

# PUBLIC HEALTH PERSPECTIVES

Scientific articles published in 2023

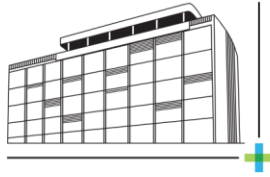
Teaching Institute of Public Health Primorje-Gorski Kotar County

2023



TEACHING INSTITUTE  
OF PUBLIC HEALTH

PRIMORJE - GORSKI KOTAR COUNTY



# TEACHING INSTITUTE OF PUBLIC HEALTH

PRIMORJE - GORSKI KOTAR COUNTY

## PUBLIC HEALTH PERSPECTIVES

Scientific articles published in 2023

Teaching Institute of Public Health Primorje-Gorski Kotar County

Rijeka, 2024.

***Publisher***

Teaching Institute of Public Health Primorje-Gorski Kotar County

**Head Department**

Department for Scientific and Teaching Activity

Krešimirova 52a, Rijeka, Croatia

***Editor in Chief***

Željko Linšak

***Editors***

Dijana Tomić Linšak

Sandra Pavičić Žeželj

Nataša Dragaš Zubalj

***Graphical Editor***

Kreativ media grupa d.o.o.

***Title Page***

Kreativ media grupa d.o.o.

***ISSN***

2991-9959

**Notebook I**

## CONTENTS

1. ORIGINAL SCIENTIFIC ARTICLE .....	1
1.1. EXPLORING THE LINK BETWEEN SULPHUR-CONTAINING COMPOUNDS AND NOXIOUS ODOURS AT WASTE MANAGEMENT FACILITIES: IMPLICATIONS FOR ODOUR MONITORING AND MITIGATION STRATEGIES3	
1.2. ARSENIC (As), COPPER (Cu), ZINC (Zn) AND SELENIUM (Se) IN NORTHWEST CROATIAN SEAFOOD: A HEALTH RISKS ASSESSMENT.....	4
1.3. BACTERIA FILTRATION EFFICIENCY FOR DIFFERENT TYPES OF PROTECTIVE FACE MASKS .....	5
1.4. ATMOSPHERIC PARAMETERS PLAY AN IMPORTANT ROLE IN DRIVING HYDROGEN SULPHIDE CONCENTRATIONS IN AMBIENT AIR NEAR WASTE MANAGEMENT CENTRES .....	7
1.5. RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR, SPINAL CURVATURES, ENDURANCE AND BALANCE OF THE TRUNK MUSCLES-EXTENDED PHYSICAL HEALTH ANALYSIS IN YOUNG ADULTS 9	
1.6. CHANGES IN NUTRITIONAL STATUS, PHYSICAL ACTIVITY HABITS, AND DIET OF CHILDREN IN PRIMARY SCHOOL DURING THE COVID-19 EPIDEMIC .....	11
1.7. THOSE THAT REMAIN: SORPTION/DESORPTION BEHAVIOUR AND KINETICS OF THE NEONICOTINOIDS STILL IN USE.....	13
1.8. PHOTODYNAMIC INACTIVATION OF MULTIDRUGRESISTANT STRAINS OF <i>KLEBSIELLA PNEUMONIAE</i> AND <i>PSEUDOMONAS AERUGINOSA</i> IN MUNICIPAL WASTEWATER BY TETRACATIONIC PORPHYRIN AND VIOLET-BLUE LIGHT: THE IMPACT OF WASTEWATER CONSTITUENTS.....	15
1.9. ASSESSMENT OF HEALTH RISKS ASSOCIATED WITH HEAVY METAL CONCENTRATION IN SEAFOOD FROM NORTH-WESTERN CROATIA .....	17
1.10. METAL POLLUTION INDEX AND RELATED HEALTH RISKS OF CONSUMERS OF LIPSTICKS AVAILABLE ON THE MARKET IN THE REPUBLIC OF CROATIA.....	19
1.11. THE EFFECT OF NUTRITIONAL AND LIFESTYLE EDUCATION INTERVENTION PROGRAM ON NUTRITION KNOWLEDGE, DIET QUALITY, LIFESTYLE, AND NUTRITIONAL STATUS OF CROATIAN SCHOOL CHILDREN .....	21
1.12. ANALYSIS OF THE GUT MICROBIOME AND DIETARY HABITS IN METASTATIC MELANOMA PATIENTS WITH A COMPLETE AND SUSTAINED RESPONSE TO IMMUNOTHERAPY .....	23
1.13. INTERIM 2022/23 INFLUENZA VACCINE EFFECTIVENESS: SIX EUROPEAN STUDIES, OCTOBER 2022 TO JANUARY 2023 .....	25
1.14. <i>COXIELLA BURNETII</i> (Q-FEVER) OUTBREAK ASSOCIATED WITH NON-OCCUPATIONAL EXPOSURE IN A SEMI-URBAN AREA OF WESTERN CROATIA IN 2022 .....	27
1.15. STRUCTURAL MODEL OF 5CS OF POSITIVE YOUTH DEVELOPMENT IN CROATIA: RELATIONS WITH MENTAL DISTRESS AND MENTAL WELL-BEING .....	29
1.16. PERINATAL MURINE CYTOMEGALOVIRUS INFECTION RE SHAPES THE TRANSCRIPTIONAL PROFILE AND FUNCTIONALITY OF NK CELLS .....	30
1.17. INVESTIGATION AND SPATIAL DISTRIBUTION OF HARD TICKS BY GEOGRAPHICAL INFORMATION SYSTEM (GIS) IN THE REGION OF ISTRIA, CROATIA .....	32
1.18. COLLECTION OF RECYCLABLE WASTE IN THE CITY OF RIJEKA: CURRENT STATUS AND PERSPECTIVES34	

1.19.	THE PORT ENVIRONMENTAL INDEX: A QUANTITATIVE IOT-BASED TOOL FOR ASSESSING THE ENVIRONMENTAL PERFORMANCE OF PORTS.....	35
1.20.	APPLYING NEW ALGORITHMS FOR NUMERICAL INTEGRATION ON THE SPHERE IN THE FAR FIELD OF SOUND PRESSURE .....	37
1.21.	IOT-BASED REAL-TIME ASSESSMENT OF ATMOSPHERIC EMISSION FROM THE PORT OF PIRAEUS, GREECE.....	39
1.22.	DEPOSITION OF HEAVY METALS IN BIOLOGICAL TISSUES OF WORKERS IN METAL WORKSHOPS .....	41
1.23.	PHENOLIC POTENTIAL OF OLIVE LEAVES FROM DIFFERENT ISTRIAN CULTIVARS IN CROATIA.....	42
1.24.	TISSUE-SPECIFIC CALCIUM AND MAGNESIUM ALLOCATION TO EXPLAIN DIFFERENCES IN BULK CONCENTRATION IN LEAVES OF ONE-YEAR-OLD SEEDLINGS OF TWO OLIVE ( <i>OLEA EUROPAEA</i> L.) CULTIVARS	44
2.	REVIEW .....	46
2.1.	NANOPARTICLES IN MEDICINE: CURRENT STATUS IN CANCER TREATMENT .....	48
2.2.	SEVENTY-FIVE YEARS SINCE THE FOUNDATION OF THE WORLD HEALTH ORGANIZATION: A REVIEW OF THE ROLE OF ANDRIJA ŠTAMPAR – THE “BALKAN BEAR” AND THE INITIATOR OF RIJEKA'S PUBLIC HEALTH HISTORY.....	50
2.3.	MOSQUITOES IN CROATIA, TRANSMITTING DISEASES, WAYS OF PREVENTION AND CONTROL .....	51
3.	CASE REPORT.....	53
3.1.	THE POTENTIAL FOR A COMBINED HEAT AND POWER (CHP) GENERATION FROM MUNICIPAL SOLID WASTE: A CASE STUDY OF CROATIA .....	55
3.2.	SUSTAINABLE ENERGY GENERATION FROM MUNICIPAL SOLID WASTE: A BRIEF OVERVIEW OF EXISTING TECHNOLOGIES.....	56
4.	LETTER TO EDITOR.....	58
4.1.	THE INFLUENCE OF HEMOCHROMATOSIS GENE (HFE) MUTATIONS ON SARS-COV-2 SUSCEPTIBILITY AND COVID-19 SEVERITY .....	60
4.2.	BUSTING THE MYTH: WASTE-TO-ENERGY PLANTS AND PUBLIC HEALTH .....	61
5.	PROFESSIONAL PAPERS .....	62
5.1.	RABIES AND RABIES POSTEXPOSURE PROPHYLAXIS IN THE PRIMORJE-GORSKI KOTAR COUNTY FROM 1986 TO 2021 .....	64
5.2.	TRICHALOMETHANES IN POOL WATER DURING IMPLEMENTATION OF THE COMBINED DISINFECTION METHOD (UV IRRADIATION AND CHLORINATION) .....	66
6.	BOOK CHAPTER .....	68
6.1.	THE IMPACT OF CLIMATE CHANGE ON WATER RESOURCES AND HUMAN HEALTH—EXAMPLES FROM CROATIA AND BOSNIA AND HERZEGOVINA.....	69
7.	INDEX OF AUTHORS.....	71

## FOREWORD

*It is with great pleasure and pride that we present our first annual compilation of scientific papers — a testament to our team's commitment to knowledge and innovation at the Teaching Institute of Public Health of the Primorje and Gorski Kotar County. This report represents an important chapter highlighting the professional and scientific achievements of our staff.*

*In these pages, we explore a wide range of environmental topics, addressing critical issues and methods across different domains. These interrelated topics underscore the interdisciplinary nature of our work and emphasize the impact of environmental factors on human health. They highlight the need for a continuous collaboration between disciplines to address public health challenges and implement preventive measures.*

*This compilation contains abstracts of 24 scientific articles, three review papers, two case reports, two letters to the editor, two professional papers and one book chapter — all published in reputable journals indexed in the WoSS and Scopus databases.*

*In 2023, our team consisted of 43 scientists, 30 of whom hold a doctorate degree, 13 a master's degree and numerous specialists. Of these, 32 are females and 11 males.*

*I would like to wholeheartedly congratulate our employees and thank them for their tireless efforts. Their contributions inspire us to constantly strive for excellence and make a lasting impact on science.*

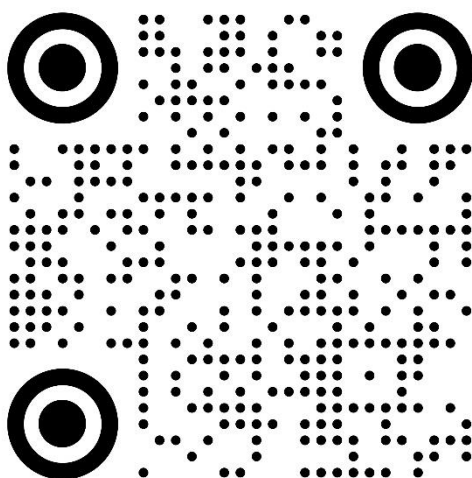
Institute Head

Assistant professor Željko Linšak, PhD

Public health perspectives 2023. in digital version available for download from

Web address: <https://zzizpgz.hr/kategorija/publikacije>

Digital identifier





# 1. ORIGINAL SCIENTIFIC ARTICLE







## 1.1. EXPLORING THE LINK BETWEEN SULPHUR-CONTAINING COMPOUNDS AND NOXIOUS ODOURS AT WASTE MANAGEMENT FACILITIES: IMPLICATIONS FOR ODOUR MONITORING AND MITIGATION STRATEGIES

Arh Hig Rada Toksikol 2023;74:179-186. DOI: 10.2478/aiht-2023-74-3738

Impact factor: 2.1; SJR: 0.33; Q3

Traven L <sup>1,2</sup>, Baldigara A <sup>3</sup>, Crvelin G <sup>2</sup>, Budimir D <sup>2</sup>, Tomić Linšak D <sup>1,2</sup>, Linšak Ž <sup>1,2</sup>

<sup>1</sup> University of Rijeka Faculty of Medicine, Department of Environmental Medicine, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of the Primorje-gorski kotar county, Rijeka, Croatia

<sup>3</sup> University of Rijeka Faculty of Engineering, Rijeka, Croatia

### Abstract

With this study we challenge the widely held assumption that sulphur-containing compounds in ambient air are good indicators of the presence noxious odours near waste management facilities. We analysed an extensive set of olfactometric data and data on the concentrations of hydrogen sulphide and trace sulphur compounds (TSCs) near a waste management facility in Croatia in 2021. The results show that the presence of noxious odours significantly correlates only with the concentrations of hydrogen sulphide and methyl mercaptan in ambient air but not with other measured TSCs. Thus, in addition to the measurement of pollutants in ambient air, Integrated Pollution and Prevention Control (IPPC) permits should mandate olfactometric measurements to detect and mitigate noxious odours near waste management facilities.

**Keywords:** bioreactor landfill; Integrated pollution prevention and control (IPPC); odour measurements; trace sulphur compounds

## 1.2. ARSENIC (As), COPPER (Cu), ZINC (Zn) AND SELENIUM (Se) IN NORTHWEST CROATIAN SEAFOOD: A HEALTH RISKS ASSESSMENT

Toxicol Rep 2023;11:413-419. DOI: 10.1016/j.toxrep.2023.10.012

Impact factor:; SJR: 0.73; Q2

Traven L <sup>1,2</sup>, Marinac-Pupavac S <sup>2</sup>, Žurga P <sup>2</sup>, Linšak Ž <sup>1,2</sup>, Pavičić Žeželj S <sup>1,2</sup>, Glad M <sup>1,2</sup>, Tomić Linšak D <sup>1,2</sup>, Cenov A <sup>1,2</sup>

<sup>1</sup> Department of Environmental Medicine, Medical Faculty, University of Rijeka, Rijeka Croatia

<sup>2</sup> Teaching Institute of Public Health of the Primorsko-goranska county, Rijeka, Croatia

### Abstract

This study focuses on the health risk assessment of arsenic (As), copper (Cu), zinc (Zn), and selenium (Se) concentrations in seafood species commonly consumed in the northwestern region of Croatia. By measuring the concentrations of these elements coupled with data on seafood consumption, the health risks were evaluated using Target Hazard Quotients and Hazard Indexes. The results indicate a slightly increased health risks linked to seafood consumption for As, Cu and Zn in some of the tested seafood species. The findings of this study highlight the critical need for stronger food quality control measures, especially targeting certain types of seafood.

**Keywords:** trace metals, seafood, health risk, assessment, target hazard quotient, hazard index

### 1.3. BACTERIA FILTRATION EFFICIENCY FOR DIFFERENT TYPES OF PROTECTIVE FACE MASKS

Appl Sci 2023;13:5972. DOI: 10.3390/app13105972

Impact factor: 2.7; SJR: 0.49; Q2

**Linšak Ž<sup>1,2</sup>, Ražov L<sup>3</sup>, Furlan N<sup>2</sup>, Begić G<sup>4</sup>, Pavičić Žeželj S<sup>1,2</sup>, Crvelin G<sup>2</sup>, Broznić D<sup>5</sup>, Tomić Linšak D<sup>1,2</sup>**

<sup>1</sup> Department of Environmental Health, Faculty of Medicine, University of Rijeka, Croatia

<sup>2</sup> Department of Environmental Health, Teaching Institute of Public Health of Primorje—Gorski Kotar County, Rijeka, Croatia

<sup>3</sup> Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>4</sup> Department for Microbiology and Parasitology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>5</sup> Department for Medical Chemistry, Biochemistry and Clinical Chemistry, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

#### **Abstract**

Emerging infectious diseases that we are witnessing in the modern age are among the leading public health concerns. They most often occur in the form of epidemics or pandemics, and they have not been sufficiently researched. Owing to the current coronavirus disease 2019 (COVID-19) pandemic, the World Health Organization has published various recommendations to prevent the spread of this communicable disease, including a recommendation to wear protective facial masks. Therefore, this study aimed to determine the filtration effectiveness of bacteria, yeasts, and molds on three different commonly and commercially available masks used in children's educational institutions. In addition, the bacterial content of indoor air bioaerosols was identified. The genera *Staphylococcus* and *Micrococcus* were dominant in all samples,

whereas bacteria of the genera *Bacillus*, *Acinetobacter*, and *Corynebacterium* were identified at a significantly smaller number. Bacterial, yeast, and mold filtering effectiveness increased from the single-layer cloth mask, which proved to be the least effective, to the surgical mask, to the filtering facepiece type 2 (FFP2) mask. Furthermore, surveys are needed to study the effectiveness of protective measures.

**Keywords:** bacterial filtration efficiency; face masks, human health, respiratory protection, personal protection

#### **1.4. ATMOSPHERIC PARAMETERS PLAY AN IMPORTANT ROLE IN DRIVING HYDROGEN SULPHIDE CONCENTRATIONS IN AMBIENT AIR NEAR WASTE MANAGEMENT CENTRES**

Environ Monit Assess 2023;195:1451. DOI: 10.1007/s10661-023-12047-2

Impact factor: 3.1; SJR: 0.63; Q2

**Traven L<sup>1,2</sup>, Linšak Ž<sup>1,2</sup>, Crvelin G<sup>2</sup>, Baldigara A<sup>3</sup>**

<sup>1</sup>Department of Environmental Medicine, Medical Faculty University of Rijeka, Rijeka, Croatia

<sup>2</sup>Department of Environmental Health, Teaching Institute of Public Health of the Primorsko-Goranska County, Rijeka, Croatia

<sup>3</sup>Technical Faculty, Doctoral Study in Environmental Engineering, University of Rijeka, Rijeka, Croatia

#### **Abstract**

Emissions of odorous compounds are major contributors to public opposition when siting waste management facilities. Thus, it is essential to understand how to minimise the concentration of odour-causing chemicals in ambient air surrounding such facilities. Although the concentration of pollutants in the atmosphere is a function of meteorology, there is limited data on the atmospheric parameters that drive ambient air concentrations of odour-causing substances in settlements near waste management facilities. Here, we analysed how temperature, wind direction, wind speed, atmospheric pressure and humidity impact the concentrations of hydrogen sulphide (H<sub>2</sub>S) in the ambient air, a potentially toxic chemical and a chief contributor to noxious odours. The relative contribution of each variable was assessed using multivariate statistical analysis applied to an extensive data set of over 7,000 data points collected during 2021. Our results show that all tested atmospheric parameters significantly affected H<sub>2</sub>S concentrations in ambient air. Wind direction had the

greatest impact on H<sub>2</sub>S concentrations, followed by temperature, humidity, atmospheric pressure and wind speed. Specifically, the concentration of H<sub>2</sub>S was positively correlated with humidity and atmospheric pressure and had a U-shaped correlation with temperature. Atmospheric variables were able to explain 15% of variation in H<sub>2</sub>S concentrations ( $R^2 = 15\%$ ), indicating the presence of other factors affecting H<sub>2</sub>S ambient air concentrations. Our study shows that proper consideration of atmospheric parameters, especially wind direction and temperatures, is of uttermost importance when siting waste management facilities. The conclusions are broadly applicable to odorous compounds near waste management facilities, so adverse effects to human health and the environment can be minimised.

**Keywords:** hydrogen sulphide, atmospheric parameters, waste management centres, odours, mechanical–biological treatment, solid recovered fuel, bioreactor landfills

### 1.5. RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR, SPINAL CURVATURES, ENDURANCE AND BALANCE OF THE TRUNK MUSCLES-EXTENDED PHYSICAL HEALTH ANALYSIS IN YOUNG ADULTS

Int J Environ. Res Public Health 2023;20:6938. DOI: 10.3390/ijerph20206938

Impact factor: 2.7; SJR: 0.83; Q2

**Marijančić V <sup>1</sup>, Grubić Kezele T <sup>2,3</sup>, Peharec S <sup>1</sup>, Dragaš-Zubalj N <sup>4</sup>, Pavičić Žeželj S <sup>5</sup>, Starčević-Klasan G <sup>6</sup>**

<sup>1</sup> Department of Physiotherapy, Faculty of Health Studies, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>3</sup> Department of Clinical Microbiology, Clinical Hospital Rijeka, 51000 Rijeka, Croatia

<sup>4</sup> Department of School and University Medicine, Teaching Institute of Public Health of Primorje-Gorski Kotar County, Rijeka, Croatia

<sup>5</sup> Department of Health Ecology, Teaching Institute of Public Health of Primorje-Gorski Kotar County, Rijeka, Croatia

<sup>6</sup> Department of Basic Medical Science, Faculty of Health Studies, University of Rijeka, Rijeka, Croatia

#### **Abstract**

**Background:** Physical inactivity and sedentary behavior are associated with poor wellbeing in young people with adverse effects extending into adulthood. To date, there are many studies investigating the relationship between physical activity (PA) and posture, but there are no data on the relationship between the type and intensity of PA and sedentary behavior, their association with thoracic and lumbar spine angles, and with endurance and balance of the trunk muscles, especially in healthy young adults aged 18–25 years. Moreover, there are no data on the relationship between PA



and sedentary behavior and musculoskeletal and cardiopulmonary health, as well as quality of life (QoL) and sleep that would provide a more comprehensive picture of physical health status. Aim: Therefore, the aim of this cross-sectional study was to investigate the extent to which PA and sedentary behavior are associated with each other and with changes in spinal curvatures, endurance and balance of trunk muscles in an extended analysis of physical health status in young adults aged 18–25 years by additionally including measures of body composition, cardiorespiratory capacity, and QoL and sleep. Methods: A total of 82 students (58% female, 42% male) aged 18–25 years completed all required tests. Primary outcome measures included the following: PA and sedentary behavior calculated from the long form of International PA Questionnaire (IPAQ-LF), spinal curvatures measured by a Spinal Mouse® device, endurance and balance of the trunk muscles measured using trunk endurance tests and their ratio. Results: Overall, 50% of students were classified as minimally active and 50% as health-enhancing PA (HEPA) active. The angles of thoracic kyphosis and lumbar lordosis showed no correlation with PA or time spent sitting. However, students with the lowest PA had significantly higher scores on the trunk extensor endurance test and trunk extensor/flexor endurance test ratio, indicating imbalanced trunk muscles. Moreover, these students spent the most their time sitting. Only PA of vigorous intensity and PA during recreation, leisure, and sports significantly correlated with QoL related to physical health. QoL related to physical and psychosocial health had significantly higher scores when students spent less time sitting. In addition, we found significantly better respiratory performance and SQ at higher PA values, i.e., PA during recreation, leisure, and sport. Conclusions: Our results suggest that students with low PA levels and more time spent sitting have imbalanced trunk muscles, worse respiratory function, and poorer QoL and sleep. Moreover, these findings in college students may reflect their lifestyle and suggest that more PA needs to be promoted to prevent the development of chronic diseases including musculoskeletal disorders.

**Keywords:** physical activity, physical fitness, posture, quality of life, sedentary lifestyle, sleep quality, spinal curvatures, trunk muscle endurance, young adults

## 1.6. CHANGES IN NUTRITIONAL STATUS, PHYSICAL ACTIVITY HABITS, AND DIET OF CHILDREN IN PRIMARY SCHOOL DURING THE COVID-19 EPIDEMIC

Paediatr Croat. 2023;67:12-19. DOI: 10.13112/PC.2023.2

Impact factor: 0.06; SJR: 0.105; Q4

**Pavičić Žeželj S<sup>1</sup>, Dragaš-Zubalj N<sup>2</sup>, Tomić Linšak D<sup>1</sup>, Kenđel Jovanović G<sup>2</sup>, Posedel M<sup>3</sup>**

<sup>1</sup> Medicinski fakultet Sveučilište u Rijeci, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of Primorje-Gorski Kotar County, Rijeka, Croatia

<sup>3</sup> Faculty of health sciences, University of Rijeka, Rijeka, Croatia

### **Abstract**

**Aim:** The COVID -19 pandemic has changed the way people live, and children are particularly at risk because of their vulnerable age. The aim of this work was to evaluate the changes in nutritional status, physical activity, and eating habits of elementary schoolaged children during the Covid 19 pandemic. **Methods:** The study was conducted from February to April 2021 and included 197 primary school children, 100 boys, and 97 girls. A questionnaire was used to collect data on lifestyle, eating habits, and physical activity outside school. The Mediterranean Diet Quality Index for children and adolescents was used to determine membership in the Mediterranean diet. The kinanthropological and anthropological data of the students were obtained from the diary of the physical education and health teacher. **Results:** The average rating of the quality of the children's diet, as determined by the Mediterranean Diet Quality Index for Children and Adolescents, showed a moderate affiliation with the Mediterranean diet. Before online instruction, 65.9% of students ate breakfast daily, whereas during online instruction, 75.7% ate breakfast ( $p < 0.001$ ). Results showed that students exercised statistically significantly more before online instruction than during online instruction ( $p < 0.05$ ). Students had weaker kinanthropological scores than

before beginning online instruction. Conclusions: According to the results, students' diet is of average quality, and some habits, such as breakfast, have improved, while physical activities have decreased significantly during the pandemic. Therefore, the promotion of proper nutrition and physical activity through public health programs should be emphasized to educate both children and parents about the importance of proper nutrition, physical activity, and responsible use of various media.

**Keywords:** exercise, child nutrition, covid-19

## 1.7. THOSE THAT REMAIN: SORPTION/DESORPTION BEHAVIOUR AND KINETICS OF THE NEONICOTINOIDS STILL IN USE

Int J Mol Sci 2023;24:6548. DOI: 10.3390/ijms24076548

Impact factor: 5.6; SJR: 1.15; Q1

**Sinčić Modrić G<sup>1</sup>, Petković Didović M<sup>2</sup>, Dubrović I<sup>1</sup>, Žurga P<sup>1</sup>, Broznić D<sup>2</sup>**

<sup>1</sup> Department of Environmental Health, Teaching Institute of Public Health of Primorje-Gorski Kotar County, Rijeka, Croatia

<sup>2</sup> Department for Medical Chemistry, Biochemistry and Clinical Chemistry, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

### Abstract

In January 2023, the derogation loophole was closed on “emergency authorisations” for the use of three out of five neonicotinoids in all EU states. In this study, we analysed the sorption/desorption behaviour and kinetic parameters of acetamiprid and thiacloprid, the two neonicotinoids that are still approved for use, either regularly or under emergency authorisations in the EU, and widely used worldwide. Sorption and desorption curves in four soils with different organic matter content were analysed using four kinetic models, namely, Lagergren’s pseudo first-order model, two-site model (TSM), Weber–Morris intraparticle diffusion model and Elovich’s model. Kinetic parameters were correlated to soil physico-chemical characteristics. To determine the mutual influence of soil characteristics and sorption/desorption parameters in the analysed soils, a factor analysis based on principal component analysis (PCA) was performed. Even though the two insecticides are very similar in size and chemical structure, the results showed different sorption/desorption kinetics. The model that best fits the experimental data was TSM. Thiacloprid showed a more rapid sorption compared to acetamiprid, and, in all soils, a higher proportion sorbed at equilibrium. Intra-particle diffusion seemed to be a relevant process in acetamiprid sorption, but

not for thiacloprid. Desorption results showed that acetamiprid is more easily and more thoroughly desorbed than thiacloprid, in all soils. The kinetic behaviour differences stem from variations in molecular structure, causing disparate water solubility, lipophilicity, and acid–base properties.

**Keywords:** acetamiprid, thiacloprid, neonics, sorption kinetics, soil

## 1.8. PHOTODYNAMIC INACTIVATION OF MULTIDRUGRESISTANT STRAINS OF *KLEBSIELLA PNEUMONIAE* AND *PSEUDOMONAS AERUGINOSA* IN MUNICIPAL WASTEWATER BY TETRACATIONIC PORPHYRIN AND VIOLET-BLUE LIGHT: THE IMPACT OF WASTEWATER CONSTITUENTS

PLoS ONE 18(8): e0290080. DOI: 10.1371/journal.pone.0290080

Impact factor: 3.75; SJR: 0.89; Q1

**Mušković M<sup>1</sup>, Planinić M<sup>2</sup>, Crepulja A<sup>2</sup>, Lušić M<sup>1</sup>, Glad M<sup>3</sup>, Lončarić M<sup>4</sup>, Malatesti N<sup>1</sup>, Gobin I<sup>2</sup>**

<sup>1</sup> Department of Biotechnology, University of Rijeka, Rijeka, Croatia,

<sup>2</sup> Department of Microbiology and Parasitology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia,

<sup>3</sup> Department for Environmental Protection and Health Ecology, Teaching Institute of Public Health, Rijeka, Croatia,

<sup>4</sup> Photonics and Quantum Optics Unit, Center of Excellence for Advanced Materials and Sensing Devices, Ruđer Bošković Institute, Zagreb, Croatia

### **Abstract**

There is an increasing need to discover effective methods for treating municipal wastewater and addressing the threat of multidrug-resistant (MDR) strains of bacteria spreading into the environment and drinking water. Photodynamic inactivation (PDI) that combines a photosensitiser and light in the presence of oxygen to generate singlet oxygen and other reactive species, which in turn react with a range of biomolecules, including the oxidation of bacterial genetic material, may be a way to stop the spread of antibiotic-resistant genes. The effect of 5,10,15,20-(pyridinium-3-yl)porphyrin tetrachloride (TMPyP3) without light, and after activation with violet-blue light (VBL) (394 nm; 20 mW/cm<sup>2</sup>), on MDR strains of *Pseudomonas aeruginosa*, *Klebsiella*

*pneumoniae* and *K. pneumoniae* OXA-48 in tap water and municipal wastewater was investigated. High toxicity ( $\sim 2 \mu\text{M}$ ) of TMPyP3 was shown in the dark on both strains of *K. pneumoniae* in tap water, while on *P. aeruginosa* toxicity in the dark was low ( $50 \mu\text{M}$ ) and the PDI effect was significant ( $1.562 \mu\text{M}$ ). However, in wastewater, the toxicity of TMPyP3 without photoactivation was much lower ( $12.5\text{--}100 \mu\text{M}$ ), and the PDI effect was significant for all three bacterial strains, already after 10 min of irradiation with VBL ( $1.562\text{--}6.25 \mu\text{M}$ ). In the same concentrations, or even lower, an anti-adhesion effect was shown, suggesting the possibility of application in biofilm control. By studying the kinetics of photoinactivation, it was found that with  $1,562 \mu\text{M}$  of TMPyP3 it is possible to achieve the complete destruction of all three bacteria after 60 min of irradiation with VBL. This study confirmed the importance of studying the impact of water constituents on the properties and PDI effect of the applied photosensitiser, as well as checking the sensitivity of targeted bacteria to light of a certain wavelength, in conditions as close as possible to those in the intended application, to adjust all parameters and perfect the method.

## 1.9. ASSESSMENT OF HEALTH RISKS ASSOCIATED WITH HEAVY METAL CONCENTRATION IN SEAFOOD FROM NORTH-WESTERN CROATIA

Sci Rep | 2023;13:16414. DOI: 10.1038/s41598-023-43365-7

Impact factor: 4.6; SJR: 0.97; Q1

**Traven L<sup>1,2</sup>, Marinac-Pupavac S<sup>2</sup>, Žurga P<sup>2</sup>, Linšak Ž<sup>1,2</sup>, Pavičić Žeželj S<sup>1,2</sup>, Glad M<sup>1,2</sup>, Vukić Lušić D<sup>1,2</sup>**

<sup>1</sup>Department of Environmental Medicine, Medical Faculty, University of Rijeka, Rijeka, Croatia

<sup>2</sup>Teaching Institute of Public Health, Rijeka, Croatia

### Abstract

The following study aims at assessing the health risks associated with the consumption of the most commonly consumed seafood in the north-western part of Croatia due to the presence of heavy metals. Samples of seafood were collected and analysed for lead (Pb), cadmium (Cd), and mercury (Hg) content. Analyses of Cd and Pb were carried out by inductively coupled plasma mass spectrometry (ICP-MS) whereas Hg content was measured using atomic absorption spectrometry (AAS). Metal concentrations were in the following order Hg > Pb > Cd for the gilthead seabream, European hake, sardines, and tuna fish whereas in the Patagonian squid cadmium (Cd) was the heavy metal with the highest concentration, with the order of other metals being Cd > Hg > Pb. The heavy metal concentrations have been used to address the health risks using the Estimated Weekly Intake (EWI), Target Hazard Quotients (THQ), and Hazard Indices (HI). The findings revealed that the concentrations of the tested heavy metals, expressed on a per wet weight basis, did not exceed the Maximum Residue Levels (MRL) for those compounds mandated by national Croatian legislation. However, the HI for Hg was above 1, indicating a risk of adverse health effects due to the presence of this heavy metal in the consumed seafood. We conclude that the consumption of



certain type of seafood such as the tuna fish should be limited when sensitive segments of the population such as children, elderly and pregnant women are concerned. Our results strongly advocate for a more stringent seafood quality control in the region.

### 1.10. METAL POLLUTION INDEX AND RELATED HEALTH RISKS OF CONSUMERS OF LIPSTICKS AVAILABLE ON THE MARKET IN THE REPUBLIC OF CROATIA

Med flum 2023; 59, 3: 290-300. DOI: 10.21860/medflum2023\_306354

Impact factor: 0.10; SJR: 0.11; Q4

**Modrić D<sup>1</sup>, Tomić Linšak D<sup>2</sup>, Glad M<sup>3</sup>, Mežnarić S<sup>1</sup>, Linšak Ž<sup>3</sup>, Broznić D<sup>4</sup>**

<sup>1</sup> Medical Faculty, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Department of Environmental Health, Medical Faculty, University of Rijeka, Rijeka, Croatia

<sup>3</sup> Department of Environmental Protection and Health Ecology, Teaching Institute of Public Health, Rijeka, Croatia

<sup>4</sup> Department for Medical Chemistry, Biochemistry and Clinical Chemistry, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

#### **Abstract**

Aim: Trace metals are not declaratively stated on cosmetic products, especially lipsticks, there is a need to determine their presence and analyze toxicological effects. This research analyzed the presence and distribution of the metals Cr, Cd, Ni, Pb and Cu and Zn in lipsticks. Materials and methods: 100 samples of lipsticks from different manufacturers were analyzed depending on the country of manufacture (European Union – EU, China, United Kingdom – UK and unknown origin). Metal content was determined using the ICPMS analytical technique. Results: The results of the collective data indicate the dominance of Pb in the metal pollution index of lipstick samples. In samples from EU producers the influence of Pb and Zn is dominant, while in Chinese producers the strongest influence on IOM is Cr. The proposed linear predictive model indicates that Cd dominates in collective and samples from different areas, although Pb also plays a significant role as a burdening metal, Ni is present as a toxicant in all

samples except from China, while Cr plays a significant role only in producers from the EU. By comparison with the legal regulations, the proportions of the analyzed metals are lower than the determined maximum allowed concentrations for certain metals, except for the sample of producers from China, where a higher proportion of Ni than the prescribed maximum allowed concentration values, was detected. Conclusions: The results of the study indicate that, regardless of the content of toxic metals in cosmetic products, attention should be paid to the long-term period of their application and the low index of elimination from the body. Due to the safety of the application of cosmetic products, there is a need for continuous monitoring of heavy metal content as well as regular control of health risks generated when using such products.

**Keywords:** cosmetics, heavy metal poisoning, metals, heavy, risk factors

### 1.11. THE EFFECT OF NUTRITIONAL AND LIFESTYLE EDUCATION INTERVENTION PROGRAM ON NUTRITION KNOWLEDGE, DIET QUALITY, LIFESTYLE, AND NUTRITIONAL STATUS OF CROATIAN SCHOOL CHILDREN

Front Sustain Food Syst 7:1019849. DOI: 10.3389/fsufs.2023.1019849

Impact factor: 4.7; SJR: 0.88; Q1

**Kenđel Jovanović G<sup>1</sup>, Janković S<sup>2</sup> Pavičić Žeželj S<sup>1,3</sup>**

<sup>1</sup>Department of Health Ecology, Teaching Institute of Public Health of Primorsko-Goranska County, Rijeka, Croatia

<sup>2</sup>Department of Social Medicine and Epidemiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>3</sup>Department of Health Ecology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

#### **Abstract**

**Introduction:** Nutrition education during adolescence has proven effective in increasing knowledge, attitudes, and practices in the diet. The Mediterranean diet has proven health benefits and is proposed as a model of a sustainable diet that is beneficial for health and the environment. Its promotion with the educational program can have a significant effect on improvements in nutrition knowledge, diet quality, and nutritive status of adolescents for their healthy adulthood. **Objective:** This study aimed to investigate the effect of the educational program on the nutrition knowledge, diet quality, lifestyle, and nutritional status of school children from the littoral part of Croatia. **Methods:** An education-based intervention study was carried out on 2,709 schoolchildren aged 10–12 years (educated/control group: 2617/92). The questionnaire about sociodemographic, anthropometric, dietary, physical activity, screen time, sleep habits, and nutrition knowledge was assessed at the baseline and

after a 6- to 9-month follow-up for the medium-term effect of education. Nutrition knowledge was provided after 3 weeks for the short-term education effect assessment. Results: Educated schoolchildren achieved a significant increase in nutrition knowledge (+75.5%), expressed as a short-term effect of the education and maintained at the 6- to 9-month follow-up (+66.8%,  $p < 0.001$ ). Follow-up of children significantly improved their nutritional status (underweight -56.6%, normal weight 24.8%, overweight -22.1%, and obesity -57.5%) and physical activity engagement (+13.2%). The proportion of children with a diet highly adhering to the Mediterranean diet significantly doubled (+105.0). Those children with the highest nutrition knowledge at the follow-up significantly improved their nutritional status (+218.9%), participated in organized sports (+204.7%), and had a diet that highly adhered to the MD (+291.8%). Conclusion: A significantly good medium-term effect of education-based nutrition and lifestyle intervention program on nutrition knowledge, diet quality, lifestyle, and nutritional status of schoolchildren aged 10–12 years was shown. The educational program promoted a Mediterranean diet and lifestyle as a healthy and sustainable way of living, important for children's future health and wellbeing. New research-based approaches are needed for making children more aware and capable of handling the complexity of sustainable living.

**Keywords:** school children, educational program, nutrition knowledge, diet, habits, lifestyle, Mediterranean diet (MD), sustainability

## 1.12. ANALYSIS OF THE GUT MICROBIOME AND DIETARY HABITS IN METASTATIC MELANOMA PATIENTS WITH A COMPLETE AND SUSTAINED RESPONSE TO IMMUNOTHERAPY

Cancers 2023;15:3052. DOI: 10.3390/cancers15113052

Impact factor: 5.2; SJR: 1.31; Q1

**Golčić M**<sup>1</sup>, **Simetić L**<sup>2</sup>, **Herceg D**<sup>2</sup>, **Blažičević K**<sup>2</sup>, **Kenđel Jovanović G**<sup>3</sup>, **Dražić I**<sup>4</sup>, **Belančić A**<sup>5</sup>, **Skočibušić N**<sup>5</sup>, **Palčevski D**<sup>6</sup>, **Rubinić I**<sup>5</sup>, **Vlahović-Palčevski V**<sup>5</sup>, **Majnarić T**<sup>7</sup>, **Dobriša-Dintinjana R**<sup>1</sup>, **Pleština S**<sup>2</sup>

<sup>1</sup>Department of Radiotherapy and Oncology, University Hospital Center Rijeka, Croatia;

<sup>2</sup> Department of Oncology, University Hospital Center Zagreb, Zagreb, Croatia

<sup>3</sup>Department of Health Ecology, Teaching Institute of Public Health of Primorsko-Goranska County, Rijeka, Croatia

<sup>4</sup>Department of Mathematics, Physics and Foreign Languages, Faculty of Engineering, University of Rijeka, Rijeka, Croatia

<sup>5</sup>Department of Clinical Pharmacology, University Hospital Center Rijeka, Croatia;

<sup>6</sup>Department of Internal Medicine, University Hospital Center Rijeka, Croatia

<sup>7</sup>Community Health Center of Primorsko-Goranska County, Rijeka, Croatia

### Abstract

Immunotherapy has improved the prognosis of metastatic melanoma patients, although most patients do not achieve a complete response. While specific gut microbiome and dietary habits might influence treatment success, there is a lack of concordance between the studies, potentially due to dichotomizing patients only into responders and non-responders. The aim of this study was to elucidate whether metastatic melanoma patients with complete and sustained response to immunotherapy exhibit differences in gut microbiome composition among themselves, and whether those differences were associated with specific dietary habits. Shotgun metagenomic sequencing revealed that patients who exhibited a

complete response after more than 9 months of treatment (late responders) exhibited a significantly higher beta-diversity ( $p = 0.02$ ), with a higher abundance of *Coprococcus comes* (LDA 3.548,  $p = 0.010$ ), *Bifidobacterium pseudocatenulatum* (LDA 3.392,  $p = 0.024$ ), and lower abundance of *Prevotellaceae* ( $p = 0.04$ ) compared to early responders. Furthermore, late responders exhibited a different diet profile, with a significantly lower intake of proteins and sweets and a higher intake of flavones ( $p < 0.05$ ). The research showed that metastatic melanoma patients with a complete and sustained response to immunotherapy were a heterogeneous group. Patients with a late complete response exhibited microbiome and dietary habits which were previously associated with an improved response to immunotherapy.

**Keywords:** dietary habits, gut microbiome, immunotherapy, melanoma, response time

### 1.13. INTERIM 2022/23 INFLUENZA VACCINE EFFECTIVENESS: SIX EUROPEAN STUDIES, OCTOBER 2022 TO JANUARY 2023

Euro Surveill 2023;28,21. DOI: 10.2807/1560-7917.ES.2023.28.21.2300116

Impact factor: 21.286; SJR: 4.15; Q1

**Kissling E<sup>1</sup>, Maurel M<sup>1</sup>, Dorthe Emborg H<sup>2</sup>, Whitaker H<sup>3</sup>, McMenamain J<sup>4</sup>, Howard J<sup>1</sup>, Trebbien R<sup>5</sup>, Watson C<sup>3</sup>, Findlay B<sup>4</sup>, Pozo F<sup>6,7</sup>, Bolt Botnen A<sup>5</sup>, Harvey C<sup>4</sup>, Rose A<sup>1</sup> European IVE group<sup>8</sup>**

<sup>1</sup>Epiconcept, Paris, France

<sup>2</sup>Department of Infectious Disease Epidemiology and Prevention, Statens Serum Institut, Copenhagen, Denmark

<sup>3</sup>UK Health Security Agency, London, United Kingdom

<sup>4</sup>Public Health Scotland, Glasgow, United Kingdom

<sup>5</sup>Department of Virus and Microbiological Special diagnostics, National Influenza Center, Statens Serum Institut, Copenhagen, Denmark

<sup>6</sup>National Centre for Microbiology, National Influenza Reference Laboratory, WHO-National Influenza Centre, Institute of Health Carlos III, Madrid, Spain

<sup>7</sup>CIBER de Epidemiología y Salud Pública (CIBERESP), Institute of Health Carlos III, Madrid, Spain

<sup>8</sup>European Influenza Vaccine Effectiveness (IVE) group members are listed at the end of the article

#### **Abstract**

Background: Between October 2022 and January 2023, influenza A(H1N1)pdm09, A(H3N2) and B/Victoria viruses circulated in Europe with different influenza(sub) types dominating in different areas. Aim: To provide interim 2022/23 influenza vaccine effectiveness (VE) estimates from six European studies, covering 16 countries in



primary care, emergency care and hospital inpatient settings. Methods: All studies used the test-negative design, but with differences in other study characteristics, such as data sources, patient selection, case definitions and included age groups. Overall and influenza (sub)typespecific VE was estimated for each study using logistic regression adjusted for potential confounders. Results: There were 20,477 influenza cases recruited across the six studies, of which 16,589 (81%) were influenza A. Among all ages and settings, VE against influenza A ranged from 27 to 44%. Against A(H1N1)pdm09 (all ages and settings), VE point estimates ranged from 28% to 46%, higher among children (< 18 years) at 49–77%. Against A(H3N2), overall VE ranged from 2% to 44%, also higher among children (62–70%). Against influenza B/Victoria, overall and age-specific VE were  $\geq 50\%$  (87–95% among children < 18 years). Conclusions: Interim results from six European studies during the 2022/23 influenza season indicate a  $\geq 27\%$  and  $\geq 50\%$  reduction in disease occurrence among all age influenza vaccine recipients for influenza A and B, respectively, with higher reductions among children. Genetic virus characterisation results and end-of-season VE estimates will contribute to greater understanding of differences in influenza (sub)type-specific results across studies.

**European IVE group members: Croatia EU-H and EU-PC studies:**

Višekruna Vučina V (Croatian Institute of Public Health, Zagreb), Ilić M (Croatian Institute of Public Health, Zagreb), Petrović G (Croatian Institute of Public Health, Zagreb), Mlinarić I (Croatian Institute of Public Health, Zagreb), Kurečić Filipović S (Croatian Institute of Public Health, Zagreb), Kaić B (Croatian Institute of Public Health, Zagreb), Pem Novosel I (Croatian Institute of Public Health, Zagreb), Ferenčak I (Croatian Institute of Public Health, Zagreb), Tabain I (Croatian Institute of Public Health, Zagreb), Čusek Adamić K (Institute of Public Health, Varaždin County), Kosanović Ličina ML (“Dr. Andrija Štampar” Teaching Institute of Public Health, Zagreb), Lakošeljac D (Teaching Institute of Public Health, Primorje-Gorski kotar County), Mihin Huskić I (Teaching Institute of Public Health, Osijek-Baranja County), Nonković D (Teaching Institute of Public Health, Split-Dalmatia County).

### 1.14. *COXIELLA BURNETII* (Q-FEVER) OUTBREAK ASSOCIATED WITH NON-OCCUPATIONAL EXPOSURE IN A SEMI-URBAN AREA OF WESTERN CROATIA IN 2022

Zoonoses 2023;70,4:285-293. DOI: 10.1111/zph.13022

Impact factor: 2.4; SJR: 0.68; Q2

Tomljenović M <sup>1,2</sup>, Lakošeljac D <sup>1,3</sup>, Knežević L <sup>2</sup>, Bubonja-Šonje M <sup>4,5</sup>, Abram M <sup>4,5</sup>, Špičić S <sup>6</sup>, Zdelar-Tuk M <sup>6</sup>, Duvnjak S <sup>6</sup>, Reil I <sup>6</sup>, Valjin O <sup>7</sup>, Kramarić M <sup>7</sup>, Miškić T <sup>8</sup>, Lohman Janković I <sup>8</sup>, Rončević D <sup>2,3</sup>

<sup>1</sup> Department of Social Medicine and Epidemiology, Faculty of Medicine, Rijeka, Croatia

<sup>2</sup> Department of Epidemiology, Teaching Institute of Public Health of the Primorje-Gorski Kotar County, Rijeka, Croatia

<sup>3</sup> Department of Public Health, Faculty of Health Studies, University of Rijeka, Rijeka, Croatia

<sup>4</sup> Department of Clinical Microbiology, Clinical Hospital Centre Rijeka, Rijeka, Croatia

<sup>5</sup> Department of Microbiology and Parasitology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>6</sup> Department of Bacteriology and Parasitology, Croatian Veterinary Institute, Zagreb, Croatia

<sup>7</sup> State Inspectorate of Republic of Croatia, Regional office Rijeka, Rijeka, Croatia

<sup>8</sup> Ministry of Agriculture, Veterinary and Food Safety Directorate, Zagreb, Croatia

#### Abstract

In March 2022, an outbreak of Q fever (*Coxiella burnetii*) with non-occupational exposure was confirmed in a semi-urban area in Čavle, Croatia. Veterinary and human epidemiological investigations were conducted to identify the source of the outbreak and to implement appropriate control measures. Three farms were settled next to each other near the homes of the first human cases at the end of the street. The closest farm was less than 500 meters away. These farms contained 161 adult sheep and

goats. Among the animal samples analysed, all 16 goats (100%) and 24/50 sheep (48%) tested positive for *C. burnetii* IgM/IgG antibodies, phase I and II. One out of five sheeps' vaginal swabs were *C. burnetii* DNA positive. Human testing revealed 20 confirmed and three probable cases (9/23 pneumonia, 2/23 hepatitis, 21/23 fever), with three hospitalizations, and one death. Twenty-seven cases were discarded following negative laboratory results. The epidemiological investigation revealed airborne transmission as the most likely route of transmission. Multiple logistic regression analyses were used to evaluate risk factors for Q fever infection. Persons who were near the farms ( $\leq 750$  m) (OR 4.5; 95% CI = 1.1–18.3) and lived in the nearest street to the farms had the highest risk of contracting Q fever (OR 3.7; 95% CI = 1.1–13.6). Decreased rainfall compared to monthly averages was recorded in the months prior to the outbreak with several days of strong wind in January preceding the outbreak. This was the largest Q fever outbreak in the county in the last 16 years, which was unexpected due to its location and non-occupational exposure. To stop the outbreak, numerous intensive biosecurity measures were implemented. The outbreak highlights the importance of urban development strategies to limit the number of animal housing near residential areas while providing regular biosecurity measures to prevent infections in livestock.

**Keywords:** *Coxiella burnetii*, Croatia, non-occupational exposure, outbreak, zoonoses

### 1.15. STRUCTURAL MODEL OF 5CS OF POSITIVE YOUTH DEVELOPMENT IN CROATIA: RELATIONS WITH MENTAL DISTRESS AND MENTAL WELL-BEING

Int J Adolesc Youth 2023;28,1,2227253. DOI: 10.1080/02673843.2023.2227253

Impact factor: 4.5; SJR: 0.965; Q2

**Novak M<sup>1</sup>, Šutić L<sup>1</sup>, Gačal H<sup>1</sup>, Roviš D<sup>2,3</sup>, Mihić J<sup>1</sup>, Maglica T<sup>4</sup>**

<sup>1</sup>Laboratory for Prevention Research, Faculty of Education and Rehabilitation Sciences, University of Zagreb, Zagreb, Croatia

<sup>2</sup>Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>3</sup>Department for Promotion and Protection of Mental Health, Teaching Institute of Public Health of Primorsko-Goranska County, Rijeka, Croatia

<sup>4</sup>Faculty of Humanities and Social Sciences Split, University of Split, Split, Croatia

#### **Abstract**

The 5C model of Positive Youth Development has widely been researched in the last decade yielding inconsistent structural solutions in different cultural settings. This paper seeks to examine the structure of the 5C model in the Croatian context. The internal structure and criterion validity of the model were examined on a sample of 3559 1st grade high school students (M = 15.12 years; 53.5% female). The item-based structural equation analyses showed that the ESEM model provides a better fit to the fivefactor structure than the CFA and bifactor models. Facet-based bifactor and bifactor (S-I-1) analyses confirmed general construct, positive youth development. Higher competence, confidence, and connection predicted less while higher character and caring predicted more mental distress in youth. Full SEM model showed that competence, character, confidence, and connection, four of the 5Cs, were associated with positive mental health. The results support the 5C model and suggest specifics of the local context.

**Keywords:** positive youth development, 5C model, mental well-being

### 1.16. PERINATAL MURINE CYTOMEGALOVIRUS INFECTION RE SHAPES THE TRANSCRIPTIONAL PROFILE AND FUNCTIONALITY OF NK CELLS

Nat Comm 2023;14:6412. DOI: 10.1038/s41467-023-42182-w

Impact factor: 16.6; SJR: 5.12; Q1

**Rožmanić C<sup>1</sup>, Lisnić B<sup>1</sup>, Pribanić Matešić M<sup>1</sup>, Mihalić A<sup>1</sup>, Hiršl L<sup>1</sup>, Park E<sup>2</sup>, Lesac Brizić A<sup>1</sup>, Indenbirken D<sup>3</sup>, Viduka I<sup>4</sup>, Šantić M<sup>4</sup>, Adler B<sup>5</sup>, Yokoyama WM<sup>2</sup>, Krmpotić A<sup>6</sup>, Juranić Lisnić V<sup>1</sup>, Jonjić S<sup>1</sup>, Brizić I<sup>1</sup>**

<sup>1</sup> Center for Proteomics, Faculty of Medicine, University of Rijeka, Rijeka, Croatia.

<sup>2</sup> Division of Rheumatology, Department of Medicine, Washington University School of Medicine, St. Louis, MO, USA

<sup>3</sup> Heinrich Pette Institute, Leibniz Institute for Experimental Virology, Hamburg, Germany

<sup>4</sup> Department of Microbiology and Parasitology, University of Rijeka, Faculty of Medicine, Rijeka, Croatia

<sup>5</sup> Max von Pettenkofer Institute & Gene Center, Virology, Faculty of Medicine, LMU Munich, Munich, Germany

<sup>6</sup> Department of Histology and Embryology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

#### **Abstract**

Infections in early life can elicit substantially different immune responses and pathogenesis than infections in adulthood. Here, we investigate the consequences of murine cytomegalovirus infection in newborn mice on NK cells. We show that infection severely compromised NK cell maturation and functionality in newborns. This effect was not due to compromised virus control. Inflammatory responses to infection dysregulated the expression of major transcription factors governing NK cell fate, such as Eomes, resulting in impaired NK cell function. Most prominently, NK cells from

perinatally infected mice have a diminished ability to produce IFN- $\gamma$  due to the downregulation of long non-coding RNA *Ifng-as1* expression. Moreover, the bone marrow's capacity to efficiently generate new NK cells is reduced, explaining the prolonged negative effects of perinatal infection on NK cells. This study demonstrates that viral infections in early life can profoundly impact NK cell biology, including long-lasting impairment in NK cell functionality.

### 1.17. INVESTIGATION AND SPATIAL DISTRIBUTION OF HARD TICKS BY GEOGRAPHICAL INFORMATION SYSTEM (GIS) IN THE REGION OF ISTRIA, CROATIA

Appl. Sci. 2023;13:9483. DOI: 10.3390/app13169483

Impact factor: 2.7; SJR: 0.49; Q2

**Cvek M**<sup>1,2</sup>; **Broznić D**<sup>3</sup>; **Puškadija D**<sup>1,2</sup>; **Blagonić, B**<sup>4</sup>; **Kirin I**<sup>2</sup>; **Pustijanac E**<sup>5</sup>; **Landeka N**<sup>2</sup>; **Stojanović A**<sup>2</sup>; **Ožanić Bučar M**<sup>6</sup>; **Tomić Linšak D**<sup>7,8</sup>

<sup>1</sup> Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of the Region of Istria, Pula, Croatia

<sup>3</sup> Department for Medical Chemistry, Biochemistry and Clinical Chemistry, Faculty of Medicine, University of Rijeka, Croatia

<sup>4</sup> Geogrupa Ltd. Pula, Pula, Croatia

<sup>5</sup> Faculty of Natural Sciences, Juraj Dobrila University of Pula, Pula, Croatia

<sup>6</sup> Department for Health Sciences, Faculty of Health Sciences, University of Novo Mesto, Novo Mesto, Slovenia

<sup>7</sup> Department for Health Ecology, Faculty of Medicine, University of Rijeka, Croatia

<sup>8</sup> Department for Scientific and Teaching Activity, Teaching Institute of Public Health County of Primorje-Gorski Kotar, Rijeka, Croatia

#### Abstract

Ticks are significant vectors of pathogens in human and veterinary medicine and have been identified as (re)emerging health threats. The primary objective of this study was to collect new data on the fauna of hard ticks within the region of Istria with a focus on spatial distribution using a geographical information system (GIS). All tick specimens were collected over three years (2020–2023), and this research included all 41 self-government units of Istria and Brijuni Islands National Park. Ticks were collected using the flagging/dragging method and manually from hosts (humans, domestic, or wild animals). In addition, morphological identification using tick keys was performed. The

obtained data were used to create maps and feed models and to predict risk assessments. Collected data reveal the predominant presence of *Ixodes ricinus*, accounting for (n = 446) or 48.1% of the tick population. *Rhipicephalus sanguineus* (Ixodida: Ixodidae) follows with (n = 253) or 27.23%, and *Hyalomma marginatum* represents (n = 136) or 14.64% of the tick species collected using the host method in the region. Tick–host relationships are complex and influenced by a range of ecological and environmental factors. The results of this research will contribute to a better understanding, identification, and prediction of the changes in their geographic ranges and help in the prevention and control of zoonosis transmitted to humans by ticks. The obtained results mapped using GIS support the first study on the spatial distribution of ticks in the region of Istria in Croatia.

**Keywords:** geographical information system, hard ticks, region of Istria, spatial distribution



## 1.18. COLLECTION OF RECYCLABLE WASTE IN THE CITY OF RIJEKA: CURRENT STATUS AND PERSPECTIVES

Cleaner waste systems 2023;5:100093. DOI: 10.1016/j.clwas.2023.100093

Impact factor:: SJR: 1.937; Q1

**Traven L**<sup>1,2</sup>, **Široka M**<sup>3</sup>

<sup>1</sup> Department of Environmental Medicine, Medical Faculty, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of the Primorsko-goranska County, Rijeka, Croatia

<sup>3</sup> DLS d.o.o., Rijeka, Croatia

### **Abstract**

In this paper collection and transfer operations of recyclable fractions of mixed municipal solid waste in the city of Rijeka, Croatia have been analysed. Using available information coupled with data obtained from the relevant scientific and technical literature an exercise in sizing the number waste bins needed for the collection of recyclables has been performed and the results were compared with the current system. The findings point out that the system is over capacitated for paper and glass fractions and under-capacitated for the plastics, metal, and multilayer packaging. It can be concluded that collection schemas for recyclables in cities are often not optimally designed and clearly structured, documented, and transparent systems are needed when designing and operating mixed municipal waste collection schemas in cities.

**Keywords:** mixed municipal waste, recyclables, collection schemas, transfer operations, mechanical-biological waste treatment

### 1.19. THE PORT ENVIRONMENTAL INDEX: A QUANTITATIVE IOT-BASED TOOL FOR ASSESSING THE ENVIRONMENTAL PERFORMANCE OF PORTS

J Mar Sci Eng 2023;11:1969. DOI: 10.3390/jmse11101969

Impact factor:2.9; SJR: 0.54; Q2

**Milošević T<sup>1</sup>; Piličić S<sup>1</sup>; Široka M<sup>1</sup>; Úbeda IL<sup>2</sup>; Pellicer AB<sup>2</sup>; Garcia RV<sup>2</sup>; Salvador CEP<sup>2</sup>; Garnier C<sup>3</sup>; Tserga, E<sup>4</sup>; Traven L<sup>1</sup>**

<sup>1</sup> Department of Environmental Medicine, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Communications Department, Universitat Politècnica de València, València, Spain

<sup>3</sup> Centre Aquitain des Technologies de l'Information et Electroniques, 33400 Talence, France

<sup>4</sup> Societe Anonyme "Thessaloniki Port Authority", Thessaloniki, Greece

#### **Abstract**

The increasing exchange of goods by sea is contributing significantly to pollution in port areas. Although several methods have been developed to assess the environmental performance of ports, most of them have shortcomings including a qualitative-only approach and self-assessment of environmental performance. Therefore, there is a pressing need to develop a different approach based on quantitative measurements obtained through measurements at ports. In this paper we present the Port Environmental Index (PEI), a quantitative composite index of port environmental performance driven by IoT. The index allows for environmental measurements to be collected in real time or close to real time through sensors providing an assessment of a port's environmental performance in real time. In addition, since the methodology for creating the index is standardised, the index makes it possible to compare different ports and rank them in terms of their

environmental performance. As a proof of concept (PoC) this paper also describes the application of the index to the port of Thessaloniki (Greece).

**Keywords:** Port environmental performance, key environmental performance indicators (eKPIs), ports, pollution, environmental aspects, Port Environmental Index

## 1.20. APPLYING NEW ALGORITHMS FOR NUMERICAL INTEGRATION ON THE SPHERE IN THE FAR FIELD OF SOUND PRESSURE

Acoustics 2023;5:999–1015. DOI: 10.3390/acoustics5040057

Impact factor: 2.1; SJR: 0.54; Q2

**Piličić S<sup>1</sup>; Skoblar A<sup>2</sup>; Žigulić R<sup>2</sup>; Traven L<sup>3</sup>**

<sup>1</sup> Mechanical Engineering School for Industrial and Craft Profession Rijeka-Secondary School, Rijeka, Croatia

<sup>2</sup> Department of Engineering Mechanics, Faculty of Engineering, University of Rijeka, Rijeka, Croatia

<sup>3</sup> Department of Environmental Medicine, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

### **Abstract**

For some sound sources, the function of the square of sound pressure amplitudes on the sphere in the far field is an integrable function or can be integrated with geometrical simplifications, so an exact or approximated analytical expression for the sound power can be calculated. However, often the sound pressure on the sphere in the far field can only be defined in discrete points, for which a numerical integration is required for the calculation of the sound power. In this paper, two new algorithms, Anchored Radially Projected Integration on Spherical Triangles (ARPIST) and Spherical Quadrature Radial Basis Function (SQRBF), for surface numerical integration are used to calculate the sound power from the sound pressures on the sphere surface in the far field, and their solutions are compared with the analytical and the finite element method solution. If function values are available at any location on a sphere, ARPIST has a greater accuracy and stability than SQRBF while being faster and easier to implement. If function values are available only at user-prescribed locations, SQRBF can directly calculate weights while ARPIST needs data interpolation to obtain function

values at predefined node locations, which reduces the accuracy and increases the calculation time.

**Keywords:** surface numerical integration on the sphere, smooth functions, sound power

### 1.21. IOT-BASED REAL-TIME ASSESSMENT OF ATMOSPHERIC EMISSION FROM THE PORT OF PIRAEUS, GREECE.

Int J Environ Sci Technol 2023; DOI: 10.1007/s13762-023-04987-6

Impact factor:3.1; SJR: 0.6; Q2

**Milošević T<sup>1</sup>, Piličić S<sup>1</sup>, Široka M<sup>1</sup>, Úbeda IL<sup>2</sup>, Kranjčević L<sup>3</sup>, Štepec D<sup>4</sup>, Martničić T<sup>4</sup>, Costa JP<sup>4</sup>, Fuart F<sup>4</sup>, Linšak Ž<sup>1</sup>, Traven L<sup>1</sup>**

<sup>1</sup> Faculty of Medicine, Department of Environmental Medicine, University of Rijeka, , Rijeka, Croatia

<sup>2</sup> Communications Department, Universitat Politècnica de València, Campus de Vera, València, Spain

<sup>3</sup> Faculty of Engineering, Department of Fluid Mechanics and Computational Engineering, University of Rijeka, Rijeka, Croatia

<sup>4</sup> XLAB d.O.O. Pot Za Brdom 100, 1000, Ljubljana, Slovenia

#### **Abstract**

Environmental protection is becoming increasingly important in the maritime sector, particularly in the port area. Both sectors have a significant impact on the environment due to activities such as cargo handling, road and rail traffic and marine vessel operations. One of the significant aspects of port operations is emissions to the atmosphere. However, building atmospheric emission inventories in ports is a challenging task that includes intensive data collection campaigns as well as significant financial investments in data processing and analysis. This assists the decision-makers to undertake timely corrective actions and curb adverse impacts. However, current methodologies for building emission inventories have a considerable time lag since emissions are evaluated weeks or months after they have occurred. This paper aims at solving this issue by providing a methodology for building air emission inventories in real-time using IoT data sources with an emphasis on building comprehensive emission inventories in an automated fashion. To validate the approach, an atmospheric

emission inventory was built based on Internet of Things (IoT) data for the port of Piraeus. The results indicate that nitrogen oxides (NOX) emissions are prevalent during both operating phases of vessels, followed by sulphur oxides (SOX) emissions. Non-methane volatile organic compounds (NMVOC) and particulate matter (PM) emissions are considerably lower. Emissions during hotelling time are on average 7.1 time higher than the emission generated during the vessel manoeuvring time. In the discussion section, the advantages and constraints of the approach are given with guidelines for further refinement of the proposed methodology.

**Keywords:** atmospheric emissions, automated data collection, environmental impact, internet of things (IoT), ports, pollution

## 1.22. DEPOSITION OF HEAVY METALS IN BIOLOGICAL TISSUES OF WORKERS IN METAL WORKSHOPS

Environ Sci Pollut Res 2023;30:36794–36806. DOI: 10.1007/s11356-022-24746-3

Impact factor:5.1; SJR: 0.94; Q1

Čargonja M <sup>1</sup>, Mekterović D <sup>1</sup>, Žurga P <sup>2</sup>, Ravlić-Gulan J <sup>3</sup>, Bogdanović Radović I <sup>4</sup>, Žauhar G <sup>1,3</sup>

<sup>1</sup> Faculty of Physics, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of Primorsko-Goranska County, Rijeka, Croatia

<sup>3</sup> Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>4</sup> Ruđer Bošković Institute, Zagreb, Croatia

### Abstract

Welding and cutting of metals produce large amounts of particulate matter (PM), which poses a significant health risk to exposed workers. Appropriate biological markers to estimate exposure are of great interest for occupational health and safety. Here, hair and nail samples from metal workers were analyzed, which appear to be more suitable than blood or urine samples for assessing long-term exposure. Four workshops working with steel components were included in the study. The hair and nail samples were analyzed by inductively coupled plasma mass spectrometry (ICP-MS) to measure the concentrations of 12 elements. At the workplaces, the concentrations of 15 elements in particulate matter were determined using X-ray fluorescence (XRF) and particle-induced X-ray emission (PIXE) techniques. The hair and nail samples of the workers contained significantly higher metal concentrations than the analytical results of a nonexposed control group. The most significant difference between the groups was found for Ti, Mn, Fe, and Co.

**Keywords:** metal workshops, hair, nails, particulate matter, XRF, PIXE, ICP-MS



### 1.23. PHENOLIC POTENTIAL OF OLIVE LEAVES FROM DIFFERENT ISTRIAN CULTIVARS IN CROATIA

Horticulturae 2023;9:594. DOI: 10.3390/horticulturae9050594

Impact factor 3.1; SJR: 0.39; Q1

**Polić Pasković M**<sup>1</sup>, **Vidović N**<sup>1</sup>, **Lukić I**<sup>1,2</sup>, **Žurga P**<sup>3</sup>, **Majetić Germek V**<sup>4</sup>, **Goreta Ban S**<sup>1,2</sup>, **Kos T**<sup>5</sup>, **Čoga L**<sup>6</sup>, **Tomljanović T**<sup>6</sup>, **Simonić-Kocijan S**<sup>7</sup>, **Ban D**<sup>1,2</sup>, **Godena S**<sup>1</sup>, **Pasković I**<sup>1</sup>

<sup>1</sup> Department of Agriculture and Nutrition, Institute of Agriculture and Tourism, Poreč, Croatia

<sup>2</sup> Centre of Excellence for Biodiversity and Molecular Plant Breeding, Zagreb, Croatia

<sup>3</sup> Teaching Institute of Public Health of Primorsko-Goranska County, Rijeka, Croatia

<sup>4</sup> Department of Food Technology and Control, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>5</sup> Department for Ecology, Agronomy and Aquaculture, University of Zadar, Zadar, Croatia

<sup>6</sup> Faculty of Agriculture, University of Zagreb, Zagreb, Croatia

<sup>7</sup> Faculty of Dental Medicine, University of Rijeka, Rijeka, Croatia

#### Abstract

For the first time the effects of different sampling periods and their interaction with five major autochthonous Croatian Istrian olive cultivars and the Italian cultivar 'Leccino' on the quantity and composition of olive leaf phenolic compounds and mineral nutrients were investigated. For that purpose, olive leaves were sampled in two collecting periods, in October and March, coinciding with the harvesting and pruning periods, respectively. All selected cultivars had a higher oleuropein leaf content in the pruning collecting period, with the highest levels noted for the 'Leccino' and 'Buža' cultivars. Cultivar significantly affected almost all the investigated phenols,

with higher concentrations of these valuable compounds in the pruning than in the harvesting period. Differences observed in leaf mineral composition were closely related to the differences in phenolic profiles and were significantly affected by genotype. Some of the studied mineral nutrients, such as P, Cu and B, were found to be significantly correlated with the most abundant olive leaf phenolic compounds, oleuropein and verbascoside.

**Keywords:** *Olea europaea* L., phenols, minerals, 'Leccino', 'Buža', oleuropein

#### 1.24. TISSUE-SPECIFIC CALCIUM AND MAGNESIUM ALLOCATION TO EXPLAIN DIFFERENCES IN BULK CONCENTRATION IN LEAVES OF ONE-YEAR-OLD SEEDLINGS OF TWO OLIVE (*OLEA EUROPAEA* L.) CULTIVARS

Plant Physiol Biochem 2023;194:619–626. DOI: 10.1016/j.plaphy.2022.11.040

Impact factor: 6.5; SJR: 1.14; Q1

Pongrac P <sup>1,2</sup>, Kelemen M <sup>2</sup>, Vogel-Mikuš K <sup>1,2</sup>, Vavpetič P <sup>2</sup>, Pelicon P <sup>2</sup>, Žurga P <sup>3</sup>, Vidović N <sup>4</sup>, Polić Pasković M <sup>4</sup>, Goreta Ban S <sup>4,5</sup>, Lukić I <sup>4,5</sup>, Pasković I <sup>5</sup>

<sup>1</sup> Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia

<sup>2</sup> Jožef Stefan Institute, Ljubljana, Slovenia

<sup>3</sup> Teaching Institute of Public Health Primorsko-Goranska County, Rijeka, Croatia

<sup>4</sup> Department of Agriculture and Nutrition, Institute of Agriculture and Tourism, Poreč, Croatia

<sup>5</sup> Centre of Excellence for Biodiversity and Molecular Plant Breeding, Zagreb, Croatia

#### Abstract

Olive tree (*Olea europaea* L.) leaves have recently been recognised as a valuable source in cosmetic and pharmaceutical industry as well as in preparation of health-supporting beverages. Little is known about the element composition of olive leaves and almost nothing about tissue-specific allocation of elements. Element composition and tissue-specific distribution were determined in leaves of two olive cultivars, Leccino and Istarska bjelica using micro-particle induced X-ray emission (micro-PIXE). In leaves of the Istarska bjelica cultivar larger bulk concentrations of potassium, sodium, molybdenum and boron, but smaller concentrations of calcium and magnesium were found than in leaves of the Leccino cultivar. Tissue-specific investigation revealed that larger concentration of calcium in epidermis and in leaf blade tissues (secondary veins, palisade and spongy mesophyll) contributed to the larger leaf bulk calcium

concentration in the Leccino cultivar. For magnesium, all leaf tissues, except the bundle sheath cells and consequently the main vascular bundle, contributed to the larger bulk concentration in the Leccino cultivar. Potassium was not predominant in any of the leaf tissues examined, while sodium and molybdenum were below the limit of detection, and boron not detectable by micro-PIXE. The results indicate that sinks for calcium and magnesium are stronger in specific leaf tissues of the Leccino than of the Istarska bjelica cultivar. The new understanding of tissue-specific allocation of elements in leaves of olive will

**Keywords:** calcium, magnesium, mineral nutrition, potassium, seedlings, X-ray fluorescence



## 2. REVIEW





## 2.1. NANOPARTICLES IN MEDICINE: CURRENT STATUS IN CANCER TREATMENT

Int J Mol Sci. 2023;24:12827. DOI: 10.3390/ijms241612827

Impact factor: 5.6; SJR: 1.14; Q1

**Pavelić K<sup>1</sup>, Kraljević Pavelić S<sup>2</sup>, Bulog A<sup>3,4</sup>, Agaj A<sup>1</sup>, Rojnić B<sup>1</sup>, Čolić M<sup>5</sup>, Trivanović D<sup>1,6</sup>**

<sup>1</sup> Faculty of Medicine, Juraj Dobrila University of Pula, Pula, Croatia

<sup>2</sup> Faculty of Health Studies, University of Rijeka, Rijeka, Croatia

<sup>3</sup> Teaching Institute for Public Health of Primorsko-Goranska County, Rijeka, Croatia

<sup>4</sup> Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>5</sup> Clear Water Technology Inc., Gardena, CA USA

<sup>6</sup> Department of Oncology and Hematology, General Hospital Pula, Pula, Croatia

### Abstract

Cancer is still a leading cause of deaths worldwide, especially due to those cases diagnosed at late stages with metastases that are still considered untreatable and are managed in such a way that a lengthy chronic state is achieved. Nanotechnology has been acknowledged as one possible solution to improve existing cancer treatments, but also as an innovative approach to developing new therapeutic solutions that will lower systemic toxicity and increase targeted action on tumors and metastatic tumor cells. In particular, the nanoparticles studied in the context of cancer treatment include organic and inorganic particles whose role may often be expanded into diagnostic applications. Some of the best studied nanoparticles include metallic gold and silver nanoparticles, quantum dots, polymeric nanoparticles, carbon nanotubes and graphene, with diverse mechanisms of action such as, for example, the increased induction of reactive oxygen species, increased cellular uptake and functionalization properties for improved targeted delivery. Recently, novel nanoparticles for improved cancer cell targeting also include nanobubbles, which have already demonstrated

increased localization of anticancer molecules in tumor tissues. In this review, we will accordingly present and discuss state-of-the-art nanoparticles and nano-formulations for cancer treatment and limitations for their application in a clinical setting.

**Keywords:** nanoparticles, cancer treatment, metallic nanoparticles, quantum dots, polymeric nanoparticles, carbon nanotubes, graphene



## 2.2. SEVENTY-FIVE YEARS SINCE THE FOUNDATION OF THE WORLD HEALTH ORGANIZATION: A REVIEW OF THE ROLE OF ANDRIJA ŠTAMPAR – THE “BALKAN BEAR” AND THE INITIATOR OF RIJEKA'S PUBLIC HEALTH HISTORY

Med flum 2023; 59,3:290-300. DOI: 10.21860/medflum2023\_306344

Impact factor: 0.10; SJR: 0.11; Q4

**Mohorić S<sup>1</sup>, Anić I<sup>1</sup>, Gašparović Babić S<sup>1</sup>, Glibotić Kresina H<sup>1</sup>, Sorta-Bilajac Turina I<sup>1</sup>**

<sup>1</sup>Teaching Institute for Public Health of Primorsko-Goranska County, Rijeka, Croatia

### **Abstract**

The World Health Organization, a special United Nations public health coordinating body with a vital role in global public health development and improvement, is celebrating its 75th anniversary. One of its founders and its first president was Andrija Štampar, who created its 10 main postulates that are still extremely relevant. Until today, the World Health Organization has achieved extraordinary global feats, from narrowly focused ones, such as smallpox eradication, to wider-aiming ones, such as the implementation of the Integrated Management of Childhood Illness strategy. We review the achievements and modern ripples of Andrija Štampar and the World Health Organization.

**Keywords:** constitution and bylaws, health education, public health, World health organization

### 2.3. MOSQUITOES IN CROATIA, TRANSMITTING DISEASES, WAYS OF PREVENTION AND CONTROL

Šumarski list, 2023; 9–10 2023:465–476. DOI: 10.31298/sl147.9-10.5

Impact factor: 0.50; SJR: 0.21; Q3

**Cvek M<sup>1</sup>, Šegota D<sup>2</sup>, Piletić K<sup>3</sup>, Begić G<sup>4</sup>, Knežević M<sup>4</sup>, Tomić Linšak D<sup>5</sup>, Šantić M<sup>4</sup>**

<sup>1</sup>Teaching Institute for Public Health of Istria County, Pula, Croatia

<sup>2</sup> Department of Medical Physics and Radiation Protection, Clinical Hospital Center Rijeka, Rijeka; Croatia

<sup>3</sup>State Inspectorate, Sanitary Inspection Service, Zagreb, Croatia

<sup>4</sup> Department of Microbiology and Parasitology, University of Rijeka, Faculty of Medicine, Rijeka, Croatia

<sup>5</sup> Department of Environmental Health, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

#### **Abstract**

Today, the protection of nature and the environment is an integral part of economic and general social development. By raising awareness, thinking and acting proactively, we can count on the sustainable development of future generations. Nevertheless, changes in the ecosystem also have an impact on the number of individual insect species. Mosquitoes are cosmopolitan animals belonging to the family *Culicidae*. They are carriers of many pathogens that cause numerous diseases in humans and animals: Dengue fever, yellow fever, West Nile fever, tularemia, Japanese encephalitis, malaria, Zika fever, etc. The aim of this review is to summarize the current scientific knowledge about mosquitoes, their life cycle, the species present in the Republic of Croatia, the mode of transmission of microorganisms and the diseases transmitted by certain mosquito species in Croatia, and to present the most modern solutions for prevention and control of invasive vector species of mosquito *Aedes albopictus* using the

technique of sterile males (SIT), which is considered one of the most environmentally friendly and developed methods of insect pest control.

**Keywords:** diseases, Croatia, mosquito control, mosquitoes, sterile mosquitoes, vectors



## 3. CASE REPORT





### 3.1. THE POTENTIAL FOR A COMBINED HEAT AND POWER (CHP) GENERATION FROM MUNICIPAL SOLID WASTE: A CASE STUDY OF CROATIA

Case Stud Chem Environ Eng 2023;8:100450. DOI: 10.1016/j.cscee.2023.100450

Impact factor: 7.93; SJR: 1.26; Q1

**Traven L**<sup>1,2</sup>

<sup>1</sup> Department of Environmental Medicine, Medical Faculty, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of the Primorsko-goranska County, Rijeka, Croatia

#### **Abstract**

The purpose of this case study was to assess the potential for combined heat and power (CHP) generation in Croatia using mixed municipal waste (MMW) as the fuel source. Calculations were based on waste composition by identifiable items coupled with heating values obtained from the technical and scientific literature. The results of the study suggest that MMW could generate between 1.79 % and 5.72 % of Croatia's electricity needs and provide between 1.099.683 and 343.652 GJ of thermal energy per year, depending on the amount of waste diverted to recycling. The research emphasizes the importance of WtE as a safe and environmentally friendly solution to waste management problems.

**Keywords:** mixed municipal waste, waste composition by identifiable items, heating value, waste-to-energy (WtE), combined heat and power production (CHP), environmental impact

### 3.2. SUSTAINABLE ENERGY GENERATION FROM MUNICIPAL SOLID WASTE: A BRIEF OVERVIEW OF EXISTING TECHNOLOGIES

Case Stud Chem Environ Eng 2023;8:100450. DOI: 10.1016/j.cscee.2023.100491

Impact factor: 7.93; SJR: 1.26; Q1

**Traven L**<sup>1,2</sup>

<sup>1</sup> Department of Environmental Medicine, Medical Faculty, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of the Primorsko-goranska County, Rijeka, Croatia

#### **Abstract**

The aim of this mini review is to outline the currently existing methods of energy recovery from municipal solid waste (MSW), including incineration, pyrolysis, anaerobic digestion, and landfill gas recovery and utilization, providing tentative suggestions for further research. Through a comparative analysis of these technologies, the paper evaluates their feasibility in the context of MSW management and presents current research related to these technologies. Incineration and landfill gas capture and utilization emerge as the most prominent options for energy recovery from municipal solid waste. Incineration effectively reduces waste volume, sanitizes the waste, and generates electricity and heat, while landfill gas capture uses methane emissions from the decomposition of landfilled waste to generate electricity and reduce environmental impact. Pyrolysis and anaerobic digestion, on the other hand, have limited use for obtaining energy from MSW due to their complex processes and challenges associated with heterogeneous MSW composition and there are problems that need to be addressed before their successful application at an industrial scale. In addition, the paper analyses the thermal treatment of waste in the context of the waste management hierarchy. This review underscores the importance of matching technology choices to waste characteristics and highlights the importance of tailored

approaches in waste management in general and Waste-to-Energy projects in particular.

**Keywords:** Municipal solid waste, energy recovery, combustion, pyrolysis, anaerobic digestion, landfill gas capture, sustainability, waste management





## 4. LETTER TO EDITOR





#### **4.1. THE INFLUENCE OF HEMOCHROMATOSIS GENE (HFE) MUTATIONS ON SARSCOV-2 SUSCEPTIBILITY AND COVID-19 SEVERITY**

Balkan Med J 2023;40:229-31. DOI: 10.4274/balkanmedj.galenos.2023.2023-1-39

Impact factor: 3.0; SJR: 0.38; Q3

**Ristić S<sup>1</sup>, Milić S<sup>2</sup>, Tatalović T<sup>3</sup>, Bilobrk M<sup>4</sup>, Rončević D<sup>4</sup>, Čurko-Cofek B<sup>5</sup>, Barac-Latas V<sup>5</sup>, Starčević Čizmarević N<sup>1</sup>**

<sup>1</sup> Department of Medical Biology and Genetics, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Department of Gastroenterology, Clinical Hospital Centre Rijeka, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>3</sup> Department of Rheumatology and Clinical Immunology, Clinical Hospital Centre Rijeka, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>4</sup> Department of Epidemiology, Teaching Institute of Public Health of Primorje-Gorski Kotar County, Faculty of Health Studies, University of Rijeka, Rijeka, Croatia

<sup>5</sup> Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

#### **To the Editor**

Coronavirus disease-2019 (COVID-19) is an extremely complex disease wherein numerous genetic and epigenetic factors determine the variable phenotypic manifestations. Owing to the wide range of symptoms, ranging from an asymptomatic condition to a mild, severe, or critical disease state, host genetics have been hypothesized to influence susceptibility to COVID-19, as in other infections. Until date, several genetic studies have been conducted using a variety of approaches and have identified genetic variants that may affect the susceptibility to and severity of COVID-19. ...

#### **4.2. BUSTING THE MYTH: WASTE-TO-ENERGY PLANTS AND PUBLIC HEALTH**

Arh Hig Rada Toksikol 2023;74:142-143. DOI: 10.2478/aiht-2023-74-3733

Impact factor: 2.1; SJR: 0.33; Q3

**Traven L**<sup>1,2</sup>

<sup>1</sup> University of Rijeka Faculty of Medicine, Department of Environmental Medicine, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of the Primorsko-goranska County, Rijeka, Croatia

##### **To the Editor**

Today, most products have a comparatively short lifespan and are being disposed of at an accelerating rate. As a result, waste management is rapidly becoming one of the most pressing global environmental issues. The European Union, for example, is experiencing a continuous rise in the amount of waste produced, with the most recent statistic reporting that, on average, in EU27 countries each person generates 530 kg of municipal solid waste (MSW) annually. To address this problem, the EU mandates a so-called “waste management hierarchy”, which prioritizes waste prevention and minimization as the preferred methods of managing waste. Material recovery and recycling are also prioritized. In contrast, thermal treatment of waste and landfilling are the least favoured methods due to concerns about their potential adverse health and environmental effects. ...

# 5. PROFESSIONAL PAPERS



## 5.1. RABIES AND RABIES POSTEXPOSURE PROPHYLAXIS IN THE PRIMORJE-GORSKI KOTAR COUNTY FROM 1986 TO 2021

Liječ Vjesn 2023;145:325–331. DOI: 10.26800/LV-145-9-10-7

Impact factor: 0.14; SJR: 0.113; Q4

**Tomljenović M**<sup>1,2</sup>, **Lakošeljac D**<sup>2,3</sup>, **Dominik S**<sup>2</sup>

<sup>1</sup> University of Rijeka Faculty of Medicine, Rijeka, Croatia

<sup>2</sup> Teaching Institute of Public Health of the Primorsko-goranska County, Rijeka, Croatia

<sup>3</sup> University of Rijeka, Faculty of Health Studies, Rijeka, Croatia

### Abstract

**Aim:** To present the characteristics of rabies preventive measures at the Antirabies Clinic at the Epidemiological Department of the Teaching Institute for public Health Rijeka, Primorje-Gorski Kotar County, in the period from 1986 to 2021. **Respondents and methods:** In this study, data from anti-rabies surveys included in the annual reports submitted to the Ministry of Health Rabies Reference Center were used. Persons who received antirabies protection (immunoprophylaxis – vaccination against rabies with or without human rabies immunoglobulin) were mostly residents of the Primorje-Gorski Kotar County, dominantly from the city of Rijeka and its surroundings. **Results:** In the period from 1986 to 2021, a decreasing trend in the number of examined persons at the Antirabies Clinic was determined ( $y=-6.9+304$ ,  $R^2=0.78$ ;  $p<0.05$ ), from 263 to 50 persons. During the study period the number of people who received protection against rabies increased ( $y=0.95+19$ ,  $R^2=0.24$ ;  $p<0.05$ ). In this period 7678 persons were examined, out of which 1318 received immunoprophylaxis (17.2%). A total of 42.3% of females (558/1318) and 57.7% of males (760/1318) were immunized. Most people were vaccinated because of scratches, contacts from unknown, dead, stray, killed or wild animals (N=1005) (group C), or

because of scratches and contacts with an animal tested positive for rabies (N=155) (group A). People were most often treated with antirabies treatment due to scratches or contact with a dog (752/1318; 57.1%). In 2011, the last person to receive antirabies treatment due to the contact with an animal tested positive for rabies was recorded. Conclusion: In 35 years of operation of the Antirabies Clinic in Rijeka, no rabies cases have been recorded in humans, which can be attributed to effective antirabies protection measures. The multidisciplinary approach has proven to be the most effective in reducing the incidence of rabies in animals and consequently preventing the occurrence of rabies in humans from the Primorje-Gorski Kotar County and the Republic of Croatia. However, human anti-rabies immunoprophylaxis still plays an indispensable role in the prevention of rabies.

**Keywords:** RABIES – epidemiology, prevention and control, veterinary; RABIES VACCINES; VACCINATION – veterinary; CROATIA – epidemiology



## 5.2. TRIHALOMETHANES IN POOL WATER DURING IMPLEMENTATION OF THE COMBINED DISINFECTION METHOD (UV IRRADIATION AND CHLORINATION)

Hrvatske vode 2023;31,124 144-150, UDK: 628.1.034.4:712.5

Impact factor: 0.45; SJR: 0.133; Q4

**Sigler Zekanović M<sup>1</sup>, Gobin I<sup>1</sup>, Tomić Linšak D<sup>1</sup>**

<sup>1</sup> University of Rijeka Faculty of Medicine, Rijeka, Croatia

### **Abstract**

Pool water must meet certain physical, chemical and microbiological condition in order to achieve health safety. Disinfection plays an important role in order to maintain the quality of pool water, and is the main method for removal and correction of microbiological and chemical dangers. The most frequent method during pool water conditioning is a disinfection with chlorine products, whereby one must be mindful of harmful by-products concentrations. Therefore, the approach combining the chlorination method with the use of ultraviolet lamps is often applied. During a one-year research was conducted into the double disinfection technology (UV irradiation/chlorination) for pool water. The concentrations of selected chemical parameters (free chlorine, trihalomethanes, etc.) in fresh water indoor pool were monitored. In addition to a chemical parameters analysis, the monitoring of the average number of bathers and the dynamics and quantity of exchanged water were monitored as well. In the observation period, a total of 12 water samples were analysed. Increased concentrations of trihalomethane (THM) and free chlorine were measured in the period of single disinfection method, although their values did not exceed Maximum Permissible Limit values. The analysis results indicate that changes in THM concentrations depend on the method of implemented disinfection and the number of bathers, but show no dependence on the quantity of exchanged water. The

results show that it is necessary to establish a continuous control of harmful by-products of disinfection and an adequate implementation of corrective measures for health protection of pool users.

**Keywords:** pool water corrective measures, disinfection by-products, trihalomethanes



# 6. BOOK CHAPTER



## 6.1. THE IMPACT OF CLIMATE CHANGE ON WATER RESOURCES AND HUMAN HEALTH—EXAMPLES FROM CROATIA AND BOSNIA AND HERZEGOVINA

In: Leal Filho, W., Vidal, D.G., Dinis, M.A.P. (eds) Climate Change and Health Hazards. Climate Change Management. Springer. DOI: 10.1007/978-3-031-26592-1\_9

**Vukić Lušić D**<sup>1,2,3</sup>, **Maestro D**<sup>4,5</sup>, **Cenov A**<sup>1,2</sup>, **Radišić M**<sup>6</sup>, **Lušić D**<sup>1,3,7</sup>, **Glad M**<sup>1,2</sup>, **Linšak Ž**<sup>1,2</sup>, **Maestro N**<sup>8</sup>, **Tomić Linšak D**<sup>1,2</sup>, **Rubinić I**<sup>6</sup>

<sup>1</sup> Department of Environmental Health, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

<sup>2</sup> Department of Environmental Health, Teaching Institute of Public Health of Primorje-Gorski Kotar County, Rijeka, Croatia

<sup>3</sup> Center for Advanced Computing and Modelling, University of Rijeka, Rijeka, Croatia

<sup>4</sup> Department of Environmental Health, Institute for Public Health of the Federation of Bosnia and Herzegovina, Sarajevo, Bosnia and Herzegovina

<sup>5</sup> Department of Environmental Health, Faculty of Health Studies, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

<sup>6</sup> Faculty of Civil Engineering Rijeka, Rijeka, Croatia

<sup>7</sup> Faculty of Health Studies, University of Rijeka, Rijeka, Croatia

<sup>8</sup> Department of Communal Hygiene, Institute for Public Health of Canton Sarajevo, Bosnia and Herzegovina, Sarajevo, Bosnia and Herzegovina

### Abstract

Due to the increase in the frequency and duration of extreme weather conditions, the main impacts of climate changes will have multiple effects on water resources. Longer periods with elevated air temperatures and more frequent occurrence of extreme precipitation are expected. It will lead to lower availability of water resources and more frequent catastrophic flooding. Greater spring utilization will further aggravate

the occurrence of karst springs turbidity as well as coastal aquifers salinization. The negative impact on surface and recreational waters is also to be expected, especially in the case of inadequately built rainwater and urban wastewater collection systems. This paper presents the results of analyses of four pilot areas, three in Croatia: (a) Monitoring the water level and degrees of salinization of drinking water sources (Vrana Lake, Cres Island); (b) Water turbidity (Rijeka Municipality water resources); (c) Rainwater and wastewater impact on the bathing seawater quality (Šibenik); and one in Bosnia and Herzegovina: (d) The water supply in flood conditions (Maglaj Municipality). Descriptive statistical methods were used to analyse the observed data in the pilot areas studied. Two types of models were used in the implementation of modelling—a hydrological model based on balance estimates and machine learning models. These phenomena, along with other environmental factors (air, soil, food quality deterioration), can represent a negative impact on human health. Their monitoring requires a multidisciplinary approach. The aim of this paper was to assess the negative impacts of climate change on human health in the case studies described and to suggest possible ways to mitigate these negative impacts.

**Keywords:** drinking water, recreational water, turbidity, salinization, microbial pollution, floods, public health



# 7. INDEX OF AUTHORS





**A**

Abram M, 27

Adler B, 30

Agaj A, 48

Anić I, 50

**B**

Baldigara A, 3, 7

Ban D, 42

Goreta Ban S, 44

Barac-Latas V, 60

Begić G, 5, 51

Belančić A, 23

Bilobrk M, 60

Blagonić, B, 32

Blažičević K, 23

Bogdanović Radović I, 41

Bolt Botnen A, 25

Brizić I, 30

Broznić D, 5, 13, 19, 32

Bubonja-Šonje M, 27

Budimir D, 3

Bulog A, 48

**C**

Costa JP, 39

Crepulja A, 15

Crvelin G, 3, 5, 7

Cenov A, 4, 69

Cvek M, 32, 51

**Č**

Čargonja M, 41

Čoga L, 42

Čolić M, 48

**Ć**

Ćurko-Cofek B, 60

**D**

Dobrića-Dintinjana R, 23

Dominik S, 64

Dorthe Emborg H, 25

Dragaš-Zubalj N, 9, 11

Dražić I, 23

Dubrović I, 13

Duvnjak S, 27

**E**

European IVE group, 25

**F**

Findlay B, 25

Fuart F, 39

Furlan N, 5

**G**

Gačal H, 29

Garcia RV, 35

Garnier C, 35

Gašparović Babić S, 50

Glad M, 4, 15, 17, 19, 69

Glibotić Kresina H, 50

Gobin I, 15, 66

Godena S, 42

Golčić M, 23



Goreta Ban S, 42

Grubić Kezele T, 9

## H

Harvey C, 25

Herceg D, 23

Hiršl L, 30

Howard J, 25

## I

Indenbirken D, 30

## J

Janković S, 21

Jonjić S, 30

Juranić Lisnić V, 30

## K

Kelemen M, 44

Kenđel Jovanović G, 11, 21, 23

Kirin I, 32

Kissling E, 25

Knežević L, 27

Knežević M, 51

Kos T, 42

Kraljević Pavelić S, 48

Kramarić M, 27

Kranjčević L, 39

Krmpotić A, 30

## L

Lakošeljac D, 26, 27, 64

Landeka N, 32

Lesac Brizić A, 30

Linšak Ž, 3, 4, 5, 7, 17, 19, 39, 69

Lisnić B, 30

Lohman Janković I, 27

Lončarić M, 15

Lukić I, 42, 44

Lušić D, 69

Lušić M, 15

## M

Maestro D, 69

Maestro N, 69

Maglica T, 29

Majetić Germek V, 42

Majnarić T, 23

Malatesti N, 15

Marijančić V, 9

Marinac-Pupavac S, 4, 17

Martničić T, 39

Maurel M, 25

McMenamin J, 25

Mekterović D, 41

Mežnarić S, 19

Mihalić A, 30

Mihić J, 29

Milić S, 60

Milošević T, 35, 39

Miškić T, 27

Modrić D, 19

Mohorić S, 50

Mušković M, 15

## N

Novak M, 29

## O

Ožanič Bučar M, 32

## P

Palčevski D, 23

Park E, 30

Pasković I, 42, 44

Pavelić K, 48

Pavičić Žeželj S, 4, 5, 9, 11, 17, 21

Peharec S, 9

Pelicon P, 44

Pellicer AB, 35

Petković Didović M, 13

Piletić K, 51

Piličić S, 35, 37, 39

Planinić M, 15

Pleština S, 23

Polić Pasković M, 42, 44

Pongrac P, 44

Posedel M, 11

Požo F, 25

Pribanić Matešić M, 30

Puškadija D, 32

Pustijanac E, 32

## R

Radišić M, 69

Ravlić-Gulan J, 41

Ražov L, 5

Reil I, 27

Ristić S, 60

Rojnić B, 48

Rončević D, 27, 60

Rose A, 25

Roviš D, 29

Rožmanić C, 30

Rubinić I, 23, 69

## S

Salvador CEP, 35

Sigler Zekanović M, 66

Simetić L, 23

Simonić-Kocijan S, 42

Sinčić Modrić G, 13

Skoblar A, 37

Skočibušić N, 23

Sorta-Bilajac Turina I, 50

Starčević Čizmarević N, 60

Starčević-Klasan G, 9

Stojanović A, 32

## Š

Šantić M, 30, 51

Šegota D, 51

Široka M, 34, 35, 39

Špičić S, 27

Štepec D, 39

Šutić L, 29

## T

Tatalović T, 60

Tomić Linšak D, 3, 4, 5, 11, 19, 32, 51, 66, 69

Tomljanović T, 42

Tomljenović M, 27, 64

Traven L, 3, 4, 7, 17, 34, 35, 37, 39, 55, 56, 61

Trebbien R, 25

Trivanović D, 48

Tserga, E, 35

## U

Úbeda IL, 35, 39

## V

Valjin O, 27

Vavpetič P, 44

Vidović N, 42, 44

Viduka I, 30

Vlahović-Palčevski V, 23

Vogel-Mikuš K, 44

Vukić Lušić D, 17, 69

## W

Watson C, 25

Whitaker H, 25

## Y

Yokoyama WM, 30

## Z

Zdelar-Tuk M, 27

## Ž

Žauhar G, 41

Žigulić R, 37

Žurga P, 4, 13, 17, 41, 42, 4



# TEACHING INSTITUTE OF PUBLIC HEALTH

PRIMORJE - GORSKI KOTAR COUNTY