November 21 – 23, 2024
Zagreb, Croatia

HSN
HRVATSKI SAVEZ NUTRICIONISTA

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9th INTERNATIONAL CONGRESS OF Nutritionists

BOOK OF ABSTRACTS

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Croatian Federation of Nutritionists

Co-organisers
Federation of European Nutrition Societies
Association for applied nutritionism in Bosnia and Herzegovina
Student Association of Faculty of Food Technology and Biotechnology ″Probion″

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Udruženje za primijenjeni nutricionizam u Bosni i Hercegovini

Student Association of Faculty of Food Technology and Biotechnology “Probion”

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Udruga studenata Prehrambeno-biotehnološkog fakulteta

The Westin Zagreb Hotel

The Westin Zagreb Hotel is centrally located in the very heart of Zagreb. Our conference hotel is situated in a leafy area in Zagreb, adjacent to the Mimara Museum and the world-famous National Theatre and Opera House. Our location is within easy walking distance to the central square, markets, the many trendy cafés, restaurants, designer boutiques, rich cultural attractions, and capital city business destinations. Recognized for offering discreet surroundings and professional, caring service, our premium business hotel in Croatia is a regular host to high-profile local, national, and international events. It has been the favorite home-away-from-home for visiting royalty, world leaders, international dignitaries, and other travelers seeking the calm comfort of a modern and corporate hotel in Zagreb.

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Dear colleagues and dear friends,

The 9th International Congress of Nutritionists is a major meeting of nutritionists in Europe, with around 400 participants and over 40 speakers from all over the world. This year's congress will take place from November 21st to 23rd in Zagreb (Westin Hotel) with the support of international partners.

The value of the International Congress of Nutritionists is recognized by many related professions and is accredited by the Croatian Medical Chamber, the Croatian Chamber of Pharmacists and the Croatian Chamber of Health Professionals. The Congress is always supported by the food and pharmaceutical industry, as the profession of nutritionist has a wide field of activity and is well represented in modern technology.

In addition to the plenary lectures, the Congress consists of numerous lectures on various topics covering all areas of interest to nutrition scientists. The Congress promotes and rewards the work of young scientists and researchers in the field of nutrition and invites the presentation of innovative practices. One day of the Congress is dedicated to interactive workshops for students and participants, where new knowledge and skills are acquired through collaborative discussions, problem-solving, and practical examples.

The 9th International Congress of Nutritionists will cover various topics such as

- Biotics
- Plant based diets
- Use of dietary supplements in healthy individuals
- Innovative products in the food industry

Wecome to the **9th International Congress of Nutritionists**!

assist. prof. **Tena Niseteo**, MSc, PhD

President of the Organizing Committee of the 9th International Congress of Nutritionists

ZAGREB

Zagreb is the Croatian capital and relatively young middle-European metropolis with about 800.000 inhabitants. With urban agglomeration Zagreb has about 1.1 million, a quarter of the total population of Croatia. Zagreb covers a total area of 641 square kilometres. Commoners divide it as "old" and the "new" Zagreb with the river of Sava as its boundary. Everything is accessible on foot – from your hotel to the theatre, wandering around the old Upper Town or through the bustling streets of the more modern Lower Town, which has not lost an ounce of its charm despite the eternal march of time. It is therefore no wonder that in 2017 it won the prize for the most exciting European destination. Today, Zagreb is the political and cultural center of Croatia and is a thriving, energetic inland city with some of the country's best museums, restaurants, and shopping.

CONGRESS PROGRAMME

Thursday, 21st 2024			
Time	**Workshop**	**Lecturer**	**Hall**
12:00 - 13:00	**Student registration**		
08:45 - 16:30	Student field workshop – Inside the HiPP factory ***powered by Hipp d.o.o.***		Hipp Factory
13:00 – 13:45 **Group A**	**Student workshop I** - The impact of diet on hormonal balance in women	Iva Tokić Sedlar	MAKSIMIR
13:00 – 13:45 **Group B**	**Student workshop II** - Diet for brain health and cognitive function	Mašenjka Katić	TUŠKANAC+ ZRINJEVAC
14:00 – 14:45 **Group A**	**Student workshop II** - Diet for brain health and cognitive function	Mašenjka Katić	MAKSIMIR
14:00 – 14:45 **Group B**	**Student workshop I** - The impact of diet on hormonal balance in women	Iva Tokić Sedlar	TUŠKANAC+ ZRINJEVAC
15:00 – 16:00 **Both groups**	**Student workshop III** / Analysis of laboratory tests from a perspective of a nutritionist	Sandra Krstev Barać	TUŠKANAC+ ZRINJEVAC
17:00 – 18:30 **Both groups**	Career development - The workshop Nestlé Needs Youth (NNY) initiative for student ***powered by Nestlé Adriatic*** Chair: Dora Babić Cikoš		TUŠKANAC+ ZRINJEVAC
16:00 – 19:30	**Registration**		HOTEL LOBBY
16:00 – 17:00	**Coffee break** ***powered by Nescafé***		CONGRESS HALL / EXPO

Thursday, 21st 2024			
Time	**Workshop**	**Lecturer**	**Hall**
17:00 – 18:00	**Regular workshop I** / How to avoid stress and enjoy every day as a nutrition counselor? Chair: Marija Selak	Monika Vandero	JELENOVAC
17:00 – 18:00	**Regular workshop II** / How to implement probiotics as a prevention and therapy? - guidelines and praxis Chair: Tena Niseteo	Dubravka Vitali Čepo	MAKSIMIR
18:00 – 18:30	**Coffee break *powered by Nescafé***		CONGRESS HALL / EXPO
18:30 – 19:30	**Regular workshop III** / Fasting – miracle cure or dangerous trend Chair: Karmen Matković Melki	Biljana Ignatovska	MAKSIMIR
18:30 – 19:30	**Regular workshop IV** / SIBO - from testing to nutritional management Chair: Lidija Šoher	Sara Sila	TUŠKANAC+ ZRINJEVAC
20:00 – 22:30	**Eno-gastro event *powered by Vindija d.d.***		CRYSTAL HALL B

Friday, 22nd 2024		
08:00 - 17:00	**Registration**	
	CRYSTAL HALL A	
09:15 – 09:45	**Opening ceremony** Tena Niseteo Darja Sokolić	
09:45 – 10:45	**Plenary lectures** Redefining the gut microbiome trough biomodulators Lecturer: Jasna Novak Chair: Darja Sokolić and Tena Niseteo	
	MAKSIMIR HALL	
10:45 – 11:30	**Coffee break - „Meet the Science by Pontus Pharma"** Fueling the gut with butyric acid Lecturer: Neven Baršić Digestive enzyme supplementation Lecturer: Darija Vranešić Bender Chair: Mašenjka Katić	
	CRYSTAL HALL A	CRYSTAL HALL B
11:30 – 12:45	**Biotics breakthroughs: enhancing life through science** ***powered by AllergoSan d.o.o.*** Chairs: Jasna Novak and Tena Niseteo	**Longevity science: epigenetic innovations and discoveries** Chairs: Sebastijan Orlić and Karmen Matković Melki
11:30 - 11:55	Biotics in weight loss therapy Lecturers: Ena Melvan and Tea Vučković	Imprinting ourselves – the story of glycome and microbiome in women's health Lecturers: Antonio Starčević and Jurica Žučko

Friday, 22nd 2024		
11:55 - 12:20	The vaginal microbriome: changes throughout womens lives Lecturer: Ulla Marton	Evidence-based “biohacking” – edition 2024 Lecturer: Sebastijan Orlić
12:20 - 12:45	Molecular precision meets AI: The future of personalized care Lecturer: Mirna Anđelić	Guiding nutrition and weight management with Nutrigen: A nutrigenetic approach to obesity risk and weight loss ***powered by Fagron Genomics*** Lecturer: Gustavo Torres
12:45 – 14:30	**CONGRESS HALL / EXPO** **Lunch break** **CRYSTAL HALL B**	
14:30 – 15:30	**Oral presentation od 5 best abstracts** Chairs: Lucija Bakarić and Ela Kolak	
15:30 – 16:00	**CONGRESS HALL / EXPO** **Coffee break *powered by Nescafé*** Poster presentations Chairs: Vanessa Ivana Peričić, Martina Bratek and Marijana Jurić	
16:00 – 17:20	**CRYSTAL HALL B** **Implementing plant-based diets for a more sustainable future** Chairs: Ivana Rumora Samarin and Ana Ilić	
16:00 - 16:20	Barriers and facilitators of consuming a more plant-based diet Lecturer: Malou Reipurth	
16:20 - 16:40	Leveraging science and innovation to support balanced and sustainable diets Lecturer: Petra Klassen Wigger	

Friday, 22nd 2024	
16:40 - 17:00	Eating habits of young adults that promote the Planetary health Lecturer: Ivana Rumora Samarin
17:00 - 17:20	Plant-based diets and sustainability: strategies for impactful communication Lecturer: Carlos Abundancia
	CRYSTAL HALL A
20:00 – 01:00	**Gala dinner**

Saturday, 23rd 2024		
09:00 – 12:00	**Registration**	
	TUŠKANAC+ZRINJEVAC	
09:00 – 09:30	**Breakfast powered by BoomBox**	
	CRYSTAL HALL A	CRYSTAL HALL B
09:30 – 10:20	**Sports nutrition for women** Chairs: Marija Selak	**Understanding the dynamics of motivation and food choice** Chairs: Marina Matković
09:30 - 09:55	Maintaining protein intake in female athletes Lecturer: Luka Batur	How can we effectively motivate change in dietary habits? Lecturer: Anđela Đinđić
09:55 - 10:20	Dietary supplements for female athletes Lecturer: Martina Dadić	Determinants of healthy food choices Lecturer: Raquel Pinho Ferreira Guiné
	CRYSTAL HALL B	
10:20 - 10:35	Clinical assessment of body composition - the latest generation ***powered by Bodystat*** Lecturer: Derya Hyusein Chair: Tena Niseteo	
	CRYSTAL HALL A	CRYSTAL HALL B
10:40 – 11:40	**Complementary therapy** Chairs: Katarina Fehir Šola and Dora Babić Cikoš	**Innovative food products** Chairs: Đurđica Ačkar and Marinela Nutrizio
10:40 - 11:00	Enhancing patient care: Croatia's first pharmacist guide to safe supplement use Lecturer: Katarina Fehir Šola	Oleogels - Innovative replacement of saturated fats in food Lecturer: Đurđica Ačkar

Saturday, 23rd 2024		
11:00 - 11:20	Clinical use of phytochemicals as complementary therapy - curcumin Lecturer: Josip Rešetar	3D printing for creation of innovative functional food products Lecturer: Marinela Nutrizio
11:20 - 11:40		Tonka Egg – The new generation of sweets Lecturer: Petar Marić and Tončica Spaija
11:40 – 12:15	CONGRESS HALL / EXPO **Brunch break by di-go a Lesaffre brand** Mix, Bake, Enjoy – the Healthy Way Lecturer: Marija Krištofić Chair: Marina Matković	
12:15 – 13:15	CRYSTAL HALL B **Nutrition in reproductive health of women** Chairs: Mirna Sentić and Sandra Krstev Barać	
12:15 - 12:35	Current perspectives on the role of nutrition in polycystic ovary syndrome Lecturer: Mirna Sentić	
12:35 - 12:55	Dietary approaches to prevent and manage endometriosis Lecturer: Lea Jankov	
12:55 - 13:15	Optimizing pregnancy outcomes through diet - focus on gestational diabetes Lecturer: Ana-Marija Liberati Pršo	
13:15 – 14:55	**Brain health and nutrition in 21st century** Chairs: Rouza Pancheva and Ela Kolak	

Saturday, 23rd 2024	
13:15 - 13:40	Brain health and lifestyle Lecturer: Vida Demarin
13:40 - 14:05	Brain gut axis ***powered by Proimmun*** Lecturer: Agata Ladić
14:05 - 14:30	Nutrition and neuropsychiatric disorders in children Lecturer: Rouzha Pancheva
14:30 - 14:55	Nutrition, exercise and cognitive function Lecturer: Marcela González Gross
14:55 - 15:15	**Award ceremony and Congress closure**

Eno-gastro event – Chrystal Hall B

Thursday, 21st November 2024 - 20.00 pm - 22.30 pm

We invite You to join us at an already traditional Eno-gastro event and enjoy relaxing atmosphere with your colleagues. Assortment by Vindija, desserts from pastry shop Cukeraj and Cmrečnjak, Horvat and Dvanajščak Kozol quality wine will spice up your evening with a wealth of flavors.

Gala dinner - Chrystal Hall A

Friday, 22nd November 2024 - 20.00 pm - 02.00 am

Those who have already been can confirm… it is more than just Gala dinner - it is the perfect blend of delicious meals, dancing and entertainment with your colleagues and friends. Don't miss it!

We look forward to seeing you!

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TRI KULINARSKA ZNALCA

1. WORKSHOPS

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1.2. Regular workshops

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2.2. Biotics breakthroughs: enhancing life through science

2.3. Longevity science: epigenetic innovations and discoveries

2.4. Implementing plant-based diets for a more sustainable future

2.5. Sports nutrition for women

2.6. Understanding the dynamics of motivation and food choice

2.7. Complementary therapy

2.8. Innovative food products

2.9. Nutrition in reproductive health of women

2.10. Brain health and nutrition in 21st century

2.11. Coffee break lectures

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3.2. Functional food and food supplements

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3.6. General topics

1. WORKSHOP ABSTRACTS

1.1 student workshops

STUDENT FIELD WORKSHOP - INSIDE THE HIPP FACTORY

Sponsored by **HIPP d.o.o**

Students will have a unique opportunity to meet the entire team of experts involved in the design and production of cereals and milk paps which are produced in Glina for the whole world. A presentation about product quality and sustainable environment is also planned. The importance of this presentation is confirmed by numerous awards that HiPP Croatia d.o.o. received for quality and exceptional commitment to environmental protection. Their experts with many years of experience will lead students through the production plant.

THE IMPACT OF DIET ON HORMONAL BALANCE IN WOMEN

Iva Tokić Sedlar

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The endocrine system comprises a complex network of cells, tissues, and organs responsible for regulating and coordinating physiological processes through the secretion of hormones. Hormones such as estrogen, testosterone, leptin, insulin, and thyroid hormones are associated with metabolism, fertility, mood regulation, and other physiological functions. Specific nutrients and dietary patterns can positively or negatively influence hormonal balance in women. For example, sufficient zinc, selenium, and iodine intake can positively impact thyroid function. On the contrary, an increased intake of saturated fatty acids, simple sugars, and a reduced intake of antioxidants can lead to an impaired quality of egg cells and anovulation.

Unlike popular diets, a holistic approach and personalized nutrition can offer long-term solutions for balancing female hormones.

This workshop includes new insights into nutrition for hormonal balance and a presentation of different case studies. Students will be split into groups offering specific nutritional approaches for the case studies.

Keywords: hormones, hormonal balance, diet, nutrients, fertility

DIET FOR BRAIN HEALTH AND COGNITIVE FUNCTION

Mašenjka Katić[1,2]

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[2] *Croatian Association of Nutritionists*

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The World Health Organization defines brain health as "the state of brain functioning across cognitive, sensory, social-emotional, behavioural, and motor domains, allowing a person to realize their full potential over the life course, irrespective of the presence or absence of disorders". A multitude of factors can affect our brain health across the course of life (as early as pre-conception), nutrition being one of them. Diets rich in essential nutrients, including omega-3 fatty acids, antioxidants, vitamins, and polyphenols, have been associated with improved cognitive performance (ability of thinking, learning, understanding and using language, remembering, paying attention, reasoning, making decisions). The Mediterranean diet, based on consumption of fruits, vegetables, whole grains, nuts, and olive oil, has been linked to enhanced memory, executive function, and overall cognitive resilience. Similarly, the MIND diet, a hybrid of the Mediterranean and DASH diets, emphasizes brain-protective foods like leafy greens and berries and has shown promise in slowing cognitive decline. Conversely, diets high in saturated fats, refined sugars, and processed foods are correlated with impaired memory and learning. Emerging evidence is highlighting the role of the gut-brain axis, suggesting that dietary fiber and probiotics may support cognitive health through modulation of gut microbiota and production of neuroactive compounds. Furthermore, specific micronutrients, such as vitamin D, B vitamins, and magnesium, have been implicated in maintaining neurotransmitter balance and neuronal health. Hydration plays a critical role in maintaining cognitive function and overall brain health. The brain is highly sensitive to changes in hydration status and adequate hydration supports key physiological processes, including cerebral blood flow, neurotransmitter production, and thermoregulation, all of which are essential for optimal cognitive performance. Applying proper nutrition for brain health has critical implications for public health, offering preventative strategies against age-related cognitive decline and neurodegenerative disorders. As part of the lecture, participants will be shown examples of the two menus – an elementary school and a retirement home, to detect nutritional gaps from the perspective of brain health and cognitive function.

Keywords: Brain health, cognitive function, Mediterranean diet, MIND diet, hydration

ANALYSIS OF LABORATORY TESTS FROM A PERSPECTIVE OF A NUTRITIONIST

Sandra Krstev Barać

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Understanding and interpreting laboratory findings is one of the main starting points for analyzing client's health and nutritional status. This knowledge, is without a doubt, a key starting point in creating personalized nutritional protocols. However, few nutritionists fully understand laboratory parameters from blood tests, which is why they may miss the opportunity to help their client more efficiently.

The goal of the workshop is to familiarize students with basic laboratory blood findings like complete blood count, lipid profile, metabolic parameters and what they reveal about the patient sitting across from us. The goal is also to learn how to recognize various types of anemia from the findings and how to optimize the client's diet in view of his laboratory findings.

Keywords: Laboratory, personalized nutrition

CAREER DEVELOPMENT - THE WORKSHOP NESTLÉ NEEDS YOUTH (NNY) INITIATIVE FOR STUDENT

Sponsored by **Nestlé Adriatic**

NNY initiative is rooted in Nestle's values and commitment to empowering young people and providing them with the skills they need to thrive in the workplace. The workshop will showcase the implementation of the NNY initiative in local activities such as education, university lectures, career counseling, workshops, job interview preparation, and programs like the renowned regional summer internship program "Summers Cool." It will provide students with the opportunity to ask questions related to employment with present Nestlé employees having similar backgrounds and receive valuable advice from HR experts on excelling in the future job market.

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1. WORKSHOP ABSTRACTS

1.2. regular workshops

HOW TO AVOID STRESS AND ENJOY EVERYDAY AS A NUTRITION COUNSELOR?

Monika Vandero-Humljan

Business&Sport, Ulica Rudolfa Bićanića 38, 10000 Zagreb, Croatia

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Every day, we face different stressful situations, but we don't always respond the same way. Depending on our perception of an event, a certain level of stress can even be beneficial. When stress becomes harmful, it's important to know how to manage it effectively, using various cognitive and behavioral strategies.

The goal of the workshop is to teach participants whether stress is necessarily negative, the different types of stress, how it affects us and our daily functioning, and ways to more easily cope with stressful situations. Additionally, participants will have the opportunity to see how the learned techniques are applied in practice with the help of a biofeedback device. After the workshop, participants will be able to distinguish between two types of stress, explain what differentiates them, and apply the learned and tested techniques to cope with everyday stress.

Keywords: Stress, stress management, breathing, biofeedback

HOW TO IMPLEMENT PROBIOTICS AS A PREVENTION AND THERAPY? - GUIDELINES AND PRAXIS

Dubravka Vitali Čepo

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Probiotics, defined as live microorganisms that confer health benefits when administered in adequate amounts, have gained recognition for their role in both prevention and therapy of various gastrointestinal disorders. Recent guidelines provide a general framework for integrating probiotics into clinical practice and emphasize the necessity of evidence-based approaches when recommending specific probiotic strains for particular health conditions.

The implementation of probiotics begins with understanding their mechanisms of action, which include enhancing gut microbiota balance, modulating immune responses, and producing beneficial metabolites such as short-chain fatty acids. Clinicians are encouraged to select probiotics based on robust clinical evidence, including randomized controlled trials that demonstrate efficacy for specific indications such as antibiotic-associated diarrhea, irritable bowel syndrome, and inflammatory bowel diseases. However continuous education and monitoring new clinical evidence on efficiency in other indications is crucial in providing adequate patient care.

Clinical practice should also consider patient-specific factors such as age, underlying health conditions, and concurrent medications that may affect probiotic efficacy. For instance, certain strains have shown benefits in pediatric populations, particularly for conditions like infantile colic and antibiotic-associated diarrhea.

In summary, the successful implementation of probiotics as a preventive and therapeutic measure hinges on a thorough understanding of the scientific evidence supporting specific strains, and consideration of individual patient needs. By following these guidelines, healthcare professionals can effectively integrate probiotics into patient care strategies, optimizing health outcomes through informed probiotic use.

Keywords: probiotics, evidence-based medicine, patient care, guidelines

FASTING – MIRACLE CURE OR DANGEROUS TREND

Biljana Ignatovska

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Different forms of fasting have been known for hundreds of years as a part of many religions believing in its positive spiritual and physical effects, but without any scientific evidence of its benefits. In recent years many studies have been performed to investigate the impact of fasting on human body. According to these researches, the impact of fasting on our body is very diverse, including different organs and systems like immune system, hormonal balance, autophagy activation, aging, even mental health. The aim of this workshop is to discuss how we can use fasting for health benefits, is there any danger in fasting, what is refeed, for how long can we fast, and how can we, as a professionals, approach to fasting.

Keywords: Water fast, refeed, autophagy

SIBO – FROM TESTING TO NUTRITIONAL MANAGEMENT

Sara Sila

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Small intestinal bacterial overgrowth (SIBO) is a clinical entity characterized by the presence of an excessive number of bacteria in the small bowel. It is associated with several non-specific gastrointestinal symptoms, such as bloating, flatulence, diarrhea, abdominal pain and fatigue, which are a consequence of bacterial nutrient fermentation.

The gold standard for diagnosis of SIBO is to obtain jejunal aspirate and aerobic and anaerobic colony counts. However, that is time consuming, expensive, and requires an upper endoscopy. Therefore, the glucose-hydrogen breath test and lactulose-hydrogen breath test have become widely used. Although there is no consensus regarding the diagnosis of SIBO, the presence of an increase in H2 ≥20 ppm over baseline within the first 90 min with either 1 g/kg up to a maximum of 50 g glucose or 10 g lactulose, respectively, is considered to be the best approach. It seems that glucose-hydrogen test has both higher sensitivity and specificity as compared to the lactulose test.

The mainstay of SIBO treatment is the use of broad-spectrum antibiotics, however, prolonged or repeated use of antibiotics have their side effects. Therefore, non-pharmacologic treatments for SIBO have been suggested and studied. These include the use of probiotics and dietary manipulation. Studies have shown that probiotics are an effective treatment option, and a provision of either Bifidobacterium sp, Saccharomyces Boulardiiboulardii, Bacillus clausii and Lactobacillus sp for a minimum of 5 days to a maximum of 6 month has shown to be beneficial. Different dietetic approaches have also been suggested, with the most convincing evidence existing for the low FODMAP diet, which is based on the exclusion of fermentable carbohydrates from the diet.

Keywords: Small intestinal bacterial overgrowth, hydrogen breath test, probiotics, low FODMAP diet

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2. LECTURE ABSTRACTS

REDEFINING THE GUT MICROBIOME THROUGH BIOMODULATORS

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

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The lecture aims to provide an overview of the importance of intestinal microbiota for human health. The human body is covered with bacteria and other microorganisms from birth. From a biotechnologist`s point of view of, we are just a physiological niche populated by thousands of different microbes. Our guts are inhabited by intestinal microbiota, which is the most diverse microbial community that colonises the intestines. It establishes and changes throughout course of life. It reflects the places we go, the things we do and the food we eat. The diverse and balanced microbiome is essential for a strong immune system. According certain researches, infants not exposed to microorganisms, are more likely to develop allergies, asthma, eczema and other health problems. Due to the importance to health and vulnerability of the industrialized microbiota, the research is focused on deciphering microbe-microbe interactions, but also on deciphering diet-microbiota interactions and the connection with health and disease. Diet has been shown as the main modulator of structure and consequently functionality of microbiota. Awareness of the importance of the gut microbiota for host health has spurred efforts to develop microbial-based strategies for microbiota restoration. The relationship between diet, gut microbiota and host health will be discussed as well as the examples of how diet and specific biosolutions can support intestinal health, mitigate disease risk or even be used as a therapy for specific diseases.

Keywords: Intestinal microbiota, probiotics, postbiotics, prebiotics, health

BIOTICS IN WEIGHT LOSS THERAPY

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The gut microbiome plays a pivotal role in regulating metabolism, energy balance, and weight management. In obesity, the gut microbiota undergoes significant changes, with an increased presence of certain bacteria like Prevotella and Fusobacterium, and a decrease in beneficial strains such as Faecalibacterium.

Biotics-probiotics, prebiotics, synbiotics, and postbiotics—are gaining attention for their potential in weight control. Probiotics, such as Lactobacillus gasseri and Bifidobacterium breve, can reduce body fat and waist circumference by enhancing short-chain fatty acid (SCFA) production, modulating appetite hormones, and improving insulin sensitivity. While clinical results vary, higher doses and single-strain probiotics show better outcomes.

Prebiotics, non-digestible fibres, promote beneficial gut bacteria by increasing SCFA production and satiety hormones like GLP-1 and PYY, which aid in reducing body weight. Synbiotics, combining probiotics and prebiotics, offer synergistic benefits for gut diversity and weight loss, while postbiotics, probiotic byproducts, may provide anti-inflammatory and gut barrier benefits.

In summary, the integration of biotics offers a promising strategy for weight loss, though more research is needed to optimize formulations, dosages, and long-term effectiveness in obesity management. Understanding these interactions will be vital for developing effective dietary interventions.

Keywords: biotics, gut microbiome, weight loss, probiotics, prebiotics, microbial dysbiosis, metabolic health

THE VAGINAL MICROBRIOME: CHANGES THROUGHOUT WOMENS LIFES

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In the past decades, evaluation of human microbiota has increasingly incresed with focused on vaginal microbiota composition, diversity, and impact on women owerall, reproductive health, and development of various diseases. Scientific data proved that vaginal micorbiota VMB consist of various bacteria, viruses, archaea, fungi, and protozoa. Role of VMB is pointed out in the context of vaginal infections or dysbiosis, which occurs after use of medication use or lifestyle changes, with the most common respone of development of vulvovaginal candidiasis (VVC) and bacterial vaginosis (BV).

Numerous conducted studies has proved that BV is associated with urinary tract infections (UTIs), increased risk of infertility, fallopian tube (uterine tube) inflammation, adverse pregnancy outcomes, and preterm birth (PTB) with all possible clinical acute and lon term health, social and emocional consquences. Vaginal dysbiosis is associated with higher risk for sexually transmitted infections such as human immune deficiency virus (HIV), human papillomaviruses (HPV), herpes, chlamydia, and gonorrhea. Steroid hormons are one of the major factors shaping the VMB from the onset of puberty to menopause and postmenopause as well as across menstrual cycle and pregnancy. Fluctuations in steroid levels across various stages of reproductive cycle, during perimenopausal and menopausal time bring considerable changes in the vaginal microbial ecosystem, are associated with a multitude of systemic and reproductive disorders. The innate and adaptive immune systems which protect the female reproductive tract against invading pathogens are also under the regulation of the differing gonadal levels. A range of variable factors contribute to the dynamics of vaginal microbiome throughout the life cycle of women. In major women, the vaginal microbiota is mostly dominated by lactic acid producing species/strains belonging to the genus Lactobacillus.

Other substances such as hydrogen peroxide and bacteriocins produced by lactobacilli in the vaginal micro environment inhibit the growth of potential pathogens. Varoius factors as ethnicity, age, variable external factors such as lifestyle, nutritional and sexual habbits, medication are wellknown to determine and influence the composition and dysbiosis/homeostasis state. Probiotics intake are considered as natural and safe means to balance the VMB composition and support during antimicrobial treatment or help in recovery from dysbiosis.

MOLECULAR PRECISION MEETS AI: THE FUTURE OF PERSONALIZED CARE

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Chronic diseases and individualized health challenges are escalating, demanding precision-driven, predictive solutions. Ani leverages AI to integrate complex omics and predictive miRNA biomarkers, transforming personalized care by providing tailored insights that elevate nutritional strategies rooted in biological evidence. This empowers professionals to guide patients toward outcomes with greater impact and clarity. By providing precise patient stratification and adaptive interventions, it delivers scientifically rigorous, evidence-based strategies that optimize metabolic health, influence affectoneuroimmunological functions, and prevent chronic disease.

IMPRINTING OURSELVES – THE STORY OF GLYCOME AND MICROBIOME IN WOMEN'S HEALTH

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In the last few decades ensable of molecular layers involved in maintaining and regulating our body has been considerly expanded with discovery of, among other, epigenome, glycome, and microbiome. All these molecular/informational profiles are relying on supply of chemicals from environment, for which food is a main source, to maintain optimal functioning of the human body. In this lecture we will focus on role of microbiome and glycome in women's health. Microbiome is made of bacteria, fungi, and viruses living in and on human body which play a crucial role in maintaining our overall health. The composition of our microbiome, which is influenced by factors like diet, lifestyle, and genetics, can significantly impact our well-being. The glycome refers to the entire set of carbohydrates (glycans) present in an organism. These sugars are attached to proteins and lipids, forming glycoproteins and glycolipids, respectively. Because they also coat the surface of the cells, these glycans interact with the microbiome, shaping its composition and function. In women's health, the glycome and microbiome play a vital role in various processes, including reproductive health, immune function, hormonal balance and mental health. The only plausible mechanism we currently have, that can affect and possibly alter these two important markers of Womens's health are balanced nutrition, physical activity, stress management and probiotics and prebiotics.

Keywords: Microbiome, glycome, omics, female health

EVIDENCE BASED "BIOHACKING" – 2024. EDITION

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Biohacking has recently emerged as a DIY (do-it-yourself) approach to human health enhancement, leveraging both traditional practices and cutting-edge technology to optimize health, performance, and well-being. This lecture explores biohacking from two angles, mainstream popular one and an evidence-based perspective. Most popular biohacking strategies nowadays include intermittent fasting, cold exposure, detox protocols, grounding and wearable technology, allowing individuals to monitor and modify their biological processes.

The talk also highlights notable biohackers and biohacking/longevity summits and conferences. Special attention will be given to quantifying aging via aging clocks and biomarkers. Overview of newest scientific papers on longevity topic will highlight the role of personalized nutrition, strength training, and sleep management in maintaining optimal metabolic health. Lecture focus is to critically examine the promises and flaws of biohacking practices in extending human lifespan and healthspan as well as counteracting the detrimental effects of modern sedentary lifestyle.

Keywords: Biohacking, longevity, biological clocks, healthspan, quality of life

GUIDING NUTRITION AND WEIGHT MANAGEMENT WITH NUTRIGEN: A NUTRIGENETIC APPROACH TO OBESITY RISK AND WEIGHT LOSS

powered by Fagron Genomics

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Personalized nutrition plays a critical role in determining the success of dietary interventions. Research has shown that genetic-guided dietary strategies can significantly improve diet adherence, particularly in individuals undergoing interventions tailored to their genetic profiles. Genetic analysis enables the customization of diet plans by providing insights into individual nutritional needs, metabolic processes, and potential health risks.

Studies have identified several single nucleotide polymorphisms (SNPs) that are directly associated with variations in body mass index (BMI). Notably, SNPs such as rs9939609 and rs1121980 have been linked to altered energy homeostasis and appetite regulation, contributing to an increased risk of obesity. These genetic variants are associated with higher energy intake, which can influence weight gain and obesity-related conditions.

By leveraging genetic information, individuals can receive personalized recommendations that account for their specific genetic predispositions. This includes insights into energy metabolism, weight loss potential, and susceptibility to nutrient deficiencies or gastrointestinal pathologies. Additionally, genetic analysis can inform the development of targeted supplementation strategies and provide a curated list of foods optimized for the individual's unique nutritional needs. This approach maximizes the efficacy of dietary interventions, promoting better long-term health outcomes.

Keywords: Nutrigenetic, personalized nutrition, single nucleotide polymorphisms, genetic analysis, nutrigen

BARRIERS AND FACILITATORS OF CONSUMING A PLANT-BASED DIET

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A shift towards a more plant-based diet and a decreased intake of meat products can help achieve The Sustainable Development Goals, aiming at reducing the total meat consumption level to 32 kg per capita per year on a global scale. Studies suggest that replacing animal-based products with plant-based products can reduce the risk of certain cardiovascular diseases and type 2 diabetes.

However, despite public awareness of the advantages regarding health and sustainability of a plant-based diet, people in the Western world are increasing their intake of animal-based products. EU meat consumption in 2018 is 69.8 kg per capita and is said to increase further by 2050.

I will share findings from my recent research on what happens in this gap, and dive into the barriers and facilitators consumers face in shifting to a more plant-based diet. The barriers and facilitators are divided in six categories: ethical, psychophysiological, health, socio-cultural, infrastructural, and personal factors.

Keywords: Plant-based, consumer behavior, sustainable diets, healthy diets

LEVERAGING SCIENCE AND INNOVATION TO SUPPORT BALANCED AND SUSTAINABLE DIETS

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It is well established that human and planetary health are inextricably linked. The food we produce impacts the planetary health and the planetary health impacts the food production; both impacts human health. Food systems are challenged today by a growing and aging world population, as well as urbanization and climate change. To address these, systemic solutions are needed factoring in nutrition, environmental and social aspects.

These components form also the basis for innovations at product level, as we consider nutrient density, environmental sustainability, taste, and affordability simultaneously. Addressing all aspects in a holistic way is not always easy, as specific goals may naturally conflict each other, e.g. dairy milk is a food with high nutritional value including protein and essential micronutrients. However, its production is related with a higher CO2 footprint compared to plant-based proteins. Combinations of animal and plant proteins provide new opportunities to deliver high nutritional value and a reduced environmental footprint. Additionally, they are more affordable versus the animal-based foods, thus allowing access to a wider population.

Finally, foods not only provide essential nutrients but are part of meals and our overall diets. A healthy diet is characterized by consuming a diverse range of foods that supply the necessary energy, macro- and micronutrients and adequate hydration in appropriate proportions to meet energy and physiological needs. Food formulation and purposeful processing are part of the solution to provide safe, nutritious, affordable and sustainable foods and diets.

Keywords: Food systems, balanced and sustainable diets, protein transition

EATING HABITS OF YOUNG ADULTS THAT PROMOTE THE PLANETARY HEALTH

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The global food system has a significant impact on the planetary health contributing to greenhouse gas emissions, biodiversity loss, water scarcity and land degradation. Young adults, as a demographic group, have a unique opportunity to influence sustainable food systems through their dietary choices and consumption behavior, while shaping their future health and wellbeing of the planet. This lecture provides a scientific examination of young adults' dietary habits and assesses the extent to which they align with planetary health goals that focus on minimizing environmental degradation while ensuring adequate nutrition. The sustainable diet guidelines recommend focusing on plant-based dietary patterns and local food sources. The "Planetary Health Diet" developed and recommended by the EAT–Lancet Commission is a suitable model for a sustainable diet. The barriers and motivators that influence young adults' dietary behavior, including cultural trends, accessibility and awareness of sustainability issues, are also highlighted. As the results show, the current dietary behavior of young adults, especially students, is not sustainable, both for their future health and for the health of the planet. So there is a clear need to educate young adults about the importance of changing their eating habits. The focus should be on increasing the consumption of vegetables, fruits, legumes, nuts and whole grains, while reducing the consumption of red meat and high-fat dairy products to prevent the development of chronic non-communicable diseases and align dietary habits with the Sustainable Development Goals.

Keywords: Sustainable nutrition, plant-based diet, young adults, planetary health

PLANT-BASED DIETS AND SUSTAINABILITY: STRATEGIES FOR IMPACTFUL COMMUNICATION

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Communicating the benefits of plant-based diets and their role in sustainability presents unique challenges, particularly when engaging diverse audiences with varying levels of awareness, interests, needs, and engagement. Drawing on recent EUFIC consumer research and successful communication campaigns, this presentation explores strategies to effectively convey the importance of plant-based eating for both personal health and environmental sustainability.

MAINTAINING PROTEIN INTAKE IN FEMALE ATHLETES

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Ensuring adequate protein intake remains a prominent and often-discussed topic in sports nutrition, particularly for female athletes who face unique nutritional challenges. While meeting protein needs is essential for muscle repair, recovery, and overall performance, an excessive focus on protein on the other hand can inadvertently shift attention away from other critical nutrients, notably carbohydrates. This misallocation in nutritional priorities can compromise energy levels, endurance, and recovery due to suboptimal carbohydrate intake, which is essential for glycogen replenishment and fueling prolonged physical activity. Additionally, special emphasis will be placed on the challenges faced by female athletes following vegan diets. is In this context, the importance of nutrition education becomes paramount to support female athletes in achieving a balanced diet that fulfills their protein needs without overshadowing the role of carbohydrates or other vital nutrients.

Keywords: Protein, female athletes, vegan, muscle repair, performance, endurance, carbohydrates

DIETARY SUPPLEMENTS FOR FEMALE ATHLETES

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Female athletes often face unique physiological and nutritional demands heightened by the volume and intensity of their training. These demands can lead to specific nutritional deficiencies, susceptibility to overtraining syndrome (OTS), and Relative Energy Deficiency in Sport (RED-S). This lecture will explore the role of targeted dietary supplementation to address these needs, focusing on the nutrients that support endurance, strength, recovery, and resilience.

In high-volume or high-intensity training, the body's requirements for key nutrients like protein, iron, calcium, and vitamin D significantly increase. For example, protein supplementation supports muscle repair and maintenance, especially vital given that women's muscle protein synthesis rates may vary across menstrual cycle phases.

Overtraining syndrome (OTS), which arises from excessive training without adequate recovery, impacts immune function, energy availability, and mental focus. Emerging research suggests that adaptogenic herbs may mitigate the physical and psychological effects of OTS by modulating cortisol levels and supporting adrenal health. These adaptogens, along with omega-3 fatty acids, can reduce inflammation and improve recovery.

Finally, RED-S, more common in female athletes due to under-fueling, disrupts metabolic, hormonal, and immune functions. Addressing energy and nutrient gaps through strategic supplementation, including B-vitamins, antioxidants, and plant-based omega-3s, can help prevent chronic fatigue and support optimal metabolic and hormonal health.

Adding these elements highlights the close relationship between training demands, the risk of nutrient deficiencies, and the need for carefully chosen supplements in maintaining peak performance and long-term health.

Keywords: Dietary supplements, female athletes, overtraining syndrome, relative energy deficiency in sport (RED-S)

CLINICAL ASSESSMENT OF BODY COMPOSITION – THE LATEST GENERATION

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The presentation, "Clinical Assessment of Body Composition," introduces Bodystat's advanced bioimpedance technology, emphasizing its utility in healthcare for precise body composition analysis. The core focus is on the Multiscan 5000 device, which employs Bioimpedance Spectroscopy (BIS) to non-invasively measure body water compartments and assess cellular health, muscle mass, and fluid balance. This capability is particularly relevant in identifying malnutrition, sarcopenia, and cachexia, conditions often undetected by traditional BMI assessments. The Multiscan 5000's accuracy, enhanced by Adaptive Compensation Technology, addresses challenges like stray capacitance and provides reliable measurements even in overcrowded or remote clinical environments.

The presentation explores malnutrition beyond BMI, stressing the importance of early, objective assessments to prevent deteriorating health outcomes. The device's ability to track fluid changes and cellular health allows for targeted nutritional and medical interventions, improving patient care across various clinical settings, including oncology, nephrology, cardiology, and critical care.

Bodystat's technology empowers healthcare providers to monitor body composition changes continuously, facilitating proactive interventions. The device's prognostic markers, including Phase Angle and Prediction Marker, offer insights into cellular health and hydration status, aiding clinicians in evaluating patient risks and tailoring treatment strategies effectively.

Ultimately, Bodystat's innovations in bioimpedance are presented as valuable tools for modern healthcare, addressing malnutrition and muscle degradation issues more comprehensively than conventional methods, fostering better patient outcomes, and supporting clinical decision-making across diverse medical applications.

Keywords: Bioimpedance Spectroscopy (BIS), Body Composition Analysis, Malnutrition Assessment, Cellular Health, Prognostic Markers

HOW CAN WE EFFECTIVELY MOTIVATE CHANGE IN DIETARY HABITS?

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Effectively motivating change in dietary habits requires not only a solid understanding of nutritional science but also the application of psychological principles, such as the framing effect. The framing effect refers to the way information is presented, which can significantly influence individuals' decisions and behaviours. This presentation will explore how the framing effect can be leveraged to encourage healthier dietary choices and promote lasting changes in eating habits.

The framing effect plays a pivotal role in shaping how individuals perceive food-related information. For instance, presenting nutritional benefits in a positive light—such as emphasising the “health benefits” of fruits and vegetables, rather than focusing on the "risks" of unhealthy eating—can encourage more favourable attitudes towards healthy eating. By positively framing gains as ‘Feeling more energised by eating regularly’, has been shown to motivate individuals. Likewise, negatively framing losses as ‘Feeling more tired by skipping meals can motivate individuals to take action. This can be difficult as it has dependency on the psychological features of the individual. This approach aligns with the principles of cognitive psychology, where people are more likely to act when presented with options framed in a positive context.

Equally important are the communication skills used to convey dietary information. The effectiveness of health messages depends on how they are delivered. Clear, concise, and culturally relevant messaging is key to ensuring that individuals understand the benefits of dietary changes. Using empathetic, non-judgmental language can also reduce resistance to dietary recommendations, as people are more likely to adopt changes when they feel understood and supported. Additionally, tailoring messages to individual preferences, concerns, and social contexts can increase the relevance and impact of dietary advice.

Keywords: dietary change, habits, communication, framing effect, psychology

EATMOT PROJECT: INVESTIGATION OF THE MOTIVATIONS FOR FOOD CONSUMPTION AMONG DIFFERENT COUNTRIES

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The EATMOT Project is a multinational study that was carried out in 16 countries focusing on different eating motivations, taking into account their recognized importance in the definition of people's dietary patterns. The act of eating is not only determined by physiology such as body needs of nutrients and energy, but also by many other factors that interact in a complex way to shape individual eating habits. Hence, the aim of this project was to investigate the different types of motivations that determine people's eating patterns, either in relation to their choices or eating habits. To do this, factors linked to food choices were evaluated in the following main areas: health motivations; economic factors; emotional aspects; cultural influences; marketing and commercials or environmental concerns. The study was based on a questionnaire that was prepared purposely for the project, and dully validated. The countries involved in the study were: Argentina, Brazil, Croatia, Egypt, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal (Coordinator), Serbia, Slovenia, Romania and United States of America. The collected results included 11,960 validated respondents, whose data was used to characterize the eating motivations in different parts of the world, including those linked with healthy eating. These results are valuable allies to shape interventions aimed at motivating people towards healthier diets. In the modern era, individuals have been increasingly recognizing the concept of dietary health, and therefore the group and individualized guidance on nutritional and healthy eating habits are becoming more relevant.

Keywords: Healthy food, Food choice, Food motivation, Food consumption, Food determinants

ENHANCING PATIENT CARE: CROATIA'S FIRST PHARMACIST GUIDE TO SAFE SUPPLEMENT USE

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Dietary supplements are more important than ever in today's fast-paced world, especially as modern lifestyles and dietary habits often leave gaps in our nutrition. Supplements can help fill these gaps, support specific health needs, and boost overall wellness by providing essential vitamins, minerals, and other nutrients that may be missing from a regular diet.

Pharmacists, being accessible healthcare professionals, are uniquely positioned to guide patients in making informed choices about supplements. With their pharmacology and patient care expertise, pharmacists can offer crucial advice on safe and effective supplement use, addressing potential issues like interactions with prescription medications or inappropriate dosages. This guidance helps ensure patient safety and promotes responsible self-care.

Creating a dedicated manual for pharmacists is a crucial initiative in this regard. This manual, grounded in evidence-based recommendations, is designed to empower pharmacists with knowledge and confidence, making them well-prepared to guide patients in making informed health choices. It highlights the growing role of pharmacists in public health and wellness and underscores the need for ongoing education in the evolving field of dietary supplementation.

With this manual, pharmacists can further enhance their practice by offering more informed patient education, ultimately contributing to better community health outcomes. This collective effort strengthens pharmacists' connection to their communities and reinforces their sense of purpose. By fostering informed decisions and promoting wellness, pharmacists can take pride in their significant impact on their patients' lives.

In summary, introducing the first Croatian manual for dietary supplements marks an important milestone in promoting these products' safe and informed use. It emphasises the critical role of pharmacists in guiding patients towards responsible self-care and highlights the potential of this manual to support them in this mission.

Keywords: Pharmacists, supplementation, vitamins, Croatian manual, nutrition

CLINICAL USE OF PHYTOCHEMICALS AS COMPLEMENTARY THERAPY – CURCUMIN

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Curcumin, the primary pharmacologically active compound in turmeric (Curcuma longa L., Zingiberaceae), exhibits a range of beneficial properties, including anti-inflammatory, anti-tumor, antioxidant, anti-diabetic, and immunomodulatory. These attributes position curcumin as a promising candidate for complementary therapy across various clinical conditions. Its therapeutic effects are primarily mediated through the modulation of key molecular pathways such as NF-κB, MAPK, and p53, which are integral to inflammation and cell proliferation. Curcumin has been evaluated in numerous clinical trials targeting a spectrum of chronic inflammatory diseases, including Alzheimer's disease, arthritis, asthma, cancer, dyslipidemia, hypertension, metabolic syndrome, type II diabetes, inflammatory bowel diseases, and non-alcoholic fatty liver disease. Generally, these trials have reported beneficial or at least neutral effects on inflammatory markers. However, the variability in supplementation protocols—encompassing formulations, dosages, and treatment durations—highlights the need for standardized guidelines to draw clearer conclusions about curcumin's efficacy. Furthermore, the clinical application of curcumin is often hindered by its pharmacokinetic limitations, such as poor solubility, low intestinal absorption, and rapid metabolism. Advances in delivery systems, including liposomes and nanoparticles, along with the use of additives like piperine, have shown promise in significantly enhancing curcumin's bioavailability. In summary, while curcumin demonstrates potential as a safe and effective complementary therapy, comprehensive and standardized studies are essential to validate its therapeutic benefits across diverse clinical contexts.

Keywords: curcumin, bioactivity, clinical use, complementary therapy, inflammation

3D PRINTING FOR CREATION OF INNOVATIVE FUNCTIONAL FOOD PRODUCTS

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With the increasing challenges in the food industry and rising consumer demand for health beneficial, personalized and easy-to-consume products, interest in innovative functional foods has grown. This research focused on developing edible 3D-printed hydrocolloid gels with plant extracts and 3D-printed capsules filled with plant material, incorporating elements of Industry 4.0. In vitro studies analyzed the release rate of bioactive components from 3D-printed polyvinyl alcohol (PVA) capsules containing lyophilized oregano and sage. Total polyphenol content was measured using the Folin-Ciocalteu reagent method, and antioxidant activity was assessed using the ferric reducing antioxidant power method. After 120 minutes, oregano showed a higher total polyphenol content and greater antioxidant activity (104.457±4.364 mg GAE/gsample; 1366.815±68.359 µmol FE/gsample) compared to sage (60.620±22.447 mg GAE/gsample; 833.454±29.706 µmol FE/gsample). After the development of a printable hydrocolloid paste (agar in combination with different concentrations and kinds of starch) the analysis of total polyphenols and antioxidant activity of the 3D printed gels with oregano/sage extracts was conducted with the same methods. In these gels, total polyphenol content ranged from 0.614±0.012 to 0.838±0.015 mg GAE/gsample for oregano and from 0.171±0.064 to 0.263±0.012 mg GAE/gsample for sage. Antioxidant activity ranged from 5.889±0.463 to 8.720±1.622 µmol FE/gsample for oregano and from 1.322±0.742 to 3.555±0.179 µmol FE/gsample for sage. Sensory analysis indicated that 52.17% of participants preferred the gel with 4% modified corn starch and oregano extract. In alignment with Industry 4.0's sustainable production principles, the study also evaluated the environmental impact of the process. The carbon footprint for the 3D-printed PVA capsule was 9.082 kg CO2/fu, while the edible gel was significantly lower at 0.129 kg CO2/fu—over 70 times less than the PVA capsules. From a cost perspective, one 3D-printed PVA capsule with lyophilized plant material costs 1.25 €, while a 3D-printed edible gel with plant extract costs 0.03 €. By integrating Industry 4.0 elements, this research successfully created a new product with potential applications as a functional food or dietary supplement, which enables simple consumption, ensures the input of bioactive substances and is economically and ecologically acceptable.

Keywords: 3D printing, Industry 4.0, additive manufacturing, edible hydrocolloid gels, PVA capsules

OLEOGELS - INNOVATIVE REPLACEMENT OF SATURATED FATS IN FOOD

Đurđica Ačkar

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Saturated fats give unique structure, texture and palatability to food products. However, due to issues related to health, and, in some fats, environmental impact, there is a growing need for their substitution. Carbohydrates, such as starch and fibre, have been used as fat replacers, but with deteriorating effect on sensory properties, and often texture. Recently, oleogels have been drawing increasing attention as potential replacers of saturated fats. By entrapping liquid oil droplets in the network of oleogelator (which is usually polymer), gel-structure is formed. Properties of oleogels depend on type of oleogelator, type of oil, and technique used for preparation. This presentation will give short overview of oleogelators and techniques used for preparation of oleogels, as well as potential application in food products.

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Keywords: oleogels, fat reduction, confectionary, bakery, meat

TONKA EGG: INNOVATIVE VEGAN CANDY FOR CHILDREN WITH ALLERGIES

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Tonka Jaje represents a new generation of sweets, designed as a tasty and nutritionally rich alternative to traditional products. Developed by a team of gastronomy students from Aspira, this vegan confectionery product is based on natural ingredients such as pea protein, beetroot, freeze-dried strawberries and cocoa butter. It is specially formulated for children with allergies to milk, gluten, eggs and nuts, providing a safe and healthy candy without compromising on taste.

During the speech, we will present in detail the development process of Tonka Eggs, including the research of ingredients, nutritional value and technological processes of production. Special emphasis will be placed on the application of the HACCP system in ensuring food safety and ecological aspects of production and packaging. We will also share experiences from the Ecotrophelia Hrvatska competition, where Tonka Jaje won first place, as well as participation in the SIAL Paris international fair.

The aim of the lecture is to highlight the importance of innovation in the food industry, especially in the segment of products intended for specific nutritional needs, and to stimulate discussion about the challenges and opportunities in the development of such products.

CURRENT PERSPECTIVES ON THE ROLE OF NUTRITION IN POLYCYSTIC OVARY SYNDROME (PCOS)

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PCOS is a hormonal disorder that is shown in 15-22% of women of reproductive age (15-49). It is a leading cause of infertility and metabolic complications such as type 2 diabetes and cardiovascular disease. PCOS is characterized by three primary features: hyperandrogenism, ovulatory dysfunction and polycystic ovaries visible on ultrasound. This condition is often linked to insulin sensitivity, chronic inflammation, imbalances in lipid and carbohydrate metabolism, making nutritional management crucial for reducing complications like: infertility, obesity, diabetes and cardiovascular disease. Also nutrient deficiencies in vitamins like D and B 12, and minerals like magnesium and zinc are commonly observed in women with PCOS. Recent studies emphasize dietary patterns like the Mediterranean diet and DASH that help in reducing inflammation and managing blood sugar levels more effectively compared to modern diets high in refined carbohydrates and saturated fats. A diet rich in anti-inflammatory foods from dark leafy vegetables, berry fruits, whole grains, omega-3 fatty fish is crucial to manage PCOS symptoms so as balancing meals, adequate protein intake and personalized supplementation. Inositol (myo-inositol and D-chiro-inositol) is often recommended for improving ovarian function and insulin sensitivity, such as chromium and berberine too. Every PCOS woman has unique symptoms metaphorized as a unique puzzle so personalised dietary approach is highly recommended.

Keywords: PCOS and diet, homone imbalance, insulin resistance, chronic inflammation, PCOS management, individual approach

DIETARY APPROACHES TO PREVENT AND MANAGE ENDOMETRIOSIS

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Endometriosis is a chronic inflammatory disease characterized by the presence of endometrial-like tissue anywhere outside the lining of the uterus, but usually on the outer surface of the uterus, ovaries, fallopian tubes, abdominal wall, intestines or lungs. Common symptoms are chronic pelvic pain, dysmenorrhea, dyspareunia, fertility complications, fatigue, heavy and prolonged periods, lower back pain, bloating, constipation, and diarrhea. Because symptoms can overlap with other conditions, it often takes more than 10 years to get a diagnosis. Endometriosis is estrogen-dependent disease characterized by immune dysfunction, estrogen dominance (an excess of estrogen, estrogen metabolites and xenoestrogens) and progesterone resistance (the endometrium's inability to properly respond to progesterone), which leads to additional inflammation in the body. Adenomyosis is also commonly seen in women with endometriosis. Due its inflammatory character and prior surgeries, intra-uterine and intra-abdominal adhesions are common complication of endometriosis. Dietary changes and appropriate supplementation have therapeutic potential in modifying chronic inflammatory processes and reducing pain perception. That is why dietary recommendations for endometriosis are based on lowering chronic systemic inflammation, modulating immune response and supporting estrogen metabolism. The first step in reducing chronic systemic inflammation is (1) stabilizing blood glucose and insulin levels, (2) restoring intestinal microbiota and mucosal health and (3) managing oxidative stress. Endometriosis often causes heavy menstrual bleeding, which can lead to blood loss and the development of anemia in some women. Above mentioned, chronic inflammation affects absorption.

Keywords: Adhesions, endometriosis, inflammation, glycemia, gut health

OPTIMIZING PREGNANCY OUTCOMES THROUGH DIET - FOCUS ON GESTATIONAL DIABETES

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Nutrition plays a crucial role in determining pregnancy outcomes, with poor diet being a major contributor to pregnancy metabolic syndrome (including diabetes) and metabolic disorders in offspring, alongside the maternal stress, rest, environment and chronic morbidities. Evidence from dozens of RCTs, involving more than 34,000 women, clearly show a a great dietetic influence of maternal and fetal outcomes: compared with routine care, diet interventions are associated with risk reduction of 21% for gestational diabetes, 57% for preterm delivery, 32% neonatal ICU admission, 54% for total adverse neonatal and 11% for total adverse maternal outcomes. Dietary interventions tailored to optimize pregnancy outcomes emphasize intake of high-quality, nutrient dense carbohydrates which to improved insulin action, lower free fatty acid levels, controlled glycemia and vascular benefits both in mothers and infants. Restrictive protocols such as ketogenic diet, Paleo diet and other diets that severely restrict macronutrients should be avoided. Carbohydrates during pregnancy not only serve as the main energy resource for mother's and fetal brain, but also a placenta relies on glucose as a primary energy resource.

But as insulin sensitivity decreases by 50-60% in the second trimester, those carbohydrates – as the primary source of energy and primary activator of insulin metabolism – start to play a crucial role in postprandial glycemia, and – if consumed in excessive amounts –can increase the risk of pregnancy complications and have lasting negative effects on offspring metabolism and development. Fluctuations in blood sugar levels, caused by ingestion of refined sugars and simple, low quality carbohydrates, are linked to fetal large gestational age, physiological development delay, impaired neurological development, increased serum lipids level, higher systolic blood pressure and increased risk of overweight or obesity in offspring.

Among women with gestational diabetes (GDM), medical nutrition therapy should be implied from the first trimester, providing 175 g of carbohydrates, 71 g of protein and 28 g of fiber per day. Among obese women with GDM, carbohydrate intake should be limited to 35-45% of total calories, with empasis on high quality, low glycemic indeks (GI) carbohydrates. On of the most appealing dietary interventions during pregnancy should be implementation oft he Mediterranean diet, rich in mono-and polyunsaturated fats, plant proteins, fiber and low GI carbohydrates. Hihg adherence to the Mediterranean diet is linked to 37% lower odds for gestational diabetes, 28% lower odds for pree/eclampsia and 21% lower odds for any adverse pregnancy outcomes. Aside the implementation of Mediterranean diet, for optimal pregnancy outcomes in women with GDM, glucose monitoring should be a daily routine, aiming glycemic goals of <5,3 mmol/L for fasting gucose, <7,8 mmol/L for 1h postprandial glucose and <6,7 mmol/L for 2 h postprandial glucose.

Keywords: Pregnancy nutrition, maternal diet, diet quality, pregnancy outcomes, glucovariability

BRAIN HEALTH AND LIFESTYLE

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The idea about the importance of healthy life for brain health is present centuries ago, from Juvenalis' Mens sana in corpore sano, along with Ramon y Cajal's that Every man can, if he so desires, become a sculptor of his own brain, to the recent motto of the World Federation of Neurology: There is no health, without brain health.

Today, we have scientific proofs for these ideas. Neuroscience research, especially intensive during Decade of the Brain at the end of 20th century, especially by use of neuroimaging techniques, have clearly shown what is happening in the brain during physical exercise, during acute or chronic stress, during so called „brain fitness“, as well as the importance of healthy nutrition to preserve of brain health.

Epidemiological and prospective studies have shown that regular physical activity improves cognitive functions and protects from neurodegenerative diseases. Extensive research is going on to prove biological mechanisms that underlie such beneficial effect. Multi domain interventions could improve or maintain cognitive functions in at-risk elderly people (FINGER study, 2015.). Prevention is the key. Greater gray matter volume, measured by MRI, was found with higher aerobic activity, pointing out that it might be neuroprotective.

Results of PREDIMED study showed the value of Mediterranean diet not only for prevention of stroke, but for prevention of cognitive decline as well. Sleep is also shown as an important factor to preserve brain health and vital social inclusion is of utmost importance as well. All these factors are important stimuli for activating neuroplasticity, slow down aging and preserving brain health.

Keywords: brain health, lifestyle, neuroplasticity, healthy nutrition, exercise

DISORDERS OF GUT-BRAIN AXIS

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A huge number of patients visiting gastrointestinal offices suffer of disorders of gut-brain axis. The main characteristic of these disorders is that patients have no organic explanation for their symptoms. Disorders of gut-brain axis encompass a broad spectrum of entities, covering every section of the GI tract – from the foregut to the hindgut. The most frequent diagnoses are irritable bowel syndrome, functional dyspepsia and functional constipation. The diagnosis is verifiable based on distinctive symptoms, signs and exclusion of an organic disease. This often leads to a high utilization of a health-care system. The pathophysiology involves dysregulation of gut-brain interaction, gut microbial dysbiosis, visceral hypersensitivity, abnormal GI motility and altered immune function.

The general principles of treatment are based on a biopsychosocial understanding and involve management of physical symptoms and psychological counselling when appropriate.

BRAIN HEALTH AND NUTRITION IN THE 21ST CENTURY: A COMPREHENSIVE APPROACH

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In the 21st century, brain health and nutrition have gained recognition as essential components of overall well-being and cognitive function. The complex interplay between nutrition, genetics, and lifestyle factors is crucial in maintaining brain health and preventing neurodegenerative diseases. This evolving understanding is driving innovations in both personalized nutrition and public health strategies to optimize brain function across the lifespan.

The Role of Essential Nutrients in Cognitive Function Key macro- and trace elements, such as iron, zinc, and selenium, play a critical role in brain development and performance. Deficiencies in these nutrients have been linked to impaired cognitive function and neurocommunication, emphasizing the need for addressing such deficiencies to enhance brain performance. Furthermore, the microbiota-gut-brain axis is increasingly recognized as a potential target for interventions aimed at neurorehabilitation and cognitive enhancement, showcasing the importance of a healthy gut for brain function.

Multidisciplinary Approaches to Brain Health The American Academy of Neurology promotes a multidisciplinary approach to brain health, advocating for preventive neurology to identify and mitigate risks associated with brain disorders. Their Brain Health Initiative underscores the importance of research, education, and public policy in promoting brain health throughout the lifespan.

Nutrition and Neurodevelopment Despite advancements, many global food policies do not adequately address the nutritional requirements essential for brain development, contributing to malnutrition and its adverse impact on neurocognitive outcomes. Ensuring access to brain-supportive foods rich in essential fatty acids and micronutrients is critical for fostering intellectual development and societal progress.

Natural Products and Precision Nutrition for Neuroprotection Natural compounds like polyphenols offer neuroprotective benefits through complex metabolic pathways, potentially impacting brain health without direct brain bioavailability. Precision nutrition, informed by genetic and metabolic data, offers a personalized approach to maintaining brain health and preventing neurodegenerative conditions.

Despite growing awareness, challenges remain in translating research into practice. Continued interdisciplinary collaboration is essential to develop effective dietary interventions for brain health.

Keywords: Brain health, Nutrition, Neurodevelopment, Gut-brain axis, Precision nutrition

NUTRITION, EXERCISE AND COGNITIVE FUNCTION

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Cognitive functions include several varied and complex brain activities, such as attention, memory, processing speed, and executive functions (i.e., reasoning, planning, problem solving, and multitasking). There are major challenges in studying the effect of nutrients and exercise on cognitive function, making the scientific evidence difficult to compare. But there is no doubt that for synthesis of the structures of the brain and the nervous system proteins, fatty acids, in particular omega-3 fatty acids, B-vitamins play an important role. Aminoacids are the precursors of neurotransmitters, carbohydrates are a main energy source. Inadecuate nutrient intake during pregnancy has been linked to brain defects, altered cognition and motor deficits. In a study performed in sheeps, maternal undernutrition affected skeletal muscle development, which can affect on the other hand motor competence and ability for exercise.

In adults, supplementation with omega-3 fatty acids has been linked to increased learning, memory, cognitive well-being and blood flow in the brain. Low water intake and reduced physiological hydration have been linked to greater decline in global cognitive function over a 2-y period. This time frame has also been sufficient to produce greater hippocampal grey matter volume decline associated with poorer memory scores in college students with high alcohol intake.

There are two main neural mechanisms linking exercise and cognitive function: A) Supramolecular mechanisms include angiogenesis, neurogenesis, and synaptogenesis. B) Molecular mechanisms, which comprise the action of molecules that modulate nerve activity and influence cognitive function. Ex: BDNF, IGF-1 and the neurotransmitters serotonin, dopamine, norepinephrine and acetylcholine. As we get older, there are age-related changes in the brain which can contribute to minor cognitive deficits, especially in memory, processing speed, cognitive flexibility, attention, and executive functions. People aged ≥ 65 y with lower strength have worst outcome in cognitive tests, i.e. the MMSE. On the other hand, in exercise interventions during one year, results indicate BDNF-mediated improvements in executive function, enhancing learning and memory capacities in subjects aged ≥ 65 y.

The combined effect of nutrition and exercise on cognitive function is still a challenge, but very important in a context of increasing longevity of the population. Current research indicates that the aged brain is capable of change, and that probably an adequate diet togeher with a well-planned training program can slow down age-related cognitive decline.

Keywords: Exercise, vitamins, healthy ageing, brain function, cognitive decline

FUELING THE GUT WITH BUTYRIC ACID

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Butyric acid, or butyrate, is a short-chain fatty acid (SCFA) with essential benefits for gut health, especially for managing conditions like irritable bowel syndrome (IBS). Produced naturally in the colon through the fermentation of dietary fibers by gut bacteria, butyrate plays a key role in maintaining the health of the intestinal lining and supporting immune function.

The gut microbiota—a complex community of bacteria, viruses, and fungi—significantly impacts overall health. A balanced microbiota, or eubiosis, promotes digestion, immune resilience, and a strong gut barrier, while an imbalance (dysbiosis) has been associated with various health concerns, such as diabetes, obesity, and gastrointestinal disorders. Protective mechanisms in the gut, including a mucus layer and tight junctions between cells, act as barriers that help prevent pathogen invasion and regulate gut permeability. Butyrate supports these barriers, helping to maintain an optimal immune response and strengthen the gut lining.

As the primary energy source for colonocytes (cells lining the colon), butyrate provides up to 70% of their energy. It also supports several key functions in the gut: it reduces pH levels, creating an environment favorable to beneficial bacteria and hostile to pathogens; stimulates the production of mucus, which fortifies the gut barrier; and promotes antimicrobial peptides that defend against infections. Butyrate's anti-inflammatory properties further support gut health by modulating immune responses, maintaining intestinal wall integrity, and regulating gut permeability.

In IBS management, butyrate has demonstrated positive effects on symptoms such as abdominal discomfort, bloating, and irregular bowel movements. For individuals with disrupted gut microbiota—due to factors like low fiber intake, antibiotic use, or dietary restrictions—butyrate may help restore microbial balance and reinforce intestinal barrier functions.

Studies have shown that supplementing with butyrate can significantly alleviate symptoms in people with IBS, leading to improvements in abdominal pain, stool consistency, and bloating. The therapeutic potential of butyrate is increasingly recognized as a valuable part of nutritional strategies to support gut health, enhance microbiota resilience, and improve quality of life for individuals experiencing gastrointestinal symptoms.

Keywords: Butyrate, SCFA, colonocytes, gut permeability, intestinal barrier

DIGESTIVE ENZYME SUPPLEMENTATION

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The essential role of enzymes in cellular biochemical processes underlines their importance to life. The discovery of enzymes and their functions, linked to figures such as Louis Pasteur, Wilhelm Kühne, and Eduard Buchner, catalyzed scientific progress through the reevaluation of established paradigms. Today, it is well-known that enzymes catalyze nearly every biochemical reaction in the body, and they are classified into three primary groups: digestive, metabolic, and dietary enzymes. Digestive enzymes, produced by the digestive system, facilitate food breakdown and nutrient absorption, while metabolic enzymes support biochemical processes, and dietary enzymes, sourced from raw foods, enhance digestive efficiency. However, modern diets, often dominated by cooked and processed foods, are low in dietary enzymes, leading to digestive deficiencies.

Digestive enzyme supplementation is indicated for conditions like lactose intolerance, indigestion, post-meal discomfort, and digestive disorders associated with pancreatic insufficiency or irritable bowel syndrome. Common enzyme supplements include mixtures of amylases, proteases, lipases, and cellulases to aid digestion. Specific enzymes, such as alpha-galactosidase for fermentable carbohydrates and cellulase for fiber-rich foods, target various substrates and can reduce symptoms like bloating. Broad-spectrum enzyme blends, incorporating multiple enzyme types, are considered more effective than single-enzyme formulations.

Enzyme supplements vary in origin, including animal, plant, and microbial sources. Plant-based enzymes like bromelain and papain, derived from pineapple and papaya respectively, are effective for protein digestion, particularly following large meals. However, microbial enzymes are increasingly recognized for their broad pH range (3–9) and activity profile, typically sourced from microorganisms such as Aspergillus and Rhizopus. These microbial enzymes, cultivated with plant substrates, offer a versatile approach for diverse digestive issues, providing wide-ranging applicability for conditions of impaired digestion. Enzyme activity is measured in specific units per the Food Chemical Codex (FCC), allowing precise quantification for enzymes like lactase, amylase, and lipase, ensuring targeted therapeutic applications.

Keywords: digestive enzyme supplementation, dyspepsia, egzocrine pancreatic insufficiency, lipase, protease, amylase

MIX, BAKE, ENJOY – THE HEALTHY WAY

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With its innovative product, di-go opened a completely new segment in nutrition, which represents a significant step forward in the expansion of their offer, standing out for its tradition and top quality. Once again offering a quick and easy product, di-go remains a reliable choice for anyone looking for excellence in every bite. di-go bread mixes are a revolutionary product entering the bakery market in response to the growing demand for healthier and tastier options.

Keywords: Healthy, Sourdough, Bread, Superfood, Easy

3. POSTER SECTION

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FF09	POSITIVE EFFECTS OF RED CLOVER (*TRIFOLIUM PRATENSE L.*) ON WOMEN'S HEALTH IN MENOPAUSE
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SN02	ASSESSING THE KNOWLEDGE AND HABITS OF ENDURANCE ATHLETES ON POST-EXERCISE NUTRITION AND THE IMPACT OF ONLINE EDUCATION

CODE	Title
	GENERAL TOPICS
GT01	EXPLORING THE KNOWLEDGE TOWARDS PROBIOTICS AMONG HEALTH SCIENCES STUDENTS: A CROSS-SECTIONAL STUDY
GT02	TRADITIONALLY PRODUCED BUCKWHEAT, BARLEY, AND RYE FLOURS: A COMPREHENSIVE ANALYSIS OF DIFFERENT FLOUR PARTICLE FRACTIONS
GT03	ADVERSE REACTION DURING THE COMPLEMENTARY FEEDING
GT04	IS THERE A DIFFERENCE IN ADHERENCE TO THE MEDITERRANEAN DIET AMONG OVERWEIGHT AND OBESE PEOPLE?
GT05	ASSESSMENT OF NUTRITIONAL STATUS AND PREVALENCE OF MALNUTRITION IN NURSING HOME RESIDENTS
GT06	ROLE OF MACRONUTRIENTS AND MICRONUTRIENTS IN THE DIET OF PATIENTS WITH CLOSTRIDIUM DIFFICILE INFECTION

NUTRITION AND VITAMIN D STATUS IN CHILDREN WITH TYPE 1 DIABETES

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Introduction: Growth and development during childhood and adolescence are complex processes which are regulated by hormonal, nutritional and environmental factors. Diabetes melitus (D1TM) is a chronic non contagious condition whose frequency has been increasing in the last few decades both in adults and in children and adolescents. Linear growth in children is in correlated with poor control of glycaemia and children with type 1 diabetes are at risk of malnutrition and reduced growth. Therefore, it is crucial to diagnose T1DM in children as early as possible and to start the treatment and dietary therapy on time. Timely diagnosis can greatly reduce complications associated with diabetes type 1 in children. The major public health problem is also deficiency of vitamin D in general population, and studies have shown that there is a connection between low levels of vitamin D in the blood and type 1 diabetes.

Methodology: The retrospective research in which parameters, such as body mass, body height and levels of vitamin D in the blood, were recorded in 91 subjects with the average age 13.7 years, suffering from type 1 diabetes, who were monitored in the Children's Hospital Zagreb in the period of years 2020-2024.

Results: The average value of body mass of the subjects was 56.1 kg (average z score=0.52), the average body height was 161.3 cm (average z score=0.53), and the average vitamin D level in the serum was 57.1 nmol/L (reference >75 nmol/L). From the total number of subjects 5.5% were malnourished, 64.8% had adequate body mass and 29.7% of them were obese. The results have also shown that, from the total number of subjects, 85.8% patients had vitamin D deficiency, that is, levels of vitamin D in the serum were lower than 75 nmol/L.

Conclusion: Majority of subjects are adequately nourished and have adequate body height, however almost 1/3 of patients are obese. Surprisingly, more than 85% of patients had lower vitamin D what leads to conclusion that there can be a tight link between a reduced serum level of vitamin D and type 1 diabetes. In regard to the results, children with DMT1 should be monitored by dietitian as global problem of obesity and vitamin D deficiency effects this patient group also.

Keywords: Type 1 diabetes, malnutrition, obesity, vitamin D status

VITAMIN D3 AND IRON STATUS IN CHILDREN WITH CELIAC DISEASE

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Introduction: Vitamin D levels in paediatric patients with celiac disease (CeD) are known to be low at diagnosis. The introduction of a gluten-free diet (GFD) improves the status, which shows that there is a relationship between the levels of vitamin D and the diagnosis of CeD, the reason for this is still unclear. In patients with celiac disease, absorption of nutrients, including iron, is reduced. Short stature is also associated with CeD, 1 in 9 paediatric patients are stunted.

Materials and methods: We conducted a retrospective study using data from the Children's Hospital Zagreb. Data form 124 children diagnosed with CeD in the period from 2020 to 2024 were analized. The median age of patients on last follow up was 9 years (range 2.7-18.3), and the median age when diagnosed was 7.6 years. Serum vitamin D and iron at the time of diagnosis and after implementing a GFD were analysed. The data was processed to see the relationship between the level of vitamin D and serum iron after implementing a GFD.

Results: The average z-score for weight-for-age is 0.15, height-for-age is 0.47, and BMI -0.18. The median level of vitamin D when diagnosed was 60.3 nmol/L (reference >75 nmol/L). Vitamin D levels after on average 13 months of adherence to a GFD were 67.15 nmol/L. In the case of reduced levels of vitamin D, supplementation ranging from 400 to 2000 IU was prescribed depending on the needs. Ferritin levels on the diagnosis point were 10 µg/L, and for iron they were 11.9 µmol/L (reference 10.3 - 55.8 µg/L; 8 – 30 µmol/L, respectively). After the introduction of a GFD, both values increase, ferritin to 14 µg/L, and iron to 19.2 µmol/L.

Conclusion: The levels of vitamin D and ferritin were lower on the point of diagnosis of CeD. Vitamin D is usually supplemented and expected to be increase, however iron is not supplemented in children with CeD as it is expected that it would be corrected with GFD. Children with CeD need nutritional support and regular dietetic follow up in regard to their adherence to GFD, growth and micronutrient follow up.

Keywords: Celiac disease, vitamin D, iron, ferritin, supplementation

THE IMPACT OF THE INFLAMMATORY POTENTIAL OF VARIOUS DIETARY PATTERNS ON THE REGULATION OF GLYCEMIC AND LIPID PROFILE IN TYPE 2 DIABETES PATIENTS DURING 12 MONTHS FOLLOW UP

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Introduction: The objectives of study were to: (I) calculate the inflammatory potential of the three types of dietary patterns: Mediterranean, diabetic, and higher-carbohydrate (HC) (II) determine the relationship between dietary habits and their influence on the regulation of glycemic and lipid profile during the twelve months follow-up.

Methods: The study included 160 patients with non-regulated type 2 diabetes (HbA1c > 7.5 %), median age 61.8 ± 8.5 years, BMI 32.57 ± 6.48 kg/m2 and disease duration 10.9 ± 7.6 years. All patients have participated in an intensive 5 day program in daily hospital, involving education and nutritional intervention, followed by three follow-up visits after 3, 6, and 12 months. During the nutritional intervention the patients were given the option of choosing one of three types of menus (Mediterranean, diabetic, or HC), which comprised breakfast and lunch. Menus are customized based on portion serving size according to diabetic exchange food group lists, and daily energy intake. The nutritionist monitored the impact of education on changing dietary habits by patients selecting menus and foods, without the knowing which menus was recommended. The Dietary Inflammatory Index (DII®) was used to analyze the inflammatory potential of the three types of menus (70 in total).

Results: As expected the Mediterranean menus had the greatest anti-inflammatory effect (DII®=-0.79), followed by the diabetic diet (DII®=-0.74), whereas the HC menus had a pro-inflammatory effect (DII®=0.63). It was found that dietary habits correlate with the biochemical parameters (glycemic and lipid profile) of the patients at the beginning, during the follow-up period and at the end of the study.

Patients who chose the HC menus more often had higher initial HbA1c concentrations and lipid profiles than those who picked the Mediterranean or diabetic menus ($p < 0.05$).

In patients who chose the Mediterranean menus more often during the five-day education, after three, six and twelve months they had the lowest values of all biochemical parameters compared to other patients ($p < 0.05$).

Conclusion: The study found that five day education and nutritional intervention, results in better regulation of glycemic and lipid profile in type 2 diabetes patients during 12 months follow up.

Keywords: Nutritional intervention, education, dietary patterns, type 2 diabetes, menus

ADHERENCE TO A GLUTEN-FREE DIET IN PATIENTS WITH CONFIRMED CELIAC DISEASE IN CANTON SARAJEVO

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Introduction: The treatment of celiac disease is a strict and lifelong gluten-free diet. Adhering to a gluten-free diet prevents health complications, but affects the quality of life. Previous research has shown that a small number of patients with celiac disease adhere to a strict gluten-free diet. The aim of the research was to examine adherence to a gluten-free diet, obstacles and risk factors for non-adherence, as well as implementation measures aimed at improving treatment.

Materials and Methods: A retrospective study was conducted of 100 subjects diagnosed with celiac disease in Canton Sarajevo. The research included individuals of both sexes, of any age and duration of diagnosed celiac disease who lived in Canton Sarajevo, and who voluntarily agreed to participate in the research. The collected data were obtained by surveying people with celiac disease, who are registered in the Association of people with celiac disease in Canton Sarajevo. The survey contained information on the age and gender of the respondents, diagnosis of celiac disease, information on the use of a gluten-free diet, as well as symptoms of exposure to gluten.

Results: The average age of the respondents was 45.16 years, and 73% were women. The obtained results indicated that the 71% of respondents adheres to a gluten-free diet. 11% of respondents does not comply to a gluten-free diet, and 18% of respondents take gluten occasionally on purpose. The association of adherence to a gluten-free diet depended on the patient's age group and the length of time celiac disease had been diagnosed.

Conclusions: The conducted research showed that the majority of people (71%) adhere to a gluten-free diet in patients with celiac disease in Canton Sarajevo. A small number of respondents (11%) do not adhere to their treatment with a gluten-free diet, and 18% of respondents take gluten occasionally on purpose. Additional monitoring and counseling of patients suffering from celiac disease on a gluten-free diet who do not adhere to treatment supported by professionals and institutions is recommended.

Keywords: Celiac disease, gluten-free diet, monitoring of patient's diet

NUTRITION STATUS AND DEFECATION FUNCTION IN COLORECTAL CANCER PATIENTS BEFORE AND AFTER NUTRITION COUNSELING

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Introduction: Colorectal cancer (CRC) represents a significant global health burden, impacting millions of lives each year. The nutritional status of CRC patients affects the outcome and recovery from the disease, and its assessment can enable more successful treatment. Although several factors such as age, gender, type of surgery, and treatments (chemotherapy or radiotherapy) are connected with defecation function, dietary factors also play an important role in controlling intestinal motility. The aim of this study was to examine the nutritional status and defecation function before and after nutrition counseling in CRC patients.

Materials and Methods: The study included 42 CRC patients (22 females and 20 males) with a mean age of 62.07±8.58. All participants received nutritional counseling, which included dietary guidelines for managing defecation during treatment (constipation or diarrhea). Nutritional status included anthropometric measurements: body height and weight, body mass index (BMI), waist, hip, and mid-upper arm circumference (MUAC). For the defecation function, a questionnaire from the EPIC study was used, translated into Croatian language. It examines bowel habits including bowel movement frequency, consistency, quantity, feeling of discomfort during bowel movement, and laxative use. Anthropometric measurements and a questionnaire about defecation function were performed at the initial nutritional counseling - prior to the start of treatment, and after a minimum of 6 months.

Results: Results show weight loss in 63.4% of CRC patients in the three months prior to the first nutrition counseling (start point). All mean values for anthropometric measurements (body weight, BMI and waist and hip circumference) were higher at the end of intervention, but none of them were statistically significant ($p>0.05$). At the start point, eight patients already had a colostomy, and two more patients at the end point. There was no statistically significant difference in stool frequency in CRC patients at the start and end point of the study. Laxative use was recorded in 12.2% of participants at the start point and in 2.4% at the end point. 33.3% of patients feel an improvement in stool consistency at the end point and after nutrition counseling.

Conclusions: Early implementation of nutritional support cannot only maintain a normal nutritional status in CRC patients but also contribute to the defecation function.

Keywords: Colorectal cancer, defecation, nutritional status

HYDRATION IN CHILDREN AND ADOLESCENTS WITH PRIMARY HEADACHE

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Introduction: Headaches have a significant impact on the health and well-being of children and adolescents. Possible triggers of headaches include inadequate hydration, irregular meals, certain foods and drinks, lack of sleep, physical inactivity and excessive use of electronic devices. Despite the general recommendation of adequate hydration to manage headaches, the scientific literature on this topic is sparse and insufficient, especially in children and adolescents.

Materials and Methods: The aim of our study was to investigate the role of hydration in pediatric patients with primary headache. The study was conducted from May to October 2023 at the Division of Pediatrics' of the University Medical Center Ljubljana and was approved by the National Medical Ethics Committee of the Republic of Slovenia (KME:0120-423/2023-2711-6). Participants completed questionnaires on headache and fluid intake and underwent body composition measurement by bioelectrical impedance vector analysis (Akern, BIA101) at baseline and after three months of the intervention. All children and adolescents received personalized advice from a dietitian on recommended fluid intake based on Slovenian dietary guidelines. Statistical analysis was performed to evaluate the effectiveness of adequate fluid intake and its impact on headache.

Results: Sixty children and adolescents (43.3% boys and 56.7% girls) aged 5-19 years with primary headache were recruited. After the intervention, participants significantly increased their fluid intake from 5-8 glasses/day to 8-10 glasses/day ($p<0.01$), their headache frequency decreased from 1-2 times/week to 3 times/month ($p<0.001$), and self-rated intensity on a scale of 1-10 decreased from 7 to 5 ($p<0.001$). Although the median duration of headaches decreased from 180 to 120 minutes, this change was not statistically significant. Changes in body composition after the intervention included a significant increase in total body water ($p<0.001$) and extracellular water ($p<0.01$), indicating improved hydration. Consumption of unsweetened beverages was linearly correlated with a lower frequency of headaches ($p=0.05$).

Conclusions: Adequate fluid intake significantly reduced the frequency and intensity of headaches in children and adolescents. Improved fluid intake was evidenced by changes in body composition. These results emphasize the importance of adequate fluid intake, particularly through unsweetened beverages, as an effective, non-invasive strategy for the management of primary pediatric headache.

Keywords: pediatric; migraine; tension-type headache; fluid intake

EFFECTS OF TIME RESTRICTED EATING WITH CALORIC RESTRICTION ON ANTHROPOMETRIC PARAMETERS, SLEEP QUALITY AND QUALITY OF LIFE IN OVERWEIGHT AND OBESE ADULTS

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Introduction: The standard dietary strategy for weight loss is caloric restriction (CR). Time-restricted eating (TRE) has become increasingly popular in recent years and it is a feasible new chrono-nutritional strategy for weight loss and metabolic health improvements due to the shorter eating time and thus easier daily adherence to dietary pattern. TRE is a form of intermittent fasting in which the daily eating window is limited to a specific consistent period of time, usually between 4 and 10 hours, with fasting duration the remaining hours. TRE can be divided into early time-restricted eating (eTRE) and late TRE (lTRE). A direct comparison of the effects of eTRE+CR and lTRE+CR on health indicators is a new research topic, so the aim of this study was to investigate the effects of eTRE+CR and lTRE+CR vs. CR on anthropometric parameters, sleep quality and quality of life in asymptomatic adults with overweight and obesity.

Methods: Participants (n=108) were allocated to three different groups according to their personal chronotype: eTRE+CR (37; eating between 8.00 and 16.00), lTRE+CR (37; eating between 12.00 and 20.00) and CR (34; eating between 8.00 and 20.00). All three groups were prescribed the same CR based on their resting metabolic rate. Ninety-three participants completed the entire 3-month intervention (34 in eTRE+CR, 28 in lTRE+CR and 31 in CR). Anthropometric and biochemical parameters were measured and sleep quality was assessed.

Results: All three groups, eTRE+CR, lTRE+CR and CR showed statistically significant effects on the reduction of BW, body fat percentage (FM), visceral fat rating, WC, fat free mass, muscle mass, metabolic age (MA), systolic blood pressure, diastolic blood pressure (DBP) and increase in percentage total body water (TBW) and quality of life after the end of intervention, although eTRE+CR yielded more benefits on FM (%), TBW (%), MA and DBP ($p < 0.05$) compared to lTRE+CR and CR and greater sleep efficiency compared with CR.

Conclusions: In this study, we found that eTRE+CR was more effective in reducing FM (%), DBP, MA and increasing TBW (%) and sleep efficiency compared to lTRE+CR and/or CR alone. All other parameters did not differ between groups.

Keywords: early and late time restricted eating, caloric restriction, anthropometric parameters, sleep quality, quality of life

SHORT-TERM EFFECTS OF TIME RESTRICTED EATING WITH ENERGY RESTRICTION, ON THE METABOLIC HEALTH OF OVERWEIGHT AND OBESE ADULTS

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Introduction: Time-restricted eating (TRE) has been shown to improve metabolic health. However, it remains unclear whether the effects on biochemical parameters and metabolic indices are solely due to energy restriction (ER) or a combination of TRE and ER. The aim of this study was to compare the effectiveness of two TRE strategies combined with ER, specifically early time-restricted eating (eTRE+ER) and late time-restricted eating (lTRE+ER), against ER alone on metabolic health.

Methods: In a 3-month intervention, 90 participants were assigned to one of three groups based on their chronotype determined by a questionnaire: eTRE+ER (eating window from 8:00 to 16:00), lTRE+ER (12:00 to 20:00), and ER (8:00 to 20:00). Fasting glucose, fasting insulin, total cholesterol, LDL, HDL, triacylglycerols (TG), CRP, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were measured at baseline, after the first month, and after the third month of the intervention following a 12-hour fasting period. Additionally, metabolic indices (HOMA-IR, HOMA-β, TyG, TyG-BMI, METS-IR, QUICKI, VAI, LAP) were calculated using established equations.

Results: All three groups showed statistically significant reductions in fasting glucose, insulin, and metabolic indices over three months ($p < 0.05$). There were significant differences in glucose reduction between the groups ($p = 0.025$), with the greatest reduction observed in the eTRE+ER group. Changes in insulin levels and metabolic indices were not significantly different between the groups. Furthermore, serum levels of TG, AST, ALT, VAI, and LAP were significantly decreased only in the lTRE+ER and ER groups ($p < 0.05$), but no significant differences were found between the groups.

Discussion and conclusions: The study shows that the improvement in biochemical parameters and metabolic indicators is largely due to ER rather than TRE, with the exception of fasting glucose reduction. However, eTRE+ER appears to be more effective in regulating glucose homeostasis compared to lTRE+ER or ER alone.

Keywords: Early and late time restricted eating, energy restriction, biochemical parameters, insulin, metabolic indexes

MALNUTRITION AS RISK FACTOR FOR IMPAIRED RESPIRATORY AND PULMONARY FUNCTION IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Introduction: Chronic obstructive pulmonary disease (COPD) is a chronic lung disease characterized by abnormalities of the airflow. The scientific literature points out that patients with COPD often have diet-related comorbidities, which can correlate with worse patient outcomes and higher mortality. The aim of this study was to assess the risk of malnutrition and to determine whether the severity of malnutrition has an impact on respiratory and pulmonary function in adult patients with COPD.

Materials and Methods: This cross-sectional study (September 2023–May 2024) involved 68 patients (55% men) aged between 45 and 85 years who suffered from COPD and came to the Special Hospital for Pulmonary Diseases (Zagreb, Croatia) for Pulmonary rehabilitation. The collection of personal data, anthropometric measurements, assessment of the risk of malnutrition (Nutrition Risk Score-2002, NRS-2002) and pulmonary function of the patients were performed according to standard protocols during the visit to the hospital.

Results: From total study sample 26.5% of patients have impaired nutritional status according to the NRS-2002. There are no differences in diaphragm thickness at the end of inspiration ($p=0.448$) and at the end of expiration ($p=0.708$) between patients at different risk of malnutrition. In addition, neither forced vital capacity (FVC) ($p=0.731$) nor forced expiratory volume in one second (FEV1) ($p=0.058$) differed between patients at different risk of malnutrition. However, it was observed that the patients with a high risk of malnutrition (1 score NRS-2002: 76.5 ± 18.2 cmH2O; 2 score NRS-2002: 66.1 ± 18.6 cmH2O; ≥ 3 score NRS-2002: 59.5 ± 23.3 cmH2O) have the lowest maximum inspiratory pressure (MIP) (MIP) ($p=0.012$).

Conclusions: A quarter of patients with COPD are at risk of severe malnutrition, which can lead to a deterioration in respiratory function. These findings emphasize the importance of using a screening.

Keywords: COPD, diaphragm thickness, maximal inspiratory pressure, NRS-2002, spirometry results

TRANSDISCIPLINARY APPROACH TO MINIMIZE CHILDREN WEIGHT LOSS IN TUBE WEANING PROGRAM

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Introduction: Children, following various medical conditions, may necessitate a feeding tube (FT) yet resist oral feeding after health improvement. A transdisciplinary approach, fostering a supportive environment for both the child and parents, along with a personalized plan of action, is imperative for successful FT weaning. The primary goal is to mitigate the typical 10-15% weight loss associated with such programs. This study assesses the efficacy of an FT weaning protocol in minimizing weight loss.

Materials and Methods: This retrospective study spanned from 2021 to August 2024, involving twelve patients (8 girls). The analysis encompassed nutritional history, malnutrition risk evaluated using the Screening Tool for the Assessment of Malnutrition in Pediatrics (STAMP), body composition assessment, and parental nutritional diaries. A daily dietetic follow-up, incorporating nutritional assessment and individualized, fortified menus, was implemented. In multidisciplinary team approach in feeding tube weaning program, the child consumed one or two meals daily, with the daily introduction of new foods/textures. Comprehensive support from Speech-Language Pathologists, occupational, physical therapy, and psychological services aimed to stimulate physical activity, appetite, and reduce stress. The nutritional plan underwent daily modification to induce hunger, and the child's clinical status was closely monitored by a medical doctor.

Results: Indications for FT included surgical complications, gastrointestinal issues, prematurity complications, infections, and genetic disorders. Upon admission, 67% were at high risk, and 33% at medium risk for malnutrition according to STAMP, with one child being obese. Despite FT weaning, minimal weight loss was observed (average 0.9%), with the majority maintaining or gaining weight. Post-discharge, food texture adaptation and oral nutritional supplement use continued, resulting in weight gain/stabilization for all patients, all twelve expanded dietary variety within two weeks.

Conclusions: This study underscores that a comprehensive transdisciplinary approach can lead to minimal or even absent weight loss during FT weaning, significantly below the expected 10-15% threshold. It emphasizes the effectiveness of personalized, transdisciplinary care in supporting pediatric patients through the challenging process of FT weaning.

Keywords: tube weaning program, pediatric clinical nutrition, transdisciplinary approach

EXPLORING THE TREND: DIETARY SUPPLEMENT USAGE AMONG STUDENT POPULATIONS

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Introduction: The need for increased concentration, a better immune system, and overall improvement in body condition during studies in general and specific learning situations may lead to the use of various dietary supplements.

Materials and Methods: The study was carried out during April and May 2018, involving a total of 514 students. The participants, comprising 133 males and 381 females, fell within the age range of 19 to 24. These students were selected from four faculties offering study programs that incorporate nutritional components. Assessment of nutritional status relied on the calculation of body mass index (BMI). The research utilized an anonymous questionnaire, and statistical analysis was performed using SPSS20.

Results: Students of medical faculties more often take dietary supplements (22-34%) compared to those who are not enrolled in medical faculties (16-17%), which may be associated with the number of subjects that include knowledge about dietary supplements for the benefit of the body. All students who take dietary supplements most commonly choose minerals and/or vitamins. A statistically significant difference ($p<0.01$) was found in the intake of dietary supplements compared to the enrolled study program as well as between medical and non-medical faculties ($p<0.01$). A quarter of students from urban and rural areas take dietary supplements, while 75% of them do not consume them at all. 81% of males and 75% of females indicated that they did not take dietary supplements. Students who reported taking dietary supplements usually consume vitamins and/or minerals. Only a small number of students take omega-3 fatty acids, amino acids, creatine, and steroids, with males more commonly using them.

Conclusions: The need for promoting proper nutrition and healthy lifestyles among the entire student population is even more emphasized. Overall, the results of the study conducted on the student population in Novi Sad, as presented in this research, indicate a lack of information among students and the need for promoting proper nutrition and healthy lifestyles.

Keywords: dietary supplements, students, Novi Sad

UNLOCKING QUERCETIN'S POTENTIAL: INNOVATIVE EXTRACTION FROM LAMIACEAE PLANTS USING DES SOLVENTS

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Introduction: Quercetin modulates the function of various antioxidant enzymes. The effectiveness of quercetin appears to be dependent on dosage, with an optimal dose being advantageous for specific plant species. The aim of the work was to examine extraction effectiveness of quercetin with choline chloride-based deep eutectic solvents from herbal plants of the Lamiaceae family, produced at the Institute „Dr. Josif Pančić".

Materials and Methods: 10 samples of herbal drugs (rosemary, lemon balm, sage, mint, lavender, oregano, savory, garden thyme, basil, wild thyme) were tested. Extraction was performed with NADES choline chloride urea (1:1) and choline chloride glucose (1:1). The content of quercetin in the herbal extracts was determined using high performance liquid chromatography.

Results: Both NADES proved to be effectiveness extractant in the isolating of quercetin, while NADES choline chloride glucose proved to be more successful. Quercetin was isolated from sage and rosemary applying NADES choline chloride urea, in range from 67.74 to 69.38 μg/g crude drug. Using NADES choline chloride glucose, quercetin was isolated from lemon balm, mint, sage, oregano, savory, garden thyme, basil, and wild thyme. The highest content was isolated from wild thyme.

Conclusions: Both choline chloride-based NADES showed good potential for a green approach to the extraction of quercetin from the plants of Lamiaceae family. Based on the results, choline chloride glucose can be used in the extraction of quercetin from herbal materials. The basic characteristics of NADES expand their application in the pharmaceutical, food and cosmetic industries.

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Keywords: NADES, choline chloride urea, choline chloride glucose, quercetin, Lamiaceae

THE USE OF DIETARY SUPPLEMENTS IN PROFESSIONAL AND SEMI-PROFESSIONAL ATHLETES: A CROSS-SECTIONAL STUDY

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Introduction: A diet that is well-balanced and tailored to an athlete's unique nutritional requirements is of the utmost importance for their performance and health. While a balanced, nutrient-rich diet should typically fulfill an athlete's nutritional needs, the use of dietary supplements in sports is widespread. The aim of the present study was to assess the frequency of dietary supplement use among professional and semi-professional athletes.

Materials and Methods: The cross-sectional study was performed during April and May 2024 as an online-based survey. The sample consisted of 118 professional and semi-professional athletes aged ≥ 18 years and residing in Croatia. The data were collected using a larger questionnaire designed to evaluate the general nutrition knowledge, attitudes, and behavior of professional and semi-professional athletes.

Results: The total sample consisted of 49.2% professional and 50.8% semi-professional athletes. A total of 86 participants (72.9%) reported using dietary supplements. Of the athletes who used dietary supplements, 69.3% did so on their own initiative. In contrast, 30.7% used supplements based on the advice of their coach, physician, nutritionist or parent. The most popular dietary supplements used were vitamins (87.5%), minerals (53.4%), proteins (80.7%), and L-carnitine (29.5%).

Conclusions: The results of the present research indicate the need for proper education of both professional and semi-professional athletes on the use of dietary supplements in sport. Those education programs should be carried out by qualified sport nutrition experts with the aim of ensuring appropriate usage of dietary supplements in sport, as well as achieving the expected positive impacts on sports performance and avoiding unwanted effects that uncontrolled and unjustified use could lead to.

Keywords: athletes; dietary supplements; nutrition; sports

FERMENTED FOODS AS A HEALTHY, NUTRITIVE, SUSTAINABLE FOOD AND EUROPEAN CULTURAL HERITAGE - PRESENTATION OF PIMENTO COST PROJECT WITH THE HIGHLIGHTS OF WG2 RESULTS

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Introduction: Fermented foods (FF), present in all European diets, hold a strategic place due to their benefits in terms of nutrition, sustainability, innovation, cultural heritage and consumer interest. Their potential for improving human health, but also driving food innovation and local production in the next decades, has become highly relevant.

The challenge of COST-PIMENTO (CA20128-Promoting Innovation of ferMENTed fOods) is to federate the scientific community and key stakeholders working on FF. The idea is to collectively advance scientific evidence of their health benefits, building a benefits/risk approach in order to promote multi-modal innovation and meet the expectations of European communities. It started on 25/5/2021 and it is still going on.

Materials and Methods: Project has 5 working groups. WG2: Cartography of FF in the diet of COST Countries, Development and validation of the First Fermented Food Frequency Questionnaire (FFFQ) and WG3: Health benefits and risks of fermented foods are the ones who will be presented.

Results: WG2 used different sources of existing data (historical and scientific literature, relevant internet sources, official FAO, EU and national statistics, nutrition/diet surveys, food production and consumption patterns, as well as personal communications). FFFQ (6006 surveys were collected) and 24-hour recall were conducted, results are still statistically analysed and scientific papers are in the publishing procedures with the results from both groups.

Conclusion: The knowledge assembled in WG2 is an important input to WG3, WG4 and WG5 and will serve beyond the present Action for any upcoming EU project concerning FF.

Keywords: Cost Action, PIMENTO, fermented foods, FFFQ, health benefits

POSITIVE EFFECTS OF DROUGHT ON THE QUALITY OF AROMATIC PLANTS: IMPROVEMENT OF TOTAL PHENOLIC AND FLAVONOID CONTENTS AND TOTAL ANTIOXIDANT CAPACITY

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Introduction: The synthesis of bioactive compounds in plants depends on many factors including, above all, environmental conditions. Some abiotic stressors, such as drought, can increase the synthesis of phytochemicals in plants; moreover, some biologically active substances are only synthesized under specific environmental conditions. The main aim of this study was to evaluate the effects of different drought levels on the total phenolic and flavonoid contents and total antioxidant capacity of mint (Mentha x piperita L.), basil (Ocimum basilicum L.), hyssop (Hyssopus officinalis L.) and oregano plants (Origanum vulgare L.).

Material and Methods: Four water field capacity (WFC), namely 100% WFC, 80% WFC, 60% WFC and 40% WFC were used as drought stress levels in this study. An experiment had a completely randomized design with three replicates and was carried out in pots in the greenhouse under controlled conditions. All plants (at the seedling stage) were subjected to drought treatments for 30 days. The total phenolic and flavonoid contents and total antioxidant capacity in the leaf extracts of the tested plants were evaluated by Folin-Ciocalteu assay, AlCl3 assay and Ferric reducing/antioxidant power (FRAP) assay, respectively.

Results: The results of this study showed that the drought strongly limited the growth of studied plants. However, the effect of drought was not the same for each drought stress levels. Drought at 60% and 40% WFC caused a decline in plant height, leaf area and dry mass compared to plants exposed to 80% and 100% of WFC, regardless of plant species. The total phenolic and flavonoid content in leaves of all studied plant species was greater under moderate (60% WFC) and severe drought conditions (40% WFC) compared to control (non-stress) treatment. The same trend was also observed for total antioxidant capacity. The highest total phenolic contents (392.85 mg/ 100 g fresh mass), total flavonoid contents (219.87 mg/ 100 g fresh mass), and total antioxidant capacity through FRAP assay (3.35 mmol Fe2+/100 g fresh mass), were observed in mint plants exposed to drought at 60% WFC.

Conclusions: The results of this study point to the conclusion that the antioxidant properties of aromatic plants can be improved significantly by deliberately applying drought stress during their cultivation. However, this increase is usually accompanied by a decrease in plant growth. In this regard, for each particular aromatic plant species it is necessary to assess carefully the advantages and disadvantages of the deliberate application of each drought level during cultivation.

Keywords: antioxidant properties, bioactive compounds, water stress

DIETARY SUPPLEMENTATION PRACTICES IN PHARMACISTS AND PHARMACEUTICAL TECHNICIANS IN SLAVONIA

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Introduction: An assortment of DS can be freely purchased at the pharmacy and in their daily work pharmacists and pharmaceutical technicians sell them and recommend them to patients. Since they are in constant contact with DS and have relevant knowledge and information about them, the aim of this study was to investigate their consumption of DS and reasoning behind it.

Materials and Methods: The cross-sectional study was conducted during spring of 2024 in five Slavonia counties and encompassed altogether 115 participants. The counties that were included in the research are Osječko-baranjska, Vukovarsko-srijemska, Brodsko-posavska, Požeško-slavonska and Virovitičko-podravska. Data were collected in 53 pharmacies out of a total of 190 in Slavonia. For data gathering short anonymous questionnaire was used. For the purpose of this study, gathered data included data on the use of DS.

Results: Out of participants 84 % used DS and 16 % of them were not users. Of the 84 % users, (51 %) were pharmacists and (49 %) were pharmaceutical technicians. The results of the study show that multivitamin preparations are the most widely used with higher representation in pharmacists (57 %) than in pharmaceutical technicians (43 %). Magnesium is the most consumed of the single essential components, used by 53 % of pharmacists and 47 % of pharmaceutical technicians. The research collected data on the preferred dosage form for DS, but not specifically for each DS. Products for specific purpose and herbal preparations are equally represented in both subgroups. As for the reasons for taking DS, the most common reason is prevention (48 % of pharmacists and 59 % of pharmaceutical technicians). As for the frequency of taking DS, regularly or occasionally, the prevalence of taking them is equal in both groups.

Conclusions: The most common sources of information about DS are congresses, professional trainings and the professional staff of pharmaceutical companies. Obtained results confirmed that both, pharmacists and pharmaceutical technicians, have a habit of using DS, use specific product types in a similar pattern and use them for the preventive purposes, and take DS in accordance with the manufacture instructions.

Keywords: dietary supplements, pharmacist, pharmacy technician, Slavonia

OPPORTUNITIES AND LIMITATIONS OF OBTAINING SUSTAINABLE NUTRACEUTICALS – THE CASE OF TOMATO PROCESSING WASTE

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Introduction: The global demand for sustainable and health-promoting products has driven significant interest in the utilization of food waste as a source of nutraceuticals. Tomatoes, widely processed into different food products, generate substantial amounts of waste which is abundant in valuable bioactives such as lycopene, polyphenols, and dietary fibers. T This offers an attractive avenue for sustainable nutraceutical development that fits into the paradigm of circular economy. However, it but also comes with different technical, economic, regulatory, and environmental challenges such as heterogenicity of raw material, contamination issues, impact of processing and storage, sustainability and cost efficiency of existing extraction procedures, scale up challenges etc. In this work we investigated sanitary safety of tomato pomace and investigated the importance of processing conditions on the content of its major target compounds – polyphenols, pectins and carotenoids.

Materials and Methods: Tomato pomace was obtained by processing a mixture of autochthonous Croatian tomato varieties into tomato sauce. Assessment of sanitary safety included determination of heavy metal (by AAS) and pesticide residues (by GC-MS). The impact of drying conditions (air-drying at 70 °C vs. lyophilization) and the degree of milling on the content of total antioxidants (UV-VIS), polyphenols, carotenoids (UV-VIS, HPLC) and pectins (gravimetric method) in whole tomato pomace, tomato skin and seeds were also investigated.

Results: The sanitary safety of tomato pomace samples was satisfactory. Tomato pomace contained high content of pectins that were not significantly affected by pre-extraction processing of raw material. Polyphenols were shown to be the major contributors to antioxidant capacity of tomato pomace and were significantly affected by the type of drying applied. Carotenoid content (β-carotene and lycopene) was also primarily affected by drying and less by degree of milling and it was significantly higher in tomato skin (in comparison to seeds).

Conclusions: Considering its sanitary safety and chemical composition, tomato pomace can be considered valuable source of bioactive compounds. The amount of polyphenols and carotenoids can be significantly affected by the drying conditions and, to a lesser extent, degree of milling, and varies depending on the ratio of tomato skin and seeds in the pomace

Keywords: tomato pomace; pectins; polyphenols; carotenoids; processing

POSITIVE EFFECTS OF RED CLOVER (*Trifolium pratense* L.) ON WOMEN'S HEALTH IN MENOPUAUSE

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Introduction: Traditional medicinal use of red clover has primarily been for various conditions of the upper respiratory tract. In recent years, its isoflavones, i.e. active compounds (biochanin A, formononetin, genistein, daidzein, glycitein) have become the focus of research aimed at developing treatments for menopausal symptoms. Reduced levels of circulating estrogen due to reduced ovarian function can cause short-term symptoms such as hot flashes, palpitations, difficulty sleeping, headaches, fatigue, mood disorders and reduced concentration, but also long-term chronic conditions, such as cardiovascular disease, accelerated weight loss and bone mass, atrophic vaginitis, osteoporosis and cognitive impairment.

The aim of this narrative review was to analyze the effects of a standardized red clover extract on women's health during menopause.

Materials and methods: The research method used is the analysis of literature sources from medical databases (Hrčak, Science Direct) and digital archive PubMed. The search included articles published in English and Croatian, and references to selected research and review articles related to the topic of the work were also searched in order to identify additional studies. The database was searched until 2021. All studies were performed in vivo.

Results: Eight randomized controlled trials involving a total of 8,769 menopausal women (aged 40 to 65 years) evaluated the effect of red clover isoflavone extract on menopausal symptoms. In al studies, isoflavone extract alleviated all symptoms of menopause as well as accompanying diseases, namely: hot flashes (25%), atherosclerosis (79%), risk of breast cancer and endometrial cancer (5 %), osteoporosis, osteopenia (6%) and menopause-related cognitive impairment (40%) were reduced, and blood lipids improved (19%).

Conclusion: Red clover isoflavone extract aglycones: biochanin A and formononetin isolated from red clover leaves and stems affect hot flashes, blood lipid composition, atherosclerosis, anticancer activity, bone health, and cognitive effects in menopausal women. Polyphenolic isoflavone compounds such as daidzein, isolated from red clover leaves, have been proven to affect hot flashes and blood lipid composition, and genistein, isolated from leaves, stems and aerial parts of the plant, has an effect on hot flashes, blood lipids and atherosclerosis.

Keywords: clover; menopause; red clover extracts; bioactive compounds

REVIEW OF APPLICATIONS OF LACTULOSE (4-O-B-D-GALACTOSYL-D-FRUCTOSE) IN FUNCTIONAL CONFECTIONERY

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Conflict of interest: I declare that my past employer was Jata Emona d.o.o, a company manufacturing products containing lactulose.

Introduction: Lactulose (4-O-beta-D-galactopyranosyl-D-fructose), the first discovered prebiotic, is a synthetic disaccharide produced from lactose. Although it has been safely used in food products, including infant formulas since 1957, its application in functional foods has remained limited.

Materials and Methods: A literature review was conducted on the confectionery applications of lactulose, focusing on its technological properties and challenges in developing confectionery products such as gummy candy and hard candy.

Results: Lactulose has favorable technological characteristics, including a sweetness level equivalent to 48–62% of sucrose without any aftertaste, high solubility, low cariogenic potential, and good stability. Gummy candy made with lactulose, without additional sweeteners, has an acceptability comparable to popular sucrose-based candies. Currently, two brands offer gummy candies made from lactulose. Gelatin-based candy has a significant disadvantage compared to hard candy: it melts at around 35°C. This has led to the development of lactulose-based hard candy. In 2022, a Slovenian patent (SI26191) for lactulose-based hard candy was granted. The process involves heating lactulose syrup to a target moisture level, adding flavorings and colorings, and then pouring the mixture into molds at a higher temperature (130–140 °C) than that used for sucrose/glucose-based sweets, due to lactulose's higher glass transition temperature. After cooling, the candies are coated with oil, wax, or starch and packaged. Lactulose-based hard candies offer a longer shelf life and better temperature stability. While direct compression of lactulose crystals is a simpler process, hard candy provides a cost-efficiency advantage by using liquid lactulose.

Conclusions: The technological properties of lactulose allow for the development of functional candies that are almost indistinguishable from those made with sucrose.

Keywords: lactulose, functional food, prebiotic, gummy candy, hard candy

COMPLIANCE OF THE CURRENT DIETARY PATTERNS OF SCHOOL - AGE CHILDREN IN CROATIA WITH THE EAT-LANCET REFERENCE DIET

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Introduction: As dietary behavior persists from childhood into adulthood, adherence to dietary recommendations that contribute to the long-term well-being of the individual and the planet, such as the EAT-Lancet recommendations, should be encouraged from an early age. The aim of this study was to assess the sustainability of current dietary patterns of school-aged children by comparing them with the EAT-Lancet reference diet.

Materials and Methods: The dietary patterns of 195 children (52% boys) aged 8.9 ± 0.4 years in the city of Zagreb (Croatia) was observed using 3-day dietary records on non-consecutive days. All foods and beverages have been categorized according to the 14 food groups of the EAT-Lancet reference diet. The target values for each food group were adapted to children's diets by adjusting them to a daily energy intake of 1755 kcal, the average energy requirement for boys and girls suggested by the European Food Safety Authority.

Results: The average daily energy intake of children was 1762 kcal (1455 kcal – 1983 kcal), which corresponds to the recommendations used to set the target values for the food groups. In general, the children exhibited reduced consumption of nearly all food groups recommended by the EAT-Lancet reference diet and higher intake of those restricted by diet. In addition, the children met the target values for 3 (2 – 4) food groups on average, of which eggs, fruit, potatoes and the saturated fat food group were most common (> 50% of children). The distribution of children who met the recommendations for each food group does not differ by sex.

Conclusions: The dietary habits of school-age children currently diverge from the EAT-Lancet reference diet guidelines. In order to adopt the EAT-Lancet diet in childhood, both children and parents need to be educated. In addition, the influence of the environment must be taken into account, as children of this age may eat up to three meals at school.

Keywords: childhood, dietary habits, EAT-Lancet, sustainable diet, sustainability

IS NUTRITIONAL SCREENING NECESSARY TO MAINTAIN HEALTH AND IMPROVE QUALITY OF LIFE?

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Introduction: Obesity is one of the leading public health issues. The goal of the poster was to present the work of Nutrition Counceling Center. It has been active within the Public Health Institute of Zadar since 2021. In the first three years, Center was opened one day a week, and in 2024., it's open five days a week. It's dedicated to growing prevalence of obesity and related health concerns through personalized dietary guidance, education, and support.

Materials and Methods: Descriptive statistical methods were used to analyze data collected in „Pretil“, and „GMON“ software programs collected from May 1, 2022, to June 1, 2024. Analyzed variables include gender, age, number of visits and anthropometric measurements.

Results: During the observed period, 221 visits were recorded in Counseling center, and 192 users were registered (74,5% female, and 25,5% male). The youngest client was 3 years and the oldest 74 years old. The average waiting time for an appointment is 3 months. The percentage of clients classified as underweight was 7,1%, normal weight 12,6% and overweight 80,2%. Out of 52 clients aged up to 19 years, 65,4% were overweight or obese, 15,4% were underweight. Since the introduction of regular weigh-ins, clients have collectively lost a total of 86,7 kg body mass.

Conclusions: The number of clients across all age groups at the Center is increasing. Growing demand for nutrition counseling highlights the need to expand our team. Due to small number of staff and large number of inquiries, waiting lists are long. The majority of clients are female. Since women are often responsible for planning family meals, the knowledge and skills gained, can positively impact other family members as well. Our clients also included individuals with healthy body weight who sought advice how to alleviate other health issues through nutrition (gastrointestinal diseases, allergies, autoimmune disorders, cancer). This emphasizes the importance of additional education on specific demands. By providing education and support, we address current needs and prepare for future challenges in public health and disease prevention.

ANALYSIS OF THE ASSOCIATIONS OF THE OLFACTORY PERCEPTION AND NUTRITIONAL STATUS OF THE ELDERLY NURSING HOME RESIDENTS

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Introduction: The ageing process contributes to the decline of olfactory function, which potentially modifies dietary intake, pleasures derived from food and could consequently negatively impact nutritional status of the elderly. The aim of this study was to analyze potential correlations between olfactory perception, and nutritive status. For that purpose, data on olfactory perception and nutritive status were collected.

Materials and Methods: The study included 123 residents of the nursing home Varaždin, with mean age of 80.7 ± 5.8 y, 76.4% females. Olfactory function was determined by The European Test of Olfactory Capabilities. The olfactory decline was established by comparison of the results of the elderly and adult group of participants. Nutritional status was determined by several measurements, the body mass index, percentage of body fat and skeletal muscle, the Mini Nutritional Assessment-Short Form (MNA-SF), and the Simplified Nutritional Appetite Questionnaire.

Results: The study established significant decline in the olfactory function of elderly subjects, with 65% of participants having hyposmia. Further, the results showed increased body weight with a trend towards the obesity, with the mean body mass index of 29.6 ± 5.2 kg/m2, of which 8.1% of participants were undernourished and 41.5% were overweight or obese. The MNA-SF showed that 75.6% of the respondents have normal nutritional status, 22.8% were at risk of malnutrition, and 1.6% of respondents were malnourished. The nutritional appetite analysis determined that 32.5% of elderly people were at a significant risk of at least 5% weight loss within the next six months. A significant association was found for olfactory perception between individuals with normal nutritional status and those with malnutrition.

Conclusions: The olfactory function has a significant impact on the quality of life in the elderly person and its influence for food appreciation is of vital importance. This study showed weak, but significant association of olfactory function to nutritional status. The hyposmic individuals had higher risk of malnutrition than normosmic. Although this study did not show a significant impact of olfactory function on all nutritional status measurements, further research is needed to further describe the causal effect for the elderly people.

Keywords: elderly people, olfactory perception, body mass index, body composition, nutritional status, nutritional appetite

PREVALENCE OF DIABETES AMONG THE ROMA POPULATION: PILOT STUDY

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Introduction: According to the estimation of the International Diabetes Federation (IDF) the prevalence of diabetes will increase by 45% worldwide by 2045. In our country (Hungary), this prevalence is 6.4% for the total population, 7.47% among adults between 20-69 years and almost 30% for the Roma (Gypsy) population.

Objective: To validate the widely used FindRisk questionnaire based on risk stratification for the Roma population.

Materials and Methods: The pilot study of our research was conducted in Alsószentmárton (Baranya county, Hungary). We assessed the risk of type 2 diabetes mellitus (T2DM) using the FindRisk questionnaire, and the presence of diabetes and prediabetes was confirmed by point-of-care HbA1c measurement. We recorded antropometric data of the participants, measured their blood pressure and body composition (with Omron BF511-B Body Composition Monitor). Dietary habits were assessed using FFQ (Food Frequency Questionnaire).

Results: Mean age of the participants was 42.1±13.7 years. 18.6% of them were patients diagnosed with Diabetes Mellitus (n=16). Of the non-diabetic patients (n=70), 36 individuals had a FindRisc score ≥12, indicating a marked predisposition to developing T2DM. ~40% of participants were diabetic, 15% prediabetic. The proportion of non-diabetic patients was ~21%. Study participants were on average in the obese category - including those without any carbohydrate metabolism disorder. The average blood pressure of diabetic patients fell into the high normal range, while prediabetes and non-diabetes patients had normal blood pressure.

Conclusions: The risk of diabetes is significantly increased in the Roma population. In our study, diabetes rates were also higher than in databases published previously (~40%). Results suggest that above a certain age, the Roma minority is likely to be at independent risk for diabetes. By using the results of our study, while screening Roma people in their place of residence and taking measures to prevent type 2 diabetes mellitus by influencing their dietary habits, a huge public health burden and cost can be saved from the already heavily burdened health care system.

Keywords: diabetes, screening, prevention, Roma

COMPARATIVE ANALYSIS OF ENVIRONMENTAL SUSTAINABILITY MESSAGES IN THE EUROPEAN FOOD-BASED DIETARY GUIDELINES FOR CHILDREN AGED 6 TO 12 YEARS

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Introduction: The hot topic of the scientific community is sustainability, and nutrition as one of its segments. Indeed, recommendations for a sustainable diet are recognized as recommendations that support both human and planetary health. Considering that Food-based dietary guidelines (FBGDs) are created in line with public health priorities to promote overall health, it is assumed that FBDGs should include messages on sustainability. Therefore, the aim of this study was to analyze the sustainability messages in FBDGs for children in European countries.

Materials and Methods: This study includes the latest editions of the European FBDGs for children aged 6 to 12 years. Initially, the FBDGs were collected from the FAO repository and then supplemented with corresponding FBDGs from official government websites (January - May 2024).

Results: Out of a total of 44 European countries, 25 (57%) have FBDGs for children, of which 15 have specific FBDGs for children or children and adolescents and 10 have guidelines for children that are integrated into the FDBGs for the general population. Only 5 countries have formulated explicit messages on environmental sustainability as qualitative recommendations, and all have been published within the last 6 years. In all five FBDGs, the key messages are to promote the consumption of various plant-based foods, limit the consumption of meat and meat products, drink water as the main source of hydration and limit food waste. Three of the five FBDGs emphasize the purchase of local and seasonal foods and foods with national front-of-pack labeling. As these are FBDGs for children, the sustainable message encourages the consumption of milk and dairy products, but within the recommendations for their age. In addition, three FBDGs recommend replacing the amount of red meat with fish, poultry meat, eggs and a combination of cereals and pulses. Only one FBDG advises following the Mediterranean diet as a model for a sustainable diet.

Conclusions: This study highlights the current state of sustainability messages in FBDGs for children across European countries. These findings underscore the necessity for further development and revision of FBDGs to integrate sustainability recommendations more comprehensively. By instilling these principles early in life, we can foster healthier and more environmentally conscious eating habits among future generations.

Keywords: childhood, FBDG, sustainable diet, sustainability

EATING HABITS OF STUDENTS AT THE BJELOVAR UNIVERSITY OF APPLIED SCIENCES

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Introduction: The aim of this research was to investigate the dietary habits of students at the Bjelovar University of Applied Sciences, with a particular focus on examining food preferences between male and female participants. This study explored the frequency of meal consumption, preparation habits, and the differences in food choices based on gender. Understanding these habits is important for providing insight into the dietary behaviors of students, which can be useful for future nutrition planning.

Materials and Methods: A total of 500 students participated in the study, of which 139 were male, and 361 were female. The sample was convenient, with 75% of participants aged between 18 and 25. The study used a cross-sectional design, and participants were asked to complete the "Dietary Questionnaire for Assessing Diet Quality." Anthropometric measurements were also collected from each participant, including BMI and fat percentage.

Results: The study revealed that most participants do not smoke cigarettes, with only 1% identifying as smokers. However, 43% of students reported consuming alcohol. In terms of physical activity, 56% of students reported not exercising, while just under half engaged in some form of physical activity during the week. Regarding dietary habits, the majority of students consume lunch regularly (69.6%), but many skip breakfast, one of the key daily meals. Only 32% of students prepare their meals daily, while 21% reported eating food prepared outside their homes one to three times per week. A statistically significant difference was found in the consumption of baked potatoes and French fries between genders, with males consuming these foods more frequently than females. Additionally, students with higher BMI and fat tissue percentage were found to consume fewer potatoes overall. Red meat was consumed once a week by most students, with 8.2% not consuming it at all. Furthermore, 5.4% of students reported never consuming skinless poultry, and 51.5% never ate oatmeal.

Conclusion: The study highlights important trends in the dietary habits of students at the Bjelovar University of Applied Sciences. The results indicate that students in this study have somewhat healthier meal consumption patterns compared to previous research, particularly regarding the frequency of eating breakfast, lunch, and dinner. The findings provide valuable insights for future menu planning in student nutrition facilities and offer a foundation for future research aimed at improving the dietary habits of this population.

Keywords: dietary habits, antropometric measurements, students, fat tisue, muscle mass

KETOGENIC DIET SUPPRESS APPETITE IN OBESE AND LEAN MICE – BEHAVIORAL AND MOLECULAR STUDIES

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Introduction: In recent decades, the plague of obesity associated with an unhealthy lifestyle - improper diet and low levels of physical activity have become an extremely important public health problem. The first-line treatment for obesity is lifestyle intervention. However, in the long-term all nutritional approaches tend to show low effectiveness due to poor patient compliance leading to gradual weight regain. Despite strong evidence supporting the use of the KD for the treatment of obesity, there is a lack of consensus regarding the mechanisms underlying weight loss under nutritional ketosis. The study aimed to evaluate how the nutritional behavior and metabolic changes in hypothalamus, associated with obesity affect the mechanisms responsible for appetite regulation during KD treatment.

Materials and Methods: Adult male mice were subjected to Western-style diet for 6 weeks to induce obesity (DIO), while the control mice were fed with standard chow (CTL). Then, DIO and CTL mice received a KD (DIO-KD, CTL-KD) or standard chow (DIO-SD, CTL-SD) for the next 2 weeks. Nutritional behavior was assessed using the palatable meal test and food-risk competition test. At the end of the experiment serum and hypothalamus samples were collected for evaluation of ghrelin, leptin and cholecystokinin and gene expression of hypothalamic appetite-related factors.

Results: Behavioral evaluation showed that the KD suppresses appetite in obese and lean mice. Caloric intake remained consistent during weight loss, regardless of diet. The obese mice respond differently to nutritional ketosis than lean animals. Obesity affects the serum concentration of ghrelin, leptin and cholecystokinin. The KD in obese and lean mice changed the expression levels of Agrp, Mc3r, Cart, while the DIO affected Mc4r expression in SD fed mice. An increase in Pomc expression was noted in the DIO-KD group compared to the CTL-SD group.

Conclusions: KD changes nutrition behavior, which may be associated with regulation of hypothalamic expression of appetite-related genes in adult obese and lean mice. The obtained results may contribute to further exploring the mechanisms of appetite regulation under nutritional ketosis and examining whether the metabolic changes of obesity regulate the body's response to a ketogenic diet.

Keywords: ketogenic diet, appetite regulation, obesity, mice, reduce body mass

GEOGRAPHICAL VARIATION OF BIOACTIVE COMPOUNDS IN FRESH AND PROCESSED WILD EDIBLE BOLETUS MUSHROOMS

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Introduction: Bioactive compounds in edible wild mushrooms comprise an important part of their beneficial nutritional value. Except for their highly desirable taste, aroma, and favourable share of macronutrients, the fruiting bodies of edible Boletus mushrooms are rich in essential elements, polyphenols, terpenoids, and alkaloids that are responsible for their antioxidative properties. However, the content of these bioactive compounds significantly fluctuates as a result of variations in the geochemical background, microclimate conditions, mushroom species and processing method. Our aim was to study levels of antioxidative enzyme-containing trace elements, polyphenolic and triterpenoid compounds, and overall antioxidant capacity in the commonly consumed wild mushrooms from Boletus genus marketed as fresh, dried or frozen.

Materials and Methods: Fresh mushrooms (N=10-14 per location) from Boletus genus were collected at each of eight distinct locations in Croatia in 2021/2022. In addition, 1 kg of packed dried (N=54) and frozen (N=74) Boletus mushrooms from South Eastern European countries, which enter the EU on the eastern Croatian border, were subsampled in 2021. In freeze-dried and acid digested samples, copper (Cu), selenium (Se), and zinc (Zn) were quantified by inductively coupled plasma spectrometry (ICP-MS). Total polyphenols and triterpenoids, phenolic acids, and antioxidant capacity were measured by colorimetric methods after alcohol extraction of freeze-dried mushrooms. The differences between the studied groups were analysed using the ANOVA with Tukey's HSD test for unequal N or the Kruskal-Wallis test followed by Mann-Whitney U test.

Results: The differences in mushroom processing methods before transport and marketing had influence on the level of trace elements, polyphenols and triterpenoids. Fresh samples contained higher levels of Cu (vs. dried: $z=2.82$, $p=0.005$), Se (vs. frozen: $z=5.09$, $p<0.001$ and vs. dried: $z=5.84$, $p<0.001$), Zn (vs. frozen: $p<0.001$ and vs. dried: $p=0.007$) and fenolic acids (vs. frozen: $z=2.82$, $p=0.005$). On the contrary, fresh vs. dried mushrooms contained lower levels of total polyphenols ($z=-3.03$, $p=0.002$). Phenolic acids and total triterpenoids were higher in dried compared to frozen samples ($z=-4.82$, $p<0.001$ and $p=0.004$, respectively). It is important to note that the interpretation of the results should consider that the comparison was made on market-packaged frozen and dried samples containing mushrooms from various countries, rather than the same mushrooms processed by the three different methods. Additionally, the ratio of Boletus species in these samples was unknown.

Conclusions: The nutritional value of mushrooms entering the EU market, is significantly affected by the processing method used prior to storage (fresh/drying/freezing) and the transport conditions. Consuming fresh or dried Boletus mushrooms, rather than frozen ones, may offer greater health benefits in terms of level of bioactive compounds.

Keywords: trace elements, polyphenols, triterpenoids, antioxidative compounds

EXPLORING THE RELATIONSHIP BETWEEN IODINE AND SALT CONSUMPTION IN ADULT POPULATION OF SLOVENIA

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Introduction: Iodine is an essential micronutrient and a major component of thyroid hormones. The main dietary source of iodine in many countries is iodized table salt, which has been used as a carrier since the 1920s. However, strategies aimed at reducing salt consumption may have an impact on iodine status. Therefore, the aim of this study was to investigate iodine and salt intake and their relationship in the adult population of Slovenia.

Materials and Methods: The National Institute of Public Health in Slovenia and its partners conducted a cross-sectional study in 2022 on a nationally representative sample of the adult population of Slovenia. The initial sample comprised of 2000 inhabitants aged between 25 and 64 years. The sample was prepared by the Statistical Office of Slovenia from the Central Population Register. The gold standard method of 24-hour urine collection was used to determine 24-hour urinary excretion of sodium and iodine, from which salt and iodine intakes were calculated. Results were weighted, analyzed using descriptive statistics and expressed as mean (95% confidence interval) and median (25th, 75th percentiles). The salt intake groups were based on the World Health Organization's recommended intake of <5 g salt/day.

Results: The final sample size was 435 participants. Mean salt intake was 10.3 g/day (95%CI 9.74-10.9). The median estimated iodine intake was 137 µg/day (89.4, 203). The lowest estimated iodine intake was in the <5 g salt intake/day group with a median of 68.6 µg/day (43.8, 100) and the highest estimated iodine intake was predictably in the ≥10 g salt intake/day group (median 180 µg/day (131, 242)). In this group, 69% of adults reached the adequate intake level of 150 µg/day.

Conclusions: The results of our study clearly show that the consumption of iodized salt has an important influence on iodine intake in the adult population. Achieving the WHO target of reducing salt intake to <5 g/day could lead to significantly lower iodine intake if iodization rates are not adjusted accordingly or if other strategies such as (bio)fortification of foods are not included. These results also suggest that food producers should use iodized salt more consistently.

Keywords: iodine, salt, adults, Slovenia

SKIPPING BREAKFAST, SOFT DRINKS CONSUMPTION AND LOWER INTAKE OF PREVENTIVE FOOD GROUPS IS ASSOCIATED WITH OBESITY IN CROATIAN SCHOOLCHILDREN: RESULTS FROM THE CROSS-SECTIONAL CroCOSI STUDY

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Introduction: Childhood obesity is frequently linked to poor dietary habits, however, there are conflicting results regarding status of specific food groups consumption and dietary habits like (un)regular breakfast consumption. The aim of this study was to explore food and beverages intakes associated with obesity among children enrolled in the CroCOSI study as part of the WHO European Childhood Obesity Surveillance Initiative.

Materials and Methods: This cross-sectional study investigated dietary habits of school-aged children on a nationally representative sample (n=5606; 7-10 yrs). Children's parents or caregivers were asked to complete a questionnaire that contained indicators of dietary habits), and children's body weight and height were measured. The 2007 WHO recommended growth reference for school-age children were used to compute BMI-for-age Z-scores. Descriptive statistics and logistic regression analyses were performed.

Results: The prevalence of obesity among Croatian children was 15.6%. Children who consume breakfast (OR 0.72, 95% CI 0.60-0.87), fruits (OR 0.18, 95% CI 0.68–0.97) and cereal (OR 0.28, 95% CI 0.52–0.97) every day were less likely to have obesity. Further, children who had ≥ 3 servings of soft drinks weekly were 1.17 (95% CI 1.07–1.36) times more likely to have obesity. Other food groups showed no significant associations with obesity.

Conclusions: Daily consumption of fruit and cereals was associated with a lower risk of obesity in children. Skipping breakfast and the intake ≥ 3 servings of soft drinks per week was associated with a higher likelihood of obesity in this population of school-age children. Interventions to overcome the problem of obesity in school-age children in Croatia can benefit from these specific relations of dietary habits and obesity.

Keywords: obesity, children, dietary intake, food, COSI

ASSESSMENT OF THE DIETARY BEHAVIOUR OF HEALTHCARE WORKERS

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Introduction: Healthcare workers form the backbone of the healthcare system and play a crucial role in society due to their demanding and responsible work. Due to shift work, healthcare workers are often unable to adhere to dietary guidelines. They often skip meals or consume readily available but nutritionally poor foods. In addition, shift work can disrupt sleep hygiene. Over an extended period of time, these circumstances can lead to undesirable changes, health conditions and even the development of chronic, non-communicable diseases.

Materials and Methods: Dietary data were collected using a validated and self-administered version of the 62-item Food Frequency Questionnaire (FFQ-6®). The questionnaire was distributed via Google Forms from 16 May to 30 June 2024.

Results: The 217 healthcare workers completed the questionnaire. The majority of respondents, 78% work 8-hour shifts, while 10% of respondents work 12-hour shifts. Only 7% of respondents stated that they do not work shifts, 4% work 24-hour shifts and 1% of respondents work 16-hour shifts. Of the respondents who reported working 12/16 or 24-hour shifts (n=33), 63.6% reported significant changes in eating behaviour during night shifts and/or after returning from work. The greatest differences in dietary behaviour were found in the consumption of meat products: 69.6 % of people who work shifts >12 hours consume them ≥3 times a week, compared with 34.5% of others. Greater difference was found in the consumption of sweetened beverages (28.3% compared to 14%) and energy drinks where 13% of those working longer than 12-hour shifts consumed ≥3 servings per week, compared to only 3.5% of those working 8-hour shifts. Almost all who noted changes reported either an increased consumption of sweets or snacks or a general increase in appetite and eating larger meals. Of the respondents who worked 8-hour shifts, 14.8% reported that they also consumed larger amounts of food during afternoon and night shifts, eating more frequently and reaching for low-nutrient foods.

Conclusion: From the results obtained, it appears that healthcare professionals working in shifts often suffer from a shift in circadian rhythm when their fasting/nutrition schedule does not match the time pattern, so they often record negative eating habits.

Keywords: Healthcare workers, eating behaviors, shift work

ASSESSING THE SUSTAINABILITY OF STUDENTS' DIET USING THE CARBON FOOTPRINT AND THE PLANT-BASED DIETARY INDEX

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Introduction: The guidelines for a sustainable diet recommend focusing on plant-based dietary patterns and local food sources. There is a lack of research focusing at sustainable, plant-based consumption among the healthy younger population, whose eating habits will prove important for both their health and the environment in the future. The aim of this study was to determine the consumption of plant-based foods in the student population as well as the carbon footprint in order to assess the sustainability of the student diet.

Materials and Methods: The study was conducted among students of the UNIZG Faculty of Pharmacy and Biochemistry (n=393) of both genders. Dietary data were collected for three consecutive years (2021-2023) using a fur diet food diary. The collected data was processed using the "Nutrition" programme and food intake was converted from games to serving. The plant-based index (PDI) was calculated, while the carbon footprint was estimated using the dataFIELD version 1.0 database. To calculate the PDI, food intake servings were categorized into 16 food groups (11 plant and 5 animal) and each food group was assigned 1-5 depending on the quintile of portion intake for each student.

Results: The estimated average carbon footprint for three consecutive years was 5,101 eqCO2, while the mean PDI was 45, with a range of 28-62, compared to a theoretical range of 16-80. The tertiles for the PDI were 28-42 (n=150) for the 1st tertile; 43-47 (n=121) for the 2nd tertile; and 48-62 (n=122) for the 3rd tertile. Participants in 3rd tertile of the PDI had a significantly higher intake of fibre (20 g compared to 14 g in the 1st tertile) and carbohydrate (242 g compared to 205 g) and a lower intake of saturated fat. They also had a slightly lower carbon footprint (4,912 eqCO2).

Conclusions: Considering the results on sustainability and the plant-based food intake of student population is, the dietary pattern followed by the students cannot be considered sustainable and its quality depends on the plant sources.

Therefore, there is a need to consider a larger population of students of different professions and provide education to improve the changes in dietary patterns.

Keywords: Student diet, plant-based diet, sustainable diet

ASSESSMENT OF KNOWLEDGE ABOUT GESTATIONAL DIABETES AND HEALTHY EATING IN PREGNANT WOMEN

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Introduction: Gestational diabetes is a common complication of pregnancy that is associated with negative consequences for both mother and child. Given that proper nutrition is key to controlling gestational diabetes, it is concerning that few healthcare teams in Croatia include nutritionists as part of a multidisciplinary approach. Therefore, it is important that expectant mothers become aware of the importance of nutrition during pregnancy, especially if they have been diagnosed with gestational diabetes.

The aim of this study is to investigate pregnant women's knowledge of proper nutrition with special reference to gestational diabetes.

Material and Methods: In this study, an anonymous questionnaire was used to assess pregnant women's knowledge about gestational diabetes and the importance of proper nutrition. The questionnaire was adapted from the Diabetes Knowledge Questionnaire and a cross-sectional study on knowledge about gestational diabetes. The survey was distributed in Croatia via Limesurvey and the link was shared via social media, kindergartens and diabetes associations.

Results: Of the 440 respondents, 283 fully completed the questionnaire. The results showed that women generally understood the risk factors for gestational diabetes and the importance of nutrition during pregnancy. However, almost half (47%) did not seek professional advice on their dietary habits, and those who did mainly consulted gynaecologists. There were significant gaps in knowledge regarding carbohydrates and other dietary components, particularly regarding the consumption of carbohydrates together with other macronutrients and the effects on increasing or decreasing blood glucose concentrations.

Conclusion: This study emphasises the need for better intervention and education for pregnant women and highlights the role of nutritionists in improving outcomes.

Whilst Croatian women have a basic understanding of gestational diabetes, there is a need for more comprehensive knowledge, particularly in relation to treatment and carbohydrate management. Improved education and counselling, as well as the integration of dietitians into healthcare teams, could reduce the burden on doctors and improve multidisciplinary care. This approach would not only improve healthcare outcomes, but also reduce the costs associated with treating diabetes.

Keywords: gestational diabetes, nutrition, pregnancy, knowledge

THE IMPACT OF NUTRITION IN THE FIRST THREE YEARS OF LIFE ON GENERAL HEALTH IN ADULTHOOD

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Introduction: Proper nutrition in the first three years is vital for long-term health. Maternal nutrition during pregnancy ensures optimal fetal development and prevents low birth weight. Breastfeeding within the first hour and exclusive breastfeeding for six months provide essential nutrients and disease protection. Introducing nutrient-rich complementary foods at six months supports growth and cognitive development. Poor early nutrition can lead to chronic diseases and mental impairments in adulthood. Addressing these issues involves focusing on maternal health, breastfeeding support, and access to nutritious foods. Early nutritional interventions significantly reduce mortality rates and improve quality of life.

Materials and Methods: Ten articles published between 2014 and 2024 from the PubMed database were analysed. Methods included synthesis, induction, deduction, compilation, and concretization, ensuring a comprehensive and qualitative study. Selected studies were critically assessed for robust conclusions. Data extraction focused on health outcomes related to early nutrition, including growth metrics, cognitive development scores, and incidence of chronic diseases.

Results: Early life overweight and obesity impact cognitive neurodevelopment, affecting attention, motor skills, and executive control. Higher intake of ultra-processed foods in children's diets is linked to weight gain, adiposity, early weaning, lower diet quality, metabolic issues, and numerous diseases. Children exclusively breastfed for at least six months scored significantly higher in communication, motor skills, and problem-solving compared to those breastfed for less than six months. Nutritional deficiencies like severe acute malnutrition, chronic undernutrition, iron deficiency, and iodine deficiency impair brain development. Early-life obesity predicts adult obesity, emphasizing the long-term impact of early nutritional choices on neurodevelopment.

Conclusions: Both underweight and overweight/obesity significantly impact cognitive neurodevelopment. Breastfeeding positively affects overall child development, while undernutrition negatively impacts mental and motor development and productivity. Early-life nutritional imbalances can cause epigenetic changes, leading to chronic diseases in adulthood. Public health initiatives must emphasize balanced nutrition in the early years to prevent long-term health issues and highlight its socio-economic benefits. Continuous monitoring and support can help address nutritional deficiencies early. Investing in early childhood nutrition is essential for lifelong health and well-being.

EDUCATION OF PRESCHOOL CHILDREN ABOUT HEALTHY DIET - HEPSC PROJECT

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Introduction: As obesity rates surge among both children and adults in Croatia, with 23% of adults classified as obese, which is far surpassing the EU's average of 16% in 2022, there is a pressing need to initiate educational interventions starting from early childhood.

Materials and Methods: In response to this alarming trend, the Healthy Eating Preschool Children (HEPSC) project was launched under the INTERREG IPA Croatia-Bosnia and Herzegovina-Montenegro 2014-2020 framework (Project ID: HR-BA-ME527). This initiative focused on educating and assessing preschoolers' knowledge regarding healthy dietary practices, adequate hydration, and physical activity through a before-and-after evaluation in five kindergartens encompassing 250 children in the Šibenik-Knin County region. While cultural factors significantly influence dietary choices and activity levels, research indicates that sugary beverages, including soft drinks and fruit juices, play a pivotal role in childhood obesity. By targeting preschoolers, the project sought to instill an understanding of food quality, promote healthy eating behaviors, emphasize the importance of hydration, and encourage regular physical activity, thereby fostering the adoption of lifelong healthy habits.

Results: The findings underscore the efficacy of early education in positively influencing dietary patterns, hydration practices, and levels of physical activity among young children.

Conclusions: Combating the obesity epidemic necessitates proactive measures, including educational initiatives targeting the youngest members of society. The HEPSC project exemplifies the potential of early intervention in cultivating healthier lifestyles and mitigating the adverse effects of poor dietary choices and sedentary behaviors.

Keywords: preschool children, education project, healthy diet, water intake, physical activity

EVALUATION OF CADMIUM ACCUMULATION IN PINK OYSTER MUSHROOMS CULTIVATED ON CONTAMINATED SUBSTRATES AND HEALTH RISK ANALYSIS

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Introduction: Pink oyster mushrooms are rich in protein, dietary fiber, non-starchy carbohydrates, vitamins, and minerals, making them a great addition to any diet. They also contain numerous bioactive compounds with significant health-promoting effects, leading to their increasing cultivation worldwide. However, pink oyster mushrooms have the ability to accumulate high concentrations of heavy metals, such as cadmium, which can cause adverse effects on human health even at low levels. The accumulation of cadmium (Cd) in mushroom fruiting bodies depends on numerous factors, primarily Cd concentrations in the mushroom substrate. The aim of this study was to evaluate the ability of pink oyster mushrooms to absorb Cd from substrates contaminated with Cd at concentrations of 0.20, 0.50 and 100 mg kg^{-1} and to assess the human health risks associated with the consumption of these mushrooms.

Material and Methods: An experiment was carried out in a completely randomized design with three replicates. Cd contents in mushroom samples were analyzed by atomic absorption spectrophotometry using the Shimadzu AA-7000 device, and the potential human health risks were assessed using the target hazard quotient (THQ).

Results: Cd accumulation in pink oyster mushrooms increased with increasing Cd content in mushroom growing substrates, ranging from 0.23 mg kg^{-1} fresh mass (in a non-contaminated substrate) to 3.09 mg kg^{-1} fresh mass (in a substrate contaminated with 100 mg kg^{-1}). On the other hand, total mushroom yield showed a decreasing trend with increasing Cd levels in substrates. The target hazard quotient (THQ) values of Cd in pink oyster mushrooms cultivated in Cd-contaminated substrates for both adults and children were much higher than 1.

Conclusions: The results of the present study strongly suggest that pink oyster mushrooms have a high ability to absorb Cd from the substrate in which they grow. Although the first group of mushrooms was grown on the substrate not contaminated with cadmium, we assume it contained trace amounts, as the mushrooms absorbed 0.23 mg kg^{-1}, exceeding the EU permissible limit of 0.05 mg kg^{-1} (EU 2023/915). Additionally, the obtained THQ values for Cd indicate that the consumption of mushrooms cultivated in Cd-contaminated substrates poses significant health risks.

Keywords: cadmium toxicity, health hazard analysis, mushrooms

DIET AS A SIGNIFICANT SEGMENT OF SUCCESS OF A TRIATHLON ATHLETE PARTICIPATING IN THE PROJECT: HUMANITY AS A FORGOTTEN OLYMPIC DISCIPLINE

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Introduction: The project "Humanity as a Forgotten Olympic Discipline" is placed in the spirit of sport where the main focus is recognition true meaning of it. Considering the above mentioned, the title stands for the humanitarian expedition which includes athlete who did 13 days of triathlon, where the starting point was the Faculty of Agriculture and Food Sciences (Sarajevo, Bosnia and Herzegovina) and the finish point was top of the Olympus Mountain (Greece).

The primary goal: of this project was to collect financial resources for the purpose of treating patients with cancer disease. Through realistic action, the triathlon athlete faced the extreme challenges which symbolically present a battle full of ups and downs which these patients are fighting each day. Triathlon is a sport that requires skills, effort, endurance and motivation. It combines three sports disciplines which include: running, cycling, and swimming. Therefore, the athlete was engaged in these disciplines during his venture to the Olympus Mountain. Most important aspect of this humanitarian expedition was the will. The will to succeed equals the will to get well. In these extreme circumstances, the athlete had support from his team which accompanied him during the running with the cars, swimming with the boats and climbing with him all the way to the top of the Olympus followed and encouraged by team spirit. The team included six individuals: triathlon athlete, project coordinator, doctor of medicine, nutritionist, climber expert and photographer. Due to daily exhausting physical activity, the role of nutritionist took significant part in his endeavor. Hence, the dietary plan was adapted to the conditions of staying in camper vans and facing unexpected challenges.

Subject: Student as a triathlon athlete. The athlete is 22 years old, weights 100 kg and he has 206 cm of height.

Methods: Anthropometry (height, weight, BMI); BIA; software Program Prehrane 5.0; creating a diet plan for 13 days including food preferences of the athlete, needs and endurance parameters.

Results: Dietary plan for 13 days. The dietary plan was adapted for 11 days of regular meals including 3 main meals and 1 side dish. The athlete consumed various grains such as rice, sweet potato, potato, whole grains pasta, oats etc., together in a combination with protein which was equally presented from animal and plant sources.

Conclusion: Expected outcome refers to meeting the nutritional needs of the athlete with the aim of maintaining endurance and energy during 13-days of triathlon.

Keywords: Triathlon, athlete, dietary plan, endurance, macronutrients

ASSESSING THE KNOWLEDGE AND HABITS OF ENDURANCE ATHLETES ON POST-EXERCISE NUTRITION AND THE IMPACT OF ONLINE EDUCATION

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Introduction: Athletes' diets are often not adapted to their training load and do not provide the nutrients needed for high performance. Among macronutrients, carbohydrate intake in particular is frequently sub-optimal, which can reduce the exercise capacity of endurance athletes. The situation is no better in terms of guidelines for post-exercise meals, with athletes typically lacking knowledge about the optimal carbohydrate content and timing of recovery meals. Current sports nutrition recommendations suggest an intake of 1-1.2 g/kg bodyweight per hour of carbohydrate in the four-hour period following endurance training to replenish glycogen stores in the muscles and liver as quickly as possible. Our research explored the knowledge and habits of endurance athletes regarding the composition and timing of post-workout meals, and the impact of an online educational programme on participants' body composition and sports performance.

Materials and Methods: Our research consisted of two parts: a broader online questionnaire survey and an 8-week intervention study. The online questionnaire was completed by 123 healthy amateur endurance athletes, of whom twenty-two participated in the intervention study. Participants filled in an online questionnaire that assessed their knowledge and habits related to post-exercise nutrition before joining the intervention. They completed a 3-day food diary, as well as a body composition assessment (BIA) and a treadmill performance test. These analyses were carried out both at baseline and after 8 weeks. Following the baseline assessment, athletes participated in a webinar on post-workout nutrition and were given a recipe booklet on optimal post-exercise meals by a sports nutritionist. Participants were asked to follow the guidelines for post-workout nutrition but not to change their general dietary habits. Adherence to post-exercise nutrition guidelines was checked by analyzing food diaries using Nutritics Performance software.

Results: Only 13.8% of respondents (n=123) answered correctly to the question on optimal carbohydrate intake in the post-exercise period. Body fat percentage decreased significantly (-0.9%, p=0.005), while time to exhaustion in the performance test increased by an average of 22 seconds (p=0.019) after the 8-week intervention period for participants receiving online

education. However, it has to be noted that the largest limitation of our study is that it is not a controlled trial.

Conclusions: Our results show that amateur endurance athletes have limited knowledge on guidelines regarding optimal timing and macronutrient composition of post-exercise meals. Online education targeting these areas while maintaining their usual training programme can have a positive impact on body composition and sports performance in endurance athletes. It is important that clear professional recommendations and practical guidelines reach amateur athletes as well.

Keywords: sport nutrition, post-exercise, glycogen, endurance athletes

EXPLORING THE KNOWLEDGE TOWARDS PROBIOTICS AMONG HEALTH SCIENCES STUDENTS: A CROSS-SECTIONAL STUDY

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Background: The comprehension of probiotics and their latest developments is a crucial aspect for health sciences students who are to become future healthcare providers. The knowledge of probiotics empowers them to recommend its usage to their future patients and leverage its benefits. The aim of this study was to investigate the current knowledge of health science students regarding probiotics at Princess Nourah University in Riyadh, Saudi Arabia.

Method: A cross-sectional study at Princess Nourah University surveyed female Saudi students (ages 18- 26) in health science colleges. Using random sampling, 144 participants completed an online questionnaire covering sociodemographic info, probiotic knowledge, and perspectives. Data collection spanned 6 weeks. Probiotic knowledge levels and perspective were categorized using Bloom's cut-off point: 80-100% for good knowledge, 60-79% for moderate knowledge, and below 60% for poor knowledge. Specialty differences were analyzed with One-way ANOVA (Korskal Wallis).

Results: 58.4% of students had poor understanding of probiotics, 39.6% had moderate knowledge, and only 2% had a high understanding. However, it was observed that nursing students exhibited the highest mean score of good knowledge (10.43 ± 2.67). In contrast, students in the Foundation Year major had the lowest mean score of good knowledge (9.88 ± 1.59).

Conclusion: A significant number of health science students lack sufficient knowledge about probiotics, with over half falling short. To remedy this concern, it is essential to implement effective educational resources such as conferences, seminars, workshops, and journal clubs. This will better prepare future healthcare providers.

Keywords: Knowledge, health science students, Saudi Arabia, probiotics, perspective

TRADITIONALLY PRODUCED BUCKWHEAT, BARLEY, AND RYE FLOURS: A COMPREHENSIVE ANALYSIS OF DIFFERENT FLOUR PARTICLE FRACTIONS

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Introduction: Buckwheat, barley, and rye flours are highly valued for their distinct nutritional profiles, each contributing to unique health benefits. Due to the high content of dietary fibers and bioactive compounds, flours of mentioned cereals and pseudo-cereal promote digestion, as well as the gut and cardiovascular health. The nutritional properties of these flours are strongly influenced by their different particle fractions. The bran fraction is rich in fiber, antioxidants, and minerals, the germ fraction is high in vitamins and healthy fats, and the endosperm is primarily composed of starch and proteins, contributing to the flour's functional properties.

Materials and Methods: Buckwheat, barley, and rye whole-meal flours were obtained by traditional artisanal milling of grains. Prior to analyses, flours were sifted by laboratory sieves, and totally four flour fractions per each culture were separated: whole-meal, and flours with particles size above 500 µm, from 250 to 500 µm, and under 250 µm. Analyses of listed flours fractions included the following: determination of moisture, ash, starch and cellulose content, titratable acidity and functional properties (emulsion activity, swelling power, and capacity of water and oil absorption).

Results: Significant differences in chemical composition, as well as physical and functional properties, were observed for all analyzed flours and among their fractions. The obtained results indicated that the higher share of bran in flour results in increase of cellulose, ash and moisture content, which leads to better flour swelling power and water and oil binding capacity. Generally, buckwheat flours were characterized by higher content of components usually found in bran, while barley and rye flours were rich in starch.

Conclusions: Generally, traditionally produced buckwheat, barley, and rye flours exhibit distinct nutritional profiles. However, understanding the different flour fractions of these raw cereals and pseudo-cereal is essential for optimizing the nutritional benefits and utilization of these flours and their fractions in various food products.

Keywords: Buckwheat, barley, rye, flour fractions, nutritional value

ADVERSE REACTION DURING THE COMPLEMENTARY FEEDING

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Introduction: Food allergy is currently the most common chronic disease in infants and young children, but every adverse reaction to food is not necessarily an allergic reaction, especially at the beginning of complementary feeding. The goal of this survey was to determine the foods that most often cause adverse reactions during the complementary feeding.

Materials and Methods: The survey has been conducted among the members of the Facebook group focused on complementary feeding, all members form Croatia and the region. 6,319 mothers of children up to 12 months have filled out a food reaction questionnaire from 2017 until today.

Results: 56% of mothers reported some kind of adverse reaction to one or more the foods, which is much more than reported food allergy reactions in infants population in the literature (<28%). The most common reported causing reaction foods are: cow's milk (8,11%), egg (5,66%), apple (3,85%), banana (2,66%), carrot (2,2%) and wheat (1,96%). While the prevalence of reported reactions to milk, egg and wheat are in accordance with the self-reported literature data, the prevalence of adverse reactions to apples, bananas and carrots is surprisingly high. The reactions to these low allergenic foods were mostly mild and transient, mainly related to the gastrointestinal system (constipation, discomfort). However, some of these reaction persisted and could be considered as potentially allergic reactions.

On the other hand, the prevalence of reactions to peanuts and nuts in this survey is unusually low (0,05%, 0,07%), probably because the majority of infants were not introduced this foods in diet during the first year of life, especially in 2017. when the new ESPGHAN guideline, according to introducing allergenic foods should not be delayed, just came out.

Conclusions: This survey has confirmed that cow's milk and egg are the most common causes of allergic reactions in infants. However, attention should also be paid to possible adverse reactions to food that is considered hypoallergenic and traditionally introduced first in infant's diet. Any adverse reaction should be reported and discussed with pediatrician.

Keywords: Food allergy, adverse reaction to food, infant, complementary feeding

IS THERE A DIFFERENCE IN ADHERENCE TO THE MEDITERRANEAN DIET AMONG OVERWEIGHT AND OBESE PEOPLE?

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Introduction: Currently, an increasing prevalence of obesity that has reached epidemic dimension worldwide, unfortunately affected also Croatia. Obesity is a risk factor for the development of non-communicable diseases (cardiovascular disease, diabetes, and respiratory diseases such as asthma) that now account for more than 80% of mortality in developed countries. On the other hand, Mediterranean diet (MD), traditionally representing diet of Mediterranean region, has beneficial health effects, especially on non- communicable diseases. The aim of this study was to determine the adherence to the MD among overweight people and people with different degrees of obesity.

Materials and Methods: We included 127 obese/overweight adult participants with BMI> 27 kg/m2, aged 22-60y (median age 47), majority female (74, 8%) who filled out the 14-item Mediterranean Diet Adherence Screener (MEDAS) before entering the weight loss program. All participant are from continental region of Croatia (Zagreb and Koprivnica). Participants were divided into 4 groups based on BMI (kg/m2): overweight (BMI= 25-30), obesity 1. degree (BMI= 30-35), obesity 2.degree (BMI= 35-40), obesity 3.degree (BMI>40). Adherence to the MD wa s assessed according to the MEDAS score ranged 0-14 points: score of ≤5 was considered to indicate poor adherence; a score of 6–9 moderate adherence, and a score of ≥10 good adherence. MEDAS score between 4 groups of participants were analyzed using one-way ANOVA test.

Results: MEDAS score of the whole sample was 6,85 ±2,13 which means generally poor to moderate adherence to MD. Less than 10% of participants has good adherence. MEDAS scores in the groups are: overweight (6,24±2,14), obesity 1. degree (7,35±1,89), obesity 2.degree (6,86±2,17), obesity 3.degree (6,39±2,09). In this study we have not observed significant difference in MEDAS scores between groups of overweight/obese people categorized according their BMI (p>0,05).

Conclusions: This study has shown that there is not significant difference in MD adherence between various nourishment status groups with BMI>25. However, due to its generally beneficial health effect, as well as the abundance of nutrients with antioxidant and anti-inflammatory properties, MD could have a beneficial effect on obese people. Therefore, it would be interesting to see its correlation with the distribution of adipose tissue, especially the abundance of visceral adipose tissue.

Keywords: Overweight, obesity, BMI, Mediterranean diet, MEDAS score

ASSESSMENT OF NUTRITIONAL STATUS AND PREVALENCE OF MALNUTRITION IN NURSING HOME RESIDENTS

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Introduction: Malnutrition is a condition caused by a deficiency, excess, or imbalance in energy and/or nutrient intake. Elderly individuals are at an increased risk of developing malnutrition due to age-related physiological changes that lead to changes in body composition and dietary habits. These changes can include difficulties with swallowing or chewing, loss of taste and smell, digestive problems, and chronic diseases. The aim of this study is to assess the nutritional status and prevalence of malnutrition among nursing home residents in Zagreb.

Materials and Methods: This study included 140 elderly individuals from two nursing homes, of whom 82.1% were women. The mean age of the participants was 83.6 ± 4.9 years. Nutritional status was assessed using the Mini Nutritional Assessment (MNA), which includes an anthropometric assessment, general health evaluation, dietary assessment, and self-assessment of health and nutritional status. An MNA score of 24-30 indicates normal nutritional status, while a score of 17-23.5 indicates a risk of malnutrition. Body composition was measured using bioelectrical impedance analysis with the BIA-ACC device (BioTekna®, Marcon-Venice, Italy).

Results: The average MNA score for women was 24.2 ± 2.8, and for men, it was 23.3 ± 3.0, but this difference was not significant ($p=0.182$). On average, women had an adequate nutritional status, while men were at risk of developing malnutrition. Nutritional status assessment revealed that 8.0% of men and 1.7% of women were malnourished, while 32.0% of men and 40.0% of women were at risk of malnutrition. The most critical risk factors for malnutrition, according to the MNA, were not consuming meat, poultry, or fish daily (37.1% of participants) and not eating two or more servings of fruits or vegetables per day (48.6% of participants). When comparing body composition between men and women, men had a significantly higher percentage of muscle mass and a lower percentage of fat mass compared to women ($p<0.001$).

Conclusions: The nutritional status assessment revealed that a higher percentage of men than women suffered from malnutrition. Overall, a significant proportion of nursing home residents are at risk of malnutrition. The findings indicate that malnutrition is present among nursing home residents, highlighting the importance of early detection of critical risk factors. Practical interventions in nursing homes could focus on promoting higher intake of protein-rich foods, as well as fruits and vegetables.

Keywords: nutritional status, malnutrition, elderly, MNA, nursing home

ROLE OF MACRONUTRIENTS AND MICRONUTRIENTS IN THE DIET OF PATIENTS WITH CLOSTRIDIUM DIFFICILE INFECTION

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Introduction: While there is no single dietary cure for Clostridium difficile infection (CDI), optimizing macronutrient and micronutrient intake can support a healthy gut microbiota, potentially aiding recovery. This study aims to provide dietary recommendations to favourably influence negative phenomena connected with CDI, like increased recurrence rate, prolonged hospital stay, high mortality, etc.

Materials and Methods: A literature search was conducted using PubMed.

Results: A soy protein diet increased the susceptibility to CDI and the mortality of antibiotic-treated, C. difficile-infected mice. Low protein diets, and defined nutrient diets in general, were found to be protective against CDI in mice. High dietary fat in the context of low dietary fibre caused increased mortality in murine antibiotic-induced CDI. The literature is conflicted about the effect of a high-carbohydrate diet on CDI. Animal studies have shown that a diet high in soluble fibre can help eliminate CDI quicker than diets high in insoluble fibre. The increase in the abundance of beneficial bacteria such as Bifidobacteriaceae, and Christensenellaceae were prominently evident during CDI recovery after administration of a high dose of cholecalciferol. Patients with vitamin D deficiency had a higher recurrence rate after CDI than those without deficiency. Patients with vitamin D deficiency also tended to stay longer in the hospital. C. difficile germination in vivo occurred due to synergistic effects between bile salts, glycine, and calcium. Excess dietary zinc altered the gut microbiota and decreased resistance to CDI. Western and gluten-free diets may be associated with increased CDI, meanwhile, vegan or plant-based diets may be protective against the development of CDI.

Conclusions: Dietary interventions for CDI are still under investigation. Further research is needed to determine the most effective macronutrient and micronutrient ratios for optimal gut microbiota support during CDI treatment. Consulting a registered dietitian experienced in gut health can provide personalized dietary guidance to manage CDI and promote gut health recovery.

Keywords: nutrients, micronutrients, Clostridium difficile, infection

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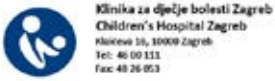
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