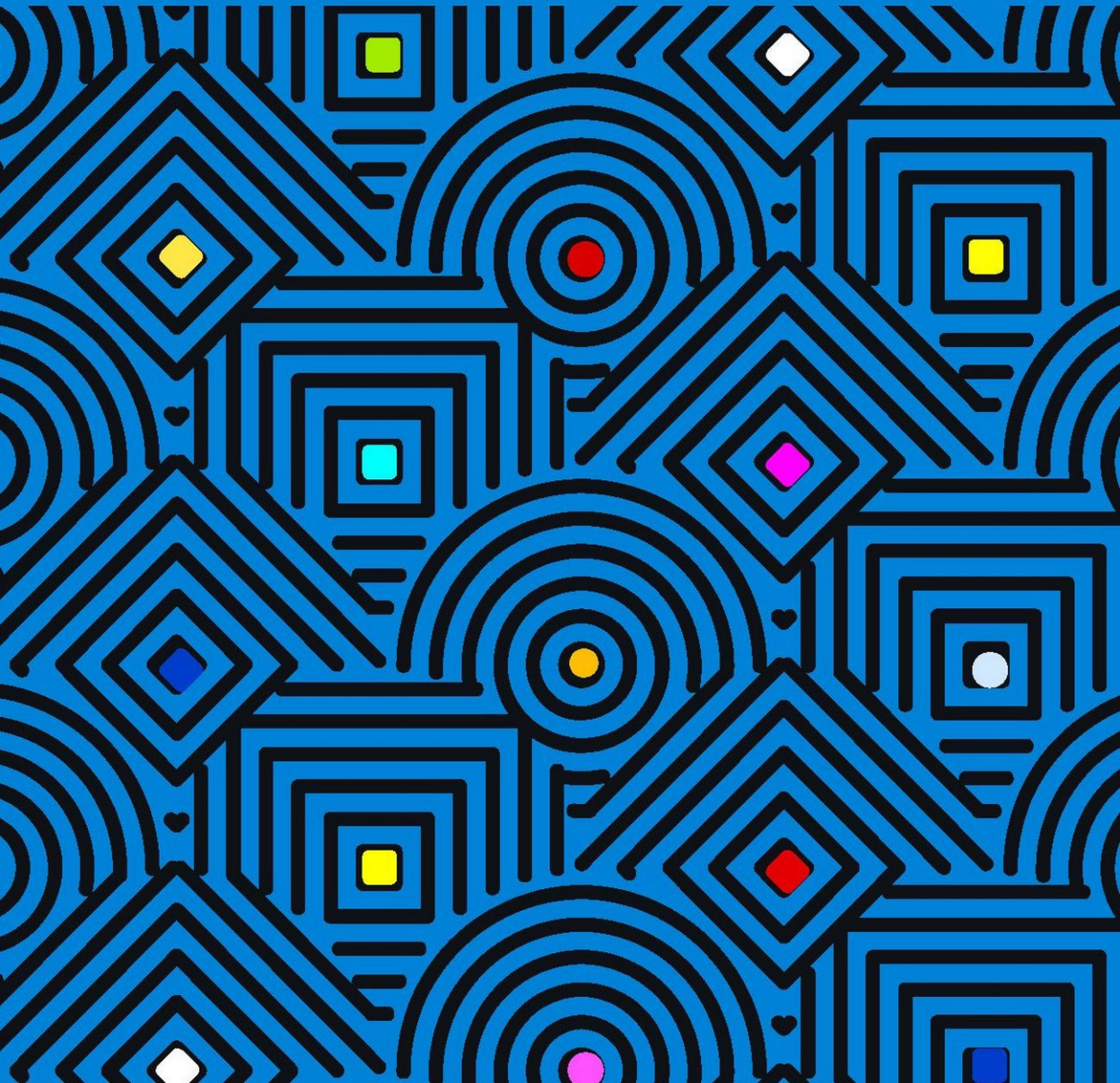# ANDRIJA STAMPAR
TEACHING INSTITUTE
OF PUBLIC HEALTH

Creating a Healthier Future

REVIEW 2022

SCIENTIFIC ARTICLES IN CURRENT CONTENTS AND OTHER INDEXED JOURNALS

REVIEW 2022

Scientific articles in Current Contents and other indexed journals

Andrija Stampar Teaching Institute of Public Health

Zagreb, 2023

CONTENTS

FOREWORD

The *2022 Review of Scientific articles in Current Contents and other indexed journals* is an annual report of scientific articles published in *Current Contents* journals and other indexed journals by the employees of the Andrija Stampar Teaching Institute of Public Health. The first chapter brings 20 abstracts of original scientific articles and reviews published in *Current Contents* journals (there were 17 such papers in 2020). There are three scientific articles published in other indexed journals in the second chapter. Two of them are about the COVID-19 pandemic.

In 2022, there were 53 scientists in the Teaching Institute: 41 with doctoral degrees and 12 with master's degrees. The percentage of female scientists dominates the overall number: 44 female scientists *versus* nine male scientists.

Despite many Institute's active roles during the COVID-19 pandemic, research work was continued. Therefore, we congratulate the employees and their external associates for any scientific contribution.

Institute Head

Prof Branko Kolarić, MD, PhD

Review 2022 in digital version is available for download from

https://stampar.hr/hr/publikacije

1. ORIGINAL SCIENTIFIC AND REVIEW ARTICLES IN CURRENT CONTENTS

1.1. ASSESSMENT OF METAL INTAKE BY SELECTED FOOD SUPPLEMENTS BASED ON BEEHIVE PRODUCTS

Vujić M[1], Lušić D[2,3], Bošnir J[4,5], Pezo Lato L[6], Kuharić Ž[4], Lasić D[4], Šabarić J[4], Barušić L[4], Vukić Lušić D[2,7]

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Abstract

The aim of this study was to determine the quantity of particular toxic metals (Pb, Cd, As, Hg) and micronutrients (Cr, Fe, Co, Ni, Cu, Zn, Se) in the recommended daily dose of 51 food supplements based on beehive products. Samples taken from the Croatian market were submitted for the identification/quantification of studied metals and micronutrients. It was carried out by means of inductively coupled plasma mass spectrometry (ICP-MS). Eleven samples (21.57%) showed an increased concentration of total arsenic, three samples (5.88%) contained an increased concentration of total iron, and eight samples (15.68%) had an increased concentration of total nickel. Three samples (5.88%) contained an

increased concentration of zinc, while one sample (1.96%) contained an increased concentration of selenium. Increased levels of certain toxic metals and micronutrients do not pose a danger to human health because the amount identified was less than what can cause toxic effects in humans. All other analysed metals and micronutrients fell within the defined literature values. Despite certain increases in particular parameters, all samples met the established toxicity criteria. This study evidenced their safety if consumed in the recommended daily dose.

Keywords: toxic metals, micronutrients, food supplements, weekly intake, recommended daily dose

1.2. Chemometric valorization of strawberry (*Fragaria x ananassa Duch.*) cv. "Albion" for the production of functional juice: the impact of physicochemical, toxicological, sensory, and bioactive value

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Abstract

Strawberries (*Fragaria x ananassa* Duch. cv. "Albion") were harvested at two stages of ripeness (75% vs. 100%) and their physicochemical, sensory, toxicological, and bioactive properties were evaluated before and after processing into juice. The fresh fruits and their by-products were also evaluated. During processing into juice, the color change was higher in the fully ripe fruits,

confirming the encouraging prospects for using the less ripe strawberries for processing. The analysis of heavy metals (Cu, Zn, Ni, As, Cd, Pb) was carried out, and in juice and by-product samples of 100% maturity, only Pb was higher than the MDK. Of the 566 pesticides analyzed, only cyprodinil was found in the by-products of the strawberries at 75% maturity, while pyrimethanil was detected in all samples. Fresh strawberries of both ripeness levels were rated similarly to the corresponding juices for all sensory attributes studied, indicating that sensory perception was not affected by processing. However, ripeness was found to be an important factor influencing most sensory attributes. The by-products were the materials with the highest levels of all bioactive compounds. Considering all quality parameters evaluated, the chemometric evaluation confirms the suitability of 75% ripe strawberries for processing into functional juice, which could be important for the juice industry.

Keywords: strawberry, ripeness, functional juice, bioactive compounds, sensory, toxicology

1.3. DEVELOPMENT OF THE EAACI% SEASON DEFINITION A BACKUP FOR A GLOBAL APPLICATION

Bastl M[1], Berger M[2], Bastl K[1], Dirr L[1], Zwingers T[3], Bergmann K[4,5], Pfaar O[6], Bruffaerts N[7], Magyar D[8], Majkowska Wojciechowska B[9], Mitrović Josipović M[10], Rybníček O[11], Stjepanović B[12], Werchan M[13], Berger U[1]

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Abstract

Pollen seasons progress differently in their timing, course, and intensity in different countries/biogeographical regions depending on regional factors such as vegetation, elevation, urbanization, and others. The variable regional situation often provides obstacles for a standard season definition. The season definition of the European Academy of Allergy and Clinical Immunology (EAACI) was published as a pollen concentration season definition depending on the selected pollen type reaching a certain threshold after a certain period of consecutive days, and it was demonstrated that they can be correlated with pollen-induced symptom loads. The season definition was developed for studies with a medical framework, particularly to allow a prospective approach. However, pollen concentrations do not reach the same level in Europe or globally and affect persons concerned differently. Therefore, there is a strong need to expand the scope of application of the EAACI season definition to a retrospective approach if the standard season definition criteria are not met within the site selection or during a clinical trial.

1.4. DIGITAL TECHNOLOGY AND HIV, HCV AND STI VOLUNTARY COUNSELLING AND TESTING: GOOD PRACTICE EXAMPLE FROM CROATIA

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Abstract

The aim of this paper is to introduce the digitalization process and its effects on better reach of the target population. Progress in the digitalization and e-health tools worldwide enables new opportunities in prevention, diagnostics and treatment for people living with HIV (PLHIV) and people in the risk of HIV infection, hepatitis C (HCV) and other sexually transmitted infections (STIs), especially in the context of the COVID-19 pandemic. The system already used for voluntary counselling and testing (VCT) at the CheckPoint Centre Zagreb run by the non-governmental organization (NGO) Croatian Association for HIV and Viral Hepatitis (CAHIV) was upgraded and adapted (due to the COVID-19 prevention epidemiological measures) and developed for implementation of the pilot project of feasibility and acceptability of home HIV self-testing (HIVST) among men who have sex with men (MSM) in Zagreb. A special feature of the HIVST mobile application enables an innovative approach in collecting clients' test result

feedback. This paper presents the method of use digitalization of the VCT and HIVST activities to support and increase availability of screening testing. Described procedures of new technologies application in VCT services and preliminary results of the HIVST pilot project indicate that technology-delivered interventions can contribute and improve access and utilisation of HIV/STI prevention and care services.

1.5. DNA BARCODING OF HARD TICKS (IXODIDAE), NOTES ON DISTRIBUTION OF VECTOR SPECIES AND NEW FAUNAL RECORD FOR CROATIA

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Abstract

Molecular methods are increasingly being utilized for accurate identification of ticks (Acari: Ixodidae), especially in cases of morphologically highly similar species. In this study, we performed molecular research of the tick fauna in Croatia using DNA barcoding method. Ticks were sampled in three biogeographical regions and thirteen species were recorded: *Dermacentor marginatus, Dermacentor reticulatus, Haemaphysalis concinna, Haemaphysalis inermis, Haemaphysalis punctata, Hyalomma marginatum, Ixodes frontalis, Ixodes hexagonus, Ixodes kaiseri, Ixodes ricinus, Rhipicephalus bursa, Rhipicephalus sanguineus s.l.* and *Rhipicephalus turanicus. Ixodes kaiseri* is for the

first time recorded in the fauna of Croatia. Of the thirteen hard tick species analyzed in this study, pathogens from different groups (bacteria, protozoa and viruses) have been detected in eight species in Croatia so far. For the important vector species *R. sanguineus s.s*., new distributional data for Croatia are given. The standard COI barcoding region was amplified, and the sequences were analyzed by species delimitation methods together with the sequences of conspecific and congeneric species from the public BOLD database. Our specimens of *H. punctata* represent a new, genetically distinct MOTU. A brief overview of the available public DNA barcoding data for Ixodidae is presented, highlighting the need for an integrative approach for the clarification of the taxonomic status of problematic Ixodid taxa. The results provide a basis for the establishment of a molecular data platform for the Ixodidae of the Croatian fauna.

1.6. Does exposure to weathered coal ash with an enhanced content of uranium-series radionuclides affect flora? Changes in the physiological indicators of five referent plant species

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Abstract

Coal ash deposited in open landfills is a potential source of environmental pollutants due to the contained toxic element content. The weathered coal ash used in this study additionally contains enhanced activity concentrations of ^{238}U series radionuclides. This study aimed to determine the physiological effects of enhanced ionizing radiation and toxic elements on five plant species (smilo grass, sticky fleabane, blackberry, mastic and pine tree) inhabiting the coal ash disposal site. Among the potentially toxic measured elements, contents of Sb, As and especially V significantly exceeded their respective levels at the control site, as well as the content of ^{238}U and its progenies. Significant changes in photosynthetic pigments were recorded following chronic exposure to the plants growing on the coal ash site. Different responses were also observed in the plant

species regarding the activity of catalase and glutathione-S-transferase (GST). The level of lipid peroxidation markedly increased in plants from the disposal site, except in blackberry, wherein GST activity was the strongest, indicating an important role of that enzyme in the adaptation to coal ash pollutants. The results of this study suggest that the modulation of the studied biochemical parameters in plants growing on coal ash is primarily species-dependent.

Keywords: radioactivity, NORM, radium, catalase, malondialdehyde, chlorophyll

1.7. EFFECTS OF SILVER NANOPARTICLES ON PHYSIOLOGICAL AND PROTEOMIC RESPONSES OF TOBACCO (*NICOTIANA TABACUM*) SEEDLINGS ARE COATING-DEPENDENT

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Abstract

The harmful effects of silver nanoparticles (AgNPs) have been confirmed in many organisms, but the mechanism of their toxicity is not yet fully understood. In biological systems, AgNPs tend to aggregate and dissolve, so they are often stabilized by coatings that influence their physico-chemical properties. In this study, the effects of AgNPs with different coatings [polyvinylpyrrolidone (PVP) and cetyltrimethylammonium bromide (CTAB)] on oxidative stress appearance and proteome changes in tobacco (*Nicotiana tabacum*) seedlings have been examined. To discriminate between the nanoparticulate Ag form from the ionic one, the treatments with $AgNO_3$, a source of Ag^+ ions, were also included. Ag uptake and accumulation were found to be similarly effective upon exposure to all treatment types, although positively charged AgNP-CTAB showed less stability and a generally stronger impact on the investigated parameters in comparison with more stable and negatively charged AgNP-PVP and ionic silver ($AgNO_3$). Both AgNP treatments induced reactive oxygen species (ROS) formation and increased

the expression of proteins involved in antioxidant defense, confirming oxidative stress as an important mechanism of AgNP phytotoxicity. However, the mechanism of seedling responses differed depending on the type of AgNP used. The highest AgNP-CTAB concentration and CTAB coating resulted in increased H_2O_2 content and significant damage to lipids, proteins and DNA molecules, as well as a strong activation of antioxidant enzymes, especially CAT and APX. On the other hand, AgNP-PVP and $AgNO_3$ treatments induced the nonenzymatic antioxidants by significantly increasing the proline and GSH content. Exposure to AgNP-CTAB also resulted in more noticeable changes in the expression of proteins belonging to the defense and stress response, carbohydrate and energy metabolism and storage protein categories in comparison to AgNP-PVP and $AgNO_3$. Cysteine addition significantly reduced the effects of AgNP-PVP and $AgNO_3$ for the majority of investigated parameters, indicating that AgNP-PVP toxicity mostly derives from released Ag^+ ions. AgNP-CTAB effects, however, were not alleviated by cysteine addition, suggesting that their toxicity derives from the intrinsic properties of the nanoparticles and the coating itself.

1.8. Epidemiological study on the incidence of haemorrhagic fever with renal syndrome in five Western Balkan countries for a 10-year period: 2006-2015

Štrbac M[1], Vuković V[1,2], Patić A[1,2], Medić S[1,2], Pustahija T[1], Petrović V[1,2], Lendak D[2,3], Kosanović Ličina ML[4], Bakić M[5], Protić J[6], Pranjić N[7], Jandrić Lj[8], Sokolovska N[9], Ristić M[1,2]

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Abstract

Background: Large-scale epidemics of haemorrhagic fever with renal syndrome (HFRS) have been reported mostly in Asia and Europe, with around 100,000 people affected each year. In the Southeast Europe, Balkan region, HFRS is endemic disease with approximately 100 cases per year. Our aim was to describe epidemiological characteristics of HFRS in five Western Balkan (WB) countries

and to describe correlation between HFRS incidence and major meteorological event that hit the area in May 2014.

Methods: National surveillance data of HFRS from Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia and Serbia obtained from 1 January 2006 to 31 December 2015 were collected and analysed.

Results: In a 10-year period, a total of 1,065 HFRS patients were reported in five WB countries. Cumulative incidence rate ranged from 0.05 to 15.80 per 100.000 inhabitants (in North Macedonia and Montenegro respectively). Increasing number of HFRS cases was reported with a peak incidence in three specific years (2008, 2012, and 2014). Average incidence for the entire area was higher in males than females (5.63 and 1.90 per 100.000 inhabitants respectively). Summer was the season with the highest number of cases and an average incidence rate of 1.74/100.000 inhabitants across 10-year period. Haemorrhagic fever with renal syndrome incidence was significantly increased (7.91/100.000 inhabitants) in 2014, when a few months earlier, severe floods affected several WB countries. A strong significant negative correlation (r = -.84, p < .01) between the monthly incidence of HFRS and the number of months after May's floods was demonstrated for the total area of WB.

Conclusion: Our findings demonstrate that the HFRS incidence had similar distribution (general, age, sex and seasonality) across majority of the included countries. Summer was the season with the highest recorded incidence. Common epidemic years were detected in all observed countries as well as a negative correlation between the monthly incidence of HFRS and the number of months after May's cyclone.

Keywords: Balkans, haemorrhagic fever with renal syndrome, incidence, national surveillance data

1.9. GENOMIC ANALYSIS OF SEWAGE FROM 101 COUNTRIES REVEALS GLOBAL LANDSCAPE OF ANTIMICROBIAL RESISTANCE

Munk P[1], Brinch C[1], Duus Møller F[1], Petersen TN[1], Hendriksen RS[1], Mette Seyfarth A[1], Kjeldgaard JS[1], Aaby Svendsen C[1], van Bunnik B[2], Berglund F[3], Global Sewage Surveillance Consortium (Jergović M[5] et al), Larsson DGJ[3], Koopmans M[4], Woolhouse M[4], Aarestrup FM[1]

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Abstract

Antimicrobial resistance (AMR) is a major threat to global health. Understanding the emergence, evolution, and transmission of individual antibiotic resistance genes (ARGs) is essential to develop sustainable strategies combatting this threat. Here, we use metagenomic sequencing to analyse ARGs in 757 sewage samples from 243 cities in 101 countries, collected from 2016 to 2019. We find regional patterns in resistomes, and these differ between subsets corresponding to drug classes and are partly driven by taxonomic variation. The genetic environments of 49 common ARGs are highly diverse, with most common ARGs carried by

multiple distinct genomic contexts globally and sometimes on plasmids. Analysis of flanking sequence revealed ARG-specific patterns of dispersal limitation and global transmission. Our data furthermore suggest certain geographies are more prone to transmission events and should receive additional attention.

Keywords: genomic analysis, sewage, antimicrobial resistance

1.10. LOWER ADHERENCE TO CLOTTING FACTOR REPLACEMENT THERAPY IN PATIENTS WITH HAEMOPHILIA ASSOCIATED WITH MORE DEPRESSIVE SYMPTOMS: TWO CENTRES CROSS-SECTIONAL STUDY

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Abstract

The aim of this study was to examine the association of depressive symptoms with medication adherence levels in a combined sample from Croatia and Slovenia. Participants in the study were adult patients with haemophilia receiving prophylaxis or on-demand treatment (N = 109). Their age was between 18 and 73 years (M = 43.86, SD = 14.89). Self-reported medication adherence (implementation phase) was measured with The Validated Haemophilia Regimen Treatment Adherence Scale, while depressive symptoms were measured with Beck Depression Inventory II. Comparison of adherence scores using t-test

indicated that participants using prophylaxis were more adherent than participants using on-demand treatment on total scale and time and plan subscales. In hierarchical regression analyses depressive symptoms were a significant predictor for the total score and time subscale after controlling for sociodemographic and clinical variables. Screening for depressive symptoms and improving medication adherence of patients using on-demand treatment is recommended.

1.11. MODERATING EFFECT OF PPAR-γ ON THE ASSOCIATION OF C-REACTIVE PROTEIN AND ISCHEMIC STROKE IN PATIENTS YOUNGER THAN 60

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Abstract

Aim: The aim of this study was to evaluate the moderating effect of peroxisome proliferator activated receptor-γ (PPAR-γ) gene variants on the association of serum C-reactive protein level (CRP) and ischemic stroke (IS).

Material and methods: A total of 114 patients with IS and 135 healthy controls were included.

Results: After adjustment for age, sex, total cholesterol, LDL and HDL cholesterol, triglycerides, hypertension, smoking, body mass index and previous therapy with antihypertensive and/or statins, PPAR-γ had statistically significant moderating effect on association of serum CRP level and IS in patients younger than 60. In participants with PPAR CG or GG genotype level of CRP and IS were not statistically significantly associated (OR = 1.00; 95% CI 0.90–1.10; p = 0.933), but in participants with PPAR CC genotype, the association of serum CRP level and IS was significant (OR = 1.67; 95% CI 1.21–2.31; p = 0.002).

Conclusion: In patients with PPAR CC genotype the association of serum CRP level and IS was significant.

Keywords: ischemic stroke, PPAR CC genotype, serum CRP level

1.12. PREVALENCE OF ENTERIC OPPORTUNISTIC PATHOGENS AND EXTENDED-SPECTRUM CEPHALOSPORIN- AND CARBAPENEM-RESISTANT COLIFORMS AND GENES IN WASTEWATER FROM MUNICIPAL WASTEWATER TREATMENT PLANTS IN CROATIA

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Abstract

Extended-spectrum β-lactamase (ESBL)- and carbapenemase-producing *Enterobacterales* are a critical global health problem and wastewater treatment plants (WWTPs) can promote their spread into the environment; yet their efficacy is not well characterized. Here, we have used conventional culturing to monitor coliform bacteria and quantitative PCR to monitor 2 ESBL and 5 carbapenemase (CP) genes and 4 enteric opportunistic pathogens (EOPs) in the influent and effluent of 7 Croatian WWTPs in two seasons. In general, levels of total, cefotaxime- and carbapenem-resistant coliforms were significantly reduced but not eliminated by conventional treatment in most WWTPs. Most WWTPs efficiently removed EOPs such as *K. pneumoniae* and *A. baumannii*, while *E. coli* and *Enterococcus spp.* were reduced but still present in relatively high concentrations in the effluent. ESBL genes (bla_{TEM} and $bla_{CTX-M-32}$) were only

slightly reduced or enriched after treatment. CP genes, bla_{KPC-3}, bla_{NDM} and bla_{OXA-48}-like, were sporadically detected, while bla_{IMP} and bla_{VIM} were frequently enriched during treatment and correlated with plant size, number or size of hospitals in the catchment area, and COD effluent concentration. Our results suggest that improvements in wastewater treatment technologies are needed to minimize the risk of environmental contamination with top priority EOPs and ARGs and the resulting public health.

Keywords: wastewater treatment, ESBL, carbapenemase, antibiotic resistance genes, enteric opportunistic pathogens

1.13. Reimbursed medication adherence enhancing interventions in 12 European countries: Current state of the art and future challenges

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Abstract

Background: Medication non-adherence jeopardises the effectiveness of chronic therapies and negatively affects financial sustainability of healthcare systems. Available medication adherence-enhancing interventions (MAEIs) are utilised infrequently, and even more rarely reimbursed. The aim of this paper was to review reimbursed MAEIs across selected European countries.

Methods: Data on reimbursed MAEIs were collected from European countries at the ENABLE Cost Action expert meeting in September 2021. The identified MAEIs were analysed and clustered according to their characteristics, direct vs. indirect relation to adherence, and the targeted adherence phase.

Results: Out of 12 contributing countries, 10 reported reimbursed MAEIs, 28 in total, of which 20 were identified as MAEIs targeting adherence directly. Reimbursed MAEIs were most often performed by either doctors (n = 6), nurses (n = 6), or pharmacists (n = 3). The most common types of MAEIs were education (n = 6), medication regimen management (n = 5), and adherence monitoring feedback (n = 4). Only seven reimbursed MAEIs were technology-mediated, whereas 11 addressed two interlinked phases of medication adherence, i.e., implementation and persistence.

Conclusion: Our review highlights the scarcity of reimbursed MAEIs across the selected European countries, and calls for their more frequent use and reimbursement.

1.14. Results of the national breast cancer screening program in Croatia (2006-2016)

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Abstract

Aim: To assess the uptake of the Croatian National Breast Cancer Screening Program from 2006 to 2016.

Methods: The Croatian National Breast Cancer Screening Program, a biennial program targeting women aged 50-69, started in October 2006. From 2006 to 2016, four cycles were completed. One cycle lasted two years, with the exception of the first cycle, which lasted three years. To determine the number of detected cancers in each cycle, the screening program data were merged with the data of the Croatian National Cancer Registry. Our results were compared with the reference values from the European guidelines for quality assurance in breast cancer screening and diagnosis.

Results: Around 150,000 mammography exams were performed every year. The response rates for cycle 1, cycle 2, cycle 3, and cycle 4 were 63%, 57%, 60%, and 59%, respectively. Further assessment rate was 6.5%. Breast cancer was

identified in 5583 women, with 4.8 cancers detected per 1000 mammography exams.

Conclusion: The National Breast Cancer Screening Program in Croatia reached a substantial proportion of the target group. Yet, additional efforts are needed to reach at least 70% of the target population.

Keywords: cancer, breast, screening

1.15. Strawberry tree fruits and leaves (*Arbutus unedo L.*) as raw material for sustainable functional food processing: A review

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Abstract

The strawberry tree (*Arbutus unedo L.*) is a Mediterranean plant known for the traditional use of its fruits and leaves due to their health benefits. Thus, it has been used for years in folk medicine to relieve various health conditions such as urological and kidney problems, dermatological, cardiovascular and gastrointestinal diseases. The fruits are traditionally used for making jams, jellies, and strong alcoholic beverages, while the leaves are mostly used for preparing tea. Since the leaves were more researched, previous results indicated that they have important biological effects, so further research should focus on the fruits. Due to its chemical composition, rich polyphenolic profile and the biological potential derived from it, the plant has great prospects for the production of

functional foods and nutraceuticals. However, the plant's potential is underutilized in terms of processing. Therefore, this review summarizes the properties and the potential of the fruits and leaves of *A. unedo* and their possible benefits for processing with respect to agricultural, nutritive, biological and economic values.

1.16. Surveillance of Tahyna Orthobunyavirus in Urban Areas in Croatia—The "One Health" Approach

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Abstract

Background: Tahyna orthobunyavirus (TAHV) is a neglected mosquito-borne bunyavirus. Although the virus is widespread in continental Europe, TAHV infections are rarely reported. We analyzed the prevalence of TAHV in humans and different animal species as well as mosquitoes collected in urban areas of Zagreb and its surroundings in the period from 2020 to 2022.

Methods: The study included 32 patients with neuroinvasive disease (NID), 218 asymptomatic individuals, 98 horses, 94 pet animals (dogs and cats), and 4456 *Aedes vexans* mosquitoes. Cerebrospinal fluid (CSF) and urine samples of patients

with NID were tested for the TAHV RNA using a real-time reverse transcription-polymerase chain reaction (RT-qPCR). Human and animal serum samples were tested for TAHV-neutralizing (NT) antibodies using a virus-neutralization test (VNT). Mosquito pools were tested for TAHV RNA using an RT-qPCR.

Results: TAHV NT antibodies were detected in 3/9.4% of patients with NID, 8/3.7% of asymptomatic individuals, 29/29.6% of horses, and 11/11.7% of pet animals. There was no difference in the seroprevalence according to age, sex, and area of residence in asymptomatic individuals. In addition, TAHV seropositivity did not differ according to age and sex in pet animals. None of the tested mosquito pools was TAHV RNA-positive.

Conclusions: The presented results highlight the importance of interdisciplinary surveillance ("One Health") of this neglected viral zoonosis.

Keywords: Tahyna orthobunyavirus, humans, horses, pet animals, mosquitoes, Croatia, One Health

1.17. The effect of ultrasonic treatment on the binding of the inclusion complex β–cyclodextrin–peppermint oil with cellulose material

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Abstract

The purpose of the research was to measure the increase in the binding of inclusion complexes β-cyclodextrin-peppermint oil (β-CD_PM) to cellulose in cotton and cotton/polyester material with BTCA as the crosslinking agent by applying an ultrasonic bath at room temperature and a frequency of 80 kHz for 10 min. After sonication, the samples were left in a bath for 24 h after which they were dried, thermocondensed and subjected to a number of wash cycles. The treated samples were analysed with Attenuated total reflection (ATR) units heated up to 300 °C (Golden Gate (FTIR-ATR)) to monitor chemical changes indicative of crosslinking, while physico-chemical changes in the samples were monitored by using Fourier transform infrared spectroscopy (FTIR-ATR). Mechanical properties were measured according to EN ISO 13934-1:1999, and coloristic changes were evaluated by the whiteness degree according to CIE (WCIE) and the yellowing index (YI), while antimicrobial activity was determined according to AATCC TM 147-2016. The results show a physico-chemical modification of the UZV-treated cellulosic material. Moreover, partial

antimicrobial efficacy on Gram-negative bacteria was confirmed for treated fabrics.

Keywords: inclusion complexes-cyclodextrin-peppermint essential oil, cotton, cotton/PES, 1, 2, 3, 4-butane tetra carboxylic acid, ultrasonic bath, FTIR-ATR, mechanical properties, antimicrobial activity

1.18. The influence of binding of selected mycotoxin deactivators and aflatoxin M_1 on the content of selected micronutrients in milk

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Abstract

Milk containing aflatoxin M_1 (ATM$_1$) in quantities above 0.05 µg/kg is considered unsuitable for consumption. It is possible to use mycotoxin deactivators that bind aflatoxin M_1 and allow the further use of milk. The study aimed to examine the impact of selected mycotoxin deactivators (beta-glucan from yeast and oats, and live and dead lactic acid bacteria) on the nutritional composition of milk after binding to aflatoxin M_1 intentionally added to milk. The study used consumption milk with 2.8% milk fat intentionally contaminated with aflatoxin M_1. Furthermore, 0.05% and 0.1% solutions of beta-glucan from yeast and beta-glucan from oats were added to the contaminated milk, as well as live and dead lactic acid. Concentrations of Na, K, Mg, and Ca were monitored at the zero hour of binding of mycotoxin deactivators and ATM$_1$, after 2 h of binding, and after 4 and 24 h of binding. The largest deviations were found in Na, K, and Mg, while the minimum changes were observed in Ca. Live lactic acid bacteria were found to have the least impact on micronutrients, except in Na (difference = 40, p =

0.029, GES = 0.083), where the 0.1% solution from oats had the least impact on micronutrient content. The results of this study suggest that it is best to use live lactic acid bacteria where the different duration of action regarding nutrients, with the possible exception of Na, is not relevant, which indicates that, when using this mycotoxin deactivator, milk contaminated with ATM_1 can be further used.

Keywords: mycotoxin, aflatoxin M_1, mycotoxin deactivators, beta-glucan, milk, dead lactic acid

1.19. THE RELATIONSHIP BETWEEN ALCOHOL DRINKING INDICATORS AND SELF-RATED MENTAL HEALTH (SRMH): STANDARDIZED EUROPEAN ALCOHOL SURVEY (SEAS)

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Abstract

Given that the self-perception of mental health is an important predictor of health outcomes and wellbeing, it is important to identify the indicators of mental health associated with alcohol consumption in order to reduce alcohol-related harms. This study used data from the cross-sectional RARHA SEAS survey (2015) in the Croatian general population, aged 18–64 years (n = 1500). Several aspects of drinking behaviors and alcohol-related harms were measured, as well as personal and sociodemographic factors. Logistic regression found a significant association between alcohol's harm to others (AHTO) and poor self-rated mental health (SRMH) (OR = 0.752; 95% CI 0.601–0.941) in the total sample, as well as in the group of participants who rarely drank alcohol (OR = 0.504; 95% CI 0.322–0.787) in the last 12 months. More frequent consumers reported poor SRMH if they had at least one harmful effect from drinking (OR 0.538; 95% CI 0.295–0.980). Younger age, higher education, professional activity, and living with someone else in a household contributed to better SRMH. AHTO has been identified as a strong predictor of poor SRMH in the general population. Targeted

public health and preventive measures are needed with specific approaches for different types of alcohol consumers.

1.20. Unusual early peaks of airborne ragweed (*Ambrosia* L.) pollen in the Pannonian Biogeographical Region

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Abstract

Early peaks of airborne ragweed (*Ambrosia* L.) pollen concentrations were observed at several monitoring stations in Hungary in June 2017 and 2018, one month before the usual start of the pollen season at the end of July. Backward trajectories were calculated to simulate potential sources of pollen collected at different locations in the Pannonian Biogeographical Region. In a collaboration between aerobiological and phenological networks, a nationwide campaign was conducted to collect field data of ragweed blooming. During field surveys, ragweed plants having extremely early blooming were found most abundantly in a rural site near Vaja (North-East Hungary) and other locations in Hungary. Field observations matched with source areas identified by trajectory analyses; i.e., early-flowering ragweed plants were found at some of these locations. Although similar peaks of airborne pollen concentrations were not detected in other years (e.g., 2016, 2019–2021), alarming results suggest the possibility of expanding seasons of ragweed allergy.

Keywords: phenology, photoperiod, pollen, ragweed, trajectory

2. ORIGINAL SCIENTIFIC AND REVIEW ARTICLES IN OTHER INDEXED JOURNALS

2.1. Diffusion of OXA-48 carbapenemase among urinary isolates of Klebsiella pneumoniae in non-hospitalized elderly patients

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Abstract

Background: Recently, a dramatic increase of *Klebsiella pneumoniae* positive for OXA-48 β-lactamases was observed first in the hospital setting and later in the long-term care facilities (LTCFs) and community in the Zagreb County, particularly, in urinary isolates. The aim of the study was to analyse the epidemiology and the mechanisms of antibiotic resistance of OXA-48 carbapenemase producing *K. pneumoniae* strains isolated from urine of non-hospitalized elderly patients.

Results: The isolates were classified into two groups: one originated from the LTCFs and the other from the community. Extended-spectrum β-lactamases (ESBLs) were detected by double disk-synergy (DDST) and combined disk tests in 55% of the isolates (51/92). The ESBL-positive isolates exhibited resistance to

expanded-spectrum cephalosporins (ESC) and in majority of cases to gentamicin. LTCFs isolates showed a significantly lower rate of additional ESBLs and consequential resistance to ESC and a lower gentamicin resistance rate compared to the community isolates, similarly to hospital isolates in Zagreb, pointing out to the possible transmission from hospitals. ESBL production was associated with group 1 of CTX-M or SHV-12 β-lactamases. Ertapenem resistance was transferable from only 12 isolates. bla_{OXA-48} genes were carried by IncL plasmid in 42 isolates. In addition IncFII and IncFIB were identified in 18 and 2 isolates, respectively. Two new sequence types were reported: ST4870 and ST4781. Conclusions: This study showed eruptive and extensive diffusion of OXA-48 carbapenemase to LTCFs and community population in Zagreb County, particularly affecting patients with UTIs and urinary catheters. On the basis of susceptibility testing, β-lactamase production, conjugation experiments, MLST and plasmid characterization it can be concluded that there was horizontal gene transfer between unrelated isolates, responsible for epidemic spread of OXA-48 carbapenemase in the LTCFs and the community The rapid spread of OXA-48 producing *K. pneumoniae* points out to the shortcomings in the infection control measures.

Keywords: *Klebsiella pneumoniae*, OXA-48, resistance, long-term care facility, urinary tract infection

2.2. Effectiveness of complete primary vaccination against COVID-19 at primary care and community level during predominant Delta circulation in Europe: multicentre analysis, I-MOVE-COVID-19 and ECDC networks, July to August 2021

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Abstract

Introduction: In July and August 2021, the SARS-CoV-2 Delta variant dominated in Europe.

Aim: Using a multicentre test-negative study, we measured COVID-19 vaccine effectiveness (VE) against symptomatic infection.

Methods: Individuals with COVID-19 or acute respiratory symptoms at primary care/community level in 10 European countries were tested for SARS-CoV-2. We measured complete primary course overall VE by vaccine brand and by time since vaccination.

Results: Overall VE was 74% (95% CI: 69–79), 76% (95% CI: 71–80), 63% (95% CI: 48–75) and 63% (95% CI: 16–83) among those aged 30–44, 45–59, 60–74 and ≥75 years, respectively. VE among those aged 30–59 years was 78% (95% CI: 75–81), 66% (95% CI: 58–73), 91% (95% CI: 87–94) and 52% (95% CI: 40–61), for Comirnaty, Vaxzevria, Spikevax and COVID-19 Vaccine Janssen, respectively. VE among people 60 years and older was 67% (95% CI: 52–77), 65% (95% CI: 48–76) and 83% (95% CI: 64–92) for Comirnaty, Vaxzevria and Spikevax, respectively.

Comirnaty VE among those aged 30–59 years was 87% (95% CI: 83–89) at 14–29 days and 65% (95% CI: 56–71%) at ≥90 days between vaccination and onset of symptoms.

Conclusions: VE against symptomatic infection with the SARS-CoV-2 Delta variant varied among brands, ranging from 52% to 91%. While some waning of the vaccine effect may be present (sample size limited this analysis to only Comirnaty), protection was 65% at 90 days or more between vaccination and onset.

Keywords: COVID-19, Delta variant, Europe, SARS-CoV-2, multicentre study, test-negative design, vaccine effectiveness

2.3. PRESENCE OF NITRATES AND NITRITES IN FRESH COW MILK FROM MILK MACHINES DURING WINTER AND SUMMER PERIOD IN THE CITY ZAGREB AND ZAGREB COUNTY AREA

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Abstract

Introduction: The aim of the study was to determine the nitrites and nitrates content in fresh cow's milk samples from milking machines, and to determine whether their amount is affected by the season of sampling (summer/winter). Methods: The methodology used was analytical transversal method at 2-time points. All milk samples were sampled at milk machines from the City of Zagreb and Zagreb County, during the summer and winter months in 2020. A total of 40 milk samples were sampled, with 20 samples in each monitored period (summer/winter). A high-performance liquid chromatography with a diode array detector was used to identify and quantify concentrations of the nitrate and the nitrite content. The results were processed using descriptive statistics and the statistics of differences.

Results: The analysis determined the range of nitrate content from 1.28 mg/kg to 19.71 mg/kg and the range of nitrite content was from 0.49 mg/kg to 3.42 mg/kg in milk samples. The mean result of nitrates in fresh cow's milk samples in the summer period was 9.12 mg/kg and in the winter period of 3.88 mg/kg. The mean

value of nitrite in the summer was 1.23 mg/kg, while the mean value of nitrite in the winter period was 1.48 mg/kg.

Conclusion: The research has shown that the nitrate and the nitrite levels in local fresh cow's milk sampled in milk machines do not exceed the maximum allowable intake. The obtained results confirmed that the amounts of nitrates and nitrites in the milk samples differ significantly during the winter and summer periods and differences are depending on the location of the milk machine.

Keywords: fresh cow's milk, nitrates, nitrites, HPLC, public health

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