blanching, while cold processing use 65 °C temperature for the same process. The aim of this research was to compare and characterize the tomato concentrate produced at these two ways. Dry matter, total acidity, total phenolic, flavonoid, anthocyanin and lycopen content, antioxidant activity (DPPH, FRAP and ABTS test), as the most appropriate quality indicators of these two products, were analyzed.

Keywords: tomato concentrate, nutritive and sensory properties, hot and cold processing

PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

INFLUENCE OF THE WORM SHAFT TYPE AND PARAMETERS OF PRESSING POPPY SEEDS BY A SCREW PRESS ON THE YIELD AND QUALITY OF OIL

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poster presentation

Poppy (lat. *Papaver somniferum*) is an annual plant one meter high. It is rich in unsaturated fatty acids, of which linoleic and oleic fatty acids are the most common. In this paper, the influence of poppy seed pressing process parameters on yield and quality of cold pressed oil was investigated. During pressing, using screw coils with a thread depth of 5 mm and 10 mm, different process parameters were changed: the extension for cake outlet, the temperature of press head and the frequency of electric motor. The basic quality parameters (peroxide number, free fatty acids, moisture content and insoluble impurities content) in the produced cold pressed poppy oil were examined. The oxidative stability of poppy oil was then examined by the addition of various antioxidants and synergists using an oxidation stability test at 98 °C. Based on the obtained results, we can say that the process parameters of pressing affect the yield of poppy oil as well as the depth of the screw thread. The basic quality parameters of cold pressed poppy oil are in accordance with the Ordinance, except for the proportion of insoluble impurities that are elevated. The results of testing the oxidative stability of cold pressed poppy oil showed that synthetic antioxidant (TBHQ) has the best antioxidant effect over six hours, and of the natural antioxidants rosemary extract (type Oxy´Less® CS) with added citric acid. The tocopherol mixture protects poppy oil from oxidative spoilage the worst.

Keywords: poppy oil, screw press, yield, antioxidants, oil quality

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

THE EFFECT OF ENZYMATIC TREATMENT OF PUMPKIN LEAVES ON PROPERTIES OF PREPARED RUBISCO PROTEIN NANOPARTICLES

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poster presentation

Over the past two decades, there has been distinct research interest in application of nanotechnology in food sector. Protein-based nanoparticles are known as non-toxic, biodegradable, easily metabolized and with good biocompatibility, compared to others. Pumpkin leaves represent waste material in pumpkin production and can be utilized as good source of crude proteins with high nutritional value (RuBisCO protein). The aim of the present work was to produce nanoparticles from pumpkin leaf protein by heat treatment and to evaluate their properties. Protein isolates were prepared by conventional and enzyme-assisted extractions (using Viscozyme and Enzym complex) from pumpkin leaves. Nanoparticles formation was induced by heat treatment at 90 °C and pH 7, and at varying duration. Particle size of nanoparicles was different in dependance of applied enzyme prepation and time of treatment, and varied from 30 to 150 nm. The smallest nanoparticles were prepared from protein extracted with the aim of Enzyme complex. Highest increase in turbidity as well as in nanoparticle size was noticed for nanoparticles prepared from isolate obtained by conventional extraction. Results of this study suggest that enzymatically extracted pumpkin leaf protein can be used for preparing nanoparticles applicable in food sector.

Keywords: RuBisCO, nanoparticles, heat treatment, food application

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PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

CHANGES IN TRACE ELEMENTS CONTENT OF CABERNET SAUVIGNON AND MERLOT RED WINE DURING AGING IN DIFFERENT WINE VESSELS

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poster presentation

Moderate daily consumption (from 125 to 250 mL) of red wine contributes significantly to the human requirements of essential trace elements, such as zinc, manganese, potassium, calcium, etc. However, high concentrations of some elements (iron, lead, copper, and others) can lead to undesirable organoleptic properties of wine or negative effects on human health. Therefore, monitoring and maintaining their concentrations below limit values is important, because each stage of the winemaking process affects them. In this study, the concentrations of potassium, calcium, manganese, iron, copper, zinc, bromide, rubidium, strontium and lead were measured in Cabernet Sauvignon and Merlot red wines that aged for 12 months in stainless steel and three wooden barrels with different toasting level (light, medium and heavy). The aim of this study was to investigate the influence of wine aging vessels on trace elements concentrations. Previously lyophilized wine samples were analyzed by the EDXRF method. The wine-aging vessels had a significant influence on the concentrations of all elements. The higher toasting level of wooden barrels resulted in higher concentrations of potassium, calcium, rubidium, strontium and lead in all samples than stainless steel which was more favourable for other elements. Similar trends were obtained for both analyzed wine varieties.

Keywords: trace elements, red wine, stainless steel, wooden barrel, toasting

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

INFLUENCE OF SODIUM CHLORIDE MARINATION ON PHYSICOCHEMICAL PROPERTIES AND PROTEIN SOLUBILITY OF PORK MEAT

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poster presentation

Marination is the treatment of raw meat with various ingredients, such as salt, oil, organic acids, phosphate, sugar, spices, and herbs, to tenderize the meat and advance its flavor and juiciness. In the present study, pork meat was marinated in 0.34 M, 0.68 M, and 1.02 M NaCl solutions at 4 °C for up to 72 h, and the effect on the physicochemical characteristics and protein solubility of meat was evaluated. No significant differences were observed in the pH of meat, while the acidity reduced after marination. Moisture content, weight gain, and cooking loss increased, while in the case of weight gain, this increase was also proportional to salt concentration and marination time. The ash content, as expected, was increased with the increase in salt concentration. Regarding proteins, the solubility of total and myofibrillar proteins was increased with marination, while sarcoplasmic protein solubility remained stable. The results of the present study are significant for the meat industry to identify the best conditions of marination to improve pork meat characteristics.

Keywords: marination, pork, cooking loss, protein solubility

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

PROTEIN ISOLATES FROM OILSEED PRESS CAKES: UNLOCKING THE POTENTIAL FOR SUSTAINABLE NUTRITION

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poster presentation

Increasing environmental and health concerns regarding consumption of animal proteins have led to an increased interest in alternative protein sources. Oilseed press cakes have emerged as promising protein sources due to their high protein content and potential to promote sustainability in the food industry. Protein isolates derived from these sources are rich in essential amino acids, making them valuable ingredients for developing nutritionally balanced food products. With high protein content and low levels of antinutritional factors, these isolates have great potential to be used in various food items, including baked goods, meat alternatives, and plant-based dairy substitutes. Moreover, their bioactivity extends beyond their nutritional benefits. The presence of bioactive peptides within the isolates contributes to their potential in improving human health, reducing the risk of chronic diseases, and enhancing overall well-being. These protein isolates also exhibit exceptional techno-functional properties such as emulsification, foaming, and gelation. These properties contribute to texture improvement, stability enhancement, and better sensory attributes in food formulations. To ensure the commercial success of oilseed press cake protein isolates, scientific research should be focused on their sensory attributes and consumer acceptance, as well as safety concerns associated with them, including allergenicity, toxicological assessments, and compliance with food regulations.

Keywords: oilseed press cake, protein isolate, nutritionally balanced food, sustainability

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PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

CAN ADDITION OF MEDICINAL MUSHROOM *Ganoderma applanatum* EXTRACT ADD VALUE TO BEER?

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poster presentation

As more and more people place importance on health and well-being, many brewers are striving to develop products with added nutritional and/or health benefits. Although beer itself has been shown to have health-promoting properties when consumed in moderation, the addition of some other functional ingredients would elevate beer to a new level. One of the major concerns of brewers in developing these types of products is not to compromise the taste of the beer too much, preferably not at all, and to maintain its long-term microbiological, colloidal and aromatic stability. Recently, mushrooms (including those of the widely distributed genus *Ganoderma*) have emerged as a significant source of bioactive compounds, so they are used not only as food (and food flavouring), but also for medicinal purposes. Various medicinal mushroom extracts can serve as promising ingredients for beer production. The beer was produced in a pilot plant with a batch size of 125 litres. Commercial top-fermenting dry yeast was used as inoculum, and the fermentation process was monitored using a standard methods for beer analysis (alcohol content, extract content, pH, turbidity, colour, etc.). The beer was bottled in 0.33-litre glass bottles, and immediately after bottling and before capping, 2, 4, and 6 mL of alcoholic extract of the medicinal mushroom *Ganoderma applanatum* were added to each individual bottle. In the beer samples thus prepared, all typical beer quality parameters were determined and sensory analysis was performed.

Keywords: beer, medicinal mushrooms, *Ganoderma applanatum*, fermentation activity, sensory analysis

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

THE COMBINED EFFECT OF BLACKBERRY LEAF AND *JUNIPERUS COMUNIS* BY-PRODUCT EXTRACTS ON *LISTERIA MONOCYTOGENES*: A CHALLENGE TEST IN FISH BURGERS

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poster presentation

Extracts of blackberry (*Rubus fructuosus*) leaf and essential oil isolation by-products from common juniper (*Juniperus communis*), whose antimicrobial activity *in vitro* were used in a challenge test against *Listeria monocytogenes* in fish burgers. The extracts were added to fish meat batter (minced sea bass and hake meat plus 1% salt) at a final concentration of 2% (w/w). A burger without extracts from the same fish meat batter was used as a control. Both types of burgers were inoculated with *L. monocytogenes*, vacuum packed and stored at 3±1°C. The growth of *L. monocytogenes* in the fish burgers was monitored for 11 days. The pH and salt content (NaCl) of the samples were also examined. The results showed that at high inoculum concentration with *L. monocytogenes* the growth was inhibited. After three days of storage the growth of *L. monocytogenes* in the burgers with extracts was significantly lower than in the burger without extracts. At the end of storage (day 11), the total counts of *L. monocytogenes* were 4.03 and 4.67 log CFU/g in the burgers with and without extracts, respectively.

Keywords: *Listeria monocytogenes*, plant by-product extracts, antimicrobial activity, fish burgers, challenge test

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PRODUCTION OF SAFE FOOD
AND FOOD WITH ADDED NUTRITIONAL VALUE

COLLOIDAL PROPERTIES OF SILK FIBROIN IN AQUEOUS SOLUTION

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poster presentation

Silk fibroin is a protein of animal origin, isolated mostly from silkworm (*B. mori sp.*) cocoons. Silk fibers obtained from silkworm cocoons usually contain 72–81% of silk fibroin (SF), 19–28% of silk sericin, and small amounts of ash, waxes, dyes, and other compounds. SF is insoluble in water, so the most common method for its isolation is boiling in sodium carbonate solution – degumming, which is used to remove silk sericin from silk fibers. Due to its water insolubility, obtained SF fibers need to be dissolved in highly concentrated salt solutions and subsequently purified to obtain SF aqueous solution. In this study, such obtained SF solution was investigated in terms of SF molecular weight (MW), surface activity, influence of SF concentration on solution pH, and ability of SF to form nanoparticles. Based on MW results, it was shown that obtain solution contains a mixture of polypeptides with MW 30–116 kg/mol. Also, it was determined that SF shows surface activity on the air/water surface, and can form nanoparticles when added to acetone.

Keywords: fibroin, silk, protein, colloidal properties, surface activity

PRODUCTION OF SAFE FOOD AND FOOD WITH ADDED NUTRITIONAL VALUE

THE IMPACTS OF DIFFERENT DRYING TEMPERATURES AND LYOPHILIZATION ON THE CHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITY OF MICROALGA *CHLAMYDOMONAS REINHARDTII*

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oral presentation

Chlamydomonas reinhardtii is a single-celled green microalga with the potential to be used as a nutraceutical due to its capability to produce various bioactive molecules important for human health. The impacts of different drying temperatures (40, 60, and 100 °C) and lyophilization on the microalgal chemical composition and the biological activities of its methanolic extracts were evaluated. Antimicrobial susceptibility test was conducted using the microdilution method, whereas antioxidant activity was determined using ABTS, DPPH, FRAP, and ORAC assays. Several enzymatic assays and LC-QTOF-MS analyses were conducted to investigate the biological potential of the extracts. The results showed that different drying techniques caused variations in the chemical and biological properties of *C. reinhardtii*. The most diverse chemical composition, as well as the highest antidiabetic potential, were detected in the biomass dried at 40 °C. The lyophilized sample exhibited the greatest *Escherichia coli* growth inhibition, antioxidant, and anti-collagenase activities. On the other hand, the greatest *Staphylococcus aureus* inhibition, antilipidemic, and neuroprotective activities were measured for the extract prepared from the biomass dried at 60 °C. Overall, *C. reinhardtii* extracts prepared from the dried biomass resulted in a more diverse chemical composition and biological activities when compared to lyophilized biomass.

Keywords: microalgae, proteins, pigments, enzymes, bioactivities

ZDRAVI STILOVI ŽIVOTA /
HEALTHY LIFESTYLES

HEALTHY LIFESTYLES

ASSESSMENT OF ZINC CONCENTRATIONS IN THE POPULATION OF EASTERN CROATIA

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poster presentation

The aim of the research is to examine the values of zinc concentrations in serum, urine and hair in the population of eastern Croatia and to relate the obtained results to age, sex, previous diseases, professional exposure, place of residence and water consumption. The research was conducted on 601 randomly selected respondents from the patient databases of family medicine offices. The samples were collected in Vladislavci, Dalj, Čepin, Našice, Osijek, Vukovar, Vinkovci, Slavonski Brod and in Virovitica. There is a difference in Zn concentrations with regard to the sex and age of the subjects. Professionally exposed subjects have significantly higher concentrations of Zn in their hair. There are no differences in zinc concentrations in biological samples between subjects with and those without previous diseases. Higher concentrations of Zn were found in serum in subjects who consumed water from the city water supply, while higher concentrations in hair were found in those consuming local water supply. Higher concentrations of Zn in serum were found in subjects from Vukovar, Vinkovci and Virovitica, urine in subjects from Virovitica and Zn levels in hair were higher in Dalj, Čepin, Našice and Osijek. Despite the fact that Zn is an essential element that is important for human health, Zn is also a metal that, in elevated concentrations, is an indicator of anthropogenic pollution. By comparing the reference values of Zn in biological samples and the median values obtained by biomonitoring (urine:282 μgL^{-1}, serum: 295 μgL^{-1}, hair: from 114 μgg^{-1} to 788 μgg^{-1}), it seems that there is no significant contamination of the population of eastern Croatia with zinc.

Keywords: zinc, biological samples, eastern Croatia

HEALTHY LIFESTYLES

ROLE OF THE NUTRITIONIST AND PERSONALISED NUTRITION PLAN IN WEIGHT LOSS PRACTICES AMONG COMBAT SPORT ATHLETES: CASE STUDY ON A SMALL GROUP OF TAEKWONDOO ATHLETES

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oral presentation

Body mass (BM) and body composition (BC) are crucial in many sport types including combat sports as taeqwondo, judo, boxing and wrestling in which weight categories are defined to minimize differences in size and strength among competitors. As a result athletes often steer to compeet in a lower weight category of those where they belong aiming that way to achieve advantage by competing against lighter, smaller and weaker opponents. Weight manipulation to achieve this goal include rapid weight loss (RWL) by various methods. The aim of this study was to provide insight which models of weight reduction are used in taekwondo athletes, and how changing the approach to diet can affect the regulation of BM. 6 professional athletes from 2 taekwondo clubs in Zagreb participated in tis study. Participants completed a questionnaire on prior practice of RWL and were measured for BC. In a conversation with a nutritionist personalized menu was created for each user. According to the completed questionnaire, all subjects previousely used RWL methods, of which the most common methods are skipping meals, dehydration and training in thicker clothing. After 3 months of following personalised nutritional plan subjects without RWL methods reduced their body weight by 2.1 ± 1.8 % of total body weight, and statistically significant difference was observed in body fat reduction, which is considered a positive outcome of this study.

Keywords: taekwondo, weight loss methods, weight loss, sports nutrition

HEALTHY LIFESTYLES

NUTRITION METHODS BEFORE AND DURING SWIMMING COMPETITIONS, AND IN THE RECOVERY PHASE

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poster presentation

The nutrition of athletes is important for achieving the best possible results and the fastest possible recovery from exertion. The emphasis in athletes' nutrition is on careful planning of the type, quality and ratio of nutrients. A high proportion of carbohydrates and an adequate proportion of fats and proteins are the basis of every athlete's diet. The priority of an athlete's diet should be to satisfy the body's energy needs in accordance with the needs before, during and after the competition. Also, the recommended daily energy intake varies from person to person and depends on gender, age, height and weight. In addition to the above, the ratio of ingested nutrients differs depending on the discipline in swimming, i.e. whether it is a discipline in which endurance or muscle strength is key, but also on the needs of each swimmer as an individual. It is important to eat optimal and selected food before and during the competition. During the competition, replenishment of water and electrolytes is crucial, which is achieved by abundant hydration. After the competition, the athletes have to replace the spent glycogen reserves, which requires a meal rich in carbohydrates, but also in proteins if you want to achieve an anabolic effect on the muscles.

Keywords: swimming, competition, nutrition methods

HEALTHY LIFESTYLES

KNOWLEDGE, ATTITUDE, AND PRACTICE IN SUPPLEMENTS USE AMONG ATHLETES

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poster presentation

Athletes, both professional and amateur, widely use dietary supplements, often without proper medical supervision. Recent studies have shown an increase of mislabeled supplements with significant amounts of anabolic-androgenic steroids (AASs). Using supplements containing AASs can lead to acute and chronic health issues, showing the need for proper education and vigilance in acquiring these products. Objective was to explore athletes' attitudes towards supplements, prevalence of use and how they acquire information, as well as obtain them. The study was designed as a cross-sectional study. Participants were male athletes from professional and amateur sports clubs in Osijek. Data was be collected using an anonymous questionnaire, which included questions regarding the knowledge, attitude and practices in use, education and purchasing of the supplements. 57% of the participants reported using dietary supplements in their diet, 37% reported no supplement use, 7% did not respond. Among the supplement using-group, most commonly used are protein powders and creatine, both reported by 35% of the participants. 88% reported purchasing supplements from specialized stores, while 52% purchase supplements in pharmacy, as well. 60% reported using supplements without any recommendation. The same percentage of participants obtains information about them mostly from their coaches. This study showed the need for professional medical advice and education regarding the use of supplements among athletes.

Keywords: supplements, anabolic-androgenic steroids, athletes, vigilance

HEALTHY LIFESTYLES

THE SIGNIFICANCE OF HYDRATION IN PHYSICAL THERAPY

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poster presentation

Water is a component of all living organisms and an irreplaceable food ingredient. It is important for the normal functioning of the human body since it participates in all biochemical reactions. The human body contains about 60% of water, and with a larger amount of visceral fat, the proportion of water decreases because the fat cell itself is not hydrophilic. The degree of hydration is very important for the proper maintenance of the homeostasis of the organism. In certain conditions, the body needs more water. These are stress states of an organism (disease, macro and microclimatic conditions, burns, trauma, rehabilitation, etc.). Therefore, water intake is an effectively and low-cost non-invasive method for individual health outcomes. By osmosis, water is exchanged between the extracellular and intracellular spaces. During the rehabilitation process, the human body is in a state of increased need for hydration, partly due to water loss through sweat, and partly for the optimal functioning of the soft tissue structures that enable movement. The water molecule is also important for maintaining the protein structure, which are building blocks of muscles. As a result of dehydration, the function of the affected structures is impaired, so the muscles lose their strength, which results in a reduced quality of our locomotion system.

Keywords: hydration, muscles, physical therapy, rehabilitation

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Napredak i inovacija, visoko precizni zanat i strast za istraživanjem – to definira Anton Paar. Naši mjerni instrumenti odražavaju naše misli i postupke: Komponente proizvedene s najvećom preciznošću, inovativni mjerni principi i dobro dizajnirana korisnička sučelja predstavljaju naše razumijevanje kvalitete. Naši proizvodi nastaju u dijalogu s našim klijentima i neprimjetno se integriraju u njihovo radno okruženje. Oni točno ispunjavaju zahtjeve kupaca i rješenja su za izazove s kojima se suočavaju. Ideja stalnog pomicanja granica onoga što je tehnički izvedivo nadahnjuje nas i motivira svaki dan da proizvodimo najbolje mjerne instrumente za naše klijente. Kao svjetski predvodnik u područjima mjerenja gustoće i koncentracije, reometrije, karakterizacije materijala i određivanja otopljenog CO2 već smo na dobrom putu da to postignemo.
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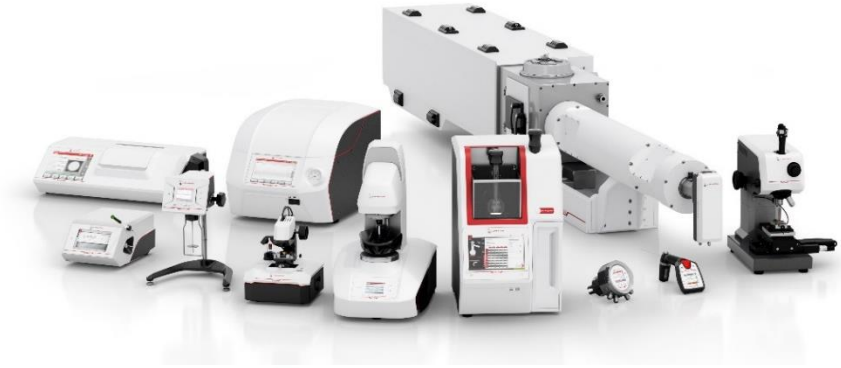

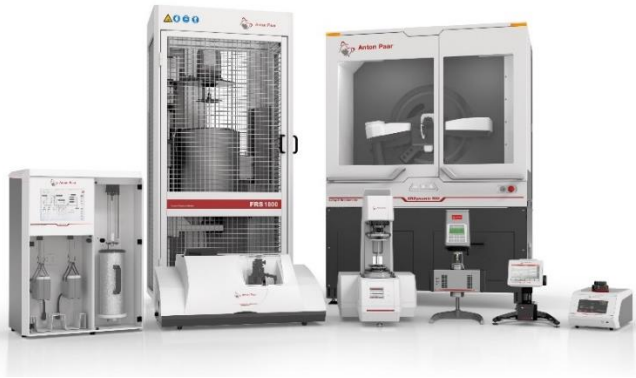

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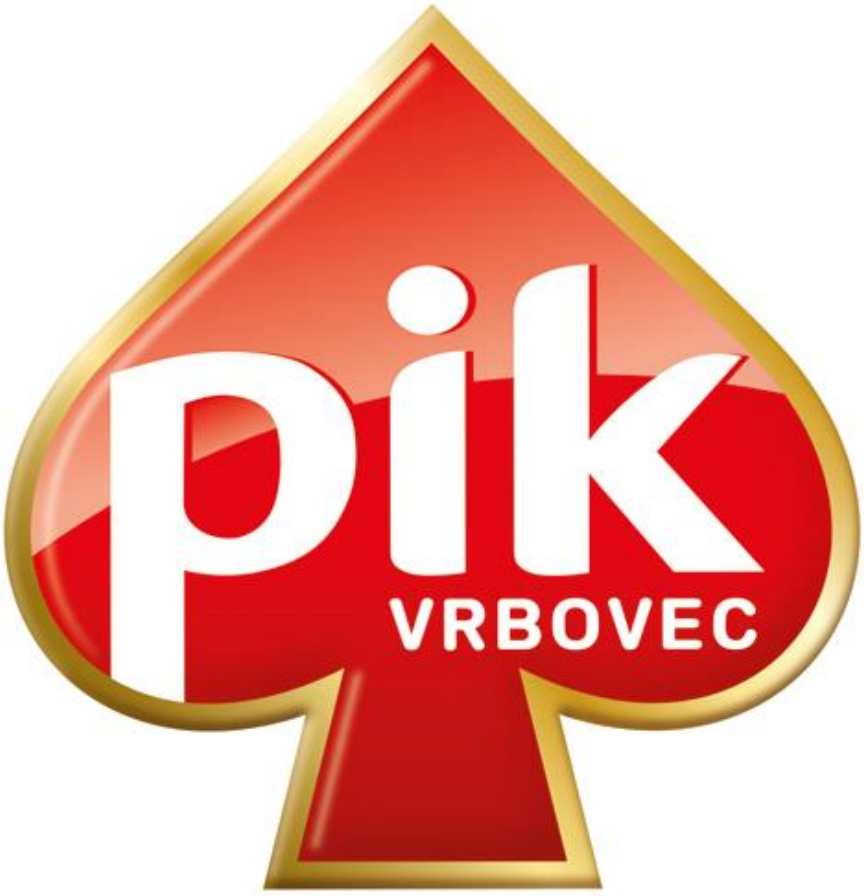

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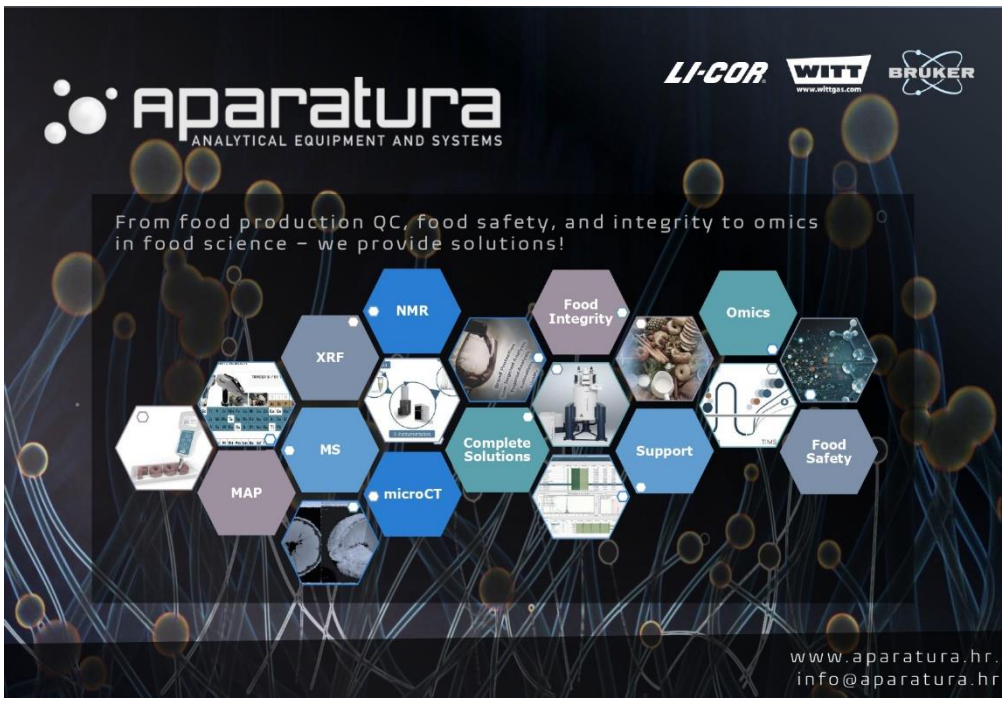

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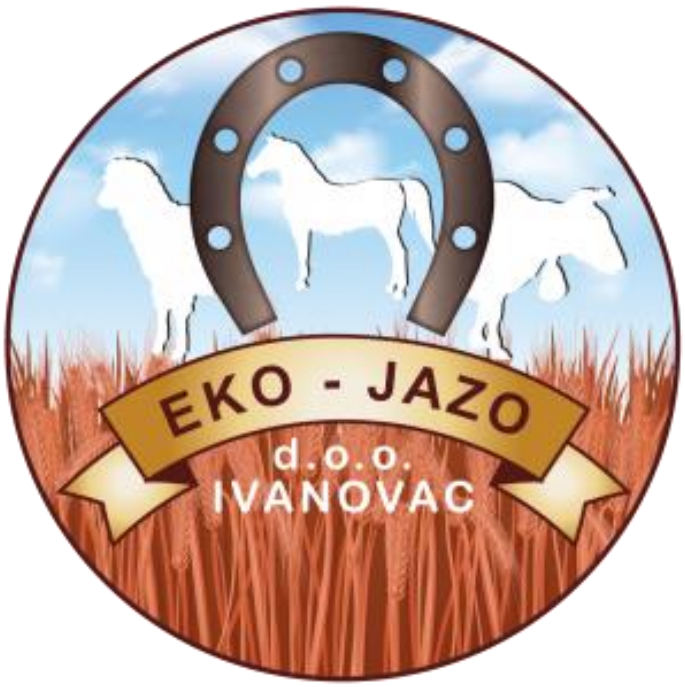

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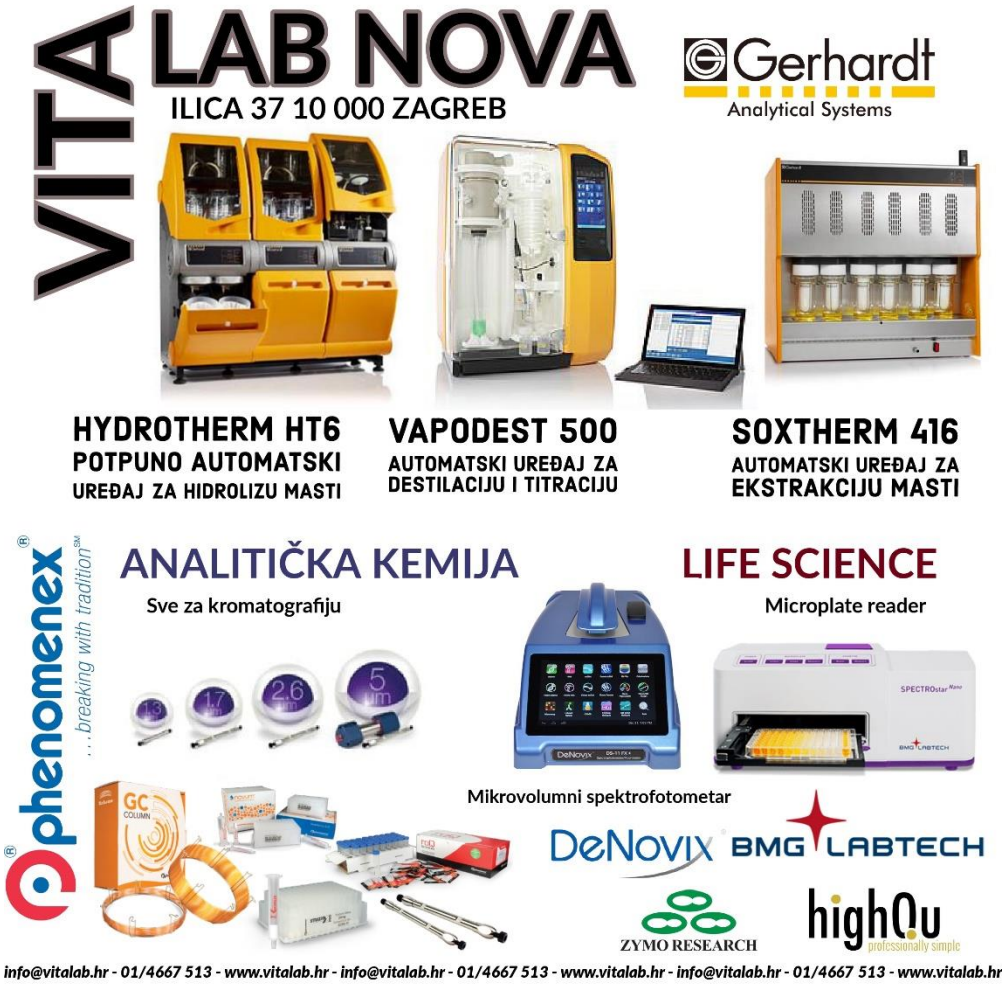

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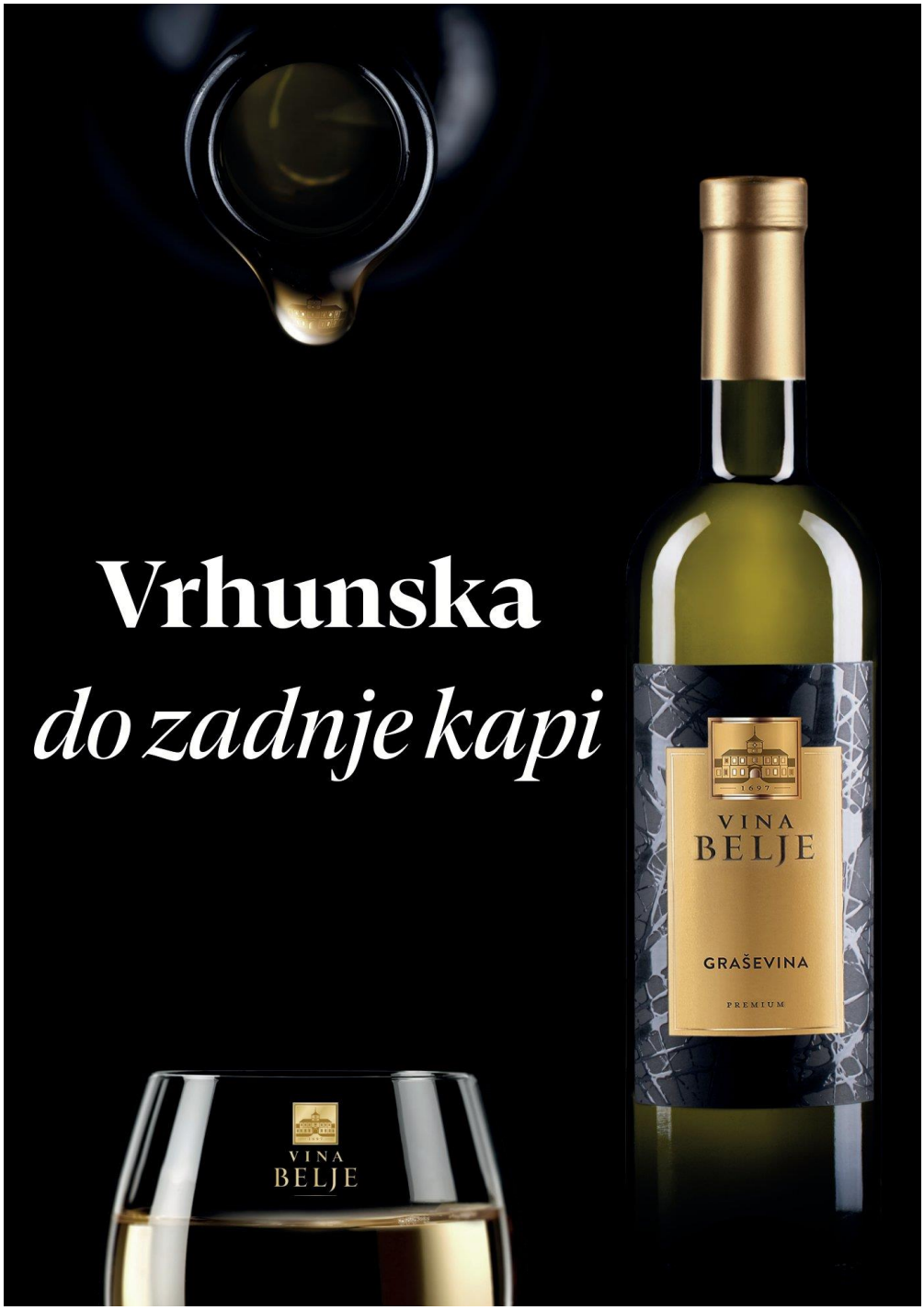
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