INSTITUTE FOR MEDICAL RESEARCH AND OCCUPATIONAL HEALTH ZAGREB

1948-2008

Report for 2004-2008

Zagreb, Croatia
2009

Institute for Medical Research and Occupational Health, 1948-2008: Report for 2004-2008

Technical support:

Cover and logo design: Horvat studio d.o.o., Zagreb

Printing: Denona, Zagreb

Print run: 400 copies

Publisher : Institute for Medical Research and Occupational Health
Ksaverska cesta 2
PO Box 291
HR-10001 Zagreb
Croatia

A CIP catalogue record for this book is available from the National and University Library in Zagreb under 723283

ISBN 978-953-96817-3-7

Contents

INTRODUCTION 7

ANALYTICAL TOXICOLOGY AND MINERAL METABOLISM UNIT 11

Research activities

Exposure, intake and effects of toxic and essential elements; Exposure to metals and their effects in pregnancy and postnatal period (Piasek M)

Reproductive health effects of metals in men; Reproductive health effects of toxic and essential metals in men (Pizent A)

Nutrients cycle in the water column and water exchanges at the water-sediment interface; Role of plankton communities in the energy and matter flow in the Adriatic Sea (Kljaković-Gašpić Z)

Professional services *(Jurasović J)*

BIOCHEMISTRY AND ORGANIC ANALYTICAL CHEMISTRY UNIT 15

Research activities

Pesticides, persistent and volatile organic pollutants in the environment; Organic pollutants in environment – distribution, interactions, human exposure; Conceptual model for biotechnical treatment of atrazine production waste water; Study of pesticide interactions with inorganic and organic substances in water and soil (Drevenkar V)

Mechanism of esterase interactions with organophosphorus compounds; Interactions of organophosphates, carbamates and selected ligands with esterases; Stereoselectivity of cholinesterases: kinetic studies of mechanisms of cholinesterase interactions with pharmacological relevant compounds; Expression and activity of cholinesterases in neuromuscular junction during organophosphate poisoning; Antidotes for the treatment of nerve gas agents poisoning; Butyrylcholinesterase and aldoximes - bioscavengers for detoxification of organophosphates (Kovarik Z)

Professional services *(Drevenkar V)*

ENVIROMENTAL HYGIENE UNIT 19

Research activities

Air pollution - exposure and health endpoints assessment; Spatiotemporal distribution and origin of aerosols in urban surroundings; Air pollution monitoring in the Mediterranean region (Šega K)

Carcinogenic and potentially carcinogenic pollutants in the air (Vađić V)

Professional services *(Vađić V)*

MOLECULAR TOXICOLOGY UNIT 23

Research activities

Mechanisms of heavy metal toxicity in the kidney and reproductive tract; Mammalian renal transporters: gender differences and effects of toxic metals (Sabolić I)

MUTAGENESIS UNIT 25

Research activities

Biomarkers of the cell genome damage in ecogenetic research; Mutagens and antimutagens in ecogenetic research (Garaj Vrhovac V)

Genotoxicity of natural and anthropogenic agents; Genotoxicity of chemical and physical agents of natural and anthropogenic origin (Kašuba V)

Professional services *(Kopjar N)*

OCCUPATIONAL AND ENVIRONMENTAL MEDICINE UNIT 28

Research activities

Allergic disorders of the respiratory system and skin; Allergotoxic effects of general and occupational environment (Macan J)

Occupational stressors and workers' health (Gomzi M)

Effects of general and work on environment on musculo-skeletal system (Cvijetić-Avdagić S)

Problem sleepiness: psychophysiological and behavioural aspects; Problem sleepiness: sociocultural, behavioural and psychophysiological aspects (Radošević Vidaček B)

Dementia: electrophysiological and genetic study; Frontotemporal dementia with motor neuron disease; Frontotemporal dementia (Liščić R)

Morbidity and mortality risks in adult Croatian population; Morbidity and mortality risk assessment in Croatian population: a follow-up study (Pavlović M)

Professional services *(Macan J)*

RADIATION DOSIMETRY AND RADIOBIOLOGY UNIT 34

Research activities

Biomedical effects of radiofrequency microwave radiation; Biological markers of the activity of electromagnetic non-ionizing radiation (Trošić I)

Professional services *(Prlić I and Trošić I)*

RADIATION PROTECTION UNIT 37

Research activities

Environmental radioactivity and radiation protection; Environmental radioactivity and radiation protection (Marović G)

Radioecology of the Adriatic Sea and coastal areas (Franić Z)

Professional services *(Marović G)*

TOXICOLOGY UNIT 40

Research Activities

Anticholinesterase poisons – biological effects of new antidots; Therapeutic effect of newly synthesized compounds in organophosphorous poisoning (Radić B)

Effect of mycotoxins on humans and animals; Toxic effects of mycotoxins on humans and animals (Peraica M)

Professional services *(Radić B)*

OTHER RESEARCH PROJECTS 42

Effect of physical and chemical agents - cytogenetic biomarkers (Fučić A)

1-Aminocyclopropanecarboxylic acids: coordination chemistry; Development of models for the estimation of stability constants (Raos N)

Transition metals with bioligands: interaction and modelling; Transition metal complexes with bioligands: modelling and interaction (Sabolović J)

Oligoelements in biological matrices and multielement profile quality control (Ivičić N)

Metal metabolism; Metals – biocompatibility and stress in alopecia, depression, and diabetes (Momčilović B)

Immunotoxic effects of the indoor bioaerosols and lifestyle (Kanceljak-Macan B)

PROFESIONAL UNITS 47

Poison Control Centre *(Macan J and Turk R)*
Laboratory Animal Unit *(Mataušić-Pišl M and Micek V)*

Archives of Industrial Hygiene and Toxicology 49

LIST OF PUBLICATIONS 2004-2008 51

A. Papers indexed in CC/SCIE/SSCI databases 51
B. Papers indexed in other secondary bibliographic databases 64
C. Papers in proceedings 69
D. Books, chapters in books, and editors 80
E. Theses 83

LIST OF STAFF 87

Introduction

The Institute for Medical Research and Occupational Health is the second largest Croatian research centre. In a multi-disciplinary environment, about 100 scientific staff and postgraduate students work together to distinguish the Institute in biomedical and environmental research, toxicology, occupational health, chemistry, physics, and biology in Croatia and abroad.

60th Anniversary

In 2008, the Institute celebrated its 60th anniversary. The Institute was founded by a decree of the Yugoslav Academy of Arts and Sciences on 27 December 1947, upon the initiative of Andrija Štampar, who then presided over the Academy. The Institute celebrated the 60th anniversary with a scientific symposium entitled "Current Research in Occupational and Environmental Health" held in Zagreb on 28 November 2008. The symposium was organized together with the Croatian Academy of Sciences and Arts. The celebration was opened with a speech by Institute's director Ana Lucić Vrdoljak and by the president of Croatian Academy of Sciences and Arts, Milan Moguš. Congratulation speeches were then held by Dragan Primorac, Croatian Minister of Science, Education and Sports and Dražen Borčić on behalf of the Croatian Medical Council. The symposium programme was opened by Marko Šarić, Institute's long-time director and academician, who gave a comprehensive overview of the Institute's history and the role of Andrija Štampar in its foundation. Followed fourteen presentations by Institute's researchers who gave an overview of the ongoing research at the Institute. All presentations were published *in extenso* in *Archives of the Industrial Hygiene and Toxicology* (Arh Hig Rada Toksikol 2009;60:1-128).

Activities

Between 2004 and 2008, research was performed within scientific projects and programmes financed by the Croatian Ministry of Science, Education and Sports (MoSES) and other Croatian and international institutions. Between 2004 and 2006, research was conducted within the framework of 21 projects financed by the MoSES, and the projects were grouped in three programmes: Experimental Toxicology (director: Maja Blanuša), Environmental Pollution and Radioactivity (director: Vlasta Drevenkar), and Environmental Effect on Health (director: Božica Kanceljak-Macan). Since 2007, research continued within 23 projects financed by the MoSES. Nineteen projects were included in three scientific programmes co-ordinated by and performed at the Institute, as follows: Experimental Toxicology of Natural and Synthetic Substances (co-ordinator: Ivan Sabolić), Environmental Pollution and Radioactivity (co-ordinator: Vlasta Drevenkar), and Environmental and Life-style Effects on Health (co-ordinator: Jelena Macan). Two projects were included in the scientific programmes of other institutions and two were independent.

Research was also conducted within collaborative projects with institutions from Croatia and the EU, and with international organizations such as World Health Organization (WHO), International Atomic Energy Agency (IAEA), and North Atlantic Treaty Organization (NATO) (Table 1).

Over the last five years the Institute's scientists published 280 research papers in journals indexed in *Current Contents* (CC) and *Science Citation Index* (SCI). This is a 42 % increase in average productivity in respect to the period 1999-2003. A particular boost in publication was seen in 2008 (Fig. 1). It is important to note that publications of the Institute's scientists have been cited about 830 times over the last five years.

The Institute has been recognised for professional services, especially in radiation protection and continuous monitoring of physical and chemical substances affecting environment. Occupational health is still as important for the Institute as it was 60 years ago, when the Institute was established. Analytical services include specific analysis such as quantification of heavy metals and pesticides in biological and environmental samples, measurement of air quality and pollution, testing for drugs, cytogenetic analysis, allergy testing, assessment of osteodegenerative changes, and psychological testing. Over the last five years professional services were contracted by the Ministry of Environmental

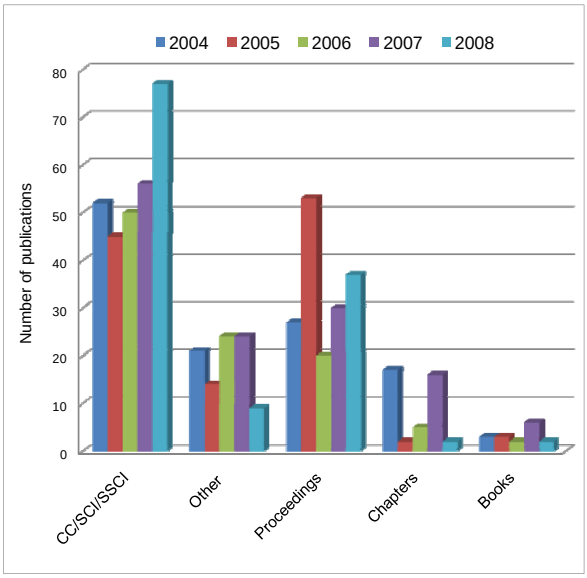

Fig. 1. Publication output of the Institute between 2004 and 2008

Table 1: The list of international projects conducted at the Institute between 2004 and 2008

Agency / Organisation	Project (participant from the Institute)
WHO	Global Environment Monitoring System Programme (GEMS/AIR): City Air Quality Trends (Vađić V)
	Global Environmental Radiation Monitoring Network (GERMON) (Kovač J and Senčar J)
EU	Assessment of environmental risk for use of radioactively contaminated industrial tailings (INTAILRISK), FP6 (2002-INCO-WBC-1), principal investigator Klerkx J, International Bureau for Environmental Studies, Brussels, Belgium: Critical pathways assessment (Kovač J)
	Cytogenetic Biomarkers and Human Cancer Risk, FP4 (QLK3-2000-02831) (project co-ordinator Norppa H, Finnish Institute of Occupational Health, Helsinki, Finland): Human Micronucleus Project, principal investigator Fenech M, CSIRO, Adelaide, Australia (Fučić A)
	European network on children's susceptibility and exposure to environmental genotoxicants, FP5 (QLK4-2002-02395), principal investigator Knudsen LE, Panum Institute, Copenhagen, Denmark (Fučić A)
	Policy interpretation network on children's health and environment, FP5 (QLK4-CT-2002-02198), principal investigator van den Hazel P, INCHES, Hulpverlening Gelderland Midden, The Netherlands (Fučić A)
	Management and remediation of hazardous industrial wastes in the Western Balkan countries (INDUWASTE), FP&-INCO-Contact Number 515919, project co-ordinator: Klerkx J, International Bureau for Environmental Studies, Bruxelles, Belgium (Kovač J)
	Environmental risk from ionising contaminants: assessment and management (ERICA) (FI6 RCT-2003-506647), principal investigator: Larsson C-M, Swedish Radiation Protection Authority, Stockholm, Sweden (Prlić I)
	Health and Environment Network (HENVINET), FP6, project co-ordinator: Floisand I, Norwegian Institute for Air Research, Kjeller, Norway (Fučić A)
	Newborns and genotoxic exposure risks: Development and application of biomarkers of dietary exposure to genotoxic and immunotoxic chemicals and of biomarkers of early effects, using mother-child birth cohorts and biobanks (NewGeneris), FP6, project co-ordinator Kleinjans J, Maastricht University, Maastricht, The Netherlands (Fučić A)
	Expert team to support biomonitoring in Europe (ESBIO), FP6, project co-ordinator Johas R, BiPRO, Munich, Germany (Fučić A)
	A future for radioecology in Europe (FUTURAE), FP6, project co-ordinator Gariel J-C, Institute for Radiological Protection and Nuclear Safety, Clamart, France (Prlić I)
IAEA	Marine environmental assessment of the Mediterranean region (RER/7/003) (Franić Z)
	Air pollution monitoring in the Mediterranean region (RER/8/009) (Šega K)
NATO	Antidotes for the treatment of nerve gas agents poisoning (Reintegration Grant) (Kovarik Z)
	Butyrylcholinesterase and aldoximes: bioscavengers for detoxification of organophosphates (Collaborative Linkage Grant) (Kovarik Z)

Protection, Physical Planning and Construction, Croatian Environmental Agency, State Office for Radiation Protection, Ministry of the Interior, Hrvatske vode (national water management agency), and many others.

Despite the fact that the Institute is primarily a research institution, our scientists also participate in educational activities at the undergraduate as well as postgraduate level teaching on predoctoral and doctoral university courses. Under the supervision of the Institute's academic staff, 30 graduation, 5 M.Sc., and 21 Ph.D. theses were completed in 2004-2008. The Institute is licensed to provide training to M.D. students who specialize in occupational health.

For many years, the Institute has been organising national and international scientific meetings, symposia, and workshops. Between 2004 and 2008, the Institute organised or co-organised the Symposium "General and Work Environment: Treatment and Prevention Aspects" (Zagreb, 2004), Third Professional Seminar "Advancement and Standardisation of Analytical Methods and Techniques for Air, Water, and Soil Pollution Measurements" (Milan, Italy; Paris, France; and

Idstein, Germany; 2004), Sixth Symposium of Croatian Radiation Protection Society (Stubičke Toplice, 2005), Regional Training Course on Heavy Metal Monitoring (Zagreb, 2005), Fourth Meeting on Air Protection (Zadar, 2005), Second Congress of Croatian Genetics (Supetar, 2005), Symposium: "Waste: Environmental and Health Issues" (Zagreb, 2005), Symposium "Immunological Reactions to Drugs" (Zagreb, 2006), Fourth Professional Seminar "Detection of Air, Water, and Soil Pollution by Specific Analytical Techniques: Introducing European Standards" (Amsterdam, The Netherlands and Germering, Germany; 2006), International Short Course "Environmental Management of Industrial Wastes in Western Balkan Countries" (Zagreb, 2006), Semi-annual working meeting of MEDICHEM members and satellite mini-symposium IMI/MEDICHEM (Zagreb, 2007), NATO Advanced Research Workshop "Decision Support for Natural Disasters and Intentional Threats to Water Security" (Dubrovnik, 2007), Fifth Meeting on Air Protection (Zadar, 2007), Fifth Professional Seminar "Detection of Air, Water, and Soil Pollution by Specific Analytical Techniques - Introducing European Standards" (Olten, Switzerland and Germering, Germany; 2006), the Symposium "Allergotoxic Research of the Environment in Croatia" (Zagreb, 2008), and the Symposium in Honour to Elsa Reiner (Osijek, 2008).

Organisation

Between 2004 and 2008, the Institute's management has changed. Since June 2008, the Institute has had a new director Ana Lucić Vrdoljak, and a new deputy director Davor Želježić. Until that time the Institute's director was Sanja Milković Kraus (since 1994). Since April 2005, Zdenko Franić has been the director's Quality Manager for the implementation of the ISO 9001:2000 quality management system. From 2004 to 2008, Institute's Management Board was changed three times. Since June 2008 it has included Krešimir Pavelić (chair), Alan Bosnar, Zdenko Franić, Vito Turšić, and Želimira Vasilić. Between October 2005 and June 2008 its members were Krešimir Pavelić (chair), Alan Bosnar, Krešimir Šega, and Želimira Vasilić. Before October 2005, the members were Zdenko Kovač (chair in 2004), Juraj Geber, Krešimir Šega, and Želimira Vasilić. Until September 2004, the chair of the Council of Scientist was Blanka Krauthacker, and Vlasta Drevenkar has chaired this body ever since.

On 31 December 2008, the Institute had nine laboratory units and two professional services. Their activities have been described in detail in this report. Several organisational changes took place between 2004 and 2008: Biomathematics Unit was closed at the beginning of 2004 and Analytical and Physical Chemistry Unit was closed in March 2008. A new Analytical Toxicology and Mineral Metabolism Unit was set up in April 2007 upon Management Board decision to merge two research units Mineral Metabolism Unit and Clinical Toxicological Chemistry Unit. Institute has a small library which is open to researchers from other institutions. There is also a documentation section which keeps all Institute's publications, reports, and theses, and also accommodates the editorial office of *Archives of Industrial Hygiene and Toxicology*, an international scientific quarterly published journal by the Institute and indexed by major services such as Science Citation Index Expanded, PubMed, and Scopus.

In 2005, the Institute established a limited liability company Medicina rada Instituta za medicinska istraživanja i medicinu rada whose aim is to provide specific health care services. The company started to work in early 2008, and since then its director has been Sanja Milković-Kraus.

In mid 2008, the Institute took over from MoSES the management of a scientific research polygon at a hunting preserve "Šumbar" near Karlovac to study and evaluate environmental pollution of the locality. MoSES has financed the maintenance of the polygon.

On 31 December 2008, the Institute had 151 staff (117 women and 34 men). Ninety-two held university degree, 52 a Ph.D, while the rest were graduated students (a list of staff is given at the end of the report).

Several Institute's buildings were thoroughly renovated between 2004 and 2008. Occupational and Environmental Medicine Unit obtained new laboratories and offices and moved from the premises of the University Hospital Jordanovac. Laboratories of the Toxicology Unit, Molecular Toxicology, Analytical Toxicology and Mineral Metabolism Unit were also renovated into modern and pleasant working spaces.

Awards and recognitions

The Institute received recognitions for its research, collaboration, and other activities from the Croatian Society for Biochemistry and Molecular Biology (in 2006), the State Office for Nuclear Safety (in 2007), the Environmental Protection and Energy Efficiency Fund of the Republic of Croatia (in 2007). In 2004 Silver Award was given to Mladen Pavlović by the European Respiratory Society. The Croatian Medical Association awarded a diploma of honour to Jelena Macan, acknowledging her substantial contribution to the promotion of its professional, scientific and ethical values and principles. In 2007, the Hong Kong University of Science and Technology and the Chinese Academy of Sciences honoured Elsa Reiner with a plaque for her contribution in cholinesterase research.

Young scientists also received recognition for their research. Adrijana Košćec-Đuknić received Young Scientists Award for 2004 from the European Sleep Research Society. The Society of University Teachers,

Scholars and Other Scientists - Zagreb awarded Marija Ljubojević in 2004 and Ana-Marija Domijan in 2006. The Croatian Society for Biochemistry and Molecular Biology gave Annual Award for Young Scientists to Zrinka Kovarik in 2004 and to Goran Šinko in 2006.

In 2005 two diploma theses were awarded. The thesis by Butković S, prepared in the Clinical Toxicological Chemistry Unit and mentored by Alica Pizent and Vlasta Drevenkar, was awarded by Hrvatske vode as the best thesis in the field of water management. The Croatian Medical and Biological Engineering Society gave the second prize to the diploma thesis of Lončar J mentored by Vera Garaj-Vrhovac, Mutagenesis Unit.

The Institute's Council of Scientists established in-house awards. In 2005 for the first time the award was given to young scientist and in 2006 for paper published in the *Archives of Industrial Hygiene and Toxicology* with at least 7 citations in SCI/SSCI/Scopus. Table 2 gives a list of all awardees between 2004 and 2008.

Zrinka Kovarik

Table 2 Annual awards for Institute's staff in five categories: (I) greatest number of papers published in journals indexed by Current Contents *(CC), (II) paper published in a journal with the highest impact factor / rank, (III) award for young scientist for the greatest number of papers published in journals indexed by CC/SCI/SSCI, (IV) paper with at least 50 citations in SCI/SSCI/Scopus, (V) paper published in the* Archives of Industrial Hygiene and Toxicology *with at least 7 citations in SCI/SSCI/Scopus, and (VI) jubilee award for the most successful scientist in the period 2004-2008.*

Year	Category					
	I	II	III	IV	V	VI
2004	Fučić A (4 CC)	Fučić A [(a)]		-		
2005	Cvijetić Avdagić S (6 CC)	Ljubojević M and Sabolić I [(b)]	Košćec-Đuknić A (2 CC)	Peraica M, Radić B, Lucić Vrdoljak A and Pavlović M (54 citations)	-	
2006	Peraica M (4 CC)	Varnai VM and Piasek M [(c)]	Domijan A-M (3 CC)	Fučić A (57 citations)	Telišman S (15 citations)	
2007	Kovarik Z (7 CC)	Liščić R [(d)]	Miličević A (5 CC)	Sabolić I (52 citations)	Peraica M and Domijan A-M (7 citations)	
2008	Kopjar N (7 CC)	Peraica M [(e)]	Domjan A-M (4 CC) Miličević A (4 CC)	Telišman S, Jurasović J and Pizent A (71 citations)	Ivičić N (9 citations)	Garaj-Vrhovac V

[(a)] Neri M, Fučić A, Knudsen LE, Lando C, Merlo F, Bonassi S. Micronuclei frequency in children exposed to environmental mutagens: a review. Mutat Res 2003;544:243-54.

[(b)] Ljubojević M, Herak- Kramberger CM, Hagos Y, Bahn A, Endou H, Burckhardt G, Sabolić I. Rat renal cortical OAT1 and OAT3 exhibit gender differences determined by both androgen stimulation and estrogen inhibition. Am J Physiol - Renal Physiol 2004;287:F124-38.

[(c)] Blanuša M, Varnai VM, Piasek M, Kostial K. Chelators as antidotes of metal toxicity: Therapeutic and experimental aspects. Curr Med Chem 2005;12:2771-94.

[(d)] Mukherjee O, Pastor P, Cairns NJ, Chakraverty S, Kauwe JSK, Shears S, Behrens MI, Budde J, Hinrichs AL, Norton J, Levitch D, Taylor- Reinwald L, Gitcho M, Tu PH, Grinberg LT, Liščić RM, Armendariz J, Morris JC, Goate AM. HDDD2 is a familial frontotemporal lobar degeneration with ubiquitin-positive, tau-negative inclusions caused by a missense mutation in the signal peptide of progranulin. Ann Neurol 2006;60:14-22.

[(e)] Pfohl-Leszkowicz A, Tozlovanu M, Manderville R, Peraica M, Castegnaro M, Stefanovic V. New molecular and field evidences for the implication of mycotoxins but not aristolochic acud in human nephropathy and urinary tract tumor. Mol Nutr Food Res 2007;51:1131-46.

Analytical Toxicology and Mineral Metabolism Unit

Scientific staff:
Jasna Jurasović, head
Martina Piasek
Alica Pizent
Nataša Brajenović
Zorana Kljaković-Gašpić
Ivana Vinković Vrček
Irena Brčić Karačonji
Anja Katić
Maja Lazarus
Tatjana Orct

Technical staff:
Mladen Komesar
Snježana Mataušić
Krešimir Nekić
Vesna Triva

Associate scientists:
Maja Blanuša
Krista Kostial
Ljiljana Skender
Spomenka Telišman

In April 2007, *Mineral Metabolism Unit* and *Clinical Toxicological Chemistry Unit* merged into *Analytical Toxicology and Mineral Metabolism Unit*.

People who retired between 2004 and 2008: Maja Blanuša, Višnja Karačić, Ljiljana Skender, Spomenka Telišman, Marija Ciganović, Đurđa Breški

People who left between 2004 and 2008: Marija Šarić, Dijana Jureša, Darko Ilić, Igor Špoljarić, Andrea Tomljenović

Research activities

Exposure, intake and effects of toxic and essential elements

Principal investigator: Maja Blanuša 2002-2005, Martina Piasek 2006; collaborators: M. Piasek, S. Cvijetić Avdagić, V. M. Varnai, K. Kostial, D. Jureša, M. Šarić, M. Lazarus, T. Orct, Đ. Breški, M. Ciganović; project supported by the Ministry for Science, Education and Sports of the Republic of Croatia (MoSES)

Exposure to metals and their effects in pregnancy and postnatal period

Principal investigator: Martina Piasek 2007-, collaborators: J. Jurasović, V. M. Varnai, D. Jureša, I. Vinković Vrček, M. Lazarus, A. Katić, T. Orct, M. Blanuša, K. Kostial, M. Matek Sarić (Department of Medical Studies, University of Zadar), S. Stasenko (Clinical Hospital "Merkur", Zagreb); project supported by MoSES

Our research includes assessment of exposure, intake and organ distribution of toxic and essential metals and metalloids, and their biological effects in target organs/tissues. The assessment integrates element analysis in various environmental and biological samples. The research is focused on females of reproductive age and young mammals, including humans. Both show higher retention and vulnerability to toxic metals. We also investigate methods to decrease metal body burden using chelating agents and/or dietary supplements (calcium, selenium) in experimental rat models *in vivo*. Research from 2004 to 2008 includes the following findings.

Monitoring of metals

We quantified the relationships between metal mass fractions in soil, leaf litter, and ground beetles in the forest ecosystem of Medvednica Nature Park (A243). Metals have also been monitored in the ecosystem of a wider area of Nature Park Kopački rit using red deer (*Cervus elaphus*) as bioindicator organism (A145, B49).

Metal distribution and effects

We have completed a study of the effects of latent iron deficiency combined with cadmium exposure during pregnancy on trace elements in mother rats and foetuses. Decreases in maternal body weight, maternal and foetal liver weights, placental weights, and tissue iron were related to low iron in feed. Cadmium in organs increased; zinc in maternal liver and kidney also increased; and foetal zinc decreased. Lower intake of iron additionally increased maternal liver cadmium. Acute cadmium exposure in the last gestational trimester posed a risk to foetal viability, especially in combination with maternal low iron intake (A207).

We evaluated the distribution of manganese in organs of perinatally exposed pups and found that manganese increased in the pups' organs irrespective of the timing and length of exposure. When exposure ceased, organ manganese dropped, and other essential elements did not change. These results pointed out existence of an accurate regulation of manganese accumulation in the perinatal period (A130).

We obtained preliminary results on the distribution of organic mercury (thiomersal, a vaccine preservative, which contains ethyl mercury) compared to inorganic mercury (as chloride) in suckling rats. Mercury mass fraction was higher in the liver and kidneys after exposure to inorganic mercury, and in the brain and blood after exposure to thiomersal (A191).

We also assessed the effects of salt on bone health (B105), the effects of dietary mineral elements and acid load on bone mass in young rats (A239, E46), and calcium intake through food and water in women of different age (E21).

Cadmium as endocrine disrupting chemicals

We co-authored a chapter in a book on cutting-edge research on smoking, passive smoking in particular, and health. We presented literature and our own data on cadmium ion as a constituent of tobacco smoke that accumulates in human placental (trophoblast) cells where it suppresses progesterone release without apparent inhibition of tissue (syncytial) development (D23). We connected findings on health effects of passive smoking in children with an assessment of perinatal exposure and health risks of cadmium using human placental tissue (B83). We contributed to an extensive review article upon invitation. Our results and the data contributed by two other review co-authors using a different experimental paradigm add to novel concept of cadmium as an endocrine disruptor in women's reproduction (B14).

Methods to decrease metal retention

We evaluated the effects of a combined treatment with *meso*-2,3-dimercaptosuccinic acid (DMSA) and calcium supplementation in reducing lead absorption and enhancing lead elimination in suckling rats. Calcium supplementation in milk, generally favourable at this age, reduced tissue lead when given during lead exposure, but had no effect when given after exposure. Administration of DMSA decreased lead in tissues. A major finding was that calcium supplementation could be efficiently applied during DMSA therapy (A266).

We assessed the efficiency of DMSA and/or calcium trisodium diethylenetriaminepentaacetate (CaDTPA) on cadmium mobilisation. Cadmium removal from rat body was better when the time between metal and chelating agent administration was shorter. Tissue zinc changed. Therapy with DMSA was more efficient, and the combination with both chelators gave best results (A163).

We evaluated the efficiency of DMSA and sodium 2,3-dimercapto-propane-1-sulphonate (DMPS) as mercury chelator in the presence of selenium in feed. Both chelating agents were efficient, and simultaneous administration of mercury and selenium caused redistribution of mercury in the organs. The results have shown that selenium decreases the efficiency of chelating agents for mercury removal from rat body (A109, E17).

We co-authored an invited overview of the clinical use and experimental aspects of chelating drugs as antidotes against metal toxicity. The article's major contribution is the evidence of age-depending efficacy of chelating treatment, which includes our own experimental results (A20).

Martina Piasek

Reproductive health effects of metals in men

Principal investigator: Spomenka Telišman, 2002-2006; collaborators: J. Jurasović, A. Pizent, D. Ilić, I. Špoljarić, K. Nekić; project supported by MoSES

Reproductive health effects of toxic and essential metals in men

Principal investigator: Spomenka Telišman, 2007, Alica Pizent, 2008-; collaborators: J. Jurasović, A. Pizent, Z. Kljaković-Gašpić, B. Čolak (University Clinic "Vuk Vrhovac", Zagreb); project supported by MoSES

Between 2004 and 2008 we have continued to investigate possible combined effects of toxic and essential metals, including the contribution of age, smoking, and alcohol consumption on human health.

The effect of low-to-moderate lead (Pb) exposure on blood pressure was examined in industrial workers (A251). There was no significant difference in blood pressure between 100 Pb workers and 51 control subjects, possibly because the control subjects had relatively high blood Pb (BPb) levels and significantly higher body mass index (BMI) than Pb workers. After adjusting for potentially confounding variables by multiple regression (blood cadmium (BCd), serum Zn (SZn) and Cu (SCu), age, intensity of smoking, alcohol consumption, and BMI), the results showed significant increase in systolic and diastolic blood pressure with increasing erythrocyte protoporphyrin (EP) in industrial workers. Long-term cumulative Pb exposure, which is better reflected by EP than by current BPb level, can significantly increase blood pressure in male workers moderately exposed to Pb.

In a chapter of the *Handbook on the Toxicology of Metals* we reviewed published studies on reproductive and developmental toxicity of metals (D7). The chapter provides up-to-date information on the adverse effects of Pb, Cd, mercury, manganese,

chromium, nickel, arsenic, aluminium, platinum, vanadium, lithium, and uranium on fertility, intrauterine growth, retardation, abortions, malformations, birth defects, and developmental effects. We also presented our own data, particularly on Pb- and Cd-related effects on human semen quality and male reproductive endocrine function.

The influence of Cd on reproductive parameters was examined in Croatian men with no occupational exposure to metals (A108). Increased exposure to Cd was mostly through smoking, and the difference in BCd was highly significant between 61 smokers and 62 nonsmokers. After adjusting for age, smoking, alcohol, and biomarkers of Pb, Cu, Zn, and Se, BCd was significantly associated with a decrease in testis size and an increase in serum estradiol, FSH and testosterone. The study results showed no significant correlation between BCd and the parameters of semen quality.

Reproductive toxicity of low-level Pb exposure was investigated in 240 Croatian men (A252). The values of BPb, BCd, SZn, SCu and serum selenium (SSe) were within the range common for general adult male population of Croatia and many other countries. After adjusting for potentially confounding variables by multiple regression, we found a significant synergistic effect of BPb and BCd levels on increasing serum testosterone, and additive effect of a decrease in SSe on increasing serum testosterone. These results may have implications for the initiation and development of prostate cancer, because testosterone speeds up the progression of prostate cancer in its early stages.

A significant association was found between a particular atopy marker and/or ventilatory function parameter and SCu and Se-glutathione-peroxidase (GPx) in women, and between SZn, SSe and Cu, Zn-superoxide dismutase (SOD) in men (A208). These results were observed in apparently healthy subjects at metal and enzyme levels comparable to those of general populations of other European countries. The observed difference in response between the groups of men and women may partly be explained by different levels of relevant toxic and essential metals, and particularly by their combinations.

Alica Pizent

Nutrient cycle in the water column and water exchange at the water-sediment interface

Principal investigator: Ante Barić (Institute of Oceanography and Fisheries), 2002-2006; collaborator from the Institute: Z. Kljaković-Gašpić; project supported by MoSES

Role of plankton communities in the energy and matter flow in the Adriatic Sea

Principal investigator: Nada Krstulović (Institute of Oceanography and Fisheries), 2007-; collaborator from the Institute: Z. Kljaković-Gašpić; project supported by the MoSES

We investigated the role of plankton communities in the energy flow and organic matter cycling in the coastal and open Adriatic Sea, with particular attention to the spawning areas of small pelagic fish, mariculture areas, and other areas under significant anthropogenic influence.

Concentrations of essential (Cu, Zn) and toxic trace metals (Cd, Cr, Hg, Pb) were determined in the edible tissue of mussels collected from four shellfish farms in the Mali Ston Bay (A117). All values were well below the permissible limits for fresh seafood. Evaluation of risks to human health associated with the consumption of mussels containing trace metals suggests that there is no health risk for moderate shellfish consumers. We have also published data on the levels of phosphorus and iron species in sediments from the Middle Adriatic area (A164, A165, C89)

Zorana Kljaković-Gašpić

Professional services

Analytical Toxicology and Mineral Metabolism Unit was set up in April 2007 upon Institute's Management Board decision to merge Mineral Metabolism Unit and Clinical Toxicological Chemistry Unit.

Between 2004 and 2008 we provided the following services for different clients, institutions (including academic ones), and industry:

- Analysis of body fluids and tissues for trace toxic (lead, cadmium, mercury, aluminium, silver) and essential elements (zinc, copper, selenium) by flame, graphite furnace, and cold vapour atomic absorption spectrometry (AAS);
- Measurement of δ-aminolevulinic acid dehydratase (ALAD) activity, erythrocyte protoporphyrin (EP) concentrations, and lead in

blood as biomarkers of lead exposure;

- Regular aluminium and mercury concentration controls of immunobiological preparations using graphite furnace and cold vapour AAS;
- Trace element (arsenic, copper, zinc, lead, cadmium, mercury, chromium, nickel and molybdenum) analysis in various environmental samples (particulate matter, water, sea sediments, soil) using flame, graphite furnace and cold vapour AAS;
- Analysis of benzene, toluene, ethylbenzene, and isomeric (*o*-, *m*-, *p*-) xylenes (BTEX) in human urine and blood using gas chromatography mass spectrometry (GC-MS);
- Analysis of phenylglyoxylic and mandelic acids (styrene and ethylbenzene metabolites) in human urine using a GC method with flame and photoionization detection;
- Analysis of lidocaine (used as anaesthetic or antiarrhythmic drug) in serum by GC-MS;
- Quantitative analysis of illicit drugs of abuse in hair and urine by GC-MS. Substances that we analysed include amphetamines, cannabinoids, opiates (morphine, codeine, heroin, 6-acethylmorphine), methadone, and cocaine. Moreover, in 2006, the Institute received a licence by the Ministry of Health and Social Welfare to perform these analyses.

All analytical methods are regularly checked for accuracy, precision and reproducibility by analysing certified reference standards and by participating in interlaboratory comparison programmes: National External Quality Assessment Scheme, Birmingham, UK (blood lead and cadmium and drugs of abuse in urine); Instituto Nacional de Toxicología y Ciencia Forenses, Sevilla, Spain (drugs of abuse in hair); U.S. Department of Health and Human Services, Wisconsin State Laboratory Hygiene, Madison, WI, USA (erythrocyte protoporphyrin in blood); Trace Elements External Quality Assessment Scheme, Guilford, UK (serum copper, zinc, selenium and aluminium); IFA-Tulln Test System at the University of Natural Resources and Applied Life Sciences, Vienna, Austria, Department for Agrobiotehnology, IFA-Tulln, Center for Analytical Chemistry (trace metals and BTEX in water); Swedish National Food Administration, Uppsala, Sweden (trace metals in food).

In 2007, in collaboration with Environmental Hygiene Unit of the Institute, we also participated in Intercomparison exercise for heavy metals in PM_{10} organized by EC Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy.

In September 2008, a thorough renovation started of the Unit's laboratories and offices to accommodate a recently purchased inductively coupled plasma mass spectrometer (ICP-MS) and a microwave autoclave high-pressure reactor system for complete digestion of samples for elemental analysis (first of that kind bought in Croatia). The ICP-MS has been bought from the Institute's funds and the microwave autoclave has been financed by MoSES. These instruments and the renovated laboratory with clean-room conditions will add value to our research and broaden the scope of services in trace and ultra trace multielement analysis.

Jasna Jurasović

Biochemistry and Organic Analytical Chemistry Unit

Scientific staff:
Vlasta Drevenkar, head
Želimira Vasilić
Zrinka Kovarik
Sanja Fingler Nuskern
Snježana Herceg Romanić
Goran Šinko
Gordana Mendaš Starčević
Anita Bosak
Sanja Stipičević
Maja Katalinić (Čalić)
Darija Kožul
Marija Sambolec

Technical staff:
Mirjana Kralj
Maja Meštrović
Biserka Tkalčević

Associate scientists:
Elsa Reiner
Vera Simeon
Blanka Krauthacker

People who retired between 2004 and 2008: Vera Simeon, Blanka Krauthacker

People who left between 2004 and 2008: Goran Tokić

Research activities

Pesticides, persistent and volatile organic pollutants in the environment

Principal investigator: Vlasta Drevenkar, 2002-2006; collaborators: V. Karačić, B. Krauthacker, Lj. Skender, Ž. Vasilić, S. Fingler Nuskern, S. Herceg Romanić, I. Brčić Karačonji, G. Mendaš Starčević, S. Stipičević, D. Kožul, R. Turk, M. Kralj, V. Triva, B. Tkalčević; project supported by MoSES

Organic pollutants in environment: distribution, interactions, human exposure

Principal investigator: Vlasta Drevenkar, 2007-; collaborators: B. Krauthacker, V. Karačić, Ž. Vasilić, S. Fingler Nuskern, S. Herceg Romanić, N. Brajenović, G. Mendaš Starčević, S. Stipičević, I. Brčić Karačonji, D. Kožul, M. Sambolec, Lj. Skender; project supported by MoSES

Conceptual model for biotechnical treatment of atrazine production waste water

Principal investigator: Dubravka Hršak (Ruđer Bošković Institute), 2002-2005; collaborators from the Institute: V. Drevenkar, Ž. Vasilić, S. Fingler Nuskern, G. Mendaš Starčević, S. Stipičević; technological scientific/development project

Study of pesticide interactions with inorganic and organic substances in water and soil

Principal investigators: Vlasta Drevenkar and Lucija Zupančič-Kralj (Faculty of Chemistry and Chemical Technology, University of Ljubljana, Slovenia), 2004-2005; collaborators from the Institute: Ž. Vasilić, S. Fingler Nuskern, G. Mendaš, Starčević, S. Stipičević; Croatian-Slovenian bilateral cooperation programme in the field of science and technology

The aim of these studies was to extend the knowledge on the processes affecting the distribution, transport, and transformation of pesticides and volatile and persistent organic pollutants in the environment, as well as on specific biochemical indicators of human exposure to these chemicals. The studies were focused on (a) persistent, lipophilic, and bioaccumulative organochlorine (OC) pesticides, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-*p*-dioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs), (b) more polar chlorotriazine, methylthiotriazine and methoxytriazine herbicides and their dealkylated and hydroxylated degradation products, (c) chlorophenols, and (d) volatile micropollutants such as benzene, toluene, ethylbenzene, isomeric xylenes (BTEX) and nicotine. Analytical procedures used in the studies were subject to improvement and critical evaluation.

Analytical methods

Conditions of microwave-assisted solvent extraction were optimised for accumulation of OC pesticides and PCB congeners from soil (E51) and pine needles and for further analysis by gas chromatography (GC) with electron capture or mass spectrometric (MS) detection.

A solid-phase microextraction procedure followed by GC analysis was developed for free concentration measurements of triazine compounds in aqueous phase before and after the sorption on a solid sorbent (E1).

Extraction with organic solvents and solid-phase extraction on different sorbents were compared for

accumulation of atrazine and its metabolites in urine. Sample preparation was optimised for final analysis with high performance liquid chromatography with UV diode array detector or coupled to tandem mass spectrometry (E28).

Dynamic headspace-purge and trap and headspace solid-phase microextraction (HS-SPME) procedures were developed and compared for GC determination of BTEX in urine with photoionisation and MS detection, respectively. HS-SPME-GC-MS method was recommended as faster and simpler for routine analysis of urinary BTEX (B9, B11).

Simple and rapid HS-SPME-GC-MS methods were developed to determine low concentrations of nicotine and cotinine in urine (A34) and of nicotine in hair. A comparison between HS-SPME and solvent extraction procedures revealed that ethyl acetate should be used for nicotine and cotinine extraction from hair and HS-SPME for their determination in urine. Cotinine concentrations determined in nonsmokers' urine by GC-MS analysis correlated significantly with concentrations measured by an enzyme-linked immunosorbent assay (ELISA).

Distribution and interactions of pollutants in the environment

Aromatic solvents (BTEX) were measured in municipal, well, river, lake, thermal, and marine water samples collected in different areas of Croatia (A33). In most samples BTEX concentrations were low and similar, and did not present any risk for the environment.

Distribution of OC compounds was investigated in aqueous and terrestrial ecosystems, including air (A143, B38, C45, E16), atmospheric particles (C159), coniferous tree needles (A98, A100, A101, A142, B38, B47, C44, C45, E16, E22), soil (A267, D9), and marine organisms from the Adriatic Sea (C70, E26).

Congener profiles of PCDDs/PCDFs were evaluated in ambient air samples collected at different sites in Zagreb in 1997-2000 (A143). The samples collected far from PCDD/PCDF sources exhibited a typical congener pattern dominated by highly chlorinated compounds. PCDF congener profiles changed markedly in air samples collected during a landfill fire.

Seasonal variations in the levels of PCB congeners (C159) and OC pesticides were studied in samples of inhalable atmospheric particles PM_{10} collected in the northern part of Zagreb in 2000-2003. These levels were characteristic of global pollution.

A comparison between OC compound levels in pine needles and in ambient air confirmed pine needles as suitable passive bioindicators of air pollution (B38, C45). Differences in the distribution of OC pesticides and PCB congeners were investigated in one and two-year-old needles (A100, C44) collected at urban sites in Croatia (A98, A142) and in Croatian mountains (A101). The pattern of OC pesticides differed between mountain and urban sites while the pattern of PCBs was similar.

PCB levels and patterns were evaluated in surface soil samples collected within and surrounding different airports and in the vicinity of partially devastated electrical transformer stations (A267). Contamination of airport soil with PCBs was not followed by an increase in the levels of PCDDs/PCDFs above the background values.

Mass fractions of OC pesticides and PCB congeners in the Mediterranean blue mussels (*Mytilus galloprovincialis*) (C70), sea turtles (*Caretta caretta*) (E26), and dolphins were characteristic of global environmental pollution. Sea mussels were sampled in collaboration with the Institute of Oceanography and Fisheries (Split), and samples of sea turtle and dolphin tissue were obtained from Croatian Natural History Museum.

Pollutant mobility in a water/soil system greatly depends on sorption interactions with organic and mineral soil constituents. Differences in sorption behaviour of chlorophenols between soil and terrestrial and marine sediments pointed to a different sorption mechanism and confirmed that the sorption capacity was related to the amount as well as type and origin of sorbent organic matter (A65). In batch experiments, triazines and chlorophenols were sorbed in native and organic free soils, humic acids isolated from soils, and in mineral sorbents in order to estimate the effect of organic and mineral soil fractions on sorption intensity and to assume sorption mechanisms. Partitioning/sorption of selected PCB congeners, OC insecticides, triazine and amide herbicides into dissolved humic acids, native soil and mineral sorbents was evaluated and compared bymeasuring their free concentrations in aqueous phase (A212).

Biodegradation pathway and mineralisation of atrazine by a bacterial community enriched from an agrochemical factory soil (261) was studied within the framework of a technological project aimed at optimising biotechnological treatment of wastewater in the production of atrazine. This study as well as the study of biodegradation of PCBs in soil by mixed bacterial cultures enriched from the PCB-contaminated soil (A205) and marine sediments (A9) was performed in collaboration with scientists from the Ruđer Bošković Institute.

Human exposure

Evaluation of long-term variations in exposure of general population in Croatia to persistent OC compounds was continued by analysis of OC pesticides and PCB congeners in human milk (A99, A271, E16) and serum (E16). OC compounds (pesticides, PCBs and PCDDs/PCDFs) in human milk have been monitored since 1977.

Atrazine metabolites were analysed in urine samples of exposed agricultural workers. Atrazine mercapturate was the only detected atrazine metabolite, distinguishing itself as a reliable and very sensitive

bioindicator of human exposure to atrazine (E28).

BTEX measurements in the urine of Zagreb general population provided reference values for environmental exposure. Smoking contributed significantly to the urinary BTEX concentration (A234, E5).

Exposure to environmental tobacco smoke (ETS) was assessed by determining nicotine (B10) and its specific metabolite cotinine in the urine (recent exposure) and hair (long-term exposure) of nonsmokers. Nicotine and cotinine were analysed in urine samples of non smokers with or without ETS exposure (A34). Nicotine was also analysed in hair samples of children without any ETS exposure and children whose parents reported that someone in their environment smoked.

Vlasta Drevenkar

Mechanism of esterase interactions with organophosphorus compounds

Principal investigator: Vera Simeon, 2002-2004, Zrinka Kovarik, 2005-2006; collaborators: Z. Kovarik, G. Šinko, A. Bosak; project supported by MoSES

Interactions of organophosphates, carbamates and selected ligands with esterases

Principal investigator: Zrinka Kovarik, 2007-; collaborators: A. Bosak, M. Katalinić, G. Šinko, E. Reiner, Z. Radić (University of California at San Diego, USA); project supported by MoSES

Stereoselectivity of cholinesterases: kinetic studies of mechanisms of cholinesterase interactions with pharmacologically relevant compounds

Principal investigators: Zrinka Kovarik and M. Goličnik (School of Medicine, University of Ljubljana, Slovenia), 2005-2006; collaborators from the Institute: A. Bosak, M. Čalić, G. Šinko; Croatian-Slovenian bilateral cooperation programme in the field of science and technology

Expression and activity of cholinesterases in neuromuscular junction during organophosphate poisoning

Principal investigators: Zrinka Kovarik and T. Marš (School of Medicine, University of Ljubljana, Slovenia) 2007-2008; collaborators from the Institute: A. Bosak, M. Čalić, G. Šinko; Croatian-Slovenian bilateral cooperation programme in the field of science and technology

Antidotes for the treatment of nerve gas agents poisoning

Principal investigator: Zrinka Kovarik, 2005-2008; collaborators: A. Bosak, M. Čalić, G. Šinko; NATO Programme Security Through Science: Reintegration grant

Butyrylcholinesterase and aldoximes - bioscavengers for detoxification of organophosphates

Principal investigators: Zrinka Kovarik and K. Kuča (Faculty of Military Health Sciences, University of Defence, Hradec Kralove, Czech Republic), 2007-2009; collaborators from the Institute: S. Berend, A. Bosak, M. Čalić, A. Lucić Vrdoljak, B. Radić, G. Šinko; NATO Programme Security Through Science: Collaborative linkage grant

Our research between 2004 and 2008 was focused on interactions of nerve warfare agents, some pesticides and drugs, which structurally belong to organophosphates (OPs), carbamates, phenotiazins and flavonoids, with acetylcholinesterase (AChE), butyrylcholinesterase (BChE), and paraoxonase (PON). The main goal was to expand the basic biochemical knowledge on esterases with an impact on health and environment. AChE has a vital function, as it terminates cholinergic neurotransmission by rapid hydrolysis of acetylcholine. The role of BChE and PON is not certain, but they exhibit a wide range of physiologically important hydrolytic activities, including drug metabolism, and interact with a broad range of substrates. It has been suggested that they scavenge anti-cholinesterase agents and thereby protect synaptic AChE from inhibition by these agents.

We studied the mechanism of enzyme-drug interactions by measuring kinetics of catalytic enzymatic reaction. OPs inhibit AChE and BChE by esterifying their active site serine. Since oximes are known as antidotes able to reactivate both cholinesterases (ChE), we investigated interactions of the well known conventional pyridinium oximes 2-PAM and HI-6 with recombinant mouse AChE, its mutants, and BChE (A134, A137). Orientation of the oxime and conjugated phosphorus moiety on the serine is an important determinant of the reactivation. Because of optimised phosphorylation and reactivation rates, we proposed experimental conditions in which a mutant-oxime pair could work as a catalytic scavenger in continuous decomposition of OP (A139, A250).

We also studied reactivation of human native ChE inhibited by tabun or soman with conventional and a series of newly synthesised pyridinium oximes (A50, A51, A138, A140, A141, A153). Compounds with the

oxime group in *para*-position on the pyridinium ring were better reactivators of tabun- than of soman-inhibited acetylcholinesterase, but oximes with the oxime group in *ortho*-position were effective protectors of AChE against both tabun and soman inhibition. Semi-empirical calculations show that differences in reactivation rates can be explained by the steric hindrance within the oxime molecule (A140). Oximes react with acetylthiocholine, the substrate of ChE. We showed that the rate constants of the non-enzymatic reaction depend on molecular properties of the oximes (A244). We also emphasised some limitations of the Ellman spectrophotometric method for measuring ChE activity in the presence of oximes (A245).

The stereoselectivity of ChE was studied in carbamoylation by bambuterol enantiomers, a selective BChE inhibitor (A29, A30, A136). The preference for (*R*)- over (*S*)-bambuterol observed primarily for ChE is dictated by residues of the acyl pocket and choline binding site (A29). The inhibition of ChE did not reveal enantiomeric preference for bicyclic amine quinuclidine-3-ol, its N-methyl or N-benzyl derivates. However, AChE did not react with (*S*)-quinuclidine-3-ol acetate, but hydrolysed (*R*)-quinuclidine-3-ol acetate (A27, E4). Kinetic models for BChE inhibition by ethopropazine, a selective inhibitor of BChE, have been extended with ethopropazine enantiomers. BChE has a higher affinity for (*R*)-ethopropazine, while mutants of mouse AChE showed varying stereoselectivity (E48). We continued developing kinetic models to describe stereoselective interaction of BChE with ethopropazine to find a model that will better describe the mechanism of interactions between ChE and chiral compounds than the models currently available in literature. We have proposed a method for cholinesterase activity measurement in whole blood based on BChE inhibition by ethopropazine (B98).

We studied the relationship between PON activity and lipid status in sera in the development of coronary diseases and oxidative stress (A225, A258-A260). PON activities were determined in healthy population and patients with type II diabetes. PON phenotypes AB and BB were related to the lipid status, which could indicate a risk of premature atherosclerosis in patients with type II diabetes (B40). A study of phenylacetate hydrolysis by human sera resulted in the confirmation of EDTA-sensitive and EDTA-insensitive esterases. We determined their catalytic constants for the hydrolysis of phenylacetate and their stability in aqueous media (A28).

We have had a fruitful collaboration with several researchers from Croatia and abroad. Recombinant enzymes were prepared at the Skaggs School of Pharmacy and Pharmaceutical Sciences, University of California at San Diego, La Jolla, USA. Oximes were synthesised at the Faculty of Science, University of Zagreb, Faculty of Military Sciences, Hradec Kralove, Czech Republic, and The Scripps Research Institute, La Jolla, USA. Cytotoxicity of oximes was measured in collaboration with GlaxoSmithKline Research Center Zagreb, Zagreb. Carbamate enantiomers were prepared at the Ruđer Bošković Institute, Zagreb. PON was studied in collaboration with colleagues from the Faculty for Veterinary Medicine and Faculty of Pharmacy and Biochemistry, University of Zagreb.

Zrinka Kovarik

Professional services

The Biochemistry and Organic Analytical Chemistry Unit provides analytical services to different institutions and laboratories engaged in environmental monitoring and protection. Organochlorine, organophosphorus, and triazine pesticides are measured in the surface, ground, and industrial waste waters. River sediments are analysed for organochlorine pesticides and atrazine. Most of surface water and river sediment analyses have been contracted by the national public utility Hrvatske vode. Triazine herbicides are analysed in agricultural soils. Polychlorinated biphenyls are determined in soils, waste oils, and similar waste materials. Aromatic solvents are determined in air samples, pesticide residues in waste materials, and the most abundant organic compounds in air and water samples using gas chromatographic-mass spectrometric analysis.

Phenotyping of human plasma BChE is performed to detect the sensitivity of individuals to neuromuscular drugs. Paraoxonase activity in the presence of macrolides is measured in human serum. Cholinesterase activities are measured in animals suspected to have been exposed to anticholinesterase pesticides (organophosphates and carbamates).

Vlasta Drevenkar

Enviromental Hygiene Unit

Scientific staff:
Vladimira Vađić, head
Krešimir Šega
Anica Šišović
Ivan Bešlić
Mirjana Čačković
Gordana Pehnec
Ranka Godec
Silva Žužul

Technical staff:
Marija Antolak
Ivica Blagović
Vjeran Dasović
Ana Filipec
Zvonimir Frković
Dunja Lipovac
Martina Šilović

People who retired between 2004 and 2008: Janko Hršak, Nataša Kalinić, Mira Adžić, Vesna Frković, Katarina Pondeljak

Research activities

Air pollution - exposure and health endpoints assessment

Principal investigator: Krešimir Šega, 2002-2006; collaborators: V. Vađić, J. Hršak, N. Kalinić, A. Šišović, I. Bešlić, G. Pehnec, M. Čačković, S. Žužul, A. Filipec, D. Lipovac, I. Balagović, V. Frković, Z. Frković, K. Pondeljak, M. Adžić; project supported by MoSES

Spatiotemporal distribution and origin of aerosols in urban surroundings

Principal investigator: Krešimir Šega, 2007-; collaborators: A. Šišović, N. Kalinić, M. Čačković, I. Bešlić, R. Godec. N. Periš (Institute of Public Health of Split and Split-Dalmatia County); project supported by MoSES

Air pollution monitoring in the Mediterranean region

National co-ordinator: Krešimir Šega, 2005-2008; supported by the International Atomic Energy Agency (IAEA)

Based on our measurements of daily concentrations of total suspended particulate matter (TSP) and black smoke (BS), and fractions of PM_{10} and $PM_{2.5}$ particle at several location in Zagreb, we estimated the following health endpoints: total mortality, cardiovascular mortality, respiratory mortality, hospital admissions due to respiratory disease, hospital admissions due to cardiovascular disease, hospital admissions due to asthma, hospital admissions due to chronic obstructive pulmonary disease (COPD), and hospital admission due to acute myocardial infarction. The obtained results suggested that fine particle fractions PM_{10} and $PM_{2.5}$ posed the main health threat to general population, while TSP and BS gave a false picture about health endpoints related to the particulate air pollution because of their negative concentration trends over the last decades (B108, C120, C121).

The influence of weather types in the continental part of Croatia on daily PM_{10} concentrations and concentrations of metallic compounds in PM_{10} were investigated. Most frequently PM_{10} elevated concentrations were related to radiation weather type and south-eastern advection, while the lowest concentrations were recorded during the wind weather type (A17, A18, B7, E3).

Measurements of air pollution levels were repeated at a large crossroads with high traffic density after its reconstruction. Concentrations of PM_{10} particle fraction, nitrogen oxides, and polycyclic aromatic hydrocarbons (PAH) were monitored at six locations in the morning and afternoon over the week. Sample analysis and data assessment are ongoing (C2, C6).

$PM_{2.5}$ particle fraction was continuously monitored to assess concentration distributions over time and space. The results show much higher annual concentration averages than recommended at all measuring sites, and significant seasonal and spatial differences in $PM_{2.5}$ concentration levels (B7, C3, C4, C119, C123).

Mass concentrations of major acidic anions (chlorides, nitrates, and sulphates) in TSP and PM_{10} particle fraction in Zagreb air were measured continuously and followed the order chloride < nitrate < sulphate. Significant correlations were found between TSP and investigated anions and between PM_{10} and investigated anions, the latter showing a higher correlation coefficient. Annual average mass ratio of NO_3^- : SO_4^{2-} obtained in TSP and PM_{10} was > 0.8, which suggests that mobile source emission was an important contributor to particle mass (A48, A49, B18, B19, C13, C14, C15, C17, C18).

Possible differences of particle-bound mass concentrations of polycyclic aromatic hydrocarbons

(PAHs) in PM_{10} particle fraction were investigated in samples collected at two locations in Zagreb. Parallel measurements were carried out for one month in the winter and again in the summer. Mass concentrations of all measured PAHs were similar at both sampling sites, except for benzo-b-fluoranthen (BbF) and benzo-ghi-perylene (BghiP). Samples of PAHs were analysed using high performance liquid chromatography with a fluorescent detector (A246, A247, B111, B112, C130, C131, C133, C135).

Road traffic NO_2/NO_x emission ratio was estimated based on hourly averages of NO, NO_2, and O_3 concentration levels measured at one sampling site in Zagreb. Results show high seasonal dependence probably caused by weather conditions, sunlight, gas consumption in households and industry, and duration of summer holidays (C124).

Sampling and analytical methods were implemented for determining organic, elemental and total carbon content in airborne particles (A94, A95, C43).

Collaboration with co-workers in the project "Environmental Radioactivity and Radiation Protection" headed by G. Marović was continued by measuring total β-activity in daily $PM_{2.5}$ samples collected at three measuring sites in Zagreb (B59, B60, C84).

In a collaborative project with the Faculty of Forestry, University of Zagreb entitled "Optimization of Energy and Safety Factors of Mechanical Woodworking", beech wood dust samples were collected at two woodworking facilities in order to determine the correction factor of the device for continuous determinations of aerosol mass concentration by photo-detection (A126, A127, C20).

Croatia, Albania, Bosnia & Herzegovina, Serbia, Montenegro, The Former Yugoslavian Republic of Macedonia, Turkey, Cyprus, Greece, Malta, and Slovenia participated in the international project "Air pollution monitoring in the Mediterranean region" and created a regional database on concentrations of particulate matter (PM) and heavy metal content in particles. The Institute hosted a training course on heavy metal determination in suspended particulate matter in Zagreb between 16 and 20 May 2005. IAEA in cooperation with the Institute of Nuclear Physics, Tirana, Albania organised a regional training course on "Validation, Evaluation, and Interpretation of Data Generated from Airborne Particulate Matter Measurements" in Tirana, Albania 23-27 June 2008.

In Zagreb, particle mass concentrations of suspended particulates were determined using the Gent air sampler. Twenty-four-hour samples were collected and mass concentrations for coarse and fine particle fractions determined and compared for the two seasons. This was followed by elemental composition analysis using energy dispersive polarised x-ray fluorescence (ED(P)XRF)-spectrometry with four secondary polarising excitation targets (analyses performed at IAEA Laboratories, Seibersdorf, Austria). We also presented and compared concentrations of the following elements Al, Si, S, Cl, K, Ca, Ti, Cr, Mn, Fe, Cu, Zn, Pb, and Br. In order to analyse elements with low atom numbers, PIXE technique was used (analyses performed at the Ruđer Bošković Institute Zagreb).

Two training courses were organised related to the monitoring of radionuclides in the air: "Regional Training Course on Gamma Spectrometry for Monitoring of Radionuclides in Air" 10-14 April 2006, Aghia Paraskevi, Greece and "Regional Training Course on Advanced Gamma Spectrometry and Total Alpha/Beta Activity Measurement for Monitoring of Radionuclides in Air" 9 -13 June 2008, Belgrade, Serbia.

An important outcome of the project was the creation of two regional databases, one related to particulate matter and heavy metal content in airborne particles and the other related to the radionuclides in the air.

Krešimir Šega

Carcinogenic and potentially carcinogenic pollutants in the air

Principal investigator: Vladimira Vađić, 2007-; collaborators: A. Šišović, M. Čačković, G. Pehnec, S. Žužul; project supported by MoSES

Literature sources were studied on arsenic, its distribution in the environment, population exposure, and the means of sampling from different environmental media, methods for determination and metabolism in humans.

Method for determination of arsenic levels in PM_{10} particles in the air was studied in the laboratory. Arsenic concentrations were determined from samples of PM_{10} particles using atomic absorption spectroscopy. Filters were destroyed by acid and samples analysed using graphite and hybrid techniques. The obtained results were compared, and hybrid technique chosen for arsenic determination.

Destruction of samples by microwaves was tested in order to determine optimal conditions for the samples preparation. The investigation will continue with analysis of arsenic using inductively coupled plasma mass spectrometry (ICP-MS) .

Arsenic in PM_{10} particles was collected around Molve gass field at four measuring locations. Samples

of soil were also collected at the same measuring sites, and arsenic concentrations in glaysol, glaysol distric and glaysol vetric soil were high. The results showed that arsenic below limit values (C162).

Arsenic levels were investigated in PM_{10} particles at five measuring sites in Zagreb. The study included horizontal and vertical distribution and seasonal variations.

Polycyclic aromatic hydrocarbons (PAH) (Flu, Pyr, BbF, BkF, BaP, BghiP and Ind) and their behaviour in the air were studied. Determination of BaAnt, Chrys, Phen and Ant started at one measuring site in the northern part of Zagreb (A247, C133, C135).

PAHs were measured at the "Podravina" gas field in the vicinity of Molve central gas plant during spring and summer seasons at four measuring sites (A95, C43).

Heavy metal composition in PM_{10} particles was determined and concentrations were compared with the concentrations of TSP. In comparison with lead in TSP, 91-97 % of lead was found in the small PM_{10} particles (A17, A18, C19, C53, C134, C156, C157).

Chemical composition of PM_{10} and $PM_{2.5}$ particles was studied with respect to the content of acidic components resulting from oxidation of primary and secondary pollutants in the air. Concentrations of acidic components were the highest in small particles.

Chemical composition of TSP and PM_{10} particles was also studied with respect to acid components as indicators of pollutant sources. Annual average mass ratios of nitrates and sulphates found in TSP and PM_{10} particles suggested that mobile source emission was an important contribution to air pollution by the particles mass. The results showed evidently higher contributions of nitrates and sulphates to overall PM_{10} particles mass compared to TSP, while chlorides contributed slightly to the overall TSP mass (A49, C17, C18).

There is an ongoing study of photochemical smog and oxidant levels in the air. The main constituent of photochemical smog is ozone. Ozone has direct harmful health effects. Due to its role in atmospheric chemistry, hydrogen peroxide is suggested as a better indicator of atmospheric oxidising capacity than ozone. Methods that successfully removed industrial SO_2 have led to the increase in H_2O_2 levels in the world and in Croatia. In the 1960s and 1970s, high levels of SO_2 and black smoke were measured in the air of Zagreb. However, over the last twenty years concentrations of SO_2, black smoke and total suspended matter have decreased, mainly as the result of lower coal consumption and introduction of natural gas for heating. The first H_2O_2 and ozone measurements in Croatia showed that both pollutants had characteristic daily variations with the highest values between 15:00 and 16:00 hours and between 14:00 and 17:00 hours, respectively. Over the day H_2O_2 volume fractions showed positive correlation with ozone ($r = 0.4$) and solar radiation ($r = 0.52$) and weak negative correlation with NO_2, CO, and BTEX. The influence of ozone as a strong oxidant on the environment and its role in atmospheric chemistry has well been described in literature. Measurements of H_2O_2 have become limited worldwide because equipment is sophisticated and expensive. For this reason computation models are being developed that calculate oxidant levels under determined environmental conditions and have an important role in assessing photochemical reactions and atmospheric processes. In 2008, we continued an analysis of photochemical models comparing measured and modelled H_2O_2 and ozone values in order to find optimal modelling parameters. Further investigation will focus on oxidant level modelling at different locations, under different meteorological conditions, and for different seasons (A3, B74, B75, B128, C102, C103, E38).

Vladimira Vađić

Professional services

Monitoring of air quality in urban and industrial areas in Croatia was started in Zagreb during the 1960s by our Unit and regional authority. Since the early 1970s, air pollution monitoring has gradually been introduced to other Croatian towns by regional Institutes of Public Health together with the regional authorities. All regional monitoring networks use the same methodology for air quality monitoring and are connected in one common network.

Coordination between regional monitoring networks continued from 2004 to 2008. Air quality was monitored in 39 Croatian towns, but only sulphur dioxide, black smoke, and deposited matter were measured in almost all towns.

Over the last five years, our Unit has been measuring SO_2, black smoke, deposited matter, PM_{10} and metals Pb, Cd, As, Ni, and Mn in PM_{10}, $PM_{2.5}$, NO_x, ozone, BaP, sulphates, and NH_3 in Zagreb. Total suspended particulate matter (TSP) and metals Pb, Cd, and Mn in TSP had been measured until 2005.

Since 1970, the Unit has been submitting to the Croatian Ministry of Health annual reports on air quality in Croatian towns, categoring it according to the Law on Air QualityProtection and the Ordinance on Recommended and Limit Air Quality Values. Since 2005, the Unit has also been submitting annual reports to the Croatian Environmental Agency.

The Environmental Hygiene Unit is a WHO-

collaborating laboratory for air pollution and participates in the Global Environmental Monitoring System within the United Nations Environmental Programme. Every year, the Unit participates in QA/QC audit within the GEMS/AIR Programme.

Since 1991, the Unit has been included in the ecological monitoring at gas field Molve. H_2S, mercaptans, and mercury in the air, monitoring of pollutants in water and soil, and vegetation (used for animal food and forest vegetation) have been monitored by a large multidisciplinary team of researchers from the Institute for Medical Research and Occupational Health, Faculty of Agriculture, Faculty of Veterinary Medicine, Faculty of Forestry, and Institute of Public Health in Koprivnica of Koprivnica-Križevci county.

For one month of every season, the Unit monitors ammonia, hydrogen sulphide, mercaptans, and meteorological parameters at the Zagreb central water purification system (CUPOVZ).

Air quality monitoring is going on in Potpićan which includes measurements of deposited matter, heavy metals, sulphates, ammonia, formaldehyde, and phenols.

PM_{10}, heavy metals, and BaP in PM_{10} are measured at the measuring sites Zagreb-1 and Sisak-1 of the national monitoring network.

In 2008, the Unit started to measure PM_{10} and heavy metals at a measuring site Galdovo in Sisak.

Measurements of deposited matter and heavy metals in it were performed in cement production plant Našicecement in Našice, in Slunj and in Vinkovci.

Vladimira Vađić

Molecular Toxicology Unit

Scientific staff:
Ivan Sabolić, head
Davorka Breljak
Marija Ljubojević
Daniela Balen
Hrvoje Brzica

Technical staff:
Eva Heršak

People who left between 2004 and 2008: Carol Mirna Herak-Kramberger, Mario Škarica

Research activities

Mechanisms of heavy metal toxicity in the kidney and reproductive tract

Principal investigator: Ivan Sabolić, 2002-2006; collaborators: C. M. Herak-Kramberger, M. Ljubojević, M. Škarica, E. Heršak, K. Šmaguc; project supported by MoSES

Mammalian renal transporters: gender differences and effects of toxic metals

Principal investigator: Ivan Sabolić, 2007-; collaborators: D. Breljak, M. Ljubojević, D. Balen, H. Brzica, N. Radović (Clinical Hospital "Dubrava" Zagreb); project supported by MoSES

In accordance with the proposed projects, several thematic groups were elaborated between 2004 and 2008. The data obtained were published in 14 peer-reviewed papers, 2 PhD theses, 4 BSc theses, 6 book chapters, and were reported at 23 national and 20 international congresses.

Localisation and sex differences (SD) in the expression and function of various transporters of organic anions (OA) and glucose were studied in kidneys and in a few other organs of rats and mice. OA transporters Oat1 (Slc22a6) and Oat3 (Slc22a8) were localised to the basolateral membrane (BLM) in specific nephron segments of the rat kidney (A151). In the cortex, the expression of both transporters exhibited SD [males (M) > females (F)] due to androgen stimulation and oestrogen inhibition. Furthermore, the expression of Oat2 (Slc22a7) protein and mRNA was studied in kidneys of variously treated rats and mice (A152). In adult rats, Oat2 mRNA was the highest in the outer stripe, whereas the protein was localised to the brush-border membrane (BBM) of the proximal tubule (PT) straight segment (S3), where it exhibited the F-dominant SD due to testosterone inhibition and oestradiol and progesterone stimulation. In mice, the expression pattern resembled that in rats. In other studies, the expression of Oats in rat, mouse, and human organs correlated with their function. Oat1 and Oat3 were localised and their roles in transporting serotonin metabolites characterised in the mouse brain and kidneys. Various serotonin metabolites proved to be good substrates for both Oats (A6). Furthermore, studies in cultured human adrenocortical cell line showed that some cAMP-effectors can stimulate cortisol release by enhancing the expression of key enzymes of steroid biosynthesis and OAT3 (A4). In another two studies we re-evaluated the previously poorly known renal transporters from the SLC22 family in humans. A previously "unknown solute transporter 1" (UST1; *SLC*22A9) was characterised, found to operate as a multispecific transporter of OA in various renal tubules, and renamed to OAT8 (A270). The second transporter, hORCTL3 (*SLC*22A13), previously assumed to transport organic cations in humans, was proven to transport OA in PT and small intestine, and was renamed to OAT10 (A7). Finally, localisation and SD in the expression of Na^+-glucose cotransporter SGLT1 were re-evaluated in the rat kidney, intestine, and a few other organs (A8, A228). The expression of SGLT1 protein along the nephron was correlated with its function and mRNA abundance; the transporter was largely localised to the BBM of S3, and exhibited SD (F>M) due to androgen inhibition. Beside in PT and small intestine, SGLT1 was detected in a few novel sites in the intestine, kidney, liver, and submandibular gland.

The effects of hypoxia and metal toxicity on the structure and function of the epithelium along the rat nephron were tested in studies *in vitro* and *in vivo*. Functional and structural stability of the kidney cortex slices was tested in optimal experimental conditions *in vitro* (A40). Impaired accumulation of *p*-aminohippurate in the tissue, loss of various membrane transporters, and loss of cytoskeleton and polarity in PT cells indicated a fast structural and functional deterioration of the slices incubated *in vitro*

for more than one hour, probably due to prolonged hypoxia. The effect of cadmium (Cd) and several other metals on the kidney structure, function, and expression of membrane transporters was tested in experimental nephrotoxicity in rats. Lipid organisation and dynamics was studied in various organelles isolated from the kidney cortex of control and Cd-treated rats (A282); Cd increased the lipid mobility and permeability for potassium without affecting the permeability for protons. We then compared the expression and cellular distribution of several BLM transporters, and the integrity of cytoskeleton in PT cells in acute and subchronic models of Cd nephrotoxicity (A227). PT of Cd-intoxicated rats exhibited damaged morphology and cytoskeleton, and loss of BLM invaginations and Na/K-ATPase. In a recent study in rats treated with various metals, the expression of P-glycoprotein Mdr1 (*Abcb1*) in the PT BBM was compared with accumulation of these metals in the renal cortex (C114). Some accumulated metals (Cu, Mn, Zn, Ca, Mg, Al) did not affect, while cis-Pt, Pb, Cd, and Hg strongly enhanced the Mdr1 expression.

Various data related to SD in the mammalian kidney and metal nephrotoxicity were collected and discussed in two invited reviews. One (A230) described numerous information on sex-related differences in sex hormone receptors, organ morphology, enzyme activities, functions, transport of specific organic compounds, expression of membrane transporters, and toxicity in the kidneys of humans and experimental animals, and the other (A229) gave a summary of known mechanisms of nephrotoxicity, common to various metals. Current data indicate that toxic metals accumulate largely in the PT cells and cause oxidative stress-mediated functional and structural damage that results in reabsorptive and secretory defects.

Ivan Sabolić

Mutagenesis Unit

Scientific staff:
Nevenka Kopjar, head
Verica Garaj Vrhovac
Vilena Kašuba
Ružica Rozgaj
Davor Želježić
Goran Gajski
Mirta Milić
Marin Mladinić

Technical staff:
Marija Milas
Maja Nikolić

People who left between 2004 and 2008: Martina Đurinec, Snježana Ramić, Goran Tokić

Research activities

Biomarkers of the cell genome damage in ecogenetic research

Principal investigator: Vera Garaj Vrhovac, 2002-2006; collaborators: D. Želježić, M. Đurinec, M. Milas, G. Tokić, M. Nikolić; project supported by MoSES

Mutagens and antimutagens in ecogenetic research

Principal investigator: Vera Garaj Vrhovac, 2007-, Collaborators: G. Gajski, M. Gavella (University Clinic Vuk Vrhovac Zagreb), B. Šarčević (University Hospital for Tumors Zagreb), V. Brumen (Andrija Štampar School of Public Health Zagreb), B. Šimpraga (Croatian Veterinary Institute Zagreb), T. Viculin (University Hospital for Tumors Zagreb); project supported by MoSES

The aim of our ecogenetic researches has been to determine mutagenicity and evaluate the risk associated with exposure to physical and chemical agents from occupational and living environment. Using *in vivo* and *in vitro* models, we evaluated the effects of chemical mutagens and ionising and non-ionising radiation on human genome, and evaluated antimutagenic properties of some natural compounds. We used different cytogenetic techniques such as analysis of chromosome aberration, sister-chromatid exchange analysis, micronucleus test, chromatid breakage assay, DNA diffusion assay, comet assay and its modifications. We evaluated the genotoxic and cytotoxic effects of low doses of pesticides and their metabolites on human peripheral blood lymphocytes and on different organ cells of experimental animals *in vitro* (A83, A272, A273, A274, A275, A276).

Chromosome aberrations as biomarkers of genome damage induced by radioactive isotopes, pesticides and their metabolites, drugs or cytostatics showed a strong deviation from control values and also showed interindividual differences which depended on mutagen concentrations and exposure time (A88, A119, A121, B31).

Recent micronucleus test measurements of cytogenetic damage were evaluated using new scoring criteria in addition to the micronucleus frequency; these include the number of nuclear bridges and buds and other new biomarkers of cell damage. This measuring enables differentiation of clastogenic and aneugenic mode of action (A82, A91, A92,).

The comet assay based on the microgel electrophoresis of a single cell is a reliable, reproducible, and quick technique, and has proven useful for cytogenetic monitoring of effects *in vitro* in different cultures, experimental animals, and populations exposed to different chemical or physical mutagens at really low exposure doses. Using the comet assay in alkali conditions, we measured the level of primary DNA damage in leukocytes of occupationally exposed populations to physical agents (ultrasound, microwaves, X-rays) and to chemical agents such as tobacco dust. These tests showed a significant difference from control values. In addition to alkali conditions, the comet assay was also performed in a neutral medium giving an insight into different types of DNA damage in human cells such as sperm cells (A87, A89, A90, A120, A122, A235, A236, C33, C42).

We studied oxidative stress as possible mechanism of genomic alterations with a modification of the comet assay using formamidopyrimidine glycosylase (A85).

We tested the cytotoxicity of honeybee venom from *Apis mellifera* and of its two major constituents melittin and phospholipaze A in different types of

tumor cells, including human laryngeal and cervical carcinoma cells and their drug resistant sublines, breast adenocarcinoma cells, colon adenocarcinoma cells, and glioblastoma, as well as in human embryonic kidney cells, normal fibroblasts, and leukocytes to determine the exact mechanism of action of this natural compound (A84).

Verica Garaj Vrhovac

Genotoxicity of natural and anthropogenic agents

Principal investigator: Vilena Kašuba, 2002-2006; collaborators: R. Rozgaj, N. Kopjar, M. Milić; project supported by MoSES

Genotoxicity of chemical and physical agents of natural and anthropogenic origin

Principal investigator: Vilena Kašuba, 2007-; collaborators: A. Fučić, R. Rozgaj, N. Kopjar, D. Želježić, M. Milić, M. Mladinić, S. Pepeljnjak (Faculty of Pharmacy and Biochemistry, University of Zagreb), I. Milas (University Hospital for Tumors Zagreb), V. Pavlica (University Hospital for Tumors Zagreb), F. Stipoljev (General Hospital "Sveti Duh" Zagreb); project supported by MoSES

The main focus of our research done over the last five years was genotoxic effects of man-made chemical and physical agents.

Occupational exposure to ionising radiation (A78, A91, A81, A121, B31, C39, C57, C58) and ultrasound (A78, A90) was confirmed to significantly increase chromosomal aberrations. In unexposed population cytogenetic damage was assessed using the micronucleus assay (MN) (A91), structural chromosomal aberration (CA) test, and alkaline comet assay (A119). A follow-up study has shown that increased MN frequency and CA in peripheral blood lymphocytes can help to predict the risk of cancer in humans (A24-A26, A77). We published a review of genomic damage in children accidentally exposed to ionising radiation (A79), and estimated the developmental and transplacental genotoxic effects of fluconazole (A80).

Using centromeric probes and the fluorescence *in situ* hybridisation (FISH) technique, we have found out that a portion of micronuclei containing centromeric region significantly increased after long-term exposure to carbofurane (A277). To assess the genome damage in tobacco industry workers, we used the MN, SCE, and CA tests. It was significantly increased, and smoking showed an additive effect to SCE values. Higher risk was seen in women (A167).

We also estimated the genome damage in cancer patients receiving radiotherapy (A87, A88, C35) and adjuvant chemotherapy (A120, A122). The effects of therapeutic irinotecan concentrations on human leucocytes were assessed using the alkali and neutral comet assay, fluorescence cell-survival assay, MN assay, CA assay, SCE, and FISH. We additionally measured the activity of acetylcholinesterase (AChE) in erythrocytes. Our results confirm irinotecan cyto- and genotoxicity, and its strong inhibitory effect on AChE. Oxime HI-6 has been found to reduce the inhibitory effect of irinotecan, with an acceptable level of cyto/genotoxicity to human cells (A123, A216). Antidotal effects of tenocyclidine (TCP) were also investigated and primary DNA damage of leukocytes and brain cells assessed in rats treated with sublethal doses of soman. Good protective ability of TCP to AChE was confirmed, with an acceptable level of cyto/genotoxicity (A154, A203, A215).

We used the alkaline comet assay to investigate DNA damage in different rat cells and organs (brain, liver, kidney). Adamantyl derivative TAMORF proved to be much more successful in alleviating poisoning symptoms in rats than physostigmine. These antidotes were not toxic for rats in tested concentrations (A154). Using cytogenetic and molecular markers in peripheral human blood lymphocytes *in vitro*, we have established that very low concentrations of tryptophol can cause apoptosis, DNA and chromosome damage, and can slow down cell division (A129).

We also studied the influence of different polymerisation modes by LED curing units on the toxicity of dental composite materials in human lymphocytes *in vitro* (A118). Mutagenic, cytogenetic, and genotoxic effects of waste waters from a phosphogypsum facility were investigated on bacterial and cell lines (A192). Using the alkaline comet assay, we assessed the integrity of DNA in erythrocytes of fish *Cobitis elongata* affected by water pollution (A124). The comet assay was used to investigate the ability of fumonizine B1 (FB_1) to induce DNA damage in rat kidney cells. A simultaneous increase in the sphinganine:sphingosine ratio points out the metabolic cohesion of sphingolipids with FB_1 genotoxicity (A59, A61, A242). We have proven the genotoxic effects of FB_1, beauvericin, and ochratoxin A, alone or in combination, in porcine kidney PK15 cells (A242).

To see how aluminium affects genome integrity we tested its effects in green and brown hydra. We observed a high level of predictivity with the comet assay, which depended on aluminium concentration in water. These results point out possible application of hydra as a bioindicator of water pollution (A133).

Lead acetate genotoxicity in suckling rats were estimated (A115). The effects of amiphostine and melatonine on human peripheral blood lymphocytes were investigated using the MN assay *in vitro*. In these experimental conditions no genotoxicity of these radioprotectors was detected. This calls for further investigation of these compounds *in vivo* and of their potential use in the clinic (A12, B45). The radioprotective effects of propolis and quercetin in gamma-irradiated mice and *in vitro* were evaluated using the alkaline comet assay (A11, A12, A13, A190, A193). The cytotoxicity of low-molecular weight metabolites of yeast *Candida albicans* was also estimated (A128).

Herbicide norflurazone was tested for toxic effects in freshwater invertebrate *Polyces felina* Daly using the alkaline comet assay. It induced higher mortality, changes in mobility, as well as morphological and histological changes in treated versus control animals, and increased DNA damage in planarian cells (A102). The same invertebrate was also investigated in toxicological and cytogenetic studies (A111-A113).

Vilena Kašuba

Professional services

The Mutagenesis Unit has been providing biomonitoring and occupational exposure assessment services and advice to individuals, institutions, and public authorities for more than 25 years. Cytogenetic analyses are regularly performed for workers exposed to physical mutagens (ionising and nonionising radiation) and mutagenic/carcinogenic chemicals in healthcare institutions and industry. Over the last five years the number of cytogenetic analyses has varied as follows: 2004: 970 analyses; 2005: 591 analyses; 2006: 359 analyses; 2007: 345 analyses and 2008: 135 analyses. The drop reflects changes in national regulatory requirements over this period.

The methodology and protocols used in cytogenetic analyses are in accordance with current International Atomic Energy Agency (IAEA) Technical reports and International Programme on Chemical Safety (IPCS) guidelines for the monitoring of carcinogens in humans. Biomarkers used in human biomonitoring and *in vitro* studies are structural chromosome aberrations, sister chromatid exchange (SCE) analysis and cytokinesis-block micronucleus (CBMN) assay in peripheral blood lymphocytes; fluorescence *in situ* hybridisation (FISH), and comet assay or single cell gel electrophoresis. *In vivo* rodent micronucleus assay is also used for experimental purposes and in animal studies. In the Mutagenesis Unit expert services have also been provided in cytogenetic testing of different drugs.

Nevenka Kopjar

Occupational and Environmental Medicine Unit

Scientific staff:
Jelena Macan, head
Naima Čorović
Milica Gomzi
Sanja Milković-Kraus
Mladen Pavlović
Jasminka Bobić
Selma Cvijetić Avdagić
Rajka Liščić
Biserka Radošević Vidaček
Veda Marija Varnai
Ljerka Prester
Adrijana Košćec Đuknić
Marija Bakotić
Ivana Sabolić Pipinić
Anita Ljubičić Ćalušić

Technical staff:
Katarina Janković
Marija Kujundžić Brkulj
Marija Lieberth
Rajka Luzar

Associate scientists:
Božica Kanceljak-Macan
Marko Šarić

People who retired between 2004 and 2008: Božica Kanceljak-Macan, Marta Malinar, Marija Poduje, Mirjana Sajko

People who left between 2004 and 2008: Davor Plavec, Ivana Maloča, Ana Gudelj Gračanin, Danijela Pažur

Research activities

Allergic disorders of the respiratory system and skin

Principal investigator: Božica Kanceljak-Macan, 2002-2005, Jelena Macan, 2006; collaborators: S. Milković-Kraus, D. Plavec, J. Macan, A. Gudelj-Gračanin, K. Janković; project supported by MoSES

Allergotoxic effects of general and occupational environment

Principal investigator: Jelena Macan, 2007-; collaborators: S. Milković-Kraus, Lj. Prester, V. M. Varnai, I. Maloča, A. Ljubičić Ćalušić, I. Sabolić Pipinić, B. Kanceljak-Macan, M. Vučemilo (Faculty of Veterinary Medicine, University of Zagreb), S. Cvitanović (Clinical Hospital Center Split), A. Čavlović (Faculty of Forestry, University of Zagreb); project supported by MoSES

Between 2004 and 2008, our research included a retrospective cohort study evaluating the prevalence of atopy markers in the period 1985-1999, assessment of exposure to common and occupational allergens in inland and coastal Croatia, and exposure to histamine in living and working environments.

Retrospective cohort study of atopy marker prevalence in Croatian adult population between 1985 and 1999

We analysed a 15-year trend in the prevalence of atopy markers (elevated total IgE, positive skin prick test to common aeroallergens and positive atopic symptoms) for 721 Croatian adults (445 men and 276 women) examined for allergies within a pre-employment screening scheme. The study showed and increasing trend in the prevalence of elevated total IgE combined with positive atopic symptoms in men (OR 2.44, 95%CI 1.39-4.29, p=0.002) but not in women (A158).

Exposure to common and occupational allergens in inland and coastal Croatia

In samples of settled dust, gathered in households and working environments from inland and coastal parts of Croatia, we determined the type of dust mites and allergen levels of pyroglyphid mites. Enzyme immunoassay (ELISA) was introduced to determine *Dermatophagoides pteronyssinus* (Der p 1) and *Dermatophagoides farinae* (Der f 1) mite allergens. ELISA showed satisfactory precision (intra-assay CV<6.9 %, inter-assay CV<13.3 %), accuracy (91-93 %), and sensitivity (2 ng/mL) (B86). Analysis of dust samples from fishing boat cabins showed significant exposure to pyroglyphid mites. This is the first time that pyroglyphid mites have been identified as potential occupational allergens for fishermen. Non-pyroglyphid mites have been confirmed as occupational allergens in various rural environments like barley, hay, animal food warehouses, and pigsties (B54).

We measured August-October levels of *Ambrosia elatior* pollen in air samples taken in the south of Croatia (Sinj and Split areas), and its proportion in total pollen count peaked in the first week of September with 12 %. During this peak, patients sensitised to *A.elatior* reported a significantly higher intensity of allergic rhinitis and asthma symptoms than in the beginning of the pollen season, confirming the significance of this pollen in the incidence of pollen allergies for the inhabitants of the south of Croatia (A47).

Azithromycin was identified and described as a new occupational allergen. We described a case series including clinical characteristics, diagnostic pathways, and risk factors in occupational allergic contact dermatitis caused by azithromycin in pharmaceutical workers. Results suggest that daily manipulation with powdered azithromycin and intermediates is a main route of sensitisation. In addition, workers reported work-related symptoms of urticaria, rhinoconjunctivitis, laryngitis, and/or dyspnoea, which might be related to azithromycin hypersensitivity (A177).

Allergy testing in a group of workers from tobacco industry (cigarette manufacture) established tobacco allergens and non-pyroglyphid mites as occupational allergens in this industry (A279).

Protective working clothes were evaluated as possible cause of skin disorders among industrial workers, including allergic and irritative textile dermatitis as an inflammatory skin disease related to wearing clothes or other aspects of manipulation with textile (production, processing, maintenance, and sale) (B55). An investigation of the cause of skin eruptions connected with wearing protective clothing in a group of female industrial workers confirmed that irritative contact dermatitis was caused by chemical irritation by residual alkali in the clothing after washing and by mechanical irritation (A214).

Exposure to histamine in living and occupational environment

Histamine was analysed as an environmental toxin and not as an endogenous mediator of allergic reactions. Initially, histamine from fish flour was identified as the cause of occupational poisoning in a group of harbour workers. For the next 40 months histamine levels were monitored in samples of stored fish flour. Histamine maintained highly toxic level (>2 g/kg) if stored at 4-8 °C for more than 3 years. If stored at ambient temperature (24 °C) and unprotected from light these levels were unchanged or maintrained for at least 3 months. The results confirmed our earlier hypothesis that fishmeals with high content of histamine are a potential long-term health hazard for poultry and other animals if used as feed, and also for men manipulating it (A157).

Jelena Macan

Occupational stressors and workers' health

Principal investigator: Milica Gomzi, 2002-2006; collaborators: Jasminka Bobić, Rajka Luzar, project supported by MoSES

In 2004-2006, our research project attempted to identify numerous health symptoms and work-related disorders and injuries in relation to age, kind of activity (woodworking industry, cement production, office work), exposure to biomechanical loads, and stress at work. Our findings indicate a subtle but powerful association between stress, health, and physical exercise. Stress associated with depression encourages fatigue and lowers resistance to illness. In further research, we focused on the nature and significance of workers' mental models of coping with stress. In workers professionally exposed to xylene, frequent complaints about loss of memory correspond to the length of exposure but not to the standardised psychological tests results (A21).

Workplace violence is a serious occupational hazard and public health issue. For injured and threatened workers, workplace violence can lead to medical treatment, absence from work, and decreased productivity (B32).

The prevalence of Post Traumatic Stress Disorder (PTSD) symptom clusters was examined in armed robbery victims (AR) at their work place and in male ex-prisoners of war (ex-POW). The results indicate greater occurrence of full PTSD in the AR group, as well as re-experience and arousal symptoms combination in those with partial PTSD, while the ex-POW group dominantly showed arousal symptoms as isolated cluster, followed by a combination of re-experience and arousal symptoms (A22). The colour preference on Luescher Colour Test was analysed in male ex-prisoners of war with PTSD. Increased preferences for violet and green and decreased preference for red were discussed in terms of “coping strategies” and “projective hypotheses” (A23).

Passive smoking increases sensitivity to environmental irritants and respiratory infection. Our follow-up study has demonstrated a significant relationship between household smoking and rates of doctor-diagnosed upper respiratory illness in schoolchildren exposed to tobacco smoke in families in which both parents are smokers (B83).

General physical environment of a workplace is associated with a risk of health disorders. We found that those who rated their physical environment (temperature, air quality, lighting, and acoustics) as poor had increased prevalence of health symptoms. Tight, mechanically ventilated working and living

space as well as daily noise may cause discomfort and health complaints (B34).

Plant noise exposure brings a serious risk of hearing disorders and injuries in woodworkers. The relation between the level of noise exposure and mean injury rate differed between the kinds of activities which led to injury, that is, whether the involved material handling or use of power tools. Although use of hearing protection should be encouraged, replacing and modifying equipment to decrease noise at the source should be the first priority. However, when resources are limited, we recommend that education about injuries and interventions should target younger working population, those who work longer hours, power tool operators, and particularly workers who have physical impairments (B33).

Musculoskeletal work-related disorders are extremely common as a result of repetitive movements, awkward postures, force, and other occupational conditions and ergonomic hazards. The effect of prolonged work in a restricted and/or standing position is multiplied by the presence of high levels of muscular tension and job strain during work (B35).

This research will continue by examining the effects of physical, psychosocial, and ergonomic factors on workers' safety and health of the musculo-skeletal system.

Milica Gomzi

Effects of general and work environment on the musculo-skeletal system

Principal investigator: Selma Cvijetić Avdagić, 2007-; collaborators: J. Bobić, M. Gomzi, M. Blanuša, S. Grazio (Clinical Hospital "Sestre milosrdnice" Zagreb), L. Krapac (Polyclinic for Rheumatic Diseases, Physical Medicine and Rehabilitation "Dr. Drago Čop" Zagreb); project supported by MoSES

Epidemiological data show that the prevalence of osteoporosis in Croatia is similar to other European countries, while the prevalence and incidence of osteoporotic fractures is slightly higher (D8, B16, B17). Our study on geographical and racial differences in bone mineral density (BMD) showed distinct global differences in BMD in the hip and spine BMD both in men and women, approximating one standard deviation between populations with the highest and lowest BMD. These differences persisted after adjustment for age, sex, and body size (A166).

The influence of age, anthropometry, and postmenopause on calculated bone mineral apparent density (BMAD) was investigated in a large number of healthy subjects (A44). The results suggested that BMD depended on the bone size and body size, and that different BMD could be the consequence of difference in these parameters. The assessment of BMD in a healthy female student population showed that the peak bone mass was achieved before the age of twenty, but later in the long-bone cortical skeleton (A46). Body weight and physical activity were the most significant positive predictors of bone density in all measured sites.

As the recurrent calcium urolithiasis is often associated with calcium metabolism disorders, BMD was assessed in patients with urolithiasis in order to determine factors that could have influenced the changes in bone density over a one year period (B15). Bone mass reduction in patients with urolithiasis did not differ significantly from controls, and was mostly related to age, hyperuricosuria, and calcium dietary restriction, but not to increased calcium excretion. Assessment of metabolic parameters in patients with urolithiasis showed 25 % higher mean ionic activity product of calcium and oxalate ions IAP(CaOx) than in controls (A5, B2). IAP(CaOx) and calculated Ogawa indices were recommended for estimating the potential risk of calcium oxalate stone formation.

We analysed the association of nutrients and lifestyle modifiers with BMD in healthy postmenopausal women. Moderate alcohol consumption was positively associated with bone mass, while mineral water and high fibre intake were beneficial for weight and body mass index. Significant differences in dietary habits were found in schoolchildren and students in relation to high or low physical activity (A42).

Progression of hand osteoarthritis in rural population aged 54 to 56 years was the most prominent in the distal interphalangeal joints in women and in the proximal interphalangeal joints in men. Mechanical factors, probably occupational workload, were associated with the more rapid progression of the disease (A45).

Our analysis of proprioception in people with whiplash injury showed that they incorrectly perceived the position of their own head (A263). Therefore, rehabilitation should include the correction of proprioception and head coordination. Monitoring recovery of femoral muscles after knee injury using ultrasound measurement of muscular volume, showed that ultrasound is an appropriate method for determining muscular atrophy during immobilisation and also for evaluating muscular restitution during physical therapy (A262).

Selma Cvijetić Avdagić

Problem sleepiness: psychophysiological and behavioural aspects

Principal investigator: Biserka Radošević Vidaček, 2002-2006; collaborators: A. Koščec-Đuknić, M. Bakotić; project supported by MoSES

Problem sleepiness: sociocultural, behavioural and psychophysiological aspects

Principal investigator: Biserka Radošević Vidaček, 2007-; collaborators: A. Koščec-Đuknić, M. Bakotić; project supported by MoSES

Research on problem sleepiness mainly shifted our interest from the context of working time to the context of school time. However, both working time and school time, which were the focus of our studies, had a common aspect: the arrangement of time in shifts. The majority of our studies dealt with sleep and daytime functioning in a school system involving two rotating shifts. Such a school system is distinct from school systems in many other countries in which school always starts in the morning. Conclusions on relations between reduced and irregular sleep, delayed sleep phase and poor sleep quality on the one hand, and poor academic performance and daytime functioning in adolescents on the other, have so far been based on the results of studies conducted in countries in which school starts in the morning. As the two-shift school system can have a specific impact on sleep and wakefulness, we have started to study Croatian adolescents attending school one week in the morning and the other in the afternoon. The aim of these studies is to see if healthy sleep is possible in different school shifts and to identify developmental, psychological, sociocultural, and situational factors related to sleep characteristics and daytime functioning in adolescents.

Our field and laboratory studies of adolescents analysed developmental changes of morningness-eveningness preferences over adolescence; relative value of different sleep preferences and characteristics for prediction of indices of daytime functioning in adolescents; interindividual differences in paying off the sleep debt from morning shift days by means of napping or extension of main sleep in situations with less external constraints; intraindividual variations in sleep patterns and daytime sleepiness over a week of morning and a week of afternoon shifts; impact of living with parents on students' sleep patterns on weekdays and weekends; effect of different activities performed in bed before sleep start on characteristics of subsequent sleep; sleep parameters obtained for school days and weekends by means of two methods - sleep diaries and actigraphs; subjective and physiological indices of daytime sleepiness; and efficiency in performing tasks at the end of week with morning shift schedule and week with afternoon shift schedule (E20).

We synthesised the results of our studies that examined the relationship between sleep characteristics and daytime functioning in students attending school in two rotating shifts and compared them with a few other studies that examined adolescents attending school in two permanent or rotating shifts (B24).

In order to explore whether parents' engagement in shift work affected the sleep habits of their adolescent children who attended school in two shifts we analysed data of primary and secondary school students of both gender, age range 11-18 years, whose parents were both employed. Parents' working schedule significantly affected the sleep patterns of secondary school adolescents, i.e. wake-up time and sleep duration on school days when they attended school in the morning shift, as well as bed time and bed time delay on weekends. A significant interaction between parents' working schedule, adolescents' gender and type of school (primary vs. secondary) was found for sleep extension on weekends after afternoon shift school. This study showed that parental involvement in shift work had negative effects on sleep of secondary school adolescents. It contributed to earlier wake-up time and shorter sleep in a week when adolescents attended school in the morning, as well as to greater bedtime irregularity (A217).

The role of various biological, behavioural and social factors in regulation of sleep and wakefulness in adolescence was discussed. Different approaches attempting to implement results of studies examining daytime sleepiness of adolescents were examined (A132).

Various forms of sleep deprivation and the effects of sleep deprivation on recovery sleep, physiological parameters, daytime sleepiness and performance in cognitive and psychomotor tasks were discussed. Special consideration was given to importance of individual differences in some characteristics related to sleep and wakefulness, like morningness-eveningness, sleep need, individual level of sleepiness, the ability to fall asleep quickly, and so called "vulnerability to sleep loss", which may be of practical importance for predicting the effects of sleep deprivation in everyday life (B3).

In addition to studies of sleep and wakefulness in the context of two-shift school system, we studied 24-hour variations of subjective activation. The study examined the validity of R. Thayer's activation model regarding 24-hour variations of two dimensions of activation (energetic and tense arousal) and their relations with variations of indices of physiological activation and performance efficiency. The activation was measured by means of Thayer's Activation-Deactivation Adjective Check List, which uses descriptors such as sleepy, drowsy, wide-awake, tired, wakeful, lively, and energetic to measure energetic arousal, and descriptors such as tense, intense, fearful, jittery, clutched up, still, and calm to measure tense

arousal. The study showed that the 24-hour variation of energy had a strong circadian component, which was related to variation of body temperature. A circadian component was not observed in 24-hour variations of tension. The results also indicated that in conditions when energy and tension varied within a normal circadian range of values higher energy was associated with lower tension. These findings were not consistent with Thayer's hypothesis that energy and tension are positively associated at low and intermediate levels of activation (A131).

Biserka Radošević Vidaček

Dementia: electrophysiological and genetic study

Principal investigator: Rajka Liščić, 2002-2006; collaborator: M. Poduje; project supported by MoSES

Frontotemporal dementia with motor neuron disease

Principal investigator: Rajka Liščić, 2007-2008; Croatian-Slovenian bilateral cooperation programme in the field of science and technology

Frontotemporal dementia

Principal investigator: Rajka Liščić, 2007-; collaborators: S. Kovačić (General Hospital Zabok), I. Martinić Popović (Clinical Hospital "Sestre milosrdnice", Zagreb); project supported by MoSES

Within the project *Dementia: Electrophysiological and Genetic Study*, we described a new neurophysiological method for the registration of the Stroop Color-Word Test in healthy volunteers in collaboration with the Institute for Clinical Neurophysiology, University Medical Centre Ljubljana. The Stroop Color-Word Test is used for investigating frontal lobes, and has been modified for electrophysiological diagnosis of dementia.

Frontotemporal dementia (FTD) is the second most common form of dementia in people under the age of 65 years after Alzheimer's disease. Therefore, within the last two projects we focused our efforts on FTD, a focal, non-Alzheimer form of dementia, clinically characterised as behavioural or aphasic variant, and later in the course of the disease with dementia and parkinsonism. Clinical FTD may be associated with a variety of different neuropathological entities. During my 12-month Fulbright scholarship we described a new mutation on granulin (GRN) gene in hereditary dysphasic disinhibition dementia family 2 (HDDD2), a variety of FTD, in collaboration with Washington University, School of Medicine, St. Louis, MO, USA (A185). It describes the molecular genetic cause of familial frontotemporal lobar degeneration (FTLD) with ubiquitin positive inclusions (FTLD-U), and is a major scientific discovery that helps to understand the mechanisms and the way progranulin mutation might cause familial FTLD. We also performed a retrospective analysis of neuropathology of FTLD (1988-2005) according to the consensus criteria by McKhann and colleagues (2001), and recommended an extension of the McKhann's criteria. Very important for the clinical work is our finding of clinical and psychometric differences between Alzheimer's disease and FTD in an early stage of the disease, again in collaboration with Washington University School of Medicine, St. Louis, MO, USA (A149). We described another new mutation on GRN gene (A10) in Hereditary Dyspasia Disinhibition Dementia 1 (HDDD1), which is another form of FTLD. This important discovery describes the molecular genetic cause of familial dementia and helps to understand the mechanisms and the way GRN mutation might cause familial FTLD.

Major discoveries have been made in the recent past in genetics, biochemistry, and neuropathology of FTLD. TAR DNA-binding protein (TDP-43), encoded by the TARDBP gene, has been identified as the major pathological protein of FTLD, with ubiquitin-immunoreactive inclusions with or without familial amyotrophic lateral sclerosis (ALS) and sporadic ALS (A150). On the level of neurotransmitters, serotonergic and catecholaminergic systems regulate behavioural functions and are involved in the aetiology of polygenic neuropsychiatric disorders such as FTLD. Cognitive impairment in ALS has been demonstrated in up to 50 % of ALS patients. Therefore, our aim was to identify gene polymorphism coding for proteins involved in serotonin synthesis (tryptophan hydroxylase), cateholamine synthesis (DBH), active neurotransmitter uptake (catecholamine and serotonin transporter), and neurotransmitter degradation (MAO-A, MAO-B, COMT), with the emphasis on executive function in ALS patients. A sizable proportion of ALS patients' showed behavioural and cognitive changes within the spectrum of FTD impairment. However, further studies on a larger sample are needed to confirm it.

Rajka Liščić

Morbidity and mortality risks in adult Croatian population

Principal investigator: Mladen Pavlović, 2002-2006; collaborators: N. Čorović, M. Malinar; project supported by MoSES

Morbidity and mortality risk assessment in Croatian population: a follow-up study

Principal investigator: Mladen Pavlović, 2007-; collaborators: N. Čorović, D. Šimić (Central State Administrative Office for E-Croatia Zagreb); project supported by MoSES

Between 2004 and 2008 we continued with the fourth phase of a project investigating chronic diseases in Croatian population. Survival analysis in relation to cardiovascular mortality and smoking and coffee drinking habits (A197, A281, B72, B73). Apart from that, we continued to collect data on residential status and vital statistics about the subjects participating in our study on chronic illnesses. We relied on available data from local registry offices and parish offices, and on telephone contacts or contacts with participants' relatives. In 2005, the participants were queried about their health status, and their subjective feeling of health. Just as in earlier research, for ethical reasons we excluded persons who were not able to respond due to illness or who had been hospitalised and persons who changed residence or moved to old people's home. With our database updated, we asked the participants to take one more examination taking care that the sample remained representative.

The 2006-2007 medical examination was conducted in the same fashion as in 1972 and 1982. We extended the basic questionnaire on chronic illnesses that was designed according to the IX International Classification of Illnesses and Causes of Death with additional questions related to older age, the mini-mental state examination (MMSE) or SF-36 (CASP 19; Croatian version) for quality of life of older persons. We also performed a smell test for isopropyl alcohol. The rest of the questionnaire dealt with marital status, possession of driving license, residence, hours spent walking, and medicines used, classified into 11 categories according to the WHO Anatomical Therapeutic Chemical (ATC) classification. The part of the questionnaire on diet was extended to include Mediterranean food (olive oil, pelagic fish, river and lake fish, beer, wine, spirits). Preparation activities for supplement to coding and electrocardiograph results were conducted as well as ventilatory function test according to predicted values for aged Croatian population. Consultations on additional anthropometric variables as height and weight, waist circumference and thorax cirtometry with difference according to inhale was introduced.

We also conducted preparation activities for ultrasound densitometry of the heel bone for participants from Zagreb, Omiš, and Split. In the autumn of 2006 and 2007 we clinically examined 396 of 754 invited participants who were earlier examined in 1969, 1972, and 1982. Analysis of lipids and basic biochemical tests including creatinine, alkaline phosphatase, activity of alpha 1-antitrypsin, proteins in serum, acidum uricum, CRP, urea, gamma GT, sugar in blood, calcium, and phosphor in serum, and urine ketones, proteins and glucose were performed at the Institute for Clinical and Experimental Medicine, Prague. Selenium, zinc and copper concentration as well as the activity of glutathione peroxydase were measured in blood samples collected from participants from Vis, Virovitica, Zagreb, Split, and Omiš. Prostate-specific antigen was also determined in the serum of men. All data were entered into databases under a code number that had existed since 1969 to protect participant's privacy. We are about to publishing preliminary data and subjective health assessment along with data related to the Mediterranean diet and metabolic syndrome. Preliminary results indicate statistically significant regional differences in serum selenium and zinc.

Mladen Pavlović

Professional services

Between 2004 and 2008, the Unit of Occupational and Environmental Medicine performed medical examination of healthy subjects and patients within research activities, and operated as an outpatient clinic providing specific diagnostic services, and medical and psychological examinations related to occupational health. Medical procedures were focused on determining occupational diseases and assessing working ability. Particular attention was given to the evaluation of occupational allergic diseases. Diagnostic procedures included bone densitometry, allergological testing, lung function testing, ECG, exercise testing, psychological examinations, and biochemical measurements. Additionally, Professional services of this Unit included court expertise in the field of occupational medicine, toxicology, and clinical psychology.

Jelena Macan

Radiation Dosimetry and Radiobiology Unit

Scientific staff:
Ivančica Trošić
Ivan Pavičić
Marija Surić Mihić

Technical staff:
Selvije Idrizi
Nada Horš
Zorica Kubelka

Professional staff:
Ivica Prlić, head
Tomislav Meštrović

People who retired between 2004 and 2008: Nediljka Iveković, Stane Hajdarović

People who left between 2004 and 2008: Martina Suša, Boro Kmezić

Research activities

Biomedical effects of radiofrequency microwave radiation

Principal investigator: Ivančica Trošić, 2002-2006; collaborators: M. Mataušić-Pišl, I. Pavičić, N. Horš; project supported by MoSES

Biological markers of activity of electromagnetic nonionising radiation

Principal investigator: Ivančica Trošić, 2007-; collaborators: S. Milković-Kraus, I. Pavičić, M. Suša, M. Mataušić-Pišl, I. Bušljeta Prusac (Belupo Pharmaceuticals and Cosmetics, Koprivnica), S. Pažanin (Institute for Marine Medicine, Split); project supported by MoSES

Exposure to radiofrequency microwave radiation (RF/MW) from electroenergetic and radar systems, RTV networks, telecommunications, and medical and household devices significantly exceeds naturally occurring exposure. Animal model studies might give a comprehensive insight into the biological effects of radiation, while cell culture research might provide a better look at action mechanisms. We used the erythrocyte micronucleus assay to investigate the extent of genetic damage in bone marrow red cells of rats exposed to RF/MW radiation and found that it increased the frequency of polychromatic erythrocytes (PCEs). RF/MW also had a transient effect on proliferation and maturation of erythropoietc cells in the rat bone marrow, and we observed sporadic appearance of micronucleated immature bone marrow red cells (A253). Further, to observe the erythropoietic changes in rats subchronically exposed to the nonthermal RF/MW irradiation, rats were submitted to the same experimental conditions as above in order to be irradiated for 2, 8, 15 and 30 days. Bone marrow smears were examined to determine absolute counts of anuclear cells and erythropoietic precursor cells. In the exposed animals, erythrocyte count, haemoglobin, and haematocrit increased in peripheral blood on irradiation days 8 and 15. Concurrently, anuclear cells and erythropoietic precursor cells significantly decreased in the bone marrow on day 15, but micronucleated cell frequency increased. In the applied experimental condition, RF/MW radiation might cause disturbance in red cell maturation and proliferation, and induce micronucleus formation in erythropoietic cells (A38). An *in vivo* mammalian cytogenetic test (MN) was used to investigate the extent of genetic damage in bone marrow red cells of rats exposed to RF/MW radiation. Rats were exposed to a 2.45 GHz continuous RF/MW field for 2 h daily, 7 days a week, at a power density of 5-10 mW/cm^2. RF/MW irradiation has a transitory cytogenetic effect manifested by micronucleus formation in erythropoietic cells (A254). To evaluate the effects of radiation on erythropoiesis in rats exposed at whole body SAR of 1.25 ± 0.36 W/kg, we observed the kinetics of PCEs and micronucleated (MN) PCEs in bone marrow and peripheral blood. Rats were exposed to the frequency field of 2.45 GHz, SAR of 1.25 W/kg for 2 hours a day, 7 days a week. Obtained findings were considered to be indicators of radiation effects on bone marrow erythropoiesis that was consequently reflected in the peripheral blood. Dynamic haemopoietic was restored by the end of the experiment, which indicates possibility of activation process to the selected experimental conditions of subchronic RF/MW exposure (A257). We investigated the blood-forming system in rats after whole-body microwave exposure, with particular reference to lymphocytes. Rat exposure was similar to conditions described above. SAR was 1-2 W/kg. Cell response was assessed from the number and the type of bone marrow nuclear and peripheral blood white cells. A significant decrease in lymphoblast count was observed on experimental day 15 and 30, whereas other examined parameters did not significantly differ from control animals. Our findings suggest that the

stress response by the blood forming system after microwave exposure could be a sign of adaptation rather than of dysfunction (A254). We tested the assumption that RF/MW affects the synthesis of melatonin, a regulator of hematopoiesis and immunological response, by determining the excretion of melatonin metabolite (aMT6s) in nocturnal urine of rats. A decline in aMT6s was observed from experimental day 8 to 11. The aMT6s level remained consistently low until the end of the experiment, but not significantly lower than the control values. Under the experimental conditions described above, repeated 2.45 GHz irradiation could act as a stressor and therefore influence rat melatonin balance (C140).

Electromagnetic radiation (EM) of microwave frequencies in the range of 300 MHz-3000 MHz (MW) has become one of the major physical environmental pollutants. This raises concern about health hazards related to the interaction between microwave EM fields and life processes. Depending on the field strength, frequency, wave form, modulation, and duration of exposure, microwave radiation is absorbed in the molecules and manifests itself as a change in vibration energy or heat. Biomarkers of susceptibility and of the effect of low-intensity microwave radiation have been investigated using complex approach that includes cell cultures, and experimental animals. The mechanisms of MW radiation activity at the cellular and subcellular level have been examined *in vitro* using continuous cell cultures. Investigation has been continued by research of cellular and intracellular response to applied doses and exposure time of particular physical agents. The influence of 864 MHz electromagnetic field on proliferation, colony forming ability, and viability of continuous cell line V79 was evaluated. Cells were exposed to 864 MHz continuous wave for 1, 2, and 3 hours at an average SAR of 0.08 W/kg. Cells irradiated for two or three hours showed a significant decrease in growth on experimental day 3. The colony-forming ability and viability of the irradiated cells did not significantly differ from control. Applied RF/MW irradiation significantly affected cell proliferation kinetics but not viability or ability of V79 cells to form colonies (A194).

We also evaluated and compared the effects of 864 MHz and 935 MHz radiofrequency/microwave (RF/MW) fields on the growth, colony-forming ability, and viability of V79 cells. Cells were exposed to continuous wave frequencies of 864 MHz and 935 MHz for 1, 2 and 3 hours. SAR was 0.08 W/kg for the 864 MHz or 0.12 W/kg for the 935 MHz field. The growth of the 864 MHz-irradiated cells significantly decreased after two- and three-hour exposure 72 hours after irradiation. Similar was observed 72 hours after exposure to 935 MHz microwaves for three hours. Colony-forming ability and cell viability of V79 cells exposed to 864 MHz or 935 MHz microwaves did not significantly differ from control cells. The two applied RF/MW fields showed similar effects on the growth, colony-forming ability, and viability of V79 cells. Cell growth impact was time-dependent for both fields (A195).

In addition, we evaluated whether low-level, ultra high frequency (UHF) irradiation of 935 MHz influenced the structure and growth of V79 cells. UHF field was generated inside a Gigahertz Transversal Electromagnetic Mode cell (GTEM-cell) with a Hewlett-Packard signal generator. The electric field strength was 8.2 ± 0.3 V/cm and the average SAR was 0.12 W/kg. Cell samples were exposed to a 935 MHz continuous wave frequency field for 1, 2, and 3 h. In comparison with control cells, the microtubule structure clearly altered after 3 h of irradiation. A significantly decreased growth was noted in cells exposed for 3 h three days after irradiation. It seems that the 935 MHz, low-level UHF radiation affects microtubule proteins, which consequently may obstruct cell growth (A196).

Basic investigations called attention of dentists to evaluate the time and dose dependence effect of halogen blue light from Elipar ®TriLight, ESPE Dental AG Germany, since the success of filling duration depends on appropriate composite polymerization. A quartz-tungsten-halogen lamp emits radiation wavelengths 400-515 nm. We evaluated the effects of halogen light from a dental curing unit on cell viability, colony-forming ability, and proliferation of V79 cells. The light was set at the medium mode (M), exponential (E) and standard (S) illumination mode for 20, 40 and 80 seconds. Cell viability was not affected by the blue light regardless of exposure time and light mode. Colony-forming ability was slightly, but not significantly lower in treated cells than in control cells. Cell proliferation was lower in cells exposed to mode M for 80 s on post-exposure day 3 and 4. On the same post-exposure days, proliferation of cells exposed to modes E and S was significantly inhibited after 20, 40, and 80 s of exposure. It is still unclear whether disrupted cell function and no significant decrease in colony-forming ability of V79 cells, in addition to significant time- and dose-dependent inhibition of cell proliferation are owed to the dental curing blue light activity and/or changes in temperature during the experiment *in vitro* (A107).

Ivančica Trošić

Professional services

Next year, the Radiation Dosimetry and Radiobiology Unit will have 50 years of providing consulting and professional services in the domain of radiation protection, personal dosimetry, quality assurance, and control of ionising radiation sources to individuals occupationally exposed to ionising radiation, medical institutions, and public authorities.

The Unit has developed a new active electronic dosimeter in collaboration with ALARA Ltd. company. This device is versatile and can be used for many purposes, including personal dosimetry, scientific validation, and professional measurements. Over the last five years the Unit has invested in new equipment to meet requirements for ISO 17025:2007 accreditation for personal and environmental TLD dosimetry. This is a step forward in harmonization with the EU directives on procedures for regular monitoring of exposure to external ionising radiation and to regaining licence to perform radiation protection technical services. We continued to invest in professional education of all staff members, scientific and professional, in order for them to implement new radiation protection safety measures in everyday life, to keep up with state-of-the-art measurement techniques, to be aware of new ionizing and nonionising radiation sources and all other new technologies affecting individuals and environment.

Over the last five years we had continued measuring and identifying natural radioactivity and radioactive elements in fallout, air, water, soil, food and feed, and coal. In a few special projects we focused on naturally occurring radioactive materials enhanced by our industries. We had also extensively measured nonionising radiation exposure to mobile radio telecommunication technologies.

The Unit has been licensed for its services by the Ministry of Health and Social Welfare, Ministry of Environmental Protection, Physical Planning and Construction, and the Ministry of Agriculture, Forestry and Water Management.

Ivica Prlić

Between 2004 and 2008, the Unit had been providing 470 immunological analyses of human sera with a double agar gel immunodiffusion test using antigen-antibody complexes. The analysis included specific immunological response to occupational and general allergens. We had also been monitoring, detecting, and identifying fibrogenic dusts, and in particular all types of asbestos in bulk materials. 215 bulk materials were analysed for asbestos by type and presence. The analysis was performed according to a standardised method for stereo- and polarizing microscopy described in the MDHS 77-HSE document "Method for the Determination of Hazardous Substaces; series 77 – Asbestos in bulk materials", ISO 9000, i BS ISO/IEC 17025. The Unit is included in the Asbestos in Materials Scheme (AIMS) under the guidance of the Institute of Occupational Medicine, Health and Safety Laboratory, Sheffield, Great Britain. At the moment, AIMS Round 37 is in procedure. Within this scheme our Institute has been appointed as the national institution for asbestos monitoring and identification in bulk materials.

Ivančica Trošić

Radiation Protection Unit

Scientific staff:
Gordana Marović, head
Zdenko Franić
Jadranka Kovač
Gina Branica
Branko Petrinec
Tomislav Bituh

Professional staff:
Iva Franulović
Božena Skoko
Manda Maračić

Technical staff:
Jasminka Senčar
Enis Sokolović
Ljerka Petroci

People who retired between 2004and 2008: Nevenka Lokobauer

Peopole who left between 2004 and 2008: Maja Bronzović, Jurica Meštrović

Research activities

Environmental radioactivity and radiation protection

Principal investigator: Gordana Marović, 2002-2006; collaborators: J. Kovač, N. Lokobauer, Z. Franić, M. Bronzović, M. Surić-Mihić, M. Maračić, T. Meštrović, B. Petrinec, I. Prlić, J. Senčar, E. Sokolović, B. Kmezić, Z. Kubelka, Lj. Petroci, S. Hajdarović, N. Iveković; project supported by MoSES

Environmental radioactivity and radiation protection

Principal investigator: Gordana Marović, 2007-; collaborators: Z. Franić, J. Kovač, M. Surić Mihić, N. Lokobauer, M. Vrtar (Clinical Hospital Center Zagreb), N. Kovačević (Clinical Hospital Center Zagreb), D. Šinka (Enconet International d.o.o. Zagreb); project supported by MoSES

Monitoring of environmental radioactivity started in 1959 as part of a continuing monitoring program designed to provide information about the presence of radionuclides in the Croatian environment. Research activities conducted under the monitoring programme have included the accumulation and translocation of natural and fission radionuclides in environmental samples. A major focus has been placed on the transfer of biologically significant radionuclides to the food chain and water, and on assessment of potential human doses resulting from direct and indirect ingestion of radionuclides.

Data on the presence and movement of radionuclides in the environment and within ecosystems were obtained by analysing samples from the terrestrial and marine environment - fallout, air, soils, drinking water, sea, and surface waters. In order to assess the body burden in Croatian population through the presence and accumulation of radionuclides in the food chain, levels of radioactivity were measured in samples of food stuffs and animal feed (A66, A68, A70, A71, C26, C80, C81, C83).

Radiation doses received by the Croatian population by ingestion of fission radionuclides through the food chain were of special importance in order to set up appropriate measures and effective actions to be implemented in case of a nuclear or radiological event and/or broad contamination by nuclear material. We have continued to improve, standardise, and harmonise analytical methods on radioactivity measurements in various media.

Radiocaesium activity in selected marine bioindicator organisms and carp were investigated in cooperation with a project headed by Z. Franić. We estimated the effective ecological half-life of ^{137}Cs in mussels and the concentration factor for carp. Annual effective dose received by an adult Croatian through consumption of these organisms is rather small (A69, C29).

Mean residence time of the Adriatic seawater has been estimated using ^{90}Sr as a radioactive tracer. We presented an overview of the ongoing and future radioecological investigations in the Adriatic Sea and coastal areas along with a detailed work plan for further investigations of seawater circulation utilising radiotracers, which will contribute greatly to the management of wastewater and other communal waste in the Adriatic area (A67, B28, C22).

Within investigations of naturally occurring radionuclides in water systems, special attention has been paid to the activity concentrations of ^{226}Ra in tap, mineral, and river waters. Some of these waters were not suitable for consumption due to increased activity concentrations of natural radionuclides. The effects of ^{226}Ra concentration in drinking water were investigated and a model was designed to measure continuous exposure to ^{226}Ra through water consumption over a long time. We also developed a mathematical model

to assess doses received through continuous exposure to low-dose radiation (A19, A35, C7, C8).

The growing popularity of bottled water consumption in recent years has raised the issue of treatment and removal of ^{226}Ra in water factories in Croatia. We estimated the doses received through water consumption with regard to age and sex. Estimated burdens make it possible to predict exposure control measures and protection for individuals or population at risk in cases of prolonged exposure (A36, B12, B13, C9, C10).

Mosses, lichens, and some mushroom species are sensitive bioindicators of radioactive contamination for various ecosystems, particularly in the event of a nuclear accident and uncontrolled emission of fission products. We summarised the results of systematic, long-term measurements of fission radionuclide activities in mosses, some edible mushroom species, and grass. Radiocaesium activity in mosses and mushrooms were in good correlation with fallout activities. Regarding the risk assessment for the Croatian population arising from consumption of mushrooms (*Boletus edulis* and *Cantharellus cibarius*), the collective effective dose was found to be quite low. Mushroom consumption was not a critical pathway for the transfer of radiocaesium from fallout (A162, C30, C86, C88).

Disposal of waste has been studied with particular attention on possible long-term exposure to radiation as well as technologically enhanced natural radioactivity associated with electrical power production and production of mineral fertilisers. Safety criteria for materials used in building construction were set, based on the external hazard index, H_{ex}, and radium equivalent activity, Ra_{eq}, of sampled ash and building material (A161, B27, B61, C61-C67, C82, C87).

In cooperation with a project headed by K. Šega, we have reviewed investigations of radioactive matter in the air as a part of systematic investigation of environmental radioactivity in the context of existing Croatian regulations. Despite the constant presence of radioactive matter in the air, background exposure doses as well as activity concentrations of monitored radionuclides have never exceeded national limits. The annual effective dose determined for ^{137}Cs and ^{7}Be inhaled from air was very small (A72, B59, B60, C24, C25, C27, C84, C85).

We have also continued developing measures for rapid and effective minimisation of radioactive contamination in normal and accidental situations (C118).

Gordana Marović

Radioecology of the Adriatic Sea and coastal areas

Principal investigator: Zdenko Franić, 2007-; collaborators: G. Marović, G. Branica, B. Petrinec, D. Kubelka (State Office for Radiation Protection Zagreb), N. Leder (Hydrographic Institute of Republic of Croatia Split); project supported by MoSES

The Adriatic Sea is a small and relatively shallow body of water, with specific water circulation and almost land-locked position between the high mountains of the Balkan and Italian peninsulas. It is therefore expected to be more sensitive to anthropogenic and natural radionuclides than the rest of the Mediterranean. In order to assess the impact on human health and the environment, investigation of main pollution sources and exposure pathways is essential. It is also important for plan, establish and implement efficient radioprotection measures for the marine environment and coastal areas, and to optimise the management of the Adriatic Sea as integral eco-system and important economic resource.

Time trends of absorbed dose rates in air and sea, inventories and activity concentrations of radionuclides in seawater and coastal areas were studied and compared with regional trends (A67, A72, C24, C25, C85).

Samples of bioindicator organisms including pilchards (*Sardina pilchardus*), musky octopusses (*Ozaena moschata*), and mussels (*Mytilus galloprovincialis*) were collected and analysed. Radiation doses received through the intake of radionuclides in these marine foodstuffs were small and comparable with other foodstuffs in Croatia, such as carp (*Cyprinus carpio*), potatoe (*Solanum tuberosum*), and wheat (A66, A68-A71, A162, C26, C29, C30, C80, C81, C83, C86, C88).

Collaborators on the project embarked on a scientific radioecological-oceanographic cruise (*International Scientific Cruise to Adriatic and Ionian Seas)* from 24 September to 5 October 2007, organised by the International Atomic Energy Agency (IAEA) within the project IAEA RER/7/003 (*Marine Environmental Assessment of the Mediterranean Sea*). The cruise ship was a research vessel Palagruža, owned by the Hydrographic Institute of the Republic of Croatia, which accommodated 30 IAEA scientists from Albania, Bosnia and Herzegovina, Croatia, Greece, Italy, Malta, Montenegro, Slovenia, Romania and Ukraine. The research route included Croatian territorial waters with sampling locations in the Channel of Brač, Jabuka Pit, Island of Brusnik, Palagruža Sill, the South Adriatic Pit, but also a few sampling locations in Greece, Albania, and Montenegro and two sampling stations in international waters at the inflowing and outflowing vein of the Strait of Otranto.

Samples of sediment core and surface seawater

were collected at 10 locations, and seawater samples from the various depths of the water column on six locations. Seawater temperature, salinity, and density were measured at all locations. At four locations sediment samples were collected from the seabed from the depths of up to 40 cm. Sampling locations Jabuka Pit – Palagruža Sill – South Adriatic Pit – Albania form a line along the Adriatic axis. Sediment samples have been divided into 2 cm thick slices for a closer look into the sedimentation processes. Subsequent investigation will include gamma-spectrometry and other methods investigating the penetration rate of fission radionuclides into deeper sediment layers. Sediment analysis is still in progress.

Preliminary estimation of the Adriatic sea-water turnover time using fallout ^{137}Cs as a radioactive tracer has confirmed the findings of a similar analysis performed using ^{90}Sr as a radioactive tracer. In both studies the turnover time was less than five years (A67, C22).

For non-radiological characterization, we collected samples of surface water at locations Jabuka Pit, near the island of Brusnik, and South Adriatic Pit. At several other locations we took samples from greater depths (B28).

Field gammaspectrometry was performed on the islands of Brusnik, Palagruža, and Vis, and the samples were also analysed in a laboratory. The results showed that background radiation on the islands of Brusnik and Jabuka is slightly greater than on the islands of Palagruža and Vis. Brusnik is partly and Jabuka entirely of magmatic origin, with higher concentrations of natural radionuclides than other, mostly limestone islands. The external hazard index and radium equivalent activity for middle-Dalmatian islands were considerably higher than on the other islands. However, external gamma dose rates measured on these islands correspond to annual doses that are less than 1 mSv (C105, C106). Radiochemical treatment of samples, gammaspectrometry, and other analyses are in progress.

Over the first two years of the project, special attention has been paid to quality assurance and quality control of laboratory practice when dealing with radioecological samples (B30, C27, C34).

Zdenko Franić

Professional services

Measurements of environmental radiological contamination by the coal-fired power plant Plomin were continued within a research contract with Hrvatska Elektroprivreda. Field measurements and sampling were carried out at the site of ash and slag deposit in the area around the plant as well as in the coastal area and in the Bay of Plomin. A decrease in the levels of radionuclide contamination was observed due to restoration taken at the waste deposit site.

Intense agricultural production with an increased use of fertilisers containing radioactive elements contributes to the level of technologically enhanced natural radioactivity. We continued our research of radionuclide concentrations in waste waters from a phosphate fertiliser plant in collaboration with fertiliser company Petrokemija Kutina.

Radioactive contamination originated by Nuclear Power Plant Krško (Republic of Slovenia) has been monitored at several locations in the north-west Croatia, including calculation of doses. As part of the programme of nuclear emergency planning, our emergency response team performed periodic field exercises to practice field measurements in case of nuclear accident. These measurements are within the framework of the project Monitoring and Assessment of Radioactive Contamination Originating from Nuclear Power Plant Krško.

The Institute has established continuous collaboration with several research institutions abroad. Over the past years, intercalibration programmes were carried out within the international collaboration with the World Health Organization (WHO), International Atomic Energy Association (IAEA), Nuclear Power Plant Krško, Jožef Štefan Institute, Ljubljana and the Institute of Occupational Safety (Zavod za varstvo pri delu) of the Republic of Slovenia.

Gordana Marović

Toxicology Unit

Scientific staff:
Božica Radić, head
Maja Peraica
Ana Lucić Vrdoljak
Suzana Berend
Dubravka Flajs

Technical staff:
Marija Kramarić
Mirjana Matašin
Jasna Mileković

Associate scientist:
Radovan Fuchs

People who left between 2004 and 2008: Ana-Marija Domjan, Radovan Fuchs, Vilim Žlender

Research activities

Anticholinesterase poisons – biological effects of new antidotes

Principal investigator: Božica Radić, 2002-2006; collaborators: A. Lucić Vrdoljak, S. Berend, M. Kramarić, J. Mileković; project supported by MoSES

Therapeutic effect of newly synthesised compounds in organophosphorous poisoning

Principal investigator: Božica Radić, 2007-; Collaborators: A. Lucić Vrdoljak, S. Berend, R. Fuchs (MoSES), J. Lovrić (Medical School, University of Zagreb); project supported by MoSES

Due to a wide use of organophosphate (OP) compounds and carbamates in modern agriculture, millions of people are exposed to these compounds through air, water, or food. In particular circumstances, this exposure can cause manifest health problems such as acute or chronic poisonings. One of the toxic effects of anticholinesterase compounds such as the highly toxic nervous warfare agents (soman, sarin, tabun, VX) and carbamates is irreversible inhibition of hydrolytic enzymes, that is, the vitally important acetylcholinesterase (AChE) and butyrylcholinesterase (BChE). AChE inhibition results in the accumulation of acetylcholine (ACh) at the synaptic cleft of the cholinergic neurones, leading to overstimulation of cholinergic receptors. Symptoms of poisoning include salivation, tremors, diarrhoea, and respiratory failure. As a result, the common cause of death is suffocation (D24). The current standard treatment of OP poisoning includes combined administration of a cholinesterase reactivator (oxime), a muscarinic cholinergic receptor antagonist (atropine sulphate), and pre-treatment with reversible carbamate AChE-inhibitor such as pyridostigmine. Our research focused on antidotes with nucleophilic characteristics, the oxime group, and other compounds that could have act against anticholinesterase poisoning. We investigated the antidotal effect of tenocyclidine (TCP) and its adamantyl derivative (TAMORF) - compounds with potential activity in N-methyl-D-aspartate (NMDA) receptors. These compounds weakly inhibited AChE, without reactivating or protecting AChE inhibited by soman *in vitro* (A215). However, *in vivo* results have shown that TAMORF could be a good alternative to current pretreatment, as it had no side effects. TAMORF metabolism in rats suggests that only a part is metabolised while the other part remains unchanged. TAMORF is a promising source molecule for further modifications and for the development of more potent antitumour or radioprotective substances or of OP-poisoning antidotes (A154, A203). In addition, we investigated the antidotal effect of mono-pyridinium compounds (A155) and bispyridinium oximes in soman and tabun poisoning (A50). A group of K-oximes was investigated *in vitro* and *in vivo* in mice and rats. Although they were relatively toxic to mice, all oximes showed an improvement in the therapy of tabun poisoning (A15, A141). With those that showed the best pharmacological properties as reactivators and protectors we expanded experiments by applying them in combination as pretreatment and therapy (A153). Low acute toxicity and high reactivating potency *in vitro* and *in vivo* single out K048 as a promising oxime for future investigation.

We have begun a research with irinotecan, an anticancer prodrug that has been approved for the treatment of colon cancer. Cancer patients receiving irinotecan may have acute cholinergic side effects. *In vitro* experiments suggest that this is due to direct inhibition of AChE. We therefore investigated the efficiency of the HI-6 oxime in protecting and/or reactivating human erythrocyte AChE inhibited by irinotecan. We also investigated its cyto/genotoxicity *in vitro*. HI-6 increases AChE activity after irinotecan inhibition. The results obtained encourage further investigation of HI-6 *in vivo*, as well as its development for possible application in chemotherapy (A123, A216).

Furthermore, we have been studying AChE activity and assessing genome damage in workers employed in carbofuran production (A277, A278).

One part of our research focused on the role of the enzyme paraoxonase and BChE in lipid metabolism in rats (A31, B51).

Božica Radić

Effect of mycotoxins on humans and animals

Principal investigator: Radovan Fuchs, 2002-2006; collaborators: M. Peraica, A-M. Domijan, V. Žlender, M. Matašin; project supported by MoSES

Toxic effects of mycotoxins on humans and animals

Principal investigator: Maja Peraica, 2007-; collaborators: R. Fuchs (MoSES), A.-M. Domijan, V. Žlender, D. Flajs; project supported by MoSES

The most common contaminants of grains in temperate climates, including Croatia are moulds of the *Fusarium*, *Penicillium* and *Aspergillus* genus. These moulds produce a number of mycotoxins and among them the most frequent are fumonisins, zearalenone (ZEA), and ochratoxin A (OTA). We have introduced methods for OTA determination in beans (A58) and ZEA in wheat (E9). ZEA was found in all samples of wheat collected in Slavonija, but its concentration was very low. In bean samples collected in various parts of Croatia the concentration of OTA was low, and OTA-positive bean samples were found in the central and northern Croatia, while those from the southern Croatia (Dalmatia and Primorje) were OTA-free. In maize samples collected in all maize-producing counties FB_1 was found in 100 %, ZEA in 84 %, OTA in 39 %, and FB_2 in 6 % of samples (A57, B20). The co-occurrence of the three mycotoxins was high (37 %), and the mean concentration of single mycotoxins was low.

The concentration of OTA was determined in white and red wines collected all over Croatia (B21). All red wines contained OTA, and its mean concentration was higher than in white wines. OTA concentration in wines from Croatia is lower than in the neighbouring countries. Our method was evaluated in an interlaboratory study performed by the Association of Enological Laboratories from Porto (Portugal).

The mechanism of OTA and FB_1 toxicity was studied on a rat model. Methods for the measuring parameters of oxidative lesions of macromolecules (proteins, lipids, and DNA) were introduced and used for studying the effect of mycotoxins in rats (A56, A59-A62, B23, E11). We have found that OTA produces apoptotic cells in the rat kidney and that their appearance depends on the dose and the length of exposure (B22). OTA-induced genotoxic lesions were measured using the comet assay in the kidney of rats treated with multiple OTA doses (A59, A275). All parameters of DNA lesions (tail length and intensity, as well as the tail moment) increase with OTA concentration in the kidney.

Multiple FB_1 treatment increased the concentration of sphinganine (Sa), sphingosine (So), and their ratio (target molecules in FB_1 toxicity), which both caused DNA damage measured with comet test (tail length, tail intensity and tail moment) in kidney and liver homogenates (A61). In both organs this happened before MDA and protein carbonyl concentrations increased and before catalase activity of decreased, showing that oxidative stress is not crucial in FB_1 genotoxicity. The effect of a single FB_1 dose on DNA lesions measured with the comet assay in kidney homogenate showed time and dose dependence (A202). Apoptotic cells were found in the cortical and outer medullar part of the kidney. The effect of FB_1 on glutathione concentration and activity of mitogen-activated protein kinases and the expression of heat shock proteins was studied in the kidney and liver (A226). FB_1 affected the oxidative balance in the cell, causing tissue-specific activation and expression of molecules involved in oxidative stress.

OTA and FB_1 increase oxidative stress, and their damaging effect on DNA is synergistic even at as low doses as those in the European-type diet (A60). Using the standard and modified comet assay with formamido-pyrimidine-DNA-glycosilase enzyme that breaks DNA at the site of oxidative lesion, we have found that both OTA and FB_1 cause oxidative DNA damage, but this is not the only mechanism of their genotoxicity (A59).

A part of our research focused on the aetiology of endemic nephropathy was performed in collaboration with the Institute of Public Health of the Brodsko-Posavska County. In it we determined OTA concentration and Sa/So ratio in human urine samples collected from the same residents of endemic and control villages in 2000 and 2005. The frequency of OTA-positive samples was higher in the residents of the endemic area than in controls. However, OTA concentrations were not significantly different between the two populations. The Sa/So ratio was also higher in the urine of the endemic area residents.

Maja Peraica

Professional services

The Toxicology Unit measures blood and plasma cholinesterase activity in people exposed to anticholinesterase pesticides, as cholinesterase activity is a direct biomarker of toxic effects caused by anticholinesterase agents (organophosphates or carbamates). We also provide toxicological evaluation of public health pesticides by determining basic acute toxicity *in vivo*. Testing includes acute oral, dermal, and primary skin and eye irritation and sensitisation.

Božica Radić

Other Research Projects

Effect of physical and chemical agents - cytogenetic biomarkers

Principal investigator: Aleksandra Fučić, 2002-2006; project supported by MoSES

My study of the impact of physical and chemical agents in humans and in animals during growth and development has shown that children and young animals are particularly vulnerable to genotoxicants. This confirms recent research findings and calls for development of a new environmental protection legislation to reduced health risks for the children (A25, A37, A186, A189, A264, A265). An analysis of chromosome aberrations showed that this method can predict increased cancer risk (A24, A74, A75, A78, B27). However, sister chromatid exchange showed no such predictivity (A24). Exposure to depleted uranium in war circumstances did not significantly change the incidence of leukaemia and lymphoma in children (A144). Research within the project resulted in additional collaboration in European Framework Programmes, as follows: European network on children susceptibility and exposure to environmental genotoxicants (FP5); Policy interpretation network on children's health and environment (FP5); Health and Environment Network (FP6); Newborns and genotoxic risks: Development and application of biomarkers of dietary exposure to genotoxic and immunotoxic chemicals and of biomarkers of early effects, using mother-child birth cohorts and biobanks (FP6); and Expert team to support biomonitoring in Europe (FP6).

Aleksandra Fučić

1-Aminocyclopropanecarboxylic acids: coordination chemistry

Principal investigator: Nenad Raos, 2002-2006; collaborators: L. Mak, A. Miličević, former Analytical and Physical Chemistry Unit; project supported by MoSES

Development of models for the estimation of stability constants

Principal investigator: Nenad Raos, 2007-; collaborators: A. Miličević; project supported by MoSES

The aims of both projects (the second being a continuation of the first) were (1) to investigate the structure of chelates with 1-aminocyclopropane-1-carboxylic acid (acc) and intepret experimental results using the molecular-mechanics method; (2) to develop and apply the overlapping spheres (OS) method; and (3) to develop models for the estimation of stability constants of coordination compounds using topological indices.

In cooperation with the Faculty of Science, University of Zagreb we solved the crystal structure of copper(II) chelate with acc (A106). The structure turned to be quite unusual; it was a trimer consisting of one diaqua-trans- and two cis-biscomplexes.

The overlapping spheres method was first applied to find low-energy conformations, and then to estimate stability constants of coordination compounds.

The search for low-energy conformations is a classical problem in conformational analysis, especially in molecular-mechanics approach. The problem stems from the fact that molecular mechanics is capable of finding out conformations, but cannot tell in advance which of them will have low conformational energy. Thus we developed an original algorithm based on the OS method. We placed the central sphere with radius R_v at a defined position in a molecule and then applied repulsive potential proportional to the overlapping volumes of atoms penetrating the central sphere. The algorithm was successfully checked on branched alkanes and on the *trans*-(*N*-Boc-acc-OH)$_2$Cu complex (A219). The OS method was also used to estimate stability constants of copper(II) and nickel(II) chelates with naturally occurring amino acids and diamines (A168, A170, A220). The central sphere was placed at various positions in molecule. The best results were obtained with central atom position.

In applying topological indices to estimate stability constants of coordination compounds (A171, A175), we developed a new approach; instead of varying topological indices, we varied graph, i.e. constitutional formula. For our calculations we used graphs of the ligand (L), mono- (ML) and bis-complex (ML$_2$), as well as mono-complex with two additionally bonded ligand water molecules (ML^{aq}) and complexes with additional bonds between central atom and side chain (ML^{cor}), mimickig this way strong non-bonding interactions within addition to copper(II) and nickel(II) complexes with amino acids, their derivatives, diamines and triamines (A172), we also estimated stability constants with dipeptides (A174), where each chelate ring of the complex was treated separately. It was also possible to estimate

stability constants of one class of compounds from the calibration line developed on another (A173) and to theoretically evaluate results obtained by two experimental methods (A221).

A general review of issues involved and methods used was published in a review article (B64). The second project yielded one Ph.D. thesis (E31).

Nenad Raos

Transition metals with bioligands: interaction and modelling

Principal investigator: Jasmina Sabolović, 2002-2006; collaborators: G. Branica, M. Marković, former Analytical and Physical Chemistry Unit; project supported by MoSES

Transition metal complexes with bioligands: modelling and interaction

Principal investigator: Jasmina Sabolović, 2007-; collaborators: G. Branica, M. Marković, S. Tomić (Ruđer Bošković Institute, Zagreb) V. Gomzi (Ruđer Bošković Institute, Zagreb); project supported by MoSES

Metal complexes with various bioligands have been studied experimentally and theoretically. Complexes dissolved in aqueous and non-aqueous solvents were analysed using voltammetry and EPR spectroscopy, whereas their solid-state structures were determined using X-ray diffraction. We have developed new molecular mechanics vacuum-like force fields applicable to both gas-phase (isolated molecules) and condensed-phase simulations (crystal, aqueous solution) to predict and simulate structural and thermodynamical properties.

We used voltammetric techniques to study the interaction between lead and ascorbic acid at physiological ionic strength, different pH values, and different ratio of metal and ligand concentrations, and have published our finding on stability constants (A32).

Using the cyclic voltammetry, we determined redox potentials for the copper(II) complexes with aliphatic L-amino acids and their *N,N*-dimethyl derivatives in non-complexing electrolyte ($NaCl_4$) under physiological conditions (0.15 mol L^{-1}). We investigated the effects of *N,N*-dimethyl groups on electrochemical properties of the studied copper(II) complexes. As we expected, dimethylated copper complexes showed lower stability, deduced from redox potential shifts, than unsubstituted copper complexes. We tested our hypothesis that different electrochemical behaviour can be explained by steric reasons and aliphatic-aliphatic interactions.

We found a significant correlation between topological indices based on graph theory and stability constants experimentally determined using glass electrode potentiometry and square wave voltammetry for a series of copper(II) complexes with glycine, L-alanine, and their *N*-alkyl derivatives (A221).

The X-ray crystal and molecular structures of bis(*N,N*-diethylglycinato)copper(II) (A232), aquabis(*N,N*-dimethylglycinato)copper(II), aquabis(*N,N*-dimethylglycinato)copper(II) dihidrate (A233), and of the copper(II) complexes with L-valine and L-isoleucine were determind. Earlier we developed a molecular mechanics model (MM) and force field (named FFW) that reliably reproduced experimental crystal and quantum-chemically calculated vacuum structures by geometry optimisation of anhydrous and aqua copper(II) complexes with alihphatic amino acids, with either *trans*- or *cis*-CuN_2O_2 coordination polyhedron.

We used FFW for conformational analysis of anhydrous bis(L-*N,N*-dimethylvalinato)copper(II) and bis(L-*N,N*-dimethylleucinato)copper(II) and surrounded with four water molecules to examine the possibility of the lowest energy conformers to bind a water molecule to the copper(II) coordination sphere (A179). MM results suggested that different EPR spectra of the two complexes, dissolved in different solvents and studied at different temperatures, could be explained by sterical reasons.

We did conformational analysis to study the effects of steric aliphatic-aliphatic interactions in the coordination polymer of bis(*N,N*-diethylglycinato)copper(II) *in vacuo* and in the crystal lattice (A232). Combined experimental and theoretical results showed that intermolecular aliphatic-aliphatic interactions affected changes in molecular conformation and in the copper(II) coordination sphere during crystallisation.

We also applied FFW to study the effects of hydrogen bonding in the crystal structures of aquabis(*N,N*-dimethylglycinato)copper(II) dihydrate and aquabis(*N,N*-dimethylglycinato)copper(II) (A233). Different hydrogen bonding patterns in these crystal modifications did not visibly affect the molecular structure of the copper(II) complex. Experimental and theoretical results suggested that the main effect of two water molecules of crystallisation in the dihydrate modification was to stabilise the crystal packing via hydrogen bonding, while similar pyramidal copper(II) coordination geometry in both modifications was due to axially coordinated water molecule and its intermolecular interactions.

In collaboration with colleagues from the University of Innsbruck, we studied the mechanism for *cis*-*trans* isomerisation of bis(glycinato)copper(II) in the gas-phase based on high-level quantum chemical calculations (A249). The results showed that *cis* to *trans* interconversion occurred without breaking the bonds.

We developed a new force field whose

parametrisation was based on experimental crystal data and quantum-chemically obtained vacuum structures of a series of copper(II) complexes with aliphatic α-amino acids and their N-alkly derivatives and an SPC/E water model. Whereas FFW has proved reliable for MM simulations *in vacuo* and in crystal, the new force field is also reliable for MD simulations of solvated complexes in aqueous solution.

We developed force fields for modelling nine *tris*(acetylacetonato)metal(III) complexes in crystalline surroundings to examine the hypothesis if experimental enthalpy of fusion values could be connected with the in-crystal potential energies, and we showed that the connection existed (A231).

Jasmina Sabolović

Oligoelements in biological matrices and multielement profile quality control

Principal investigator: Nikola Ivičić, 2007-; Collaborators: B. Momčilović, A. Benutić (Croatian National Institute of Public Health, Zagreb), J. Pongračić (Croatian National Institute of Public Health, Zagreb); project supported by MoSES

We continued to study the relationship between human depression and multielement profile of distinct biological matrices such as hair and whole blood. Our prospective, randomised, double-blind, clinical-epidemiological study of the multielement profile involved 48 depressed subjects (15 men and 33 women) and 48 apparently healthy control subjects (23 men and 25 women). All research was conducted at the Centre for Biotic Medicine in Moscow, Russia, strictly observing the Declaration of Helsinki. We analysed 40 elements in hair and whole blood using the inductively coupled plasma mass spectrometry (ICP-MS) at the. The multielement profile of depressed subject was distinctly different from control subjects, and showed higher accumulation of trace elements Al, Ag, B, Ba, Cd, Ga, La, Mg, Mn, S, Sr, Ti, V i W in the hair and of so-called macro-elements sodium and potassium in the whole blood (A184, C94). To our knowledge, this is the first demonstration of the biomolecular basis of human depression (A184, C94). At the same time, we observed selenium, copper, and iodine deficiency in depressed subjects, i.e., the lack of elements that were hypothetically associated with human the depression. Thus, copper is essential for the synthesis of the epinephrine, selenium is essential in enzymes controlling the uptake of iodine to the thyroid gland, and iodine is essential for the hormonal function of the thyroid gland. We demonstrated iodine deficiency to be the principal nutritive determinant associated with human depression (A183, B66). We also showed that lymphocyte DNA damage that accompanied the physical sport activity depended on the athlete's nutritional status, which reflected in hair multielement profile (C160). In our study of calcium metabolism in perimenopausal women, we observed a phenomenon that we named the "calcium paradox", i.e. that simultaneous supplementation with the calcium, magnesium, and vitamin D was followed by counter-intuitive fall of hair calcium, supposedly due to increased calcium deposition in the skeletal mineralised tissue under the given conditions of supplementation (A209, B67).

We also studied theoretical implications of the same isotope mass number within and between elements on mass spectrometric analysis, and developed a new conceptual "fish skin" model (Russ. *cheschuya*) to describ these relationships (B66).

A study of the human whole blood multielement profile revealed that the homeostasis of bioelements in the human body varies with every element within that homeostasis system. This observation allows for a new conceptual approach that nears holistic interpretation of complex interactions between bioelements in the human body (A182).

Nikola Ivičić

Metal metabolism

Principal investigator: Berislav Momčilović, 2002-2006; collaborator: N. Ivičić, former Analytical and Physical Chemistry Unit; project supported by MoSES

We studied hair and blood multielement profile in subjects suffering from depression in a prospective, randomized, double blind, clinical-epidemiological study. The results indicate a strong aetiological link to the euthyroid nutritional iodine deficiency and/or metabolic impairment. The multielement profile analysis of Hg, Se, and I showed the increased hair Hg in association with low iodine, but variable Se concentration. In contrast to the now prevailing view of Hg toxicity as a result of high binding affinity to Se, our research points to the iodine nutritional status and/or metabolism as the primary target of human Hg toxicity. Furthermore, the multielement profile analysis of hair and blood showed higher Ca, Mg, Sr,

and Si content as an early warning sign of osteoporosis at the time when DEXA (dual x-ray absorptiometry) findings were inconclusive. Dental alloys are widely used in oral and orthopaedic prosthetics. Our research in collaboration with theZagreb University Dental School demonstrated thatmanufacturers of dental alloys do not report their composition in full (A52). Metal ion leaching from Au/Pt dental alloy showed a large release of Cr and onlyminuscule amounts of Au; indicating that the allergy associated with Au is in fact to be associated with thenon-recognized Cr.

In collaboration with the University of North Dakota Department of Physics, we showed that the distribution of radon daughters ^{214}Po (alpha emitter) and ^{214}Bi (beta emitter) varied considerably between different human brain structures in people suffering Alzheimer's disease (AD) (A181). Therefore, the radiation risk to the amygdala and hippocampus, two brain structures controlling emotions and memory respectively, is more than two orders of magnitude higher than that to the paleo cerebral structures of locus ceruleus and nucleus basalis. The internal dose of ^{214}Po alpha particles to amygdala is sufficient enough to destroy this brain structure within but a few years. In AD, both ^{214}Po and ^{214}Bi radon daughters accrue selectively in the brain cell proteins whereas lipids are not infested, except for amygdala.

A new method for Mo analysis in whole human blood using differential pulsed anodic stripping voltammetry (DPASV) was developed at the Institute's Analytical and Physical Chemistry Unit. The results were compared with those obtained by another Institute's Unit using electrothermal atomic absorption spectrometry (ET-AAS) and by the Center for Biotic Medicine (CBM), Moscow, Russia, using inductively coupled plasma mass spectrometry (ICP-MS).

There was a high congruence between the results of all three different analytical methods (ANOVA $P>0.05$ for comparing all three methods and between any two methods). Beside these departments and laboratories at home and abroad, we collaborated with the Energy and Environment Research Center, Grand Forks, ND, USA on the application of an experimental doserate idiorrhythmic model, to study metabolic and toxicological implications of temporary high intake of Hg from whale meat in the diet of isolated island communities.

This report was taken from the Activity Report for 2006 (Arh Hig Rada Toksikol 2007;58:99-100)

Metals – biocompatibility and stress in alopecia, depression, and diabetes

Principal investigator: Berislav Momčilović, 2007-; collaborators: A. Čelebić (School of Dental Medicine, University of Zagreb, Zagreb), J. Stipetić-Ovčariček (School of Dental Medicine, University of Zagreb, Zagreb), V. Stančić (Clinical Hospital "Sestre milosrdnice", Zagreb), R. Poljak-Guberina (Privat Dental Practice, Zagreb), S. Morović (Clinical Hospital "Sestre milosrdnice", Zagreb), Z. Mršić-Krmpotić (University Hospital for Tumors, Zagreb), T. Radionov (Psychiatric Hospital "Vrače", Zagreb), R. Zorica (University Hospital for Tumors, Zagreb); project supported by MoSES

We reported the importance of the multielement profile of hair and whole blood in diagnostics and dietary supplementation in depression, osteopenia/osteoporosis, and occupational exposure to the freeradical-generating xenobiotics, based on our own clinical material from a prospective, randomized, double blind, clinical-epidemiological study (D22). Depressed subjects (B66) have a distinctly different multielement profile than the healthy subjects. Heavy metals like silver have a strong tendency to accumulate in the hair of depressed subjects (B67). The number of sister chromatid exchanges (SCE) in the lymphocytes of registered medical nurses working with cytostatics (free-radical-generating xenobiotics) was inversely related to blood Se, Sr, Mn, and Cu, indicating the protective role of these elements in decreasing the risk of cytostatics and other free-radical-generating xenobiotics in human health (A97). These results were presented as three invited lectures at international meetings. Moreover, multielement profile appears to be a very sensitive indicator for early detection of osteopenia/osteoporosis and for the assessment of the metabolic response to dietary supplementation with calcium, magnesium, and vitamin D. Our study revealed a seasonal variation of whole body radon daughter ^{214}Bi and environmental radon in the air we breath, with high values occurring in the winter, and lower values in the summer; the whole body concentration of radon daughter ^{214}Bi was higher in the human body than in the surrounding air (A182). The results of this research were implemented in a postgraduate programme for medical and dental practitioners

This report was taken from the Activity Report for 2007 (Arh Hig Rada Toksikol 2008;59:R45)

Immunotoxic effects of indoor bioaerosols and lifestyle

Principal investigator: Božica Kanceljak-Macan, 2002-2005; collaborators: M. Bakotić, J. Bobić, M. Gomzi, J. Jurasović, A. Košćec-Đuknić, J. Macan, M. Mataušić-Pišl, S. Milković-Kraus, I. Pavičić, A. Pizent, B. Radošević Vidaček, S.Telišman, I. Trošić, R. Turk, V. M. Varnai; project supported by the Institute for Medical Research and Occupational Health

The aim of this project was to establish occupational indoor exposure to biological hazards and to see which lifestyle factors contribute to immunological disorders associated with this exposure. We measured endotoxin levels in environmental samples (air or settled dust). Endotoxin is considered a good marker of indoor bacterial contamination and also an environmental immunomodulator that may play a role in the occurrence of allergic disorders (B123). The standard method for endotoxin measurement is the chromogenic *Limulus* amoebocyte lysate (LAL) bioassay, and we introduced and validated an end-point variation, which yielded a good linearity of the standard curve (r = 0.983), recovery (92 and 110%), and repeatability (CV 0 to 8.5 %) (B122).

In order to study the influence of the indoor environment on health, well-being, and work effectiveness, we investigated non-specific symptoms known as the Sick Building Syndrome (SBS) in office buildings workers.

Endotoxin levels were determined in settled dust samples from the workplaces and households of librarians, and were evaluated with regard to the prevalence of SBS symptoms. The presence of one or more work-related SBS symptoms was reported in 65.2 % of analysed librarians (eye irritation in 61 %, throat irritation in 38 %, sneezing in 32 %, nose irritation in 30 %, cough in 16 %, and cold in 14 %). Endotoxin levels were similar in dust samples from the library and households of librarians, suggesting that occupational exposure to endotoxin cannot explain the occurrence of SBS symptoms in librarians (C79).

We then investigated the contribution of somatic, psychological, and environmental factors to SBS symptoms in women office workers from three companies. Women working in air conditioned buildings reported SBS symptoms more often than those working in buildings with natural ventilation. Neuroticism and physical condition as certain aspects of psychological profile were strongly associated with reported SBS symptoms in both groups of office workers. Only psychological factors were established as predictors of SBS symptoms, while somatic variables, including markers of atopy, failed to predict SBS symptoms (A96). Symptoms which are the consequence of psychosocial stressors may render a person more sensitive to otherwise normally tolerated physical and chemical factors in the environment. Persons of greater emotional stability report better quality of life, less SBS symptoms in the working environment, and better work organisation. Furthermore, they have better simple reaction time scores to visual stimuli.

We studied the association of age, smoking, alcohol, erythrocyte superoxide dismutase (SOD), whole blood glutathione peroxidase (GPx), blood lead (BPb) and cadmium (BCd), and serum copper (SCu), zinc (SZn) and selenium (SSe) with atopic status and ventilatory function in 166 women and 50 men with no occupational exposure to metals or other xenobiotics. In women, the increase in IgE was associated with a decrease in SCu. In men, the increase in non-specific bronchial reactivity and in the risk of positive SPT was associated with a decrease in SSe. Additionally, the decrease in FVC% and FEV_1% in men were associated with a decrease in SZn. These results were observed at metal levels comparable to those in general populations worldwide (A208).

Božica Kanceljak-Macan

Professional Units

Poison Control Centre

The Poison Control Centre of the Institute for Medical Research and Occupational Health in Zagreb is the only toxicological information centre in Croatia, serving a population of about 4.5 million inhabitants. It was founded in 1971 by the Department for Occupational Diseases and Toxicology of the Institute, and ever since the average number of calls has been increasing from about the initial 100 a year to more than 1400 in 2008. The Centre provides a wide range of services accessible to the general public, medical professionals, and health authorities. The most important is our 24-hour emergency phone service (+385-1-2348-342), providing basic first aid information to general public and to medical care personell in the event of poisoning. It also provides information on the toxic effects of poisoning or exposure including treatment advice for health professionals. The Centre's database, comprising information on 3000 commercial products most frequently involved in poisoning episodes, is updated on the regular basis.

From 2004 to 2008, the Centre received a total of 6418 telephone enquiries about suspected poisoning incidents, averaging to 1300 calls a year. Most calls come from medical professionals and more than 90 % concern acute poisoning incidents. Consultations on health risks from chemical exposure at the workplace were given to occupational health physicians in 59 cases (B115). The Centre also performed toxicological risk assessments for 532 plant protection and biocidal products placed on the market in Croatia.

The Centre has been publishing annual activity reports in a science journal *Archives of Industrial Hygiene and Toxicology* since 2006. Several lectures on toxicology and poison control were delivered to plant protection and pest control manufacturers and users and to emergency physicians, paediatricians, and pharmacists at the scientific and professional meetings. The Centre also provides expert toxicological assistance to the Croatian Ministry of Health and Social Welfare within the scope of activities of the Committee on Hazardous Chemicals and has participated in the preparation of legal acts and guidelines for registration and control of hazardous chemicals and biocides. We intensified our collaboration with the Ministry of Agriculture, Fishery, and Rural Development on harmonisation and implementation of the EU legislation regarding plant protection products. Centre's experts were involved in toxicological training provided within the two CARDS twinning projects on "Further development in capacity building in the area of plant protection products" by the Pesticide Safety Directorate in York, UK.

Jelena Macan and *Rajka Turk*

Laboratory Animal Unit

Institute's Laboratory Animal Unit breeds Wistar rats (HsdBrlHan:WIST) in accordance with the national Animal Welfare Act and other applicable regulations, guidelines and policies. Animals are bred in strictly controlled conditions, under surveillance of a veterinarian, and then used for scientific research. The living conditions foster good health and comfort of animals. Animals receive standard GLP-certified laboratory food and water *ad libitum* with altering 12h light and dark cycles. The facilities are cleaned every week to reduce the risk of external contamination. Croatian legislation forbids animal experiments that have not been approved by the Institutional Animal Care and Use Committee (IACUC) and National Animal Research Authority, appointed by the Ministry of Agriculture, Republic of Croatia. The approval is issued to a researcher at the Institute who requested it for the experiment. During experiments, the veterinarian checks on all the animals included in the experiment on the daily basis. At the end of an experiment, animals are put down with carbon dioxide (CO_2) or other recommended method. In the past five years, 6315 animals of both sexes were bred and used in scientific experiments conducted at the Institute or other research institution in Croatia. Breeding and maintenance costs are covered by selling animals. A health monitoring program, which includes a check for zoonoses, is regularly performed in collaboration with the National Veterinary Institute.

Mirjana Mataušić-Pišl and *Vedran Micek*

Archives of Industrial Hygiene and Toxicology

Since 1950, the Institute has published a quarterly scientific journal *Arhiv za higijenu rada i toksikologiju - Archives of Industrial Hygiene and Toxicology*. In the period 2004-2008, *Archives* was the official journal of the Croatian Medical Association - Croatian Society on Occupational Health, Croatian Toxicological Society, and Slovenian Society of Toxicology.

Archives publishes contributions relevant to all aspects of environmental and occupational health and toxicology (scientific papers, professional papers, reviews, short communications, case reports, observations, technical papers and letters to the editor). Announcements, book reviews and meeting reports are also accepted. In the period 2004-2008 *Archives* published 195 manuscripts, and their distribution by category is shown in Table 1.

In 2008, *Archives* has been accepted for coverage in Science Citation Index Expanded® (Thomson Reuters). We expect to receive an impact factor in the 2010 Journal Citation Reports, to be published in late spring/early summer 2011. The journal is also indexed by Medline/PubMed, Scopus, Animal Science Database, Biological Sciences (CSA), BIOSIS Previews, GreenFile, INIS, Pollution Abstracts, Veterinary Science Database, and Water Resources Abstracts.

Over the past five years the editors in chief of *Archives* were:

- Radovan Pleština in 2004; Vol. 55
- Elsa Reiner and Marko Šarić in 2005; Vol. 56
- Blanka Krauthacker between 2006 and 2008; Vol. 57, 58 and 59 (No. 1, 2)
- Nevenka Kopjar since 2008; Vol. 59 (No. 3, 4)

Archives has had an international Advisory Editorial Board and an Executive Editorial Board.

Between 2004 and 2008 the members of the Advisory Editorial Board were Black A (Australia) 2004-2006; Aliev G (USA) 2008-; Bajgar J (Czech Republic) 2008-; Blasiak J (Poland) 2008-; Borzelleca J (USA) 2004-2006; Borron SW (USA) 2008-; Budihna MV (Slovenia) 2004-; Cikrt M (Czech Republic) 2004-; Doctor BP (USA) 2008-; Drobne D (Slovenia) 2008-; Evans HL (USA) 2004-; Godnić-Cvar J (Austria) 2007-; Hsieh YHP (USA) 2008-; Ilich-Ernst J (USA) 2004-; Kendrovski V (Macedonia) 2007-; Hayes AW (USA) 2008-; Kežić S (The Netherlands) 2007-; Kostial K (Croatia) 2004-; Lotti M (Italy) 2004-; Matković V (USA) 2008-; Mišurović A (Montenegro) 2007-; Pavelić K (Croatia) 2007-; Petz B (Croatia) 2004-2005; Plavšić F (Croatia) 2004-2006; Pleština R (Croatia) 2005-2006; Prpić-Majić D (Croatia) 2004-2005; Radenković M (Serbia) 2007-; Reiner E (Croatia) 2007-; Rico A (France) 2004-2006; Rumboldt Z (Croatia) 2004-; Šarić M (Croatia) 2007-; Šega K (Croatia) 2004-2006; Valić F (Croatia) 2004-; Winker R (Austria) 2008-.

The Editorial Executive Board consisted of Bogadi Šare A (Croatia) 2004-2006; Bradamante V (Croatia) 2008-; Cvijetić Avdagić S (Croatia) 2007-; Dodič-Fikfak M (Slovenia) 2008-; Franić Z (Croatia) 2005-;. Gomzi M (Croatia) 2004-2006; Jurasović J (Croatia) 2007-2008; Kopjar N (Croatia) 2004-2008; Lucić Vrdoljak A (Croatia) 2008-; Milković-Kraus S (Croatia) 2004-2008; Peraica M (Croatia) 2004-2006; Piasek M (Croatia) 2004-; Radošević-Vidaček B (Croatia) 2004-2006, 2008-; Šega K (Croatia) 2007-2008; Trebše P (Slovenia) 2004-2008; Vasilić Ž (Croatia) 2004-.

Table 2. Distribution of manuscripts by categories published in the Archives between 2004 and 2008

Category	2004	2005	2006	2007	2008	Total
Original scientific paper	3	14	14	15	13	59
Short communication	2	5		2	11	20
Observation	1	4	7	-	4	16
Case report	-	-	-	-	2	2
Professional paper	-	-	8	6	3	17
Technical paper	-	-	5	1	1	7
Conference paper	14	1	-	-	-	15
Review	8	11	13	18	5	55
Note	1	1	-	-	2	4
Total	29	36	47	42	41	195

Associate Editors of *Archives* were Elsa Reiner and Marko Šarić (Vol. 55, 2004 and Volume 57, 2006). Assistant Editor was Želimira Vasilić (Vol. 56-58, 2005-2008). Technical Editor was Želimira Vasilić. Copyeditor for articles in English was Dado Čakalo (English), and Branko Erdeljac was the language reviser for Croatian.

ISI Web of Science® cited altogether 52 manuscripts published in *Archives* in the period 2004-2008 (sum of citations: 94). The authors of manuscripts published in *Archives* came from 27 countries (Figure 2). Figure 3 shows the proportion of authors from the Institute in the total number of Croatian manuscripts published in *Archives*.

The publishing of *Archives* is supported by the Ministry of Science, Education and Sports of the Republic of Croatia.

All research articles published in the journal are permanently available on-line free of charge at http://hrcak.srce.hr/aiht or http://www.versita.com/science/medicine/aiht.

Nevenka Kopjar

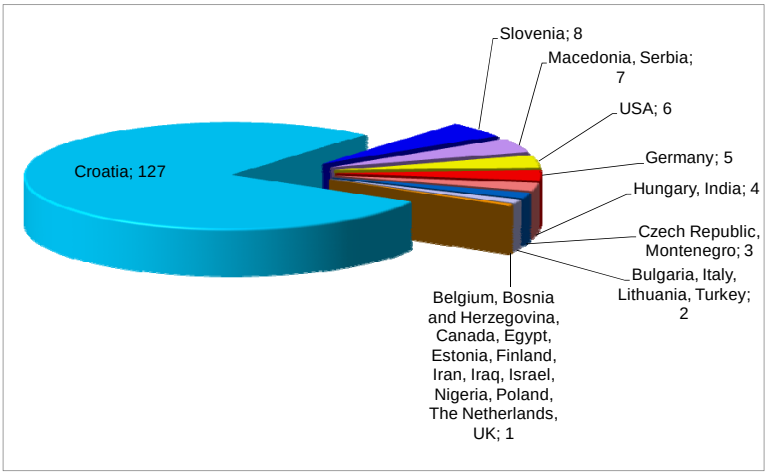

Fig. 2. Distribution of countries that the corresponding authors came from in period 2004-2008

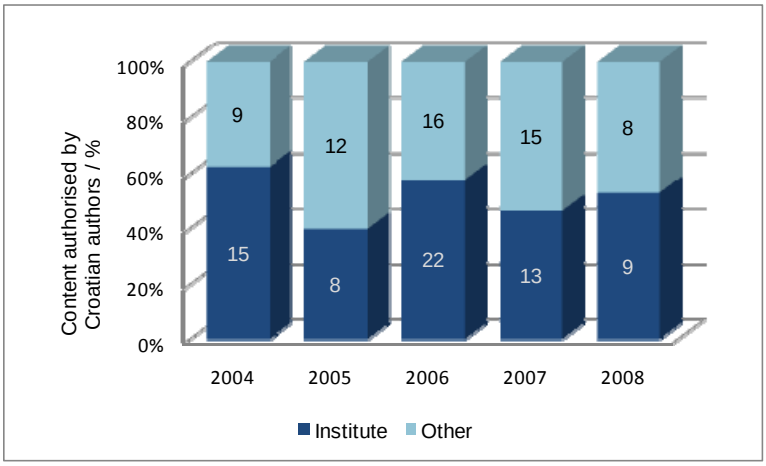

Fig. 3. Proportion of Institute's authors with respect to total number of Croatian manuscripts published in the Archives

List of Publications 2004-2008

A. Papers indexed in CC/SCIE/SSCI databases

A1. ACKER K, KEZELE N, KLASINC L, MÖELLER D, PEHNEC G, ŠORGO G, WIEPRECHT W, ŽUŽUL S. Atmospheric H_2O_2 measurement and modeling campaign during summer 2004 in Zagreb, Croatia. Atmos Environ 2008;42:2530-42.

A2. ALILOVIĆ M, PEROŠ-GOLUBIČIĆ T, TEKAVEC TRKANJEC J, SMOJVER-JEŽEK S, LIŠČIĆ R. Epidemiological characteristics of sarcoidosis patients hospitalized in the University Hospital for Lung Diseases "Jordanovac" (Zagreb, Croatia) in the 1997-2002 period. Coll Antropol 2006;30:513-7.

A3. ALEBIĆ-JURETIĆ A, CVITAŠ T, KEZELE N, KLASINC L, PEHNEC G, ŠORGO G. Atmospheric particulate matter and ozone under heat-wave conditions: do they cause an increase of mortality in Croatia? Bull Environ Contam Toxicol 2007;79:468-71.

A4. ASIF AR, LJUBOJEVIĆ M, SABOLIĆ I, SHNITSAR V, METTEN M, ANZAI N, MÜLLER GA, BURCKHARDT G, HAGOS Y. Regulation of steroid hormone biosynthesis enzymes and organic anion transporters by forskolin and DHEA-S treatment in adrenocortical cells. Am J Physiol Endocrinol Metab 2006;291:E1351-9.

A5. BABIĆ-IVANČIĆ V, CVIJETIĆ AVDAGIĆ S, ŠERIĆ V, KONTREC J, TUCAK A, FÜREDI-MILHOFER H, MARKOVIĆ M. Metabolic evaluation of urolithiasis patients from Eastern Croatia. Coll Antropol 2004;28:655-66.

A6. BAHN A, LJUBOJEVIĆ M, LORENZ H, SCHULTZ C, GHEBREMEDHIN E, UGELE B, SABOLIĆ I, BURCKHARDT G, HAGOS Y. Murine renal organic anion transporters mOAT1 and mOAT3 facilitate the transport of neuroactive tryptophan metabolites. Am J Physiol Cell Physiol 2005;289: C1075-84.

A7. BAHN A, HAGOS Y, REUTER S, BALEN D, BRZICA H, KRICK W, BURCKHARDT BC, SABOLIĆ I, BURCKHARDT G. Identification of a new urate and high affinity nicotinate transporter, hOAT10 (SLC22A13). J Biol Chem 2008;283:16332-41.

A8. BALEN D, LJUBOJEVIĆ M, BRELJAK D, BRZICA H, ŽLENDER V, KOEPSELL H, SABOLIĆ I. Revised immunolocalization of the Na^+-D-glucose cotransporter SGLT1 in rat organs with an improved antibody. Am J Physiol Cell Physiol 2008;295:C475-89.

A9. BEGONJA KOLAR A, HRŠAK D, FINGLER S, ĆETKOVIĆ H, PETRIĆ I, UDIKOVIĆ KOLIĆ N. PCB-degrading potential of aerobic bacteria enriched from marine sediments. Int Biodeter Biodegr 2007;60:16-24.

A10. BEHRENS MI, MUKHERJEE O, TU P-H, LIŠČIĆ RM, GRINBERG LT, CARTER D, PAULSMEYER K, TAYLOR-REINWALD L, GITCHO M, NORTON JB, CHAKRAVERTY MS, GOATE AM, MORRIS JC, CAIRNS NJ. Neuropathologic heterogeneity in HDDD1: A familial frontotemporal lobar degeneration with ubiquitin-positive inclusions and *Progranulin* mutation. Alzheimer Dis Assoc Disord 2007;21:1-7.

A11. BENKOVIĆ V, HORVAT-KNEŽEVIĆ A, ĐIKIĆ D, LISIČIĆ D, ORŠOLIĆ N, BAŠIĆ I, KOSALEC I, KOPJAR N. Radioprotective effects of propolis and quercetin gamma-irradiated mice evaluated by the alkaline comet assay. Phytomedicine 2008;15:851-8.

A12. BENKOVIĆ V, KOPJAR N, HORVAT-KNEŽEVIĆ A, ĐIKIĆ D, BAŠIĆ I, RAMIĆ S, VICULIN T, KNEŽEVIĆ F, ORŠOLIĆ N. Evaluation of radioprotective effects of propolis and quercetin on human white blood cells *in vitro*. Biol Parm Bull 2008;31:1778-85.

A13. BENKOVIĆ V, ORŠOLIĆ N, HORVAT-KNEŽEVIĆ A, RAMIĆ S, ĐIKIĆ D, BAŠIĆ I, KOPJAR N. Evaluation of radioprotective effects of propolis and flavonoids in gamma-irradiated mice: the alkaline comet assay study. Biol Pharm Bull 2008;31:167-72.

A14. BEREND S, GRABARIĆ Z. Određivanje polifenola u namirnicama metodom ubrizgavanja u protok. Arh Hig Rada Toksikol 2008;59:205-12.

A15. BEREND S, LUCIĆ VRDOLJAK A, RADIĆ B, KUČA K. New bisphyridinium oximes: *in vitro* and *in vivo* evaluation of their biological efficiency in soman and tabun poisoning. Chem Biol Interact 2008;175:413-6.

A16. BEŠLIĆ I, ŠEGA K, ŠIŠOVIĆ A, BENCETIĆ KLAIĆ Z. PM_{10}, CO and NO_x concentrations in the Tuhobić road tunnel, Croatia. Int J Environ Pollut 2005;25:251-62.

A17. BEŠLIĆ I, ŠEGA K, ČAČKOVIĆ M, BENCETIĆ KLAIĆ Z, VUČETIĆ V. Influence of weather types on concentrations of metallic components in airborne PM_{10} in Zagreb, Croatia. Geofizika 2007;24:93-107.

A18. BEŠLIĆ I, ŠEGA K, ČAČKOVIĆ M, BENCETIĆ KLAIĆ Z, BAJIĆ A. Relationship between 4-day air mass back trajectories and metallic components in PM_{10} and $PM_{2.5}$ particle fractions in Zagreb air, Croatia. Bull Environ Contam Toxicol 2008;80:270-3.

A19. BITUH T, PETRINEC B, MAROVIĆ G,

SENČAR J, GOSPODARIĆ I. ^{226}Ra and ^{228}Ra in Croatian rivers. Coll Antropol 2008;32(Suppl 2):105-8.

A20. BLANUŠA M, VARNAI VM, PIASEK M, KOSTIAL K. Chelators as antidotes of metal toxicity: Therapeutic and experimental aspects. Curr Med Chem 2005;12:2771-94.

A21. BOBIĆ J, GOMZI, M. Memory and concentration efficiency in workers professionally exposed to xylene. Studia Psychologica 2004;46:65-71.

A22. BOBIĆ J, PAVIĆEVIĆ L, GOMZI M. Post traumatic stress disorder in armed robbery victims and ex-prisoners of war. Studia Psychologica 2007;49:135-43.

A23. BOBIĆ J, PAVIĆEVIĆ L, GOMZI M. Posttraumatic stress disorder and color preference in released prisoners of war. Studia Psychologica 2007;49:223-32.

A24. BOFFETTA P, VAN DEN HAL O, NORPPA H, FABIANOVA E, FUČIĆ A, GUNDY S, LAZUTKA J, CEBULSKA-WASILEWSKA A, PUSKAILEROVA D, ZNAOR A, KELECSENYI Z, KURTINAITIS J, RACHTAN J, FORNI A, VERMEULEN R, BONASSI S. Chromosomal aberrations and cancer risk: results of a cohort study from Central Europe. Am J Epidemiol 2007;165:36-43.

A25. BONASSI S, ZNAOR A, CEPPI M, LANDO C, CHANG WP, HOLLAND N, KIRSCH-VOLDERS M, ZEIGER E, BAN S, BARALE R, BIGATTI P, BOLOGNESI C, CEBULSKA-WASILEWSKA A, FABIANOVA E, FUČIĆ A, HAGMAR L, JOKSIĆ G, MARTELLI A, MIGLIORE L, MIRKOVA E, SCARFI MR, ZIJNO A, NORPPA H, FENECH M. An increased micronucleus frequency in peripheral blood lymphocytes predicts the risk of cancer in humans. Carcinogenesis 2007;28:625- 31.

A26. BONASSI S, NORPPA H, CEPPI M, STRÖMBERG U, VERMEULEN R, ZNAOR A, CEBULSKA-WASILEWSKA A, FABIANOVA E, FUČIĆ A, GUNDY S, HANSTEEN IL, KNUDSEN LE, LAZUTKA J, ROSSNER P, SRAM RJ, BOFFETTA P. Chromosomal aberration frequency in lymphocytes predicts the risk of cancer: results from a pooled cohort study of 22 358 subjects in 11 countries. Carcinogenesis 2008;29:1178-83.

A27. BOSAK A, PRIMOŽIČ I, ORŠULIĆ M, TOMIĆ S, SIMEON-RUDOLF V. Enantiomers of quinuclidin- 3-ol derivatives: Resolution and interactions with human cholinesterases. Croat Chem Acta 2005;78:121-8.

A28. BOSAK A, BARLOVIĆ-TUŠEK B, REINER E. Differentiation of EDTA-sensitive from EDTA-insensitive human serum esterases hydrolysing phenylacetate. J Enzym Inhib Med Chem 2008;23:521-5.

A29. BOSAK A, GAZIĆ I, VINKOVIĆ V, KOVARIK Z. Amino acid residues involved in stereoselective inhibition of cholinesterases with bambuterol. Arch Biochem Biophys 2008;471:72-6.

A30. BOSAK A, GAZIĆ I, VINKOVIĆ V, KOVARIK Z. Stereoselective inhibition of human, mouse, and horse cholinesterases by bambuterol enantiomers. Chem Biol Interact 2008;175:192-5.

A31. BRADAMANTE V, VRKIĆ N, LUCIĆ A, RADIĆ B, MACAN M. Interrelated effects of high sucrose diet and gemfibrozil on butyrylcholinesterase activity and plasma lipids in rats. Period boil 2005;107:189-93.

A32. BRANICA G, METIKOŠ-HUKOVIĆ M, OMANOVIĆ D. Voltammetric determination of stability constants of lead complexes with vitamin C. Croat Chem Acta 2006;79:77-83.

A33. BRČIĆ KARAČONJI I, SKENDER Lj, KARAČIĆ V. Benzene, toluene, ethylbenzene, and isomeric xylenes in various water samples in Croatia. Bull Environ Contam Toxicol 2006;76:458-62.

A34. BRČIĆ KARAČONJI I, SKENDER Lj, KARAČIĆ V. Determination of nicotine and cotinine in urine by headspace solid phase microextraction gas chromatography with mass spectrometric detection. Acta Chim Slov 2007;54:74-8.

A35. BRONZOVIĆ M, MAROVIĆ G. Age-dependent dose assessment of ^{226}Ra from bottled water intake. Health Phys 2005;88:480-5.

A36. BRONZOVIĆ M, MAROVIĆ G, VRTAR M, BITUH T. Life exposure to ^{226}Ra and possible consequences. J Environ Sci Health A 2007;42:817-23.

A37. BUSBY C, FUČIĆ A. Ionizing radiation and children's health: Conclusions. Acta Paediatrica 2006;95 Suppl 453:81-6.

A38. BUŠLJETA I, TROŠIĆ I, MILKOVIĆ-KRAUS S. Erythropoietc changes in rats after 2.45 GHz nonthermal irradiation. Int J Hyg Environ Health 2004;207:1-6.

A39. CINDRIĆ M, GALIĆ N, VULETIĆ M, KLARIĆ M, DREVENKAR V. Evaluation of recombinant human interferon α-2b structure and stability by in-gel tryptic digestion, H/D exchange and mass spectrometry. J Pharm Biomed Anal 2006;40:781-7.

A40. CRLJEN V, SABOLIĆ I, SUŠAC J, APPENROTH D, HERAK-KRAMBERGER CM, LJUBOJEVIĆ M, ANZAI N, ANTOLOVIĆ R, BURCKHARDT G, FLECK C, SABOLIĆ I. Immunocytochemical characterization of the incubated rat renal

cortical slices. Pfluegers Arch – Eur J Physiol 2005;450:269-79.

A41. CRNČEVIĆ UREK M, TUDORIĆ N, PLAVEC D, UREK R, KOPRIVC-MILENOVIĆ T, STOJIĆ M. Effect of educational programs on asthma control and quality of life in adult asthma patients. Patient Educ Couns 2005;58;47-54.

A42. COLIĆ-BARIĆ I, KAJFEŽ R, ŠATALIĆ Z, CVIJETIĆ S. Comparison of dietary habits in the urban andrural Croatian schoolchildren. Eur J Nutr 2004;43:169-74.

A43. CRNČEVIĆ-UREK M, TUDORIĆ N, PLAVEC D, UREK R, KOPRIVC-MILENOVIĆ T, STOJIĆ M. Effect of educational programs on asthma control and quality of life in adult asthma patients. Patient Educ Couns 2004;58:47-54.

A44. CVIJETIĆ S, KORŠIĆ M. Apparent bone mineral density estimated from DXA in healthy men and women. Osteoporosis Int 2003;15:295-300.

A45. CVIJETIĆ S, KURTAGIĆ N, DEKANIĆ OŽEGOVIĆ D. Osteoarthritis of the hands in the rural population: a follow-up study. Eur J Epidemiol 2004;19:687- 91.

A46. CVIJETIC S, COLIC BARIC I, KESER I, CECIC I, SATALIC Z, BLANUSA M. Peak bone density in Croatian women: variations at different skeletal sites. J Clin Densitom Assess Skel Health 2008;11:260-5.

A47. CVITANOVIĆ S, ZNAOR Lj, KANCELJAK-MACAN B, MACAN J, GUDELJ I, GRBIĆ D. Allergic rhinitis and asthma in southern Croatia: impact of sensitization to *Ambrosia elatior*. Croat Med J 2007;48:68-75.

A48. ČAČKOVIĆ M, ŠEGA K, VAĐIĆ V, BEŠLIĆ I. Correlation between metallic and acidic components in high-risk particle fraction in Zagreb Air. Bull Environ Contam Toxicol 2006;76:1014-20.

A49. ČAČKOVIĆ M, ŠEGA K, VAĐIĆ V, BEŠLIĆ I. Characterisation of major acidic anions in TSP and PM10 in Zagreb Air. Bull Environ Contam Toxicol 2008;80:112-4.

A50. ČALIĆ M, LUCIĆ VRDOLJAK A, RADIĆ B, JELIĆ D, JUN D, KUČA K, KOVARIK Z. *In vitro* and *in vivo* evaluation of pyridinium oximes: Mode of interaction with acetylcholinesterase, effect on tabun- and soman-poisoned mice and their cytotoxicity. Toxicology 2006;219:85-96.

A51. ČALIĆ M, BOSAK A, KUČA K, KOVARIK Z. Interactions of butane, but-2-ene or xylene-like linked bispyridinium *para*-aldoximes with native and tabun-inhibited human cholinesterases. Chem Biol Interact 2008;175:305-8.

A52. ČELEBIĆ A, BAUČIĆ M, STIPETIĆ J, BAUČIĆ I, MIKO S, MOMČILOVIĆ B. Ion release from gold/platinum dental alloy: could release of other elements be accountable in the contact allergy attributed to the gold? J Mater Sci Mater Med 2006;17:301-5.

A53. ČOROVIĆ N, DURAKOVIĆ Z, MIŠIGOJ-DURAKOVIĆ M. Dispersion of the corrected QT and JT interval in the electrocardiogram of alcoholic patients. Alcohol Clin Exp Res 2006;30:150-4.

A54. DAVIS WC, CHRISTOPHER SJ, PUGHRS, DONARD OFX, KRUPP EA, POINT D, HORVAT M, GIBIČAR D, KLJAKOVIĆ-GAŠPIĆ Z, PORTER BJ, SCHANTZ MM. Certification of methylmercury content in two fresh-frozen reference materials: SRM 1947 Lake Michigan fish tissue and SRM 1974b organics in mussel tissue (*Mytilus edulis*). Anal Bioanal Chem 2007;387:2335-41

A55. DE JACO A, COMOLETTI D, KOVARIK Z, GAIETTA G, RADIĆ Z, LOCKRIDGE O, ELLISMAN MH, TAYLOR P. A mutation linked with autism reveals a common mechanism of endoplasmic reticulum retention for the α/β-hydrolase fold protein family. J Biol Chem 2006;281:9667-76.

A56. DOMIJAN A-M, PERAICA M, FUCHS R, LUCIĆ A, RADIĆ B. Effect of ochratoxin A on enzyme activity and malondialdehyde in rat urine. Period Biol 2004;106:373-6.

A57. DOMIJAN A-M, PERAICA M, JURJEVIĆ Ž, IVIĆ D, CVJETKOVIĆ B. Fumonisin B_1, fumonisin B2, zearalenone and ochratoxin A contamination of maize in Croatia. Food Addit Contam 2005;22:677- 80.

A58. DOMIJAN A-M, PERAICA M, ŽLENDER V, CVJETKOVIĆ B, JURJEVIĆ Ž, TOPOLOVEC-PINTARIĆ S, IVIĆ D. Seed-borne fungi and ochratoxin A contamination of dry beans (*Phaseolus vulgaris* L.) in the Republic of Croatia. Food Chem Toxicol 2005;43:427-32.

A59. DOMIJAN A-M, ŽELJEŽIĆ D, KOPJAR N, PERAICA M. Standard and Fpg-modified comet assay in kidney cells of ochratoxin A- and fumonisin B_1-treated rats. Toxicology 2006;222:53-9.

A60. DOMIJAN A-M, PERAICA M, LUCIĆ VRDOLJAK A, RADIĆ B, ŽLENDER V, FUCHS R. The involvement of oxidative stress in ochratoxin A and fumonisin B_1 toxicity in rats. Mol Nutr Food Res 2007;51:1147-51.

A61. DOMIJAN A-M, ŽELJEŽIĆ D, MILIĆ M, PERAICA M. Fumonisin B_1: oxidative status and DNA damage in rats. Toxicology 2007;232:163-9.

A62. DOMIJAN A-M, PERAICA M. Determination of 8-hydroxy-2'deoxyguanosine in urine using HPLC with electrochemical detection. Arh Hig Rada Toksikol 2008;59:277-82.

A63. DURAKOVIĆ Z, MIŠIGOJ-DURAKOVIĆ

M, VUORI I, ČOROVIĆ N, KUVALJA S, KUVALJA D, ŠKAVIĆ J, DEFINIS-GOJANOVIĆ M. Acute cardiovascular complications due to physical exercise in male teenagers. Coll Antropol 2004;28:271-6.

A64. ĐURINEC M, ŽELJEŽIĆ D, GARAJ-VRHOVAC V. Phytohaemagglutinin as a modulator of DNA repair measured by chromosome aberration analysis and micronucleus assay in ionizing radiation biodosimetry. Radiol Oncol 2006:40:43- 9.

A65. FINGLER S, DREVENKAR V, FRÖBE Z. Sorption of chlorophenolates in soils and aquifer and marine sediments. Arch Environ Contam Toxicol 2005;48:32-9.

A66. FRANIĆ Z, LOKOBAUER N, MAROVIĆ G. Radiostrontium activity concentrations in milk in the Republic of Croatia for 1961 - 2001 and dose assessment. Health Phys 2004;87:160-5.

A67. FRANIĆ Z. Estimation of the Adriatic Sea water turnover time using fallout 90Sr as a radioactive tracer. J Mar Syst 2005;57:1-12.

A68. FRANIĆ Z, MAROVIĆ G, LOKOBAUER N. Radioceasium activity concentrations in wheat grains in the Republic of Croatia for 1965-2003 and dose assessment. Environ Monit Assess 2006;115:51-67.

A69. FRANIĆ Z, MAROVIĆ G. Long-term investigations of radiocaesium activity concentrations in carp in North Croatia after the Chernobyl accident. J Environ Radioactivity 2007;94:75-85.

A70. FRANIĆ Z, PETRINEC B, MAROVIĆ G, FRANIĆ Z. Radiocaesium activity concentrations in potatoes in Croatia after the Chernobyl accident and dose assessment. J Environ Sci Health B 2007;42:211-17.

A71. FRANIĆ Z, MAROVIĆ G, MEŠTROVIĆ J. Radiocaesium contamination of beef in Croatia after the Chernobyl accident. Food Chem Toxicol 2008;46:2096-102.

A72. FRANIĆ Z, MAROVIĆ G, SENČAR J. Long-term investigations of radioactive matter in the air of Zagreb, Croatia. Atmos Res 2008;89:391-5.

A73. FUCHS R, PERAICA M. Ochratoxin A in human kidney diseases. Food Addit Contam 2005;Suppl 1:53-7.

A74. FUČIĆ A, LASAN R, MIJIĆ A, JAZBEC A-M, HITREC V. The frequency of micronuclei in mononucleated and binucleated lymphocytes as an indicator of acute or chronic occupational exposure. Period biol 2004;106:279-82.

A75. FUČIĆ A, SEDLAR M, PERINČIĆ Z, MIJIĆ A. Cytogenetic damage in an interplanetary voyage crew. Period biol 2004;106:445-9.

A76. FUČIĆ A, MARKOVIĆ D, FERENČIĆ Ž, MILDNER B, JAZBEC A-M, BUBIĆ ŠPOLJAR J. Comparison of genomic damage caused by 5- nitrofurantoin in young and adult mice using the in vivo micronucleus assay. Environ Mol Mutagen 2005;46:59-63.

A77. FUČIĆ A, ZNAOR A, STRNAD M, VAN DER HEL O, ALEKSANDROV A, MIŠKOV S, GRAH J, SEDLAR M, JAZBEC AM, CEPPI M, VERMEULEN R, BOFFETTA P, NORPPA H, BONASSI S. Chromosome damage and cancer risk in the workplace: The example of cytogenetic surveillance in Croatia. Toxicol Lett 2007;172:4- 11.

A78. FUČIĆ A, ŽELJEŽIĆ D, KAŠUBA V, KOPJAR N, ROZGAJ R, LASAN R, MIJIĆ A, HITREC V, LUCAS JN. Stable and unstable chromosome aberrations measured after occupational exposure to ionizing radiation and ultrasound. Croat Med J 2007;48:371-7.

A79. FUCIC A, BRUNBORG G, LASAN R, JEZEK D, KNUDSEN LE, MERLO DF. Genomic damage in children accidentally exposed to ionizing radiation: A review of the literature. Mutat Res 2008;658:111-23.

A80. FUCIC A, MARKOVIC D, HERCEG Z, GAMULIN M, KATIC J, STOJKOVIC R, FERENCIC Z, MILDNER B, JAZBEC A-M, DOBRANIC T. Developmental and transplacental genotoxicology: Fluconazole. Mutat Res 2008;657:43-7.

A81. FUCIC A, MERLO DF, CEPPI M, LUCAS JN. Spontaneous abortions in female populations occupationally exposed to ionizing radiation. Int Arch Occup Environ Health 2008;81:873-9.

A82. GAJSKI G, RAVLIĆ S, CAPUDER Ž, GARAJ-VRHOVAC V. Use of sensitive methods for detection of DNA damage on human lymphocytes expopsed to *p,p'* DDT: Comet assay and new criteria for scoring micronucleus test. J Environ Sci Health B 2007;42:607-13.

A83. GAJSKI G, GARAJ-VRHOVAC V. Application of cytogenetic endpoints and comet assay on human lymphocytes treated with atorvastatin *in vitro*. J Environ Sci Health Part A 2008;43:78-85.

A84. GAJSKI G, GARAJ-VRHOVAC V. Genotoxic potential of bee venom (*Apis Mellifera*) on human peripheral blood lymphocytes in vitro using single cell gel electrophoresis assay. J Environ Sci Health Part A 2008;43:1279-87.

A85. GAJSKI G, GARAJ-VRHOVAC V, OREŠČANIN V. Cytogenetic status and oxidative DNA-damage induced by atorvastatin in human peripheral blood lymphocytes: Standard and Fpg-modified comet assay. Toxicol Appl Pharmacol 2008;231:85-93.

A86. GALVANO F, RITIENI A, LA FAUCI L, LI

VOLTI G, DI GIACOMO C, VANELLA L, MARCANTONI C, PERAICA M. Cereals consumption and risk for renal cell carcinoma: Can be hypothesized a role of mycotoxins? Int J Cancer 2007;121:2116-7.

A87. GAMULIN M, GARAJ-VRHOVAC V, KOPJAR N. Evaluation of DNA damage in radiotherapytreated cancer patients using the alkaline comet assay. Coll Antropol 2007;31:837-45.

A88. GAMULIN M, KOPJAR N, GRGIĆ M, RAMIĆ S, BIŠOF V, GARAJ-VRHOVAC V. Genome damage in oropharyngeal cancer patients treated by radiotherapy. Croat Med J 2008;49:515-27.

A89. GARAJ-VRHOVAC V, ŽELJEŽIĆ D. Comet assay in the assessment of the human genome damage induced by gamma-radiation in vitro. Radiol Oncol 2004;38:43-7.

A90. GARAJ-VRHOVAC V, KOPJAR N. Investigation into possible DNA damaging effects of ultrasound in occupationally exposed medical personnel – the alkaline comet assay study. J Appl Toxicol 2005;25:184-92.

A91. GARAJ-VRHOVAC V, ĐURINEC M, KOPJAR N, OREŠČANIN V. A survey on the cytogenetic status of the Croatian general population by use of the cytokinesis-block micronucleus assay. Mutat Res 2008;649:91-100.

A92. GARAJ-VRHOVAC V, GAJSKI G, RAVLIĆ S. Efficacy of HUMN criteria for scoring the micronucleus assay in human lymphocytes exposed to a low concentration of *p,p*'–DDT. Braz J Med Biol Res 2008;41:473-6.

A93. GAZIĆ I, BOSAK A, ŠINKO G, VINKOVIĆ V, KOVARIK Z. Preparative HPLC separation of bambuterol enantiomers and stereoselective inhibition of human cholinesterases. Anal Bioanal Chem 2006;385:1513-9.

A94. GODEC R. Ugljik u lebdećim česticama u zraku. Arh Hig Rada Toksikol 2008;59:309-18.

A95. GODEC R, ŠIŠOVIĆ A, BEŠLIĆ I, VAĐIĆ V. Polycyclic aromatic hydrocarbons in the air near gas field Molve. Arh Hig Rada Toksikol 2008;59:191-6.

A96. GOMZI M, BOBIĆ J, RADOŠEVIĆ-VIDAČEK B, MACAN J, VARNAI VM, MILKOVIĆ-KRAUS S, KANCELJAK-MACAN B. Sick building syndrome: psychological, somatic, and environmental determinants. Arch Environ Occup Health 2007;62:147-55.

A97. IVIČIĆ N, PREJAC J, KOPJAR N, MOMČILOVIĆ B. The sister chromatid exchange rate is inversely related to the Se, Sr, Mn, Cu, and Be trace element nutritional status. J Trace Elem Med Biol 2007;21(S1):74-6.

A98. HERCEG ROMANIĆ S, KRAUTHACKER B. Distribution of organochlorine compounds in pine needles collected at urban sites in Croatia. Bull Environ Contam Toxicol 2004;72:1203-10.

A99. HERCEG ROMANIĆ S, KRAUTHACKER B. Organochlorine pesticides and PCB congeners in human milk from two population groups in Croatia. Bull Environ Contam Toxicol 2006;76:705-11.

A100. HERCEG ROMANIĆ S, KRAUTHACKER B. Distribution of persistent organochlorine compounds in one-year and two-year old pine needles. Bull Environ Contam Toxicol 2006;77:143-8.

A101. HERCEG ROMANIĆ S, KRAUTHACKER B. Distribution of organochlorine compounds in pine needles collected on Croatian mountains. Fresen Environ Bull 2008;17:803-9.

A102. HORVAT T, KALAFATIĆ M, KOPJAR N, KOVAČEVIĆ G. Toxicity testing of herbicide norflurazon on an aquatic bioindicator species – the planarian *Polycelis felina* (Daly.). Aquatic Toxicol 2005;73:342-52.

A103. JAKAS A, KATIĆ A, BIONDA N, HORVAT Š. Glycation of a lysine-containing tetrapeptide by D-glucose and D-fructose – influence of different reaction conditions on the formation of Amadori/Heyns products. Carbohydr Res 2008;343:2475-80.

A104. JANEŽIČ D, LUČIĆ B, MILIČEVIĆ A, NIKOLIĆ S, TRINAJSTIĆ N, VUKIČEVIĆ D. Hosoya matrices as the numerical realization of graphical matrices and derived structural descriptors. Croat Chem Acta 2007;80:271-6.

A105. JANEŽIČ D, MILIČEVIĆ A, NIKOLIĆ S, TRINAJSTIĆ N, VUKIČEVIĆ D. Zagreb indices: Extension to weighted graphs representing molecules containing heteratoms. Croat Chem Acta 2007;80:541-5.

A106. JUDAŠ N, RAOS N. Self-assembly of cis and trans forms of the copper(II) complex with 1-aminocyclopropane-1-carboxylate into discrete trimers in the solid state. Inorg Chem 2006;45:4892-4.

A107. JUKIĆ KRMEK S, TROŠIĆ I, PAVIČIĆ I, KEROS J, SIMEON P, MALČIĆ A, PRPIĆ-MEHIČIĆ G. Dose- and mode-dependent effect of halogen dental curing blue light on the V79-cell line. Coll Antropol 2008;32:913-8.

A108. JURASOVIĆ J, CVITKOVIĆ P, PIZENT A, ČOLAK B, TELIŠMAN S. Semen quality and reproductive endocrine function with regard to blood cadmium in Croatian male subjects. BioMetals 2004;17: 735-43.

A109. JUREŠA D, BLANUŠA M, KOSTIAL K. Simultaneous administration of sodium selenite and mercuric chloride decreases efficacy of DMSA and DMPS in mercury

elimination in rats. Toxicol Lett 2005;155:97-102.

A110. JUREŠA D, BLANUŠA M, FRANCESCONI KA, KIENZL N, KUEHNELT D. Biological availability of selenosugars in rats. Chem Biol Interact 2007;168:203-10.

A111. KALAFATIĆ M, KOPJAR N, BESENDORFER V, The influence of mercuric chloride on neoblast division in regenerating planarian *Polycelis felina* (Daly.). Water Air Soil Pollut 2004;156:195-210.

A112. KALAFATIĆ M. KOPJAR N. BESENDORFER V. The impairments of neoblast division in regenerating planarian *Polycelis felina* (Daly.) caused by *in vitro* treatment with cadmium sulfate. Toxicol In Vitro 2004;18:99-107.

A113. KALAFATIĆ M, KOPJAR N, ZRNA G, ZUPAN I, KOVAČEVIĆ G, FRANJEVIĆ D. Karyological analysis of two allopatric populations of planarian *Polycelis felina* (Daly.) in Croatia. Folia Biol 2004;52:131-133.

A114. KALINIĆ N, HRŠAK J, VAĐIĆ V, LAMBAŠA-BELAK Ž, MIHELČIĆ V, PERKOVIĆ B. Fluoride content in soil and vegetation. Bull Environ Contam Toxicol 2005;75:157-62.

A115. KAŠUBA V, ROZGAJ R, FUČIĆ A, VARNAI VM, PIASEK M. Lead acetate genitoxicity in suckling rats. Biologia 2004;59:779-85.

A116. KAŠUBA V, ROZGAJ R, JAZBEC A. Chromosome aberrations in peripheral blood lymphocytes of Croatian hospital staff occupationally exposed to low levels of ionising radiation. Arh Hig Rada Toksikol 2008;59:251-9.

A117. KLJAKOVIĆ-GAŠPIĆ Z, UJEVIĆ I, ZVONARIĆ T, BARIĆ A. Biomonitoring of trace metals (Cu, Cd, Cr, Hg, Pb, Zn) in Mali Ston Bay (eastern Adriatic) using the Mediterranean blue mussel (1998-2005). Acta Adriat 2007;48:73-88.

A118. KNEŽEVIĆ A, ŽELJEŽIĆ D, KOPJAR N, TARLE Z. Cytotoxicity of composite materials polymerized with LED curing units. Oper Dent 2008;33:19-26.

A119. KOPJAR N, ŽELJEŽIĆ D, GARAJ-VRHOVAC V. Evaluation of DNA damage in white blood cells of healthy human volunteers using the alkaline comet assay and the chromosome aberration test. Acta Biochim Pol 2006;53:321- 36.

A120. KOPJAR N, MILAS I, GARAJ-VRHOVAC V, GAMULIN M. Alkaline comet assay study with breast cancer patients: evaluation of baseline and chemotherapy-induced DNA damage in non-target cells. Clin Exp Med 2006;6:177-90.

A121. KOPJAR N, GARAJ-VRHOVAC V. Assessment of DNA damage in nuclear medicine personnel - comparative study with the alkaline comet assay and the chromosome aberration test. Int J Hyg Environ Health 2005;208:179-91.

A122. KOPJAR N, MILAS I, GARAJ-VRHOVAC V, GAMULIN M. Cytogenetic outcomes of adjuvant chemotherapy in non-target cells of breast cancer patients. Hum Exp Toxicol 2007;26:391- 9.)

A123. KOPJAR N, ŽELJEŽIĆ D, LUCIĆ VRDOLJAK A, RADIĆ B, RAMIĆ S, MILIĆ M, GAMULIN M, PAVLICA V, FUČIĆ A. Irinotecan toxicity to human blood cells *in vitro*: relationship between various biomarkers. Basic Clin Pharmacol Toxicol 2007;100:403-13.

A124. KOPJAR N, MUSTAFIĆ P, ZANELLA D, BUJ I, ĆALETA M, MARČIĆ Z, MILIĆ M, DOLENEC Z, MRAKOVČIĆ M. Assessment of DNA integrity in erythrocytes of *Cobitis elongata* affected by water pollution: the alkaline comet assay study. Folia Zool 2008;57:120-30.

A125. KOPPE JG, BARTONOVA A, BOLTE G, BISTRUP ML, BUSBY C, BUTTER M, DORFMAN P, FUČIĆ A, GEE D, van den HAZEL P, HOWARD V, KOHLHUBER M, LEIJS M, LUNDQUVIST C, MOSHAMMER H, NAGINIENE R, NICOLOPOULOU-STAMATI P, RONCHETTI R, SALINES G, SCHOETERS G, ten TUSSCHER G, WALLIS MK, ZUURBIER M. Exposure to multiple environmental agents and their effects. Acta Paeditrica 2006;95 Suppl 453:106-13.

A126. KOS A, BELJO-LUČIĆ R, KALINIĆ N. Research of formaldehyde concentration in indoor air surrounding woodworking places. Wood Res 2003;48:25-31.

A127. KOS A, BELJO-LUČIĆ R, ŠEGA K, RAPP AO. Influence of woodworking machine cutting parameters on the surrounding air dustiness. Holz Roh Werkst 2004;62:169-76.

A128. KOSALEC I, PUEL O, DELAFORGE M, KOPJAR N, ANTOLOVIĆ R, JELIĆ D, MATICA B, GALTIER P, PEPELJNJAK S. Isolation and cytotoxicity of low-molecular-weight metabolites of *Candida albicans*. Frontiers Biosci 2008;13:6893-904.

A129. KOSALEC I, ŠAFRANIĆ A, PEPELJNJAK S, BAČUN-DRUŽINA V, RAMIĆ S, KOPJAR N. Genotoxicity of tryptophol in battery of short-term assays on human white blood cells *in vitro*. Basic Clin Pharmacol Toxicol 2008;102:443-52.

A130. KOSTIAL K, BLANUŠA M, PIASEK M. Regulation of manganese accumulation in perinatally exposed rat pups. J Appl Toxicol 2005;25:89-93.

A131. KOŠĆEC A, RADOŠEVIĆ-VIDAČEK B. Circadian components in energy and tension and their relation to physiological activation and performance. Chronobiol Int 2004;21:673-90.
A132. KOŠĆEC A, RADOŠEVIĆ-VIDAČEK B, BAKOTIĆ M. Regulacija budnosti i spavanja u adolescenciji: biološki, bihevioralni i socijalni aspekti. Suvremena psihologija 2008;11:223-39.
A133. KOVAČEVIĆ G, ŽELJEŽIĆ D, HORVATIN K, KALAFATIĆ M. Morphological features and comet assay of green and brown hydra treated with aluminium. Symbiosis 2007;44:145-52.
A134. KOVARIK Z, RADIĆ Z, BERMAN HA, SIMEON-RUDOLF V, REINER E, TAYLOR P. Mutant cholinesterases possessing enhanced capacity for reactivation of their phosphonylated conjugates. Biochemistry 2004;43:3222-9.
A135. KOVARIK Z, RADIĆ Z, TAYLOR P. Site-directed mutagenesis of acetylcholinesterase – a tool for studying structure/function relationship. Period biol 2004;106:289-94.
A136. KOVARIK Z, SIMEON-RUDOLF V. Interaction of human butyrylcholinesterase variants with bambuterol and terbutaline. J Enzyme Inhib Med Chem 2004;19:113-7.
A137. KOVARIK Z, CIBAN N, RADIĆ Z, SIMEON RUDOLF V, TAYLOR P. Active site mutant acetylcholinesterase interactions with 2-PAM, HI-6, and DDVP. Biochem Biophys Res Commun 2006;342:973-78.
A138. KOVARIK Z, ČALIĆ M, LUCIĆ VRDOLJAK A, RADIĆ B. Interaction of pyridinium oximes with acetylcholinesterase and their effect on organophosphate-poisoned mice. J Mol Neurosci 2006;30:113-4.
A139. KOVARIK Z, RADIĆ Z, BERMAN AH, TAYLOR P. Mutation of acetylcholinesterase to enhance oxime-assisted catalytic turnover of methylphosphonates. Toxicology 2007;233:79-84.
A140. KOVARIK Z, ČALIĆ M, BOSAK A, ŠINKO G, JELIĆ D. *In vitro* evaluation of aldoxime interactions with human acetylcholinesterase. Croat Chem Acta 2008;81:47-57.
A141. KOVARIK Z, ČALIĆ M, ŠINKO G, BOSAK A, BEREND S, LUCIĆ VRDOLJAK A, RADIĆ B. Oximes: reactivators of phosphorylated acetylcholinesterase and antidotes in therapy against tabun poisoning. Chem Biol Interact 2008;175:173-9.
A142. KOŽUL D, HERCEG ROMANIĆ S. Distribution of organochlorine compounds in pine needles collected in Zagreb. Bull Environ Contam Toxicol 2008;81:339-42.
A143. KRAUTHACKER B, HERCEG ROMANIĆ S, WILKEN M, MILANOVIĆ Z. PCDD/Fs in ambient air collected in Zagreb, Croatia. Chemosphere 2006;62:1829-37.
A144. LABAR B, RUDAN I, IVANKOVIĆ D, BILOGLAV Z, MRSIĆ, M., STRNAD M, FUČIĆ A, ZNAOR A, BRADIĆ T, CAMBELL H. Haematological malignancies in childhood in Croatia: Investigating the theories of depleted uranium, chemical plant damage and «population mixing». Europ J Epidemiol 2004;19:55-60.
A145. LAZARUS M, ORCT T, BLANUŠA M, VICKOVIĆ I, ŠOŠTARIĆ B. Toxic and essential metal concentrations in four tissues of red deer (*Cervus elaphus*) from Baranja, Croatia. Food Add Contam 2008;25:270-83.
A146. LEMO N, VNUK D, RADIŠIĆ B, SKENDER Lj, KARAČIĆ V, BRČIĆ I. Determination of the toxic dose of lidocaine in dogs and its corresponding serum concentration. Vet Rec 2007;160:374-5.
A147. LIM W-S, LIŠČIĆ R, XIONG C, MORRIS JC. Highdoagse vitamin E supplementation and all-cause mortality. A reply to Meta-Analysis. Ann Intern Med 2005;143:152.
A148. LIŠČIĆ RM, BRECELJ J. Visual evoked potentials in multiple sclerosis patients treated with interferon beta-1a. Croat Med J 2004;45:323-7.
A149. LIŠČIĆ RM, STORANDT M, CAIRNS NJ, MORRIS JC. Clinical and psychometric distinction of frontotemporal and Alzheimer dementias. Arch Neurol 2007; 64:535-40.
A150. LIŠČIĆ RM, GRINBERG TL, ZIDAR J, GITCHO MA, CAIRNS NJ. ALS and FTLD: two faces of TDP-43 proteinopathy. Eur J Neurol 2008;15:772-80.
A151. LJUBOJEVIĆ M, HERAK-KRAMBERGER CM, HAGOS Y, BAHN A, ENDOU H, BURCKHARDT G, SABOLIĆ I. Rat renal cortical OAT1 and OAT3 exhibit gender differences determined by both androgen stimulation and estrogen inhibition. Am J Physiol Renal Physiol 2004;287:F124-38.
A152. LJUBOJEVIĆ M, BALEN D, BRELJAK D, KUŠAN M, ANZAI N, BAHN A, BURCKHARDT G, SABOLIĆ I. Renal expression of organic anion transporter OAT2 in rats and mice is regulated by sex hormones. Am J Physiol Renal Physiol 2007;292:F361-72.
A153. LUCIĆ VRDOLJAK A, ČALIĆ M, RADIĆ B, BEREND S, JUN D, KUČA K, KOVARIK Z. Pretreatment with pyridinium oximes improves antidotal therapy against tabun poisoning. Toxicology 2006;228:41-50.
A154. LUCIĆ VRDOLJAK A, RADIĆ B, GARAJ-VRHOVAC V, KOPJAR N, ŽLENDER V. Evaluation of antidotal effects of adamantyl derivative Tamorf in soman poisoning. J Appl Toxicol 2006;26:56-63.

A155. LUCIĆ VRDOLJAK A, LOVRIĆ J, RADIĆ B, ŽLENDER V. Antidotal efficacy of pyridinium chloride derivatives against soman poisoning. Basic Clin Pharmacol Toxicol 2006;99:17-21.
A156. MACAN J, BUNDALO-VRBANAC D, ROMIĆ G. Effects of the new karate rules on the incidence and distribution of injuries. Br J Sports Med 2006;40:326-30)
A157. MACAN J, TURK R, VUKUŠIĆ J, KIPČIĆ D, MILKOVIĆ-KRAUS S. Long-term follow-up of histamine levels in a stored fish meal sample. Anim Feed Sci Technol 2006;127:169-74.
A158. MACAN J, VARNAI VM, MALOČA I, KANCELJAK-MACAN, B. Increasing trend in atopy markers prevalence in a Croatian adult population between 1985 and 1999. Clin Exp Allergy 2007;37:1756-63.
A159. MALČANOV K, KOJIĆ-PRODIĆ B, RAOS N. Analysis of the less common hydrogen bonds involving ester oxygen sp3 atom as acceptors in the crystal structures of small organic molecules. Acta Cryst 2004;B60:424-32.
A160. MANFREDI JJ, DONG J, LIU W-J, RESNICKSILVERMAN, QIAO R, CHAHINIAN P, ŠARIĆ M, GIBBS AR, PHILLIPS JI, MURRAY J, AXTEN CW, NOLAN RP, AARONSON SA. Evidence against a role for SV40 in human mesothelioma. Cancer Res 2005;65:2602-9.
A161. MAROVIĆ G, SENČAR J, KOVAČ J, PRLIĆ I. Improvement of the radiological environmental situation due to remedial actions at the coal-fired power plant. J Radioanal Nucl Chem 2004;261: 451-5.
A162. MAROVIĆ G, FRANIĆ Z, SENČAR J, BITUH T, VUGRINEC O. Mosses and some mushroom species as bioindicators of radiocesium contamination and risk assessment. Coll Antropol 2008;32(Suppl. 2):109-14.
A163. MATEK SARIĆ M, BLANUŠA M, JUREŠA D, ŠARIĆ M, VARNAI VM, KOSTIAL K. Combined early treatment with DMSA and CaDTPA in acute oral cadmium exposure. Basic Clin Pharmacol Toxicol 2003;94:119-23.
A164. MATIJEVIĆ S, KLJAKOVIĆ-GAŠPIĆ Z, BOGNER D, GUGIĆ A, MARTINOVIĆ I. Vertical distribution of phosphorus species and iron in sediment at open sea stations in the middle Adriatic region. Acta Adriat 2008;49:165-84.
A165. MATIJEVIĆ S, KUŠPILIĆ G, KLJAKOVIĆ-GAŠPIĆ Z, BOGNER D. Impact of fish farming on the distribution of phosphorus in sediments in the middle Adriatic area. Mar Pollut Bull 2008;56:535-48.
A166. McCLOSKEY EV, DEY A, PARR RM, ARAS N, BALOGH A, BOSTOCK J, BORELLI A, KRISHNAN S, LOBO G, QIN LL, ZHANG Y, CVIJETIĆ S, ZAICHICK V, LIM-ABRAHAM M, BOSE K, WYNCHANK S, IYENGAR GV. Global variations in peak bone mass as studied by dualenergy X-ray absorptiometry J Radioanal Nucl Chem 2004;259:341-5.
A167. MILIĆ M, KAŠUBA V, OREŠČANIN V, ŽELJEŽIĆ D, KOPJAR N, ROZGAJ R. Chromosome damage in workers in cigarette manufacturing industry. J Appl Toxicol 2008;28:399-404.
A168. MILIČEVIĆ A, RAOS N. Estimation of stability constants of copper(II) and nickel(II) chelates with 1,2-diaminoethanes by the overlapping spheres method. Croat Chem Acta 2005;78:525-34.
A169. MILIČEVIĆ A, NIKOLIĆ S, TRINAJSTIĆ N. Toxicity of aliphatic ethers: A comparative study. Mol Diver 2006;10:95-9.
A170. MILIČEVIĆ A, RAOS N. Estimation of stability constants of copper(II) bis-chelates by the overlapping spheres method. Croat Chem Acta 2006;79:281-90.
A171. MILIČEVIĆ A, RAOS N. Estimation of stability of coordination compounds by using topological indices. Polyhedron 2006;25:2800-8.
A172. MILIČEVIĆ A, RAOS N. Estimation of stability constants of copper(II) chelates with triamines and their mixed complexes with amino acids by using topological indices and the overlapping spheres method. Polyhedron 2007;26:3350-6.
A173. MILIČEVIĆ A, RAOS N. Prediction of stability of copper(II) and nickel(II) complexes with fructoseamino acids from the molecular graph models developed on amino acid chelates. Croat Chem Acta 2007;80:557-63.
A174. MILIČEVIĆ A, RAOS N. Estimation of stability constants of copper(II) and nickel(II) chelates with dipeptides by using topological indices. Polyhedron 2008;27: 887-92.
A175. MILIČEVIĆ A, RAOS N. Influence of chelate ring interactions on copper(II) chelate stability studied by connectivity index functions. J Phys Chem A 2008;112:7745-9.
A176. MILETIĆ-MEDVED M, DOMIJAN A-M, PERAICA M. Recent data on endemic nephropathy and related urothelial tumors in Croatia. Wien Klin Wochenschr 2005;117: 604-9.
A177. MILKOVIĆ-KRAUS S, MACAN J, KANCELJAK-MACAN B. Occupational allergic contact dermatitis from azithromycin in pharmaceutical workers: a case series. Contact Dermatitis 2007;56:99-102.
A178. MIRIĆ M, PLAVEC D. Risk of acute bronchospasm and bronchial hyperreactivity

from inhaled acid aerosol in 79 healthy subjects: randomized, double-blind controlled trial. Croat Med J 2004: 45:709-14.

A179. MIROSAVLJEVIĆ M, SABOLOVIĆ J, NOETHIG LASLO V. Conformational analysis of bis(L-*N*,*N*dimethylvalinato) copper(II) and bis(L-*N*,*N*-dimethylleucinato) copper(II) in different solvents by EPR spectroscopy and a molecular mechanics study. Eur J Inorg Chem 2004; 3930-7.

A180. MIŠIGOJ-DURAKOVIĆ M, VUČETIĆ V, DURAKOVIĆ Z, WOLF-CVITAK J, MATKOVIĆ B, ČOROVIĆ N, BONEVSKI A. Body physique and composition in premenarchal ballerinas and female athletes in aesthetic sports. Med Probl Perform Art 2005;20;175-9.

A181. MOMČILOVIĆ B, LYKKEN GI, COOLEY M. Natural distribution of environmental radon daughters in the different brain areas of an Alzheimer Disease victim. Mol Neurodegen 2006;1:11.

A182. MOMČILOVIĆ B, LYKKEN GI. Seasonality of ^{214}Bi activity in the human body and of ^{222}Rn concentration in home ambient air. Health Phys 2007;92:484-7.

A183. MOMČILOVIĆ B, MOROVIĆ J, PREJAC J, SKALNAYA MG, IVIČIĆ N. Relationship of iodine, selenium and copper in the hair and whole blood of depressed human subjects. Trace Elem Electrol 2008;25:195-8.

A184. MOMČILOVIĆ B, MOROVIĆ J, PREJAC J, SKALNY AV, IVIČIĆ N. Trace element profile of human depression – the tapestry of patterns. Trace Elem Electrol 2008;25:187-90.

A185. MUKHERJEE O, PASTOR P, CAIRNS NJ, CHAKRAVERTY S, KAUWE JSK, SHEARS S, BEHRENS MI, BUDDE J, HINRICHS AL, NORTON J, LEVITCH D, TAYLOR-REINWALD L, GITCHO M, TU P-H, TENENHOLZ GRINBERG L, LIŠČIĆ RM, ARMENDARIZ J, MORRIS JC, GOATE A M. HDDD2 is a familial frontotemporal lobar degeneration with ubiquitin-positive, tau-negative inclusions caused by a missense mutation in the signal peptide of progranulin. Ann Neurol 2006;60:314-22.

A186. NERI M, UGOLINI D, BONASSI S, FUCIC A, HOLLAND N, KNUDSEN LE, SRÁM RJ, CEPPI M, BOCCHINI V, MERLO DF. Children's exposure to environmental pollutants and biomarkers of genetic damage. II. Results of a comprehensive literature search and meta-analysis. Mutat Res 2006;612:14-39.

A187. NIKOLIĆ S, MILIČEVIĆ A, TRINAJSTIĆ N. Graphical matrices in chemistry. Croat Chem Acta 2005;78:241-50

A188. NIKOLIĆ S, MILIČEVIĆ A, TRINAJSTIĆ N. QSPR study of polarographic half-wave reduction potentials of benzenoid hydrocarbons. Croat Chem Acta 2006;79:155-9.

A189. NORPPA H, BONASSI S, HANSTEEN I-L, HAGMAR L, STRÖMBERG U, RÖSSNER P, BOFFETTA P, LINDHOLM C, GUNDY S, LAZUTKA J, CEBULSKA-WASILEWSKA A, FABIÁNOVÁ E, ŠRÁM RJ, KNUDSEN LE, BARALE R, FUČIĆ A. Chromosomal aberrations and SCEs as biomarkers of cancer risk. Mutat Res 2006;600:37-45.

A190. ODŽAK R, ČALIĆ M, HRENAR T, PRIMOŽIČ I, KOVARIK Z. Evaluation of monoquaternary pyridinium oximes potency to reactivate tabuninhibited human acetylcholinesterase. Toxicology 2007;233:85-96.

A191. ORCT T, BLANUŠA M, LAZARUS M, VARNAI VM, KOSTIAL K. Comparison of organic and inorganic mercury distribution in suckling rat. J Appl Toxicol 2006;26:536-9.

A192. OREŠČANIN V, KOPJAR N, DURGO K, GARAJ-VRHOVAC V, FRANEKIĆ ČOLIĆ J, RAMIĆ S, NAĐ K, VALKOVIĆ V. Toxicological characterization of the new water cleaning product and its waste by product. J Environ Sci Health 2004;39:1277-90.

A193. ORŠOLIĆ N, BENKOVIĆ V, HORVAT-KNEŽ EVIĆ A, KOPJAR N, KOSALEC I, BAKMAZ M, MIHALJEVIĆ Ž, BENDELJA K, BAŠIĆ I. Assessment by survival analysis of the radioprotective properties of propolis and its polyphenolic compounds. Biol Pharm Bull 2007;30:946-51.

A194. PAVICIC I, TROSIC I. Influence of 864 MHz electromagnetic field on growth kinetics of established cell line. Biologia 2006;61:321-5.

A195. PAVICIC I, TROSIC I. Impact of 864 MHz or 935 MHz radiofrequency microwave radiation on the basic growth parameters of V79 cell line. Acta Biol Hung 2008;59:67-76.

A196. PAVICIC I, TROSIC I. *In vitro* testing of cellular response to ultra high frequency electromagnetic field radiation. Toxicol in vitro 2008;22:1344-8.

A197. PAVLOVIĆ M, ČOROVIĆ N, GOMZI M, ŠIMIĆ D, JAZBEC A, KUJUNĐIĆ TILJAK M. Smoking habits, signs of chronic diseases, and survival in inland and coastal regions of Croatia: a follow up study. Coll Antropol 2004;28:689-700.

A198. PEHNEC G, VAĐIĆ V, HRŠAK J. Measurements of ozone concentrations in Zagreb. Environ Monit Assess 2005;105:165-74.

A199. PEPELJNJAK S, SLOBODNJAK Z, ŠEGVIĆ M, PERAICA M, PAVLOVIĆ M. The ability of fungal isolates from human lung aspergilloma to produce mycotoxins. Hum Exp Toxicol 2004;23: 15-9.

A200. PERAICA M, DOMIJAN A-M, MILETIĆ-MEDVED M, FUCHS R. The involvement of mycotoxins in the development of endemic nephropathy. Wien Klin Wochenschr 2008;120:402-7.
A201. PERAICA M, DOMIJAN A-M, ŠARIĆ M. Mycotoxic and aristolochic acid theories of the development of endemic nephropathy. Arh Hig Rada Toksikol 2008;59:59-65.
A202. PERAICA M, LJUBANOVIĆ D, ŽELJEŽIĆ D, DOMIJAN A-M. The effect of a single dose of fumonisin B_1 on rat kidney. Croat Chem Acta 2008;81:119-24.
A203. PETEK MJ, BEREND S, KOPJAR N, ŽELJEŽIĆ D, MLADINIĆ M, RADIĆ B, LUCIĆ VRDOLJAK A. Tenocyclidine treatment in soman-poisoned rats – intriguing results on genotoxicity *versus* protection. Acta Biochim Polon 2008;55:97-105.
A204. PETRIK J, ŽANIĆ-GRUBIŠIĆ T, BARIŠIĆ K, PEPELJNJAK S, RADIĆ B, FERENČIĆ Ž, ČEPELAK I. Apoptosis and oxidative stress induced by ochratoxin A in rat kidney. Arch Toxicol 2003;17:685-93.
A205. PETRIĆ I, HRŠAK D, FINGLER S, VONČINA E, ĆETKOVIĆ H, BEGONJA KOLAR A, UDIKOVIĆ KOLIĆ N. Enrichment and characterization of PCB-degrading bacteria as potential seed cultures for bioremediation of contaminated soil. Food Technol Biotechnol 2007;45:11-20.
A206. PFOHL-LESZKOWICZ A, TOZLOVANU M, MANDERVILLE R, PERAICA M, CASTEGNARO M, STEFANOVIĆ V. New molecular and field evidences for the implication of mycotoxins but not aristolochic acid in human nephropathy and urinary tract tumor. Mol Nutr Food Res 2007;51:1131-46.
A207. PIASEK M, BLANUŠA M, KOSTIAL K, LASKEY JW. Low iron diet and parenteral cadmium exposure in pregnat rats: the effects on trace elements and fetal viability. BioMetals 2004;17:1-14.
A208. PIZENT A, MACAN J, JURASOVIĆ J, VARNAI VM, MILKOVIĆ-KRAUS S, KANCELJAK-MACAN B. Association of toxic and essential metals with atopy markers and ventilatory lung function in women and men. Sci Total Environ 2008;390:369-76.
A209. PREJAC J, IVIČIĆ N, MOMČILOVIĆ B. Hair calcium paradox – a report of two cases of a controlled intermittent dietary calcium, magnesium and vitamin D supplementation vs. a case of non supplementation. Trace Elem Electrol 2008;25:191-4.
A210. PRLIĆ I, SURIĆ-MIHIĆ M, MILKOVIĆ-KRAUS S, MEŠTROVIĆ T, VRTAR M. Characterization of workplaces in interventional radiology using active dosimeters ALARA OD. Rad Protect Dosim 2007;125:379-82.
A211. PRLIĆ I, SURIĆ MIHIĆ M, VUČIĆ Z. Active electronic personal dosemeter in interventional radiology. Rad Protect Dosim 2008;132:308-12.
A212. PROSEN H, FINGLER S, ZUPANČIČ-KRALJ L, DREVENKAR V. Partitioning of selected environmental pollutants into organic matter as determined by solid-phase microextraction. Chemosphere 2007;66:1580-9.
A213. PUNTARIĆ D, KOS A, ŠMIT Z, ZEČIĆ Ž, ŠEGA K, BELJO LUČIĆ R, HORVAT D, BOŠNIR J. Wood dust exposure in wood industry and forestry. Coll Anthropol 2005;29:207-11.
A214. PUŠIĆ T, MACAN J, TURK R, BORČIĆ-KONJAREK Lj, TOMIĆ-BENKO V, SOLJAČIĆ I. Pojava iritativnog tekstilnog dermatitisa uzrokovanog nošenjem radne odjeće. Tekstil 2005;54:20-6.
A215. RADIĆ B, LUCIĆ VRDOLJAK A, PETEK MJ, KOPJAR N, ŽELJEŽIĆ D. *In vitro* biological efficiency of tenocyclidine – TCP and its adamantane derivative TAMORF. Toxicol In Vitro 2006;20:1455-64.
A216. RADIĆ B, LUCIĆ VRDOLJAK A, ŽELJEŽIĆ D, FUCHS N, BEREND S, KOPJAR N. Evaluation of HI-6 oxime: potential use in protection of human acetylcholinesterase inhibited by antineoplastic drug irinotecan and its cyto/genotoxicity *in vitro*. Acta Biochim Pol 2007;54:583-93.
A217. RADOŠEVIĆ-VIDAČEK B, KOŠĆEC A. Shiftworking families: Parents' working schedule and sleep patterns of adolescents attending school in two shifts. Rev Saude Publica 2004;38 supl:38-46.
A218. RAJTMAJER SM, MILIČEVIĆ A, TRINAJSTIĆ N. On the complexity of Archimedean solids. J Mathem Chem 2006;39:119-32.
A219. RAOS N, ŽUŽA-MAK L. Application of cluster analysis in search of low-energy conformations by the overlapping spheres method. Croat Chem Acta 2004;77:53-60.
A220. RAOS N. Estimation of stability constants of copper(II) chelates with amino acids by overlapping spheres method. Croat Chem Acta 2005;78:175-80.
A221. RAOS N, BRANICA G, MILIČEVIĆ A. The use of graph-theoretical models to evaluate two electroanalytical methods for determination of stability constants. Croat Chem Acta 2008;81:511-7.
A222. REINER E. Pedeseta godišnjica prve strukovne organizacije biokemičara u Hrvatskoj: Od Sekcije za biokemiju do Hrvatskog društva za biokemiju i molekularnu biologiju. Period biol 2008;110:111-4.

A223. REINER E. Profesor Božo Težak: Prigodom stote godišnjice rođenja i šezdesete obljetnice osnivanja Instituta za medicinska istraživanja i medicinu rada. Arh Hig Rada Toksikol 2008;59:141-3.

A224. REINER E. U povodu šezdesete obljetnice Instituta za medicinska istraživanja i medicinu rada u Zagrebu. Arh Hig Rada Toksikol 2008;59:319-22.

A225. RICHTER B, NIESSNER A, PENKA M, GRDIĆ M, STEINER S, STRASSER B, ZIEGLER S, ZORN G, MAURER G, SIMEON-RUDOLF V, WOJTA J, HUBER K. Endurence training reduces circulating asymmetric dimethylarginine and myeloperoxidase levels in persons at risk of coronary events. Thromb Haemost 2005;94:1306-11.

A226. RUMORA L, DOMIJAN A-M, ŽANIĆ GRUBIŠIĆ T, PERAICA M. Mycotoxin fumonisin B_1 alters cellular redox balance and signalling pathways in rat liver and kidney. Toxicology 2007;242:31-8.

A227. SABOLIĆ I, HERAK-KRAMBERGER CM, ANTOLOVIĆ R, BRETON S, BROWN D. Loss of basolateral invaginations in proximal tubules of cadmium-intoxicated rats is independent of microtubules and clathrin. Toxicology 2006;218:149-63.

A228. SABOLIĆ I, ŠKARICA M, GORBOULEV V, LJUBOJEVIĆ M, BALEN D, HERAK KRAMBERGER CM, KOEPSELL H. Rat renal glucose transporter SGLT1 exhibits zonal distribution and androgen-dependent gender differences. Am J Physiol Renal Physiol 2006;290: F913-26.

A229. SABOLIĆ I. Common mechanisms in nephropathy induced by toxic metals. Nephron Physiol 2006;104:107-14.

A230. SABOLIĆ I, ASIF AR, BUDACH WE, WANKE C, BAHN A, BURCKHARDT G. Gender differences in kidney function. Pfluegers Arch - Eur J Physiol 2007;455:397-429.

A231. SABOLOVIĆ J, MRAK Ž, KOŠTRUN S, JANEKOVIĆ A. Is the enthalpy of fusion of tris(acetylacetonato)metal(III) complexes affected by their potential energy in the crystal state? Inorg Chem 2004;43:8479-89.

A232. SABOLOVIĆ J, KAITNER B. The effects of sterical aliphatic-aliphatic interactions in the coordination polymer of bis(*N*,*N*-diethylglycinato)copper(II): Experimental evidence and theoretical modeling. Polyhedron 2007;26:1087- 97.

A233. SABOLOVIĆ J, KAITNER B. The effect of hydrogen bonding in two crystal modifications of aquabis(*N*,*N*-dimethylglycinato-κ*N*,κ*O*)copper(II): Experimental and theoretical study. Inorg Chim Acta 2008;361:2418-30.

A234. SKENDER Lj, BRČIĆ I, KARAČIĆ V. Urin analysis for the evaluation of environmental exposures to aromatic hydrocarbons. Arch Environ Health 2004;59:237-44.

A235. SOKOLOVIĆ M, GARAJ-VRHOVAC V, RAMIĆ S, ŠIMPRAGA B. Chicken nucleated blood cells as a cellular model for genotoxicity testing using the comet assay. Food Chem Toxicol 2007;45:2165- 170.

A236. SOKOLOVIĆ M, GARAJ-VRHOVAC V, ŠIMPRAGA B. T-2 toxin: Incidence and toxicity in poultry. Arh Hig Rada Toksikol 2008;59:43-52.

A237. STOEV SD, STEFANOV M, DENEV S, RADIĆ B, DOMIJAN A-M, PERAICA M. Experimental mycotoxicosis in chickens induced by ochratoxin A and penicillic acid and intervention with natural plant extracts. Vet Res Commun 2004;28:727-46.

A238. SURIĆ MIHIĆ M, MEŠTROVIĆ T, PRLIĆ I, SURIĆ D. Importance of quality assurance program implementation in conventional diagnostic radiology. Coll Antropol 2008;32(Suppl. 2):181-4.

A239. ŠARIĆ MARIJA, PIASEK M, BLANUŠA M, KOSTIAL K, ILICH JZ. Sodium and calcium intakes and bone mass in rats revisited. Nutrition 2005;21:609-14.

A240. ŠARIĆ M, ĆURIN K, VARNAI VM. The role of polio-vaccine in pleural mesothelioma - An epidemiological observation. Coll Antropol 2008;32:479-83.

A241. ŠEGVIĆ KLARIĆ M, PEPELJNJAK S, DOMIJAN A-M, PETRIK J. Lipid peroxidation and glutathione levels in porcine kidney PK15 cells after individual and combined tretment with fumonisin B_1, beauvericin and ochratoxin A. Basic Clin Pharmacol Toxicol 2007;100:157-64.

A242. ŠEGVIĆ KLARIĆ M, PEPELJNJAK S, ROZGAJ R. Genotoxicity of fumonisin B1, beauvericin and ochratoxin A in porcine kidney PK15 cells: Effects of individual and combined treatment. Croat Chem Acta 2008;81:139-46.

A243. ŠERIĆ JELASKA L, BLANUŠA M, DURBEŠIĆ P, JELASKA SD. Heavy metal concentrations in ground beetles, leaf litter, and soil of a forest ecosystem. Ecotoxicol Environ Safety 2007;66:74-81.

A244. ŠINKO G, ČALIĆ M, KOVARIK Z. *para*- and *ortho*-Pyridinium aldoximes in reaction with acetylthiocholine. FEBS Lett 2006;580:3167-72.

A245. ŠINKO G, ČALIĆ M, BOSAK A, KOVARIK Z. Limitation of the Ellman method: Cholinesterase activity measurement in the presence of oximes. Anal Biochem 2007;370:223-7.

A246. ŠIŠOVIĆ A, VAĐIĆ Ž, ŠEGA K, BEŠLIĆ I, VAĐIĆ V. Comparison between PAH mass concentrations measured in PM_{10} and $PM_{2.5}$ particle fractions. Bull Environ Contam Toxicol 2005;75:121-6.
A247. ŠIŠOVIĆ A, BEŠLIĆ I, ŠEGA K, VADJIĆ V. PAH mass concentrations measured in PM_{10} particle fraction. Environ Int 2008;34: 580-4.
A248. ŠURINA B, NOSSO D, ŠIFTAR Z, FLEGARMEŠTRIĆ Z. SIMEON-RUDOLF V. Cholinesterase unit establishment and issuing of "Warning cards" for carriers of suxamethonium sensitive serum butyrylcholinesterase variants. Coll Antropol 2004;28 supl 2:297-304.
A249. TAUTERMANN CS, SABOLOVIĆ J, VOEGELE AF, LIEDL KR. Mechanism of the cis-trans isomerization of bis(glycinato)copper(II). J Phys Chem B 2004;108:2098-102.
A250. TAYLOR P, KOVARIK Z, REINER E, RADIĆ Z. Acetylcholinesterase: Converting a vulnerable target to a template for antidotes and detection of inhibitor exposure. Toxicology 2007;233:70-8.
A251. TELIŠMAN S, PIZENT A, JURASOVIĆ J, CVITKOVIĆ P. Lead effect on blood pressure in moderately lead-exposed male workers. Am J Ind Med 2004;45:446-54.
A252. TELIŠMAN S, ČOLAK B, PIZENT A, JURASOVIĆ J, CVITKOVIĆ P. Reproductive toxicity of low-level lead exposure in men. Environ Res 2007;105:256-66.
A253. TROŠIĆ I, BUŠLJETA I, MODLIC B. Investigation of the genotoxic effect of microwave irradiation in rat bone marrow cells: *in vivo* exposure. Mutagenesis 2004;5:361-4.
A254. TROŠIĆ I, BUŠLJETA I, PAVIČIĆ I. Blood-forming system in rats after whole-body microwave exposure; reference to the lymphocytes. Toxicol Lett 2004;154:125-32.
A255. TROŠIĆ I, MILKOVIĆ-KRAUS S. Asbestos in the Republic of Croatia. Int J Occupat Environ Health 2004;10:198-201.
A256. TROŠIĆ I, BUŠLJETA I. Frequency of micronucleated erythrocytes in rat bone marrow exposed to 2.45 GHz radiation. Physica Scripta 2005;T118:168-70.
A257. TROSIC I, BUSLJETA I. Erythropoietic dynamic equilibrium in rats maintained after microwave irradiation. Exp Toxicol Pathol 2006;57:247-51.
A258. TURK R, JURETIĆ D, GEREŠ D, TURK N, REKIĆ B, SIMEON-RUDOLF V, SVETINA A. Serum paraoxonase activity and lipid parameters in the early postpartum period of dairy cows. Res Vet Sci 2004;76:57-61.
A259. TURK R, JURETIĆ D, GEREŠ D, TURK N, REKIĆ B, SIMEON-RUDOLF V, ROBIĆ M, SVETINA A. Serum paraoxonase activity in dairy cows during pregnancy. Res Vet Sci 2005;79:15-8.
A260. TURK R, JURETIĆ D, GEREŠ D, TURK N, SIMEON-RUDOLF V, REKIĆ B, SVETINA A. Oxidative stress in dairy cows - serum paraoxonase activity related to hepatomegaly. Croat Chem Acta 2005;78:375-8.
A261. UDIKOVIĆ KOLIĆ N, HRŠAK D, BEGONJA KOLAR A, PETRIĆ I, STIPIČEVIĆ S, SOULAS G, MARTIN-LAURENT F. Combined metabolic activity within an atrazine-mineralizing community enriched from agrochemical factory soil. Int Biodeter Biodegrad 2007;60:299-307.
A262. UREMOVIĆ M, BOŠNJAK PAŠIĆ M, ŠERIĆ V, VARGEK SOLTER V, BUDIĆ R, BOŠNJAK B, CVIJETIĆ-AVDAGIĆ S, SOLTER D, DEMARIN V. Ultrasound measurement of the volume of musculus quadriceps after knee joint injury. Coll Antropol 2004;28(Suppl 2):227-33.
A263. UREMOVIĆ M, CVIJETIĆ S, BOŠNJAK PAŠIĆ M, ŠERIĆ V, VIDRIH B, DEMARIN V. Impairment of proprioception after whiplash injury. Coll Antropol 2007;31:823-7.
A264. van den HAZEL P, ZUURBIER M, BABISCH W, BARTONOVA A, BISTRUP ML, BOLTE G, BUSBY C, BUTTER M, CECCATELLI S, FUČIĆ A, HANKE W, JOHANSSON C, KOHLHUBER M, LEIJS M, LUNDQVIST C, MOSHAMMER H, NAGININENE R, PREECE A, RONCHETTI R, SALINES G, SAUNDERS M, SCHOETERS G, STILIANAKIS N, ten TUSSCHER G, KOPPE JG. Today's epidemics in children: Possible relations to environmental pollution ad suggested preventive measures. Acta Paeditrica 2006;95 Suppl 453:18-25.
A265. van den HAZEL P, ZUURBIER M, BISTRUP ML, BUSBY C, FUČIĆ A, KOPPE JG, LUNDQVIST C, RONCHETTI R, ten TUSSCHER G. Policy and science in children's health and environment: Recommendations from the PINCHE project. Acta Paeditrica 2006;95(Suppl 453):114-9.
A266. VARNAI VM, PIASEK M, BLANUŠA M, MATEK SARIĆ M, JUREŠA D, KOSTIAL K. Succimer treatment and calcium supplementation reduce tissue lead in suckling rats. J Appl Toxicol 2004;24:123-8.
A267. VASILIĆ Ž, PERIŠ N, WILKEN M, DREVENKAR V. Polychlorinated biphenyls, dibenzo-*p*-dioxins and dibenzofurans in soil samples from airport areas of Croatia. Intern J Environ Anal Chem 2004;84:1093-103.
A268. VUČEMILO M, MATKOVIĆ K, VINKOVIĆ B, MACAN J, VARNAI VM, PRESTER Lj, GRANIĆ K, ORCT T. Effect of microclimate on the airborne dust and endotoxin

concentration in a broiler house. Czech J Anim Sci 2008;53:83-9.

A269. VUKIČEVIĆ D, MILIČEVIĆ A, NIKOLIĆ S, SEDLAR J, TRINAJSTIĆ N. Paths and walks in acyclic structures: plerographs *versus* kenographs. ARKIVOC 2005;X:33-44.

A270. YOKOYAMA H, ANZAI N, LJUBOJEVIĆ M, OHTSU N, SAKATA T, MIYAZAKI H, NONOGUCHI H, ISLAM R, ONOZATO ML, TOJO A, TOMITA K, KANAI Y, IGARASHI T, SABOLIĆ I, ENDOU H. Functional and immunochemical characterization of a novel organic anion transporter Oat8 (Slc22a9) in rat renal collecting duct. Cell Physiol Biochem 2008;21:269-78.

A271. ZUBČIĆ S, KRAUTHACKER B. Analysis of polychlorinated biphenyl congeners in human milk collected in Zagreb, Croatia. Fresen Environ Bull 2004;13: 346-52.

A272. ŽELJEŽIĆ D, GARAJ-VRHOVAC V. Atrazine genotoxicity evaluation in different mouse organs by comet assay. Period biol 2004;106:155-9.

A273. ŽELJEŽIĆ D, GARAJ-VRHOVAC V. Chromosomal aberrations, micronuclei and nuclear buds induced in human lymphocytes by 2,4- dichlorophenoxyacetic acid pesticide formulation. Toxicology 2004;200:39-47.

A274. ŽELJEŽIĆ D, GARAJ-VRHOVAC V. Genotoxicity evaluation of pesticide formulations containing alachlor and atrazine in multiple mouse tissues (blood, kidney, liver, bone marrow, spleen) by comet assay. Neoplasma 2004;51:198-203.

A275. ŽELJEŽIĆ D, DOMIJAN A-M, PERAICA M. DNA damage by ochratoxin A in rat kidney assessed by the alkaline comet assay. Braz J Med Biol Res 2006;39:1563-8.

A276. ŽELJEŽIĆ D, GARAJ-VRHOVAC V, PERKOVIĆ P. Evaluation of DNA damage induced by atrazine and atrazine-based herbicide in human lymphocytes *in vitro* using a comet and DNA diffusion assay. Toxicol in vitro 2006;20:923-35.

A277. ŽELJEŽIĆ D, LUCIĆ VRDOLJAK A, RADIĆ B, FUCHS N, BEREND S, OREŠČANIN V, KOPJAR N. Comparative evaluation of acetylcholinesterase status and genome damage in blood cells of industrial workers exposed to carbofuran. Food Chem Toxicol 2007;45:2488- 98.

A278. ZELJEZIC D, LUCIC VRDOLJAK A, KOPJAR N, RADIC B, MILKOVIC KRAUS S. Cholinesterase-inhibiting and genotoxic effects of acute carbofuran intoxication in man: A case report. Basic Clin Pharmacol Toxicol 2008;103:329-35.

A279. ŽUŠKIN E, MUSTAJBEGOVIĆ J, SCHACHTER EN, KANCELJAK B, MACAN J, KERN J, BUNETA L, PUCARIN-CVETKOVIĆ J. Immunological and respiratory changes in tobacco workers. Am J Ind Med 2004;45:76-83.

A280. ZUSKIN E, MUSTAJBEGOVIC J, SCHACHTER EN, KERN J, DECKOVIC-VUKRES V, TROSIC I, CHIARELLI A. Respiratory function in pesticide workers. J Occup Environ Med 2008;50:1299-305.

A281. ŽUŠKIN E, MUSTAJBEGOVIĆ J, SCHACHTER NE, PAVLOVIĆ M, ARUMUGAM U, CHIARELLI A. Respiratory findings in art students. Coll Antropol 2004;28:717-25.

A282. ŽUVIĆ-BUTORAC M, HERAK-KRAMBERGER CM, KRILOV D, SABOLIĆ I, HERAK JN. EPR study of lipid phase in renal cortical membrane organelles from intact and cadmium-intoxicated rats. Biochim Biophys Acta 2005;1718:44-52.

B. Papers indexed in other secondary bibliographic databases

B1. BALEN B, KRSNIK-RASOL M, ZADRO I, SIMEON-RUDOLF V. Esterase activity and isoenzymes in relation to morphogenesis in *Mammillaria gracillis* Pfeiff. tissue culture. Acta Bot Croat 2004;63:83-91.

B2. BABIĆ-IVANČIĆ V, MARKOVIĆ M, TUCAK A, DEKANIĆ D, CVIJETIĆ S, ŠERIĆ V FÜREDIMILHOFER H. Trideset godina u nefrolitijazi; suradnja kemičara i urologa. Med Vjesn 2004;36:125-43.

B3. BAKOTIĆ M, RADOŠEVIĆ-VIDAČEK B, KOŠĆEC A. Individualne razlike i učinci deprivacije spavanja. Arh Hig Rada Toksikol 2007;58:435-47.

B4. BEKIĆ A, NIKOLIĆ I, TURČIN S, GOREČAN M, KRIŽANAC Š, MOROVIĆ S, PLAVEC D. Clinical staging of central non-small cell bronchial carcinoma. Acta Clin Croat 2005;44(3);285-9.

B5. BEŠLIĆ I. Lebdeće čestice u atmosferi grada Zagreba (The collecting of airborne particles in Zagreb area). Gospodarstvo i okoliš 2004;66:29- 34.

B6. BEŠLIĆ I, ŠEGA K, BENCETIĆ KLAIĆ Z. PM_{10} and $PM_{2.5}$ levels in urban part of Zagreb Croatia: selfconstructed *vs.* reference samplers. EUROSAP Newsletter 2004;53:6-18.

B7. BEŠLIĆ I, ŠEGA K, BENCETIĆ KLAIĆ Z. Utjecaj tipova vremena na koncentracije lebdećih čestica (The influence of weather types on suspended particle concentrations). Gospodarstvo i okoliš 2004;65:587-9.

B8. BOSAK A. Organofosforni spojevi: klasifikacija i reakcije s enzimima. Arh Hig Rada Toksikol 2006;57:445-57.

B9. BRČIĆ I. Izloženost opće populacije hlapljivim aromatskim ugljikovodicima. Arh Hig Rada Toksikol 2004;55:291-300.

B10. BRČIĆ KARAČONJI I. Facts about nicotine toxicity. Arh Hig Rada Toksikol 2005;56:363-71.

B11. BRČIĆ KARAČONJI I, SKENDER Lj. Comparison between dynamic headspace and headspace solid-phase microextraction for gas chromatography of BTEX in urine. Arh Hig Rada Toksikol 2007;58:421-7.

B12. BRONZOVIĆ M, MAROVIĆ G, VRTAR M. Public exposure to ^{226}Ra in drinking water. Arh Hig Rada Toksikol 2006;57:39-44.

B13. BRONZOVIĆ M, MAROVIĆ G. ^{226}Ra removal processes in Croatian water facilities. Arh Hig Rada Toksikol 2006;57:165-70.

B14. CHEDRESE PJ, PIASEK M, HENSON MC. Cadmium as an endocrine disruptor in the reproductive system. Immun Endoc Metab Agents Med Chem 2006;1:27-35

B15. CVIJETIĆ S, BABIĆ IVANČIĆ V, TUCAK A, MILHOFER FÜREDI H. Mineralna gustoća kosti u bolesnika s urolitijazom. Med vjesn (Osijek) 2004;36:149-53.

B16. CVIJETIĆ S, GRAZIO S, KAŠTELAN D, KORŠIĆ M. Epidemiologija osteoporoze u Hrvatskoj. Liječ Vjesn 2006;128:261-4.

B17. CVIJETIĆ S, GRAZIO S, KAŠTELAN D, KORŠIĆ M. Epidemiologija osteoporoze. Arh Hig Rada Toksikol 2007;58:13-8.

B18. ČAČKOVIĆ M. Kisele komponente u lebdećim česticama u zraku Zagreba (Acidic components in airborne particles in Zagreb air). Gospodarstvo i okoliš 2004;66:35-9.

B19. ČAČKOVIĆ M, ŠEGA K, VAĐIĆ V, HRŠAK J, BEŠLIĆ I, ŠOLJIĆ Z. Olovo, mangan, kadmij, kloridi, nitrati i sulfati u $PM_{2,5}$ frakciji lebdećih čestica u zraku Zagreba (Lead, manganese, cadmium, chlorides, nitrates and sulphates in $PM_{2.5}$ particle fraction in Zagreb air). Gospodarstvo i okoliš 2004;65:583-6.

B20. DOMIJAN A-M, PERAICA M, CVJETKOVIĆ B, TURČIN S, JURJEVIĆ Ž, IVIĆ D. Mould contamination and co - occurrence of mycotoxins in maize grain in Croatia. Acta Pharm 2005;55:349- 56.

B21. DOMIJAN A-M, PERAICA M. Ochratoxin A in wine. Arh Hig Rada Toksikol 2005;56:17-20.

B22. DOMIJAN A-M, PERAICA M, FERENČIĆ Ž, ČUŽIĆ S, FUCHS R, LUCIĆ A, RADIĆ B. Ochratoxin A induced apoptosis in rat kidney tissue. Arh Hig Rada Toksikol 2004;55:243-8.

B23. DOMIJAN A-M, RUDEŠ K, PERAICA M. The effect of ochratoxin A on the concentration of protein carbonyls in rats. Arh Hig Rada Toksikol 2005;56:311-5.

B24. FISCHER FM, RADOŠEVIĆ-VIDAČEK B, KOŠĆEC A, TEIXEIRA LR, MORENO CRC, LOWDEN A. Internal and external time conflicts in adolescents: sleep characteristics and interventions. Mind Brain Education 2008;2:17-23.

B25. FUČIĆ A. Genotoxic studies in populations occuaptionally exposed to low doses of physical and chemical agents in R Croatia. Rad Biol Radioecol 2004;44:328-32.

B26. FRANIĆ Z. Elektronički otpad, operacijski sustavi i okoliš. Priroda 2005;1:22-4.

B27. FRANIĆ Z. Zračenje građevnih materijala. Graditelj 2005;1-2:53-8.

B28. FRANIĆ Z, PETRINEC B. Marine radioecology and waste management in the Adriatic. Arh Hig Rada Toksikol 2006;57:347-52.

B29. FRANIĆ Z, SALAMON D. Spomenička baština banovinskih gradina kao suvremena kulturno-turistička ekodestinacija u funkciji

kreiranja egzistencije u nerazvijenom području. In: Suvremene hrvatske teme. Zagreb: Hrvatsko društvo za sustave; 2007:169 -80.

B30. FRANIĆ Z. Infrastruktura kvalitete i poslovodstvo kvalitete. In: Suvremene hrvatske teme. Zagreb: Hrvatsko društvo za sustave; 2007: 281-7.

B31. GARAJ-VRHOVAC V, KOPJAR N, POROPAT M. Evaluation of cytogenetic damage in nuclear medicine personnel occupationally exposed to low-level ionising radiation. Arh Hig Rada Toksikol 2006;57:31-8.

B32. GOMZI M. Nasilje na radnom mjestu. Sigurnost 2004;46:199-205.

B33. GOMZI M. I svakodnevna buka šteti zdravlju. Zdrav život 2007;50,51:28-32.

B34. GOMZI M. živimo li u bolesnoj zgradi? Zdrav život 2007;46:24-8.

B35. GOMZI M. Stajanje i stojeći rad - čemu treba posvetiti pozornost. Zdrav život 2008;65:30-3.

B36. HRŠAK J, ČAČKOVIĆ M, KALINIĆ N, BALAGOVIĆ I. Kisele tvari i teški metali u ukupnoj taložnoj tvari (Deposition of acidic components and heavy metals in Zagreb in 1991-2001). Gospodarstvo i okoliš 2004;65:605-7.

B37. HORVAT D, KOS A, ZEČIĆ Ž, ŠUŠNJAR M, BEŠLIĆ I. Istraživanje koncentracije drvne prašine hrastovine u radnoj okolini sjekača pri izradbi prostornog drva. Šumarski list 2005;7-8:393-6.

B38. HERCEG ROMANIĆ S, KRAUTHACKER B. Are pine needles bioindicators of air pollution? Comparison of organochlorine levels in pine needles and ambient air. Arh Hig Rada Toksikol 2007;58:195-9.

B39. JURETIĆ D, TADIJANOVIĆ M, REKIĆ B, PETLEVSKI R, SIMEON-RUDOLF V. Paraoxonase phenotype distribution in a healthy population group from the Slavonski Brod area. Biochemia Medica 2004;14:51-6.

B40. JURETIĆ D, MOTEJLKOVA A, KUNOVIĆ B, REKIĆ B, FLEGAR-MEŠTRIĆ Z, VUJIĆ L, MESIĆ R, LUKAČ-BAJALO J, SIMEON-RUDOLF V. Paraoxonase/arylesterase in serum of patients with type II diabetes mellitus. Acta Pharm 2006;56:59-68.

B41. KALINIĆ N, HRŠAK J, VAĐIĆ V, LAMBAŠA-BELAK Ž, MIHELČIĆ V, PERKOVIĆ B. Onečišćenje tla i vegetacije fluoridima iz zraka (Airborne fluoride contamination of soil and vegetation). Gospodarstvo i okoliš 2004;65:602-4.

B42. KANCELJAK-MACAN B, ŽUŠKIN E, MACAN J. Organic aerosols and the development of allergic disorders. Arh Hig Rada Toksikol 2004;55:213-20.

B43. KANCELJAK-MACAN B. Suvremeni pogledi na alergijske bolesti. Arh Hig Rada Toksikol 2004;55: 123-34.

B44. KLEPAC PULANIĆ T, MACAN J, PLAVEC D, KANCELJAK-MACAN B. Exercise and allergic diseases. Arh Hig Rada Toksikol 2004;55:197-204.

B45. KOPJAR N, MIOČIĆ S, RAMIĆ S, MILIĆ M, VICULIN T. Assessment of the radioprotective effects of amifostine and melatonin on human lymphocytes irradiated with gamma-rays in vitro. Arh Hig Rada Toksikol 2006;57:155-63

B46. KOVARIK Z, ČALIĆ M, ŠINKO G, BOSAK A. Structure-activity approach in the reactivation of tabun-phosphorylated human acetylcholinesterase with bispyridinium paraaldoximes. Arh Hig Rada Toksikol 2007;58:201- 9.

B47. KOŽUL D, HERCEG ROMANIĆ S. Analiza poliklorbifenila i organoklorovih pesticida u borovim iglicama. Arh Hig Rada Toksikol 2007;58:461-9.

B48. KRAUTHACKER B. Postojana organska zagađivala i njihov utjecaj na ljude i okoliš. Gospodarstvo i okoliš 2005;75:483-7.

B49. LAZARUS M, VICKOVIĆ I, ŠOŠTARIĆ B, BLANUŠA M. Heavy metal levels in tissues of red deer (*Cervus elaphus*) from Eastern Croatia. Arh Hig Rada Toksikol 2005;56:233-40.

B50. LIŠČIĆ R. How to differentiate frontotemporal from Alzheimer's dementia? Recent developments in molecular genetics and neuropathology. Zdrav Vestn 2008;77(Suppl. 2):71-4.

B51. LUCIĆ VRDOLJAK A, BRADAMANTE V, RADIĆ B, PERAICA M, FUCHS R, REINER Ž. Butyrylcholinesterase activity and plasma lipids in dexamethasone treated rats. Acta Pharm 2005;55:177-85.

B52. LUKOVITS I, MILIČEVIĆ A, TRINAJSTIĆ N, VUKIČEVIĆ D. Kekulé structure counts in damaged benzenoid parallelograms. Internet Electron J Mol Des 2006;5:144-9.

B53. MACAN J, MUSTAČ M, TALIJANČIĆ A, CVITANOVIĆ S, MILKOVIĆ-KRAUS S. Izloženost i alergija na prašinske grinje u općem i radnom okolišu u Hrvatskoj. Arh Hig Rada Toksikol 2004;55:183-92

B54. MACAN J, KANCELJAK-MACAN B, MUSTAČ M, MILKOVIĆ-KRAUS S. Analysis of dust samples from urban and rural occupational environments in Croatia. Arh Hig Rada Toksikol 2005;56:327- 32.

B55. MACAN J, VUJASINOVIĆ E, MALOČA I, PUŠIĆ T. Zaštitna radna odjeća kao uzrok kožnih tegoba u industrijskih radnika. Sigurnost 2006;48:111-24.

B56. MACAN J. Profesionalne alergijske bolesti kože. Sigurnost 2007;49:313-5.

B57. MACAN J. Profesionalne bolesti mišićno-koštanog sustava. Sigurnost 2007;49:395-7.

B58. MALOČA I, PLAVEC D. Važnost analize kondenzata izdahnutog zraka u plućnim bolestima. Arh Hig Rada Toksikol 2006;57:213-27.
B59. MAROVIĆ G, SENČAR J, ŠEGA K, BEŠLIĆ I. Ukupna beta aktivnost u zraku i oborini u odnosu na koncentraciju lebdećih čestica (Total beta activity in the air and wet fallout in relation with suspended particulate matter concentrations). Gospodarstvo i okoliš 2004;12:594-6.
B60. MAROVIĆ G, SENČAR J, BEŠLIĆ I, ŠEGA K, FRANIĆ Z, ŠOLIĆ-GAVRANOVIĆ M. Ukupna beta aktivnost zraka i koncentracija lebdećih čestica u uvjetima pojačanog prometa. Gospodarstvo i okoliš 2005;13:723-6.
B61. MAROVIĆ G, SENČAR J, BRONZOVIĆ M, FRANIĆ Z, KOVAČ J. Otpad vezan uz proizvodnju električne energije i proizvodnju mineralnih gnojiva. Arh Hig Rada Toksikol 2006;57:333-8.
B62. MILIĆ M, KOPJAR N. Evaluation of the genotoxic activity of bleomycin and mitomycin C in human lymphocytes by the alkaline comet assay. Arh Hig Rada Toksikol 2004;55:249-59.
B63. MILIČEVIĆ A. Što rade naši (i drugi) kristalografi. Priroda 2007;7-8:64-6.
B64. MILIČEVIĆ A, RAOS N. Procjene vrijednosti konstanti stabilnosti kompleksnih spojeva. Kem Ind 2007;56:449-55.
B65. MOMČILOVIĆ B. Značenje proteina, vitamina I mikroelemenata u cijeljenu rane. Medix 2003;9: 66-70.
B66. MOMČILOVIĆ B, MOROVIĆ J, IVIČIĆ N, SKALNY AV. Hair and blood multielement profile for metabolic imaging of the major unipolar depression. Study rationale and design. Trace Elem Med 2006;7:35-42.
B67. MOMČILOVIĆ B, MOROVIĆ J, PREJAC J, ČELEBIĆ A, GRABEKLIS AR, SKALNY AV, IVIČIĆ N. Trace element metabolic imaging of the major unipolar clinical depression - Silver in the hair and blood. Trace Elem Med 2006;7:43-55.
B68. NIKOLIĆ S, MILIČEVIĆ A, TRINAJSTIĆ N. Toxicity of aliphatic ethers: a comparative study. Lecture Ser Comput Computat Sci 2005;3:216-8.
B69. NIKOLIĆ S, MILIČEVIĆ A, TRINAJSTIĆ N. Graphical matrices in chemistry. Wseas Trans Inform Sci Appl 2005;11:1739-42.
B70. PAVIČIĆ I: Utjecaj radiofrekventnog zračenja na stanicu i strukture citoskeleta. Arh Hig rada Toksikol 2004;55:321-8.
B71. PAVIČIĆ I, TROŠIĆ, I, ŠAROLIĆ, A. Comparison of 864 MHz and 935 MHz microwave radiation effects on cell culture. Arh Hig RadaToksikol 2006;57:149-54.
B72. PAVLOVIĆ M, ŠARIĆ M, ČOROVIĆ N. Kardiovaskularni morbiditet i mortalitet dosadašnje spoznaje. Acta Med Croatica 2007;61:329-33.
B73. PAVLOVIĆ M, VITALE K, VUKIĆ R. Stanovanje i zdravlje. Sigurnost 2007;49:19-28.
B74. PEHNEC G. Vodikov peroksid u troposferi. Arh Hig Rada Toksikol 2007;58:239-49.
B75. PEHNEC G, KEZELE N, ŠORGO G. Estimation of UV exposure in Croatia over the summer using a simple approximate formula. Arh Hig Rada Toksikol 2007;58:387-97.
B76. PETEK MJ, LUCIĆ VRDOLJAK A. Kvalitativne i kvantitativne metode analize gamahidroksibutirata (GHB). Arh Hig Rada Toksikol 2006;57:397-404.
B77. PERAICA M, DOMIJAN A-M. Mikotoksini I zdravlje ljudi. Hrvatski časopis za javno zdravstvo 2006;2:1-3.
B78. PERAICA M, DOMIJAN A-M, IVIĆ D, CVJETKOVIĆ B. Neželjeni učinci mikotoksina nađenih na kukuruzu u Republici Hrvatskoj. Glasilo biljne zaštite 2007;7:299-305.
B79. PERAICA M, DOMIJAN A-M, FLAJS D, IVIĆ D, CVJETKOVIĆ B. The exposure of general population in Croatia to ochratoxin A. Krmiva 2008;50:27-33.
B80. PERAICA M. Etika u toksikologiji. Glasnik Hrvatskoga katoličkog liječničkog društva 2008;18:23-5.
B81. PIASEK G, PIASEK M. Opažanja Ivana Krstitelja Lalanguea na tragu ideja moderne medicine rada u Hrvatskoj. Radovi Zavoda za znanstveni rad HAZU Varaždin 2004;(14-15):31-7.
B82. PIASEK G, PIASEK M. Varaždinsko zdravstvo u 17. stoljeću. Arh Hig Rada Toksikol 2004;55:25-34.
B83. PIASEK M, GOMZI M. Pasivno pušenje i djeca: procjena izloženosti i zdravstvene posljedice. Liječ Vjesn 2004;126:325-30.
B84. PIASEK G, PIASEK M. Tradicija hospitala (kesnodohija) u Varaždinu. Arh Hig Rada Toksikol 2006;57:459-68.
B85. PLAVEC D. ARIA-jedinstvena alergijska bolest dišnog sustava: što povezuje naša dosadašnja istraživanja s koncepcijom? Arh Hig Rada Toksikol 2004;55:135-40.
B86. PRESTER Lj, BRČIĆ KARAČONJI I, MACAN J. Determination of mite allergens in house dust using the enzyme immunoassay. Arh Hig Rada Toksikol 2007;58:413-9.
B87. PRLIĆ I, SURIĆ MIHIĆ M, MEŠTROVIĆ T. Nedosljednosti Pravilnika o zaštiti od elektromagnetskih polja. Sigurnost 2008;50:167-72.
B88. PRIMOŽIĆ I, ODŽAK R, TOMIĆ S, SIMEON-RUDOLF V, REINER E. Pyridinium, imidazolium and quinuclidinium

oximes: synthesis, interaction with native and phosphylated cholinesterases, and antidotes against organophosphates. J Med Chem Def 2004;2:1-30. http://www.jmedchemdef.org.
B89. RADOŠEVIĆ-VIDAČEK B, MACAN J, KOŠĆEC A. Stres i alergija. Arh Hig Rada Toksikol 2004;55: 205-11.
B90. RADOŠEVIĆ-VIDAČEK B, KOŠĆEC A. Europska direktiva o radnom vremenu: između zaštite zdravlja radnika i kompetitivne ekonomije. Sigurnost 2007;49:9-18
B91. RAOS N, PAVLOVIĆ G. Jedna slaba vodikova veza: C–H···A. Kem Ind 2004;53:485-93.
B92. RAOS N. Bubanović i Arrhenius. Kem Ind 2005;54:320-2.
B93. RAOS N. Colloquial confusion. Chem World 2005;2:72
B94. RAOS N, PAVLOVIĆ G. Vodikove veze s metalima. Kem Ind 2006;55:167-74.
B95. RAOS N. Liječenje živom u povijesti medicine. Farm Glas 2007;63:453-63.
B96. RAOS N. Zlato kao lijek. Farm Glas 2007;63:85- 94.
B97. RAOS N. Letters of Svante Arrhenius to his former Croatian student. Bull Hist Chem 2008;33: 12-16.
B98. REINER E, BOSAK A, SIMEON-RUDOLF V. Activity of cholinesterases in human whole blood measured with acetylthiocholine as substrate and ethopropazine as selective inhibitor of plasma butyrylcholinesterase. Arh Hig Rada Toksikol 2003;55:1-4.
B99. REINER E, SIMEON-RUDOLF V. Pyridinium, imidazolium and quinuclidinium compounds: toxicity and antidotal effects against the nerve agents tabun and soman. Arh Hig Rada Toksikol 2006;57:171-9.
B100. REINER E, RADIĆ Z, SIMEON-RUDOLF V. Mechanisms of organophosphate toxicity and detoxication with emphasis on studies in Croatia. Arh Hig Rada Toksikol 2007;58:329-38.
B101. ROZGAJ R, KAŠUBA V, BLANUŠA M. Mercury chloride genotoxicity in rats following oral exposure, evaluated by comet assay and micronucleus test. Arh Hig Rada Toksikol 2005;56:9-15.
B102. SABOLIĆ PIPINIĆ I, MACAN J. Profesionalna astma. Sigurnost 2008;50:159-62.
B103. SABOLIĆ PIPINIĆ I, MACAN J. Profesionalni virusni hepatitisi. Sigurnost 2008;50:325-7.
B104. SUŠA M, PAVIČIĆ I. Djelovanje radiofrekvencijskog elektromagnetskog zračenja na spermatogenezu u sisavaca. Arh Hig Rada Toksikol 2007;58:449- 59.
B105. ŠARIĆ MARIJA, PIASEK M. Utjecaj natrijeva klorida na kost. Arh Hig Rada Toksikol 2005;56:39-44.
B106. ŠEGA K. Lebdeće čestice (Aerosoli) [Suspended particles (aerosols)]. Gospodarstvo i okoliš 2004;66:11-6.
B107. ŠEGA K, BEŠLIĆ I. Health impact assessment of black smoke and airborne particulates on Zagreb population. Newsletter 2006;(38):2-6.
B108. ŠINKO G. Enzimske i proteinske metode u pripravi enantiomerno čistih kiralnih spojeva i svojstva nekih biološki aktivnih enantiomera. Arh Hig Rada Toksikol 2005;56:351-61.
B109. ŠINKO G. Istražiti kako rade enzimi. Priroda 2008;4:38-43.
B110. ŠINKO G, MENDAŠ STARČEVIĆ G. Pola stoljeća u službi zdravlja i zdravog okoliša. Priroda 2008;5:31-5.
B111. ŠIŠOVIĆ A. Kratki pregled mjerenja koncentracija PAU u zraku Zagreba (A brief review of PAHs mass concentrations measurements in Zagreb air). Gospodarstvo i okoliš 2004;66:45-52.
B112. ŠIŠOVIĆ A, VAĐIĆ Ž, ŠEGA K, BEŠLIĆ I, VAĐIĆ V. Usporedba masenih koncentracija PAU mjerenih u različitim veličinama lebdećih čestica (Comparison of PAH mass concentrations measured in different size particle fractions). Gospodarstvo i okoliš 2004;65:590-3.
B113. TRINAJSTIĆ N, PAUŠEK-BAŽDAR S, RAOS N, ŠKARE D. Hrvatska kemija u XX. stoljeću. IV.[1-3] Hrvatski kemijski časopisi. Kem Ind 2008;57:465-79.
B114. TURK R, JURETIĆ D, GEREŠ D, TURK N, REKIĆ B, SIMEON-RUDOLF V, SVETINA. Paraoksonaza i lipidi u serumu mliječnih krava kao pokazatelj metaboličkih promjena tijekom reprodukcijskog ciklusa. Biochemia Medica 2004;14:45-50.
B115. TURK R, PLAVEC D, MILKOVIĆ-KRAUS S, MACAN J. Results of clinical-toxicological assessments performed in the Poison Control Centre in Zagreb over a 10-year period. Arh Hig Rada Toksikol 2004;55:269-72.
B116. TROŠIĆ I. Poduka o azbestu može spasiti živote. Gospodarstvo i okoliš 2005;75:477-82.
B117. TAYLOR P, REINER E, KOVARIK Z, RADIĆ Z. Application of recombinant DNA methods for production of cholinesterases as organophosphate antidotes and detectors. Arh Hig Rada Toksikol 2007;58:339-45.
B118. VAĐIĆ V, HRŠAK J. Sadržaj teških metala u lebdećim česticama u zraku (Heavy metals content in suspended particulate matter in the air. Gospodarstvo i okoliš 2004;66:40-3.
B119. VAĐIĆ V. Indikatori onečišćenja zraka uzrokovani prometom. Sigurnost 2004;46:1-11.
B120. VAĐIĆ V. Mjerenje crnog dima u Zagrebu. Sigurnost 2006;48:243-56.
B121. VAĐIĆ V. Onečišćenje zraka u području odlagališta otpada Jakuševec i u okolnim

naseljima. Arh Hig Rada Toksikol 2006;57:317- 24.
B122. VARNAI VM, MACAN J, PLAVEC D, JUREŠA D. Endotoxin level measurement in the house dust by the end-point Limulus amoebocyte lysate method. Arh Hig Rada Toksikol 2004;55:175- 81.
B123. VARNAI VM, MACAN J. Profesionalna izloženost endotoksinu. Sigurnost 2004;46:207-16.
B124. VARNAI VM. Reaktivni disfunkcijski sindrom dišnih putova. Sigurnost 2008;50:441-3.
B125. VASILIĆ Ž. O zaštiti okoliša u njemačkoj pokrajini Baden-Württemberg. Arh Hig Rada Toksikol 2006;57:353-7.
B126. ŽLENDER, V. Detekcija apoptoze. Arh Hig Rada Toksikol 2006;57:229-36.
B127. ŽUŠKIN E, PIASEK M, PIASEK G, ŠARIĆ M, MUSTAJBEGOVIĆ J, SUŠEC T. Žene i medicinsko umijeće-povijesni ogled. Liječ Vjesn 2006:128:114-21.
B128. ŽUŠKIN E, ŠARIĆ M, VAĐIĆ V, MUSTAJBEGOVIĆ J, DOKO-JELINIĆ J, PUCARIN-CVETKOVIĆ J, MILOŠEVIĆ M. Uzroci klimatskih promjena i njihove posljedice za zdravlje čovjeka. Acta Med Croatica 2008;62:293-9.
B129. ŽUŽUL S, PEHNEC G, ČAČKOVIĆ M, VAĐIĆ V. Sezonske varijacije masenih koncentracija ozona u zraku (Seasonal variations of ozone mass concentrations in the air of Zagreb). Gospodarstvo i okoliš 2004;65:578-82.

C. Papers in proceedings

C1. BEŠLIĆ I. Lebdeće čestice u atmosferi grada Zagreba. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05", Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka, 2005:15-26.

C2. BEŠLIĆ I, ŠEGA K, ŠIŠOVIĆ A. Pilot air pollution investigation at Zagreb crossroads. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli- Izmir: Altindag Grafik Matbaacilik; 2005: 1484-8.

C3. BEŠLIĆ I, ŠEGA K. Seasonal and spatial distribution of $PM_{2.5}$ particle fraction in Zagreb air during 2005. In: IUAPPA regional conference / 17th EFCA speciality conference "Air pollution and environmental health / from science to action: the challenge of particulate matter"; Lille, France 2006. Lille: APPA NPC; 2006. [CD].

C4. BEŠLIĆ I, ŠEGA K, NEĆAK J, BILIĆ M. Korekcijski faktori rezultata određivanja masene koncentracije lebdećih čestica uporabom β-atenuacijske metode na području grada Zagreba. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007:131-6.

C5. BEŠLIĆ I, ŠEGA K. Utjecaj prilagođavanja hrvatskih propisa legislativi Europske zajednice na procjenu kvalitete zraka s obzirom na onečišćenje lebdećim česticama. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 111-9.

C6. BEŠLIĆ I, ŠEGA K. Onečišćenje zraka dušikovim dioksidom i lebdećim česticama na nadvožnjaku Slavonske avenije i Radničke ceste u Zagrebu. In: Vasić-Rački Đ, ed. Zbornik radova znanstveno-stručnog skupa „Tehnologije zaštite zraka"; Tuheljske toplice 2008. Zagreb: Akademija tehničkih znanosti Hrvatske; 2008: 117-20.

C7. BITUH T, PETRINEC B, MAROVIĆ G, SENČAR J. ^{226}Ra in some Croatian rivers. In: IRPA Regional Congress for Central and Eastern Europe "Regional and Global Aspects of Radiation Protection"; Brasov, Romania 2007. Bukurest: RSRP; 2007. [CD].

C8. BITUH T, PETRINEC B, MAROVIĆ G, SENČAR J, GOSPODARIĆ I. ^{226}Ra i ^{228}Ra u rijekama Hrvatske. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 236-41.

C9. BRONZOVIĆ M, MAROVIĆ G. Water intake and age-dependent dose assessment. 11th International Congress of the International Radiation Protection Association IRPA 11 "Widening the Radiation Protection World"; Madrid, Spain 2004.

C10. BRONZOVIĆ M, VRTAR M, MAROVIĆ G. Višegodišnja izloženost ^{226}Ra putem pijenja vode. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja;Stubičke Toplice 2005. Zagreb: Agraf; 2005: 276-80.

C11. BRUMEN V, GARAJ-VRHOVAC V, FRANEKIĆ ČOLIĆ J, RADALJ Ž. Zdravstvene tegobe operatera na videoterminalima – posljedica elektromagnetskog zračenja ili štogod drugo? In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 464-7.

C12. ČAČKOVIĆ M, VAĐIĆ V, HRŠAK J, ŽUŽUL S. Razine olova mangana i kadmija u zraku u okolici odlagališta otpada Jakuševec. In: Milanović Z, ed. Zbornik radova VIII. Međunarodnog simpozija "Gospodarenje otpadom" Zagreb 2004; Zagreb 2004. Zagreb: Gospodarstvo i okoliš d.o.o. 2004: 679-88.

C13. ČAČKOVIĆ M, VAĐIĆ V, ŠEGA K, BEŠLIĆ I. Sulfati, nitrati i kloridi u frakcijama čestica PM_{10} i $PM_{2.5}$ u zraku Zagreba. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 167-74.

C14. ČAČKOVIĆ M, ŠEGA K, VAĐIĆ V, BEŠLIĆ I. Spatial and temporal variations of major acidic species in $PM_{2.5}$ particle fraction in Zagreb air. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli- Izmir: Altindag Grafik Matbaacilik; 2005: 1-7.

C15. ČAČKOVIĆ M, ŠEGA K, VADJIĆ V, BEŠLIĆ I. Characterisation of major acidic anions in TSP and PM_{10} in Zagreb air. In: IUAPPA regional conference / 17th EFCA speciality conference "Air pollution and environmental health / from science to action: the challenge of particulate matter"; Lille,

France 2006. Lille: APPA NPC; 2006. [CD].

C16. ČAČKOVIĆ M, VAĐIĆ V, HRŠAK J, ŽUŽUL S. Koncentracije teških metala u zraku u okolici odlagališta otpada Jakuševec tijekom procesa sanacije. In: Milanović Z, ed. Zbornik radova IX. međunarodnog simpozija "Gospodarenje otpadom Zagreb 2006."; Zagreb 2006. Zagreb: Gospodarstvo i okoliš d.o.o.; 2006: 825-33.

C17. ČAČKOVIĆ M, VAĐIĆ V, ŠEGA K, BEŠLIĆ I. Kvaliteta zraka - sulfati u lebdećim česticama u zraku Zagreba. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 215-20.

C18. ČAČKOVIĆ M, VAĐIĆ V, ŠEGA K, BEŠLIĆ I. Mass concentrations of major acidic anions in PM_{10} particle fraction in Zagreb air. In: Doley D, ed. Proceedings of the 14th IUAPPA World Congress 2007 incorporating 18th CASANZ Conference; Brisbane, Australia 2007. Brisbane: The Clean Air Society of Australia and New Zealand; 2007. [CD].

C19. ČAČKOVIĆ M, VAĐIĆ V, ŽUŽUL S. Teški metali u lebdećim česticama i ukupnoj taložnoj tvari u zraku u okolici odlagališta otpada Jakuševec tijekom procesa sanacije. In: Vasić-Rački Đ, ed. Zbornik radova znanstveno-stručnog skupa "Tehnologije zaštite zraka"; Tuheljske toplice 2008. Zagreb: Akademija tehničkih znanosti Hrvatske; 2008: 63-9.

C20. ČAVLOVIĆ A, BELJO LUČIĆ R, BEŠLIĆ I. Određivanje korekcijskog faktora uređaja za kontinuirano mjerenje masene koncentracije čestica drvne prašine. In: Šega K, ed. Petiznanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 121-9.

C21. ČELEBIĆ A, STIPETIĆ J, RINČIĆ N, BAUČIĆ I, MIKO S, MOMČILOVIĆ B. Trace element release from two different base alloys under conditions of imitating oral saliva. In: Anke M, Flachowsky G, Kisters K, Schafer U, Schenkel H, Seifert M, Stoeppler M, eds. Macro and Trace Elements. Mengen- und Spurenelemente. Vol. 2; Jena, Germany 2004. Leipzig: Schubert-Verlag; 2004: 1730-5.

C22. FRANIĆ Z. Analiza osjetljivosti modela za procjenu srednjeg vremena boravka morske vode u Jadranskom moru zasnovanom na ^{90}Sr kao radioaktivnom obilježivaču. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 373-8.

C23. FRANIĆ Z, ILIJAŠ B. Ugovor o neširenju nukleranog oružja. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 64-8.

C24. FRANIĆ Z, MAROVIĆ G, SENČAR J, PETRINEC B. ^{137}Cs u zraku i radioaktivnom talogu u Zagrebu nakon Černobiljske nesreće. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstvenostručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 265-71.

C25. FRANIĆ Z, MAROVIĆ G, SENČAR J. Long-term investigations of radioactive matter in the air in the city of Zagreb. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on AirQuality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli-Izmir: Altindag Grafik Matbaacilik; 2005: 747-55.

C26. FRANIĆ Z, MAROVIĆ G. Radioceasium activity concentrations in potatoes in Croatia after the Chernobyl accident. In: Proceedingsof the Second European IRPA Congress on Radiation Protection "Radiation protection: From knoweldge to action"; Paris, France 2006. Paris: IRPA; 2006. P154. [CD].

C27. FRANIĆ Z, GALJANIĆ S. Infrastruktura kvalitete izaštita zraka. In: Šega K, ed. Peti znanstven-ostručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 27-33.

C28. FRANIĆ Z. Radioaktivnost i nuklearna tematika u znanstvenoj fantastici. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 13-22.

C29. FRANIĆ Z, MAROVIĆ G, PETRINEC B, KUBELKA D. ^{137}Cs activity concentrations in Adriatic mussels and musky octopuses and dose assessment. In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008. Buenos Aires: IRPA; Topical Section TS II.2.2, Topic ID 2597. [CD].

C30. FRANIĆ Z, MAROVIĆ G, SENČAR J. Long-term investigations of ^{137}Cs in some mushroom species in North Croatia. In: Strand P, Brown J, Jølle T, eds. Proceedings of the International Conference on Radioecology & Environmetal Radioactivity, Part 2; Bergen, Norvey 2008. Østerås: Norwegian Radiation Protection Authority; 2008: 119-22.

C31. FUCHS R, LUCIĆ A. Pridruživanje Europskoj Uniji nije opravdanje za donošenje loših zakonskih rješenja. Zbornik radova 16. seminara „DDD i ZUPP 2004. Da li smo spremni za Europu?"; Rovinj 2004. Zagreb: Korunić d.o.o.; 2004: 239-43.

C32. FUČIĆ A, ZNAOR A, JAZBEC A-M, SEDLAR M. Significance of stable and unstable cytogenetic biomarkers in estimation of genome damage in subjects exposed to physical and chemical agents. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 216-21.

C33. GAJSKI G, GARAJ-VRHOVAC V, PAŽANIN S, BRUMEN V. Evaluation of cytogenetic damage in workers exposed to microwave radiation of GEM radar using new criteria in scoring micronucleus test. In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008. Buenos Aires: IRPA; Topical Section TS III.2.1, Topic ID 3084. [CD].

C34. GALJANIĆ S, FRANIĆ Z. Akreditacija laboratorija u području zaštite od zračenja. In: Garaj-VrhovacV, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 34-9.

C35. GAMULIN M, GARAJ-VRHOVAC V, KOPJAR N. Primjena alkalnog komet testa u procjeni oštećenja DNA u bolesnika sa solidnim tumorima liječenih radioterapijom. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005:183-8.

C36. GARAJ-VRHOVAC V, BRUMEN V, FRANEKIĆ ČOLIĆ J. Genotoxic impact of video display terminals. Proceedings of the 3rd International Workshop "Biological effects of EMFs". Vol. 2; Kos, Greece 2004. Athens, Greece: NCSR "Demokritos"; 2004:1014-9.

C37. GARAJ-VRHOVAC V, KOPJAR N. Biomonitoring of genotoxic risk in radar facility workers: comparison of the comet assay with micronucleus assay and chromatid breakage assay [CD document P4]. Proceedings of the IRPA Regional Congress on Radiation Protection in Central Europe; Bratislava, Slovakia 2003.

C38. GARAJ-VRHOVAC V, KOPJAR N. The evaluation of genotoxicrisks in medical personnel occupationally exposed to ultrasound [CD document 1c5]. 11th International Congress of the Radiation Protection Association IRPA 11 "Widening the Radiation Protection World"; Madrid, Spain 2004.

C39. GARAJ-VRHOVAC V, KOPJAR N, POROPAT M. Evaluation of cytogenetic damage in nuclear medicine personnel occupationally exposed to low-level ionising radiation. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 200-5.

C40. GARAJ-VRHOVAC V, ĐURINEC M. Evaluation of genetic damage in workers employed in tobacco industry using the alkaline comet assay. In: Taraškevičius R, ed. Proceedings of the 3rd International Conference Metals in the Environment; Vilnius, Lithuania 2006. Vilnius: Institute of Geology and Geografy Lithuanian Metalecology Society; 2006: 41-5.

C41. GARAJ-VRHOVAC V, GAJSKI G. Citogenetski status u osoba profesionalno izloženih mikrovalnom zračenju GEM radara. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 118-24.

C42. GARAJ-VRHOVAC V, GAJSKI G, PAŽANIN S, BRUMEN V. Cytogenetic monitoring of personnel occupationally exposed to microwave radiation of GEM radar. In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008.. Buenos Aires: IRPA; Topical Section TS III.2.1, Topic ID 3412. [CD].

C43. GODEC R, ŠIŠOVIĆ A, BEŠLIĆ I, ŠEGA K, VAĐIĆ V. Policiklički aromatski ugljikovodici u zraku okolice plinskog polja Molve. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007:299-305.

C44. HERCEG ROMANIĆ S, KRAUTHACKER B. PCB and organochlorine pesticides in one-year and two-year old pine needles. [CD document 101]. In: Rotard W, ed. Proceedings of the 24th International Symposium on Halogenated Environmental Organic Pollutants and POPs - DIOXIN 2004; Berlin, Germany 2004. Organohalogen Compounds 2004;66:1813-7.

C45. HERCEG ROMANIĆ S, KRAUTHACKER B. Borove iglice - bioindikator onečišćenja zraka. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 93-8.

C46. HRŠAK J, BALAGOVIĆ I. Sadržaj olova, kadmija i talija u taložnoj tvari u Zagrebu u razdoblju 1998.-2004. godine. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005:257-62.

C47. HRŠAK J, VAĐIĆ V. Cadmium content in suspended particulate matter in Zagreb Air. In:

Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli- Izmir: Altindag Grafik Matbaacilik; 2005: 1441-5.

C48. KALINIĆ N, HRŠAK J, VAĐIĆ V, ČAČKOVIĆ M, LAMBAŠA-BELAK Ž, MIHELČIĆ V. Teški metali i kisele komponente u ukupnoj taložnoj tvari u Šibeniku. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 249-56.

C49. KALINIĆ N, HRŠAK J, VAĐIĆ V, LAMBAŠABELAK Ž. Fluoridi u česticama i njihov udio u koncentraciji ukupnih fluorida u zraku In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 201-8.

C50. KALINIĆ N, HRŠAK J, VAĐIĆ V, ČAČKOVIĆ M, LAMBAŠA-BELAK Ž, MIHELČIĆ V. Correlation between metallic and acidic components indeposited matter. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli-Izmir: Altindag GrafikMatbaacilik; 2005:759-65.

C51. KALINIĆ N, HRŠAK J, VADJIĆ V, LAMBAŠABELAK Ž. Particulate fluorides in relation to the total fluoride mass concentrations in the air. In: IUAPPA regional conference / 17th EFCA speciality conference "Air pollution and environmental health / from science to action: the challenge of particulate matter"; Lille, France 2006. Lille: APPA NPC. [CD].

C52. KALINIĆ N, VAĐIĆ V, ČAČKOVIĆ M. Plinoviti fluoridi u zraku u okolici odlagališta otpada Jakuševec. In: Milanović Z, ed. Zbornik radova IX. međunarodnog simpozija "Gospodarenje otpadom 2006". Zagreb 2006. Zagreb: Gospodarstvo i okoliš d.o.o.; 2006: 817-24.

C53. KALINIĆ N, VAĐIĆ V, LAMBAŠA-BELAK Ž, ŽUŽUL S, MIHELČIĆ V. Ukupna taložna tvar I teški metali na području Šibenika i kategorizacija kakvoće zraka prema starim i novim propisima. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 193-203.

C54. KALINIĆ N, VAĐIĆ V, ĆAĆKOVIĆ M, ŠIŠOVIĆ A, ŠEGA K, BEŠLIĆ I. Levels of specific air pollutants characterized by annoying odour. In: Doley D, ed. Proceedings of the 14th IUAPPA World Congress 2007 incorporating 18th CASANZ Conference; Brisbane, Australia. Brisbane: The Clean Air Society of Australia and New Zealand; 2007. [CD].

C55. KAŠUBA V, ROZGAJ R, JAZBEC A. Evaluation of chromosomal aberrations in radiologists and medical radiographers chronically exposed to ionising radiation. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 206-10.

C56. KLERKX J, DEHANDSCHUTTER B, ANNUNZIATELLIS A, BACCANI A, BITUH T, CELIKOVIC I, CIOTOLI G, COLTELLA M, DEMAJO A, DOGJANI S, GAVSHIN V, GRADASCEVIC N, HOXHA L, JOVANOVIC P, JUHASZ L, KISIC D, KOLOBOVA S, KOVAC J, LOMBARDI S, MATYCHENKOV V, MELGUNOV M, MENG S, MIHAILJ A, PETRINEC B, POFFIJN A, POPOVIC A, SAMEK D, SAMSONOVA A, SARACEVIC L, SZERBIN P, UJIC P, ZUNIC ZS. Environmental impact of radioactivity in waste from coal and aluminum industries in western Balkan countries. In: 5th International Symposium on Natural Occurring Radioactive Material; Seville, Spain 2007. Seville: Universidad de Sevilla; 2007. [CD].

C57. KOPJAR N, GARAJ-VRHOVAC V. The alkaline comet assay as a biomarker of primary DNA damage in peripheral blood leukocytes of nuclear medicine personnel [CD document P5]. Proceedings. of the IRPA Regional Congress on Radiation Protection in Central Europe; Bratislava 2003, Slovakia.

C58. KOPJAR N, GARAJ-VRHOVAC V. The assessment of primary DNA damage in peripheral blood leukocytes of nuclear medicine personnel [CD document 1c7]. 11th International Congress of the Radiation Protection Association IRPA 11 "Widening the Radiation Protection World"; Madrid 2004, Spain.

C59. KOPJAR N, MIOČIĆ S, RAMIĆ S, MILIĆ M, VICULIN T. Assessment of the radioprotective effects of Amifostine and Melatonin on human lymphocytes irradiated with γ-rays *in vitro*. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 194-9.

C60. KOVAČ J, MAROVIĆ G, SENČAR J. Working levels in some Croatian spas [CD document 6a42]. 11th International Congress of the Radiation Protection Association IRPA 11

"Widening the Radiation Protection World"; Madrid, Spain 2004.

C61. KOVAČ J, SENČAR J, MAROVIĆ G. Radioactive contamination of soil close to phosphogypsum disposal pond [CD document 422]. Proceedings of Sixth International Symposium & Exhibition on Environmental Contamination in Central and Eastern Europe and the Commonwealth of Independent States; Prague, Czech Republic 2004.

C62. KOVAČ J, MAROVIĆ G, SENČAR J. Praćenja radioaktivnosti na plinskom polju Molve. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 400-4.

C63. KOVAČ J, MAROVIĆ G. Natural radioactivity at Podravina gas fields. In: Proceedings of the Second European IRPA Congress on Radiation Protection "Radiation protection: From knoweldge to action"; Paris, France 2006. Paris: IRPA; 2006. P178. [CD].

C64. KOVAČ J. Natural Radioactivity at CBPP deposite site. In: IRPA Regional Congress for Central and Eastern Europe „Regional and Global Aspects of Radiation Protection"; Brasov, Romania 2007. Bukurest: RSRP; 2007. [CD].

C65. KOVAČ J, MAROVIĆ G. Radioaktivnost odlagališta pepela i šljake. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 261-5.

C66. KOVAČ J, MAROVIĆ G. Natural radioactivity at CBPP waste pile. In: Strand P, Brown J, Jølle T, eds. Proceedings of the International Conference on Radioecology & Environmetal Radioactivity, Part 1; Bergen, Norvey 2008. Østerås: Norwegian Radiation Protection Authority; 2008: 125-18.

C67. KOVAČ J, MAROVIĆ G. Natural radioactivity at CBPP waste pile. In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008. Buenos Aires: IRPA; Topical Section TS III.4.4. – ID 1097. [CD].

C68. KOVARIK Z. RADIĆ Z, BERMAN HA, SIMEONRUDOLF V, REINER E, TAYLOR P. Reactivation of phosphonylated acetylcholinesterase analysed by chirality and mutagenesis. In: Gertrud Puu, urednica. Proceedings of the Eighth International Symposium on Protection against Chemical and Biological Warfare Agents; Gothenburg, Sweden 2004. Umeĺ: Swedish Defence Research Agency Division of NBC Defence; 2004. [CD].

C69. KOVARIK Z, ČALIĆ M, KUČA K, JUN D. Interaction of the pyridinium oximes K027, K033 and K048 with native and tabun-inhibited human acetylcholinesterase. In: Bokan S, Orehovec Z, Price B, eds. The Proceedings of the Chemical and Biological Medical Treatment Symposium CB MTS - Industry IV - "The Third World Congress on Chemical, Biological and Radiological Terrorism"; Dubrovnik 2005. Aberdeen, Maryland, USA: ASAApplied Science and Analysis, Inc.; 2006: 173-5.

C70. KOŽUL D, HERCEG ROMANIĆ S, KLJAKOVIĆ-GAŠPIĆ Z, VEŽA J. Levels of polychlorinated biphenyls and organochlorine pesticides in the Mediterranean blue mussel from the Adriatic sea. In: 28th International Symposium on Halogenated Persistent Organic Pollutants (POPs) - Dioxin 2008; Birmingham, UK 2008. Organohalogen Compounds 2008;70:1243-46.

C71. LYKKEN GI, MOMČILOVIĆ B. Radon and humans from another perspective. Proceedings of the 14th Annual International Radon Sympisum; Newport, RI, USA 2005. Lebanon, PA: American Association of Radon Scientists and Technologies; 2004. [CD].

C72. LUCIĆ VRDOLJAK A, RADIĆ B, TURK R, FUCHS R. Aktivnost kolinesteraza u krvi radnika izloženih antikolinesterazama: Rezultati petogodišnjeg praćenja. In: Korunić Z, ed. Zbornik radova seminara "DDD i ZUPP 2005 - sigurna uporaba pesticida"; Rovinj 2005. Zagreb: Korunić d.o.o.; 2005: 299-304.

C73. MACAN J. Grinje (Acari). DDD radionica "Otrovne, iritantne ili gadljive životinje i netopiri". In: Korunić Z, ed. Zbornik radova 16. seminara „DDD i ZUPP 2004. Da li smo spremni za Europu?"; Rovinj 2004. Zagreb: Korunić d.o.o., 2004: 77-87.

C74. MACAN J. Skladišni štetnici kao uzročnici alergijskih bolesti u Hrvatskoj. In: Korunić Z, ed. Zbornik radova 16. seminara „DDD i ZUPP 2004. Da li smo spremni za Europu?"; Rovinj 2004. Zagreb: Korunić d.o.o.; 2004: 75-88.

C75. MACAN J. Alergije uzrokovane skladišnim štetnicima. In: Korunić J, ed. Zbornik radova DDD radionice "Štetnici hrane, uskladištenih poljoprivrednih proizvoda i predmeta opće uporabe te muzejski štetnici"; Zagreb 2005. Zagreb: Korunić d.o.o., 2005: 85-91.

C76. MACAN J, MALOČA I. Profesionalni kontaktni dermatitisi u djelatnika na poslovima dezinfekcije, dezinsekcije i deratizacije (DDD). In: Korunić Z, ed. Zbornik radova seminara "DDD i ZUPP 2005 - sigurna uporaba pesticida"; Rovinj 2005. Zagreb: Korunić d.o.o.; 2005: 305-12.

C77. MACAN J, TURK R. Toksikološke i kliničke karakteristike fumiganata. In: Korunić Z, ed. DDD Trajna edukacija. Fumigacija – javno zdravstvo, veterina, zaštita bilja; Zagreb 2007. Zagreb: Korunić d.o.o.; 2007: 137-43.

C78. MACAN J, LJUBIČIĆ ČALUŠIĆ A, SABOLIĆ PIPINIĆ I. Novosti u suzbijanju prašinskih grinja (*Acari*). In: Korunić Z, ed. DDD i ZUPP 2008 Globalno zatopljenje, biološke promjene; Šibenik 2008. Zagreb: Korunić d.o.o.; 2008: 157-65.

C79. MACAN J, GOMZI M, VARNAI VM, SABOLIĆ PIPINIĆ I, PRESTER Lj, ORCT T. Occupational versus household exposure to endotoxin and sick building syndrome-related symptoms in librarians. In: Strøm-Tejsen P, Olesen BW, Wargocki P, Zukowska D, Toftum J, eds. Proceedings of the 11th International Conference on Indoor Air Quality and Climate; Copenhagen, Denmark 2008. Copenhagen: International Centre for Indoor Environment and Energy, Technical University of Denmark; 2008

C80. MARAČIĆ M, LOKOBAUER N, FRANIĆ Z. Koncentracije aktivnosti ^{90}Sr u mlijeku i oborinama grada Zagreba. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 271-5.

C81. MARAČIĆ M, FRANIĆ Z, MAROVIĆ G. Koncentracija aktivnosti ^{90}Sr u životinjskim kostima u Republici Hrvatskoj. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 254-60.

C82. MAROVIĆ G, KOVAČ J, SENČAR J, BRONZOVIĆ M. Radioactive contamination of the environment due to phosphate fertilizer production [CD document 6b9]. 11th International Congress of the International Radiation Protection Association IRPA 11; "Widening the Radiation Protection World"; Madrid, Spain 2004.

C83. MAROVIĆ G, FRANIĆ Z, SENČAR J. Primjeri procjene efektivne doze zračenja. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 265-70.

C84. MAROVIĆ G, SENČAR J, BEŠLIĆ I, ŠEGA K, FRANIĆ Z, ŠOLIĆ-GAVRANOVIĆ M. Ukupna beta aktivnost zraka i koncentracija lebdećih čestica u uvjetima pojačanog prometa. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 273-8.

C85. MAROVIĆ G, SENČAR J, FRANIĆ Z. Radioaktivne tvari u zraku u svjetlu postojećih propisa. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 333-9.

C86. MAROVIĆ G, FRANIĆ Z, SENČAR J. Mahovina u radiološkom monitoringu. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 230-5.

C87. MAROVIĆ G, FRANIĆ F, SENČAR J, PETRINEC B, BITUH T, KOVAČ J. Natural radionuclides in coal and waste material originating from coal fired power plant. In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008. Buenos Aires: IRPA; Topical Section (TS) III.4.4, Topic ID 2652. [CD].

C88. MAROVIĆ G, FRANIĆ Z, SENČAR J. Mosses as bioindicators of radioactive contamination. In: Strand P, Brown J, Jølle T, eds. Proceedings of the International Conference on Radioecology & Environmetal Radioactivity, Part 2; Bergen, Norvey 2008. Østerås: Norwegian Radiation Protection Authority; 2008: 212-5.

C89. MATIJEVIĆ S, KUŠPILIĆ G, KLJAKOVIĆ-GAŠPIĆ Z, BOGNER D, BARIĆ A. Phosphorus species concentrations in the middle Adriatic coastal sediment. In: Proceedings 38th CIESM Congress; Istanbul, Turkey 2007. Rapp Comm Int Mer Médit 2007;38:291.

C90. MILKOVIĆ Đ, GARAJ-VRHOVAC V, RANOGAJEC-KOMOR M, MILJANIĆ S, BECK N, GAJSKI G, KNEŽEVIĆ Ž. Mjerenje apsorbirane doze zračenja i oštećenja DNK pri RTG pregledu pluća kod djece. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 111-7.

C91. MILKOVIĆ Đ, GARAJ-VRHOVAC V, RANOGAJEC-KOMOR M, MILJANIĆ S, KNEŽEVIĆ Ž, GAJSKI G, BECK N, KOVAČ K. Biological effects of radiation and dosimetry in X-ray diagnostics of children. In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008. Buenos Aires: IRPA; Topical Section TS I.1.3, Topic ID 3356. [CD].

C92. MOMČILOVIĆ B. ^{54}Manganese whole body

retention and the gastrointestinal transit time of the women in their reproductive age are inversly related to the ferritin status. In: Anke M, Flachowsky G, Kisters K, Schafer U, Schenkel H, Seifert M, Stoeppler M, eds. Macro and Trace Elements. Mengen- und Spurenelemente. Vol. 2; Jena, Germany 2004. Leipzig: Schubert-Verlag; 2004. str,1715-22.

C93. MOMČILOVIĆ B, IVIČIĆ N, JURASOVIĆ J, KOPJAR N, MOROVIĆ J, SKALNY AV, GRABEKLIS AR, SEREBRYANSKY EP. Doubleblind multicentric quality control study of the human whole blood molybdenum (Mo) with the methods of differential pulsed anodic stripping voltametry (DPASV), electrothermal atomic absorption spectrometry (ET-AAS), and the inductively coupled plasma mass spectrometry (ICP-MS). First Symposium of the Russian Society of Trace Elements in Medicine (RUSTEM); Moskow, Rusia 2004. Trace Elements in Medicine (Moscow) 2004;5:92-3.

C94. MOMČILOVIĆ B, MOROVIĆ J, IVIČIĆ N, KOPJAR N, SKALNY AV, GRABEKLIS AR. Preliminary study of the multielement profile (MP) in the hair of subjects with manifest clinical depression (MCD) revealed a link to iodine deficiency. First Symposium of the Russian Society of Trace Elements in Medicine (RUSTEM); Moskow, Rusia 2004. Trace Elements in Medicine (Moscow) 2004;5:91-2.

C95. MOMČILOVIĆ B, LYKKEN GI. Men and radon – A noble gas of many disguise, Part I. In: Garaj- Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 235-9.

C96. MOMČILOVIĆ B, LYKKEN GI. Men and radon – A noble gas of many disguise, Part II. In: Garaj- Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 240-6.

C97. PAVIČIĆ I, TROŠIĆ I. Influence of 864 MHz electromagnetic field on growth kinetics of established cell line. In: Kos T, Grgić M, eds. Proceedings of the 46th International Symposium Electronics in Marine ELMAR-2004; Zadar 2004. Zagreb: Fakultet elektrotehnike i računarstva Sveučilišta u Zagrebu; 2004: 396-401.

C98. PAVIČIĆ I, TROŠIĆ I, ŠAROLIĆ A. Usporedba djelovanja mikrovalnog zračenja frekvencija 864 i 935 MHz na stanice u kulturi. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 454-8.

C99. PAVICIC I, TROSIC I. Cellular and intracellular response to electromagnetic field of ultra high frequency radiation. In: Kostarakis P, ed. Proceedings of the 4th International Workshop on Biological Effects of Electromagnetic Fields; Vol. II.. Creta, Greece 2006. 2006: 1114-9.

C100. PAVICIC I, TROSIC I. Microtubule impairment and micronucleus prevalence in cultured cells following mobile-phone frequency irradiation. In: Ng K-H, Montgomery ND, Tan L-K, eds. Edited Conference Proceedings, International EMF Conference 2007 Electromagnetic Fields, Bioeffects Research, Medical Applications, and Standards Harmonization; Kuala Lumpur, Malesia 2007. Kuala Lumpur: University of Malaya Press; p.101-3.

C101. PEHNEC G, ŽUŽUL S, BEŠLIĆ I, ŠEGA K, VAĐIĆ V, HRŠAK J. Comparison of NO_2 concentrations and concentrations of lead, manganese and cadmium in PM_{10} in Zagreb air. In: IUAPPA regional conference / 17th EFCA speciality conference "Air pollution and environmental health / from science to action: the challenge of particulate matter"; Lille, France 2006. Lille: APPA NPC, 2006. [CD].

C102. PEHNEC G, VAĐIĆ V, KRMPOTIĆ S. Kategorizacija zraka u Zagrebu s obzirom na onečišćenje ozonom - usporedba starih i novih propisa. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 221-7.

C103. PEHNEC G, VAĐIĆ V, BEŠLIĆ I, ŽUŽUL S. Ozone concentrations in different parts of Zagreb and its surroundings. In: Doley D, ed. Proceedings of the 14th IUAPPA World Congress 2007 incorporating 18th CASANZ Conference; Brisbane, Australia 2007. Brisbane: The Clean Air Society of Australia and New Zealand; 2007. [CD].

C104. PERAICA M. Etika u toksikologiji. In: Znidarčić Ž, ed. Zbornik radova sa simpozija "Etika u medicinskoj znanosti"; Zagreb 2007. Zagreb: Hrvatsko katoličko liječničko društvo; 2007: 22-5.

C105. PETRINEC B, FRANIĆ Z. Radiocezij u neobrađenom tlu na nekim lokacijama u Republici Hrvatskoj. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 345-50.

C106. PETRINEC B, FRANIĆ Z, BITUH T, SENČAR J, MAROVIĆ G. Terenska gamaspektrometrija srednjedalmatinskih otoka. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog

simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 215-21.

C107. PLAVEC D, TURK R, MACAN J, RADIĆ B, LUCIĆ VRDOLJAK A. Otrovanja pesticidima nekad i danas - 20 godina iskustva Centra za kontrolu otrovanja u Zagrebu. In: Korunić Z, ed. Zbornik radova seminara "DDD i ZUPP 2005 - sigurna uporaba pesticida"; Rovinj 2005. Zagreb: Korunić d.o.o.; 2005: 293-8.

C108. PRLIĆ I, RUBIN O, MILKOVIĆ-KRAUS S, VUČIĆ Z, VRTAR M. Active electronic personal dosemeter in interventional radiology. IOMP Proceedings of the World Congress on Medical Physics and Biomedical Engineering 2006 "Imaging the Future Medicine"; Seul, Korea 2006. Vol 2. Berlin: Springer Verlag; 2006. [CD].

C109. PRLIĆ I, SURIĆ MIHIĆ M, MILKOVIĆ KRAUS S. Nonionizing radiation - a modern stressor to the environment. In: Strand P, Brown J, Jølle T, eds. Proceedings of the International Conference on Radioecology & Environmetal Radioactivity, Part 2; Bergen, Norvey 2008. Østerås: Norwegian Radiation Protection Authority; 2008: 14-6.

C110. PRLIĆ I, SURIĆ MIHIĆ M. Occupational exposure to EM radiation in the range from 800 to 2500 MHz – What are we really talking about? In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008. Buenos Aires: IRPA; Topical Section TS III.2.2. – ID 3240. [CD].

C111. ROMIĆ G, MACAN J, HRŽENJAK M. Karate training and allergic diseases. In: Milanović D, Prot F, eds. 5th International Scientific Conference on Kineziology, Kinesiology Research Trends and Applications; Zagreb 2008. Zagreb: Faculty of Kinesiology, University of Zagreb, 2008. Proceedings book p. 188-91.

C112. ROZGAJ R, KAŠUBA V. Chromosome aberrations – the most reliable biological indicator of exposure to low doses of ionising radiation. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 211-15.

C113. REINER E, SIMEON-RUDOLF V. Pyridinium, imidazolium and quinuclidinium compounds: toxicity of and antidotes against tabun and soman. In: Bokan S, Orehovec Z, Price B, eds. The Proceedings of the Chemical and Biological Medical Treatment Symposium CB MTS - Industry IV - "The Third World Congress on Chemical, Biological and Radiological Terrorism"; Dubrovnik 2005. Aberdeen, Maryland, USA: ASA-Applied Science and Analysis, Inc.; 2006: 249-51.

C114. SABOLIĆ I, BRELJAK D, HERAK-KRAMBERGER CM, LJUBOJEVIĆ M, THÉVENOD F. Expression of multidrug resistance P-glycoprotein Mdr1 (Abcb1) in rat kidney proximal tubules is up-regulated by nephrotoxic metals. In: Collery P, Maymard I, Theophanides T, Khassanova L, Collery T, eds. Proceedings of the 10th International Symposium on Metal Ions in Biology and Medicine; Bastia, Corsica 2008, France. Metal Ions Biol Med 2008;10:315-21.

C115. SOKOLOVIĆ M, GARAJ-VRHOVAC V, ŠIMPRAGA B. Toksičnost T-2 toksina u peradi. In: Balenović M, urednica. Zbornik radova VII. Simpozija "Peradarski dani 2007" s međunarodnim sudjelovanjem; Poreč 2007. Zagreb: Centar za peradarstvo; 2007: 213-8.

C116. SURIĆ MIHIĆ M, PRLIĆ I, MILKOVIĆ-KRAUS S, MEŠTROVIĆ T, ROJNICA F. Područje nadzora oko rendgen uređaja za slikanje zubi – dozimetrijska studija. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 317-24.

C117. SURIĆ MIHIĆ M, MEŠTROVIĆ T, PRLIĆ I. Nužnost provedbe programa osiguranja kvalitete u klasičnoj dijagnostičkoj radiologiji. In: Barišić D, Grahek Ž, Krajcar-Bronić I, Miljanić S, eds. Zbornik radova sedmog simpozija Hrvatskog društva za zaštitu od zračenja; Opatija 2008. Zagreb: Hrvatsko društvo za zaštitu od zračenja; 2008: 35-9.

C118. SURIĆ MIHIĆ M, PRLIĆ I, NOVAKOVIĆ M, MEŠTROVIĆ T, MAROVIĆ G. The occupational exposure during characterisation, conditioning and securing of radioactive sealed sources in Croatia - case study. In: Proceedings 12th International Congress of the International Radiation Protection Association "Strengthening Radiation Protection Worldwide"; Buenos Aires, Argentina 2008. Buenos Aires: IRPA; Topical Section TS I.1.1. – ID 3012. [CD].

C119. ŠEGA K, BEŠLIĆ I, ČAČKOVIĆ M. Monitoring of $PM_{2.5}$ particle fraction in Zagreb air. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli- Izmir: Altindag Grafik Matbaacilik; 2005: 718-25.

C120. ŠEGA K, BEŠLIĆ I. Proračun zdravstvenih učinaka dima, ukupnih lebdećih čestica i frakcija lebdećih čestica po veličini $PM\text{-}_{10}$ i $PM\text{-}_{2.5}$ za populaciju grada Zagreba. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog

znanstveno-stručnog skupa “Zaštita zraka ‘05”; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 289-98.

C121. ŠEGA K, BEŠLIĆ I. Health impact assessment of black smoke and airborne particulates on Zagreb population. In: IUAPPA regional conference / 17th EFCA speciality conference “Air pollution and environmental health / fromscience to action: the challenge of particulate matter”; Lille, France 2006. Lille: APPA NPC. [CD].

C122. ŠEGA K, BEŠLIĆ I. Utjecaj prilagođavanja hrvatskih propisa legislativi Europske zajednice na procjenu učestalosti zdravstvenih učinaka s obzirom na onečišćenje lebdećim česticama. In: Šega K, ed. Peti znanstveno-stručni skup “Zaštita zraka ’07”; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 63-8.

C123. ŠEGA K, BEŠLIĆ I. Sample luminance as an equivalent method for $PM_{2.5}$ mass concentration determination. In: Doley D, ed. Proceedings of the 14th IUAPPA World Congress 2007 incorporating 18th CASANZ Conference; Brisbane, Australia 2007. Brisbane: The Clean Air Society of Australia and New Zealand; 2007. [CD].

C124. ŠEGA K, BEŠLIĆ I. Procjena omjera NO2/NOx vezanog uz cestovni promet u Zagrebu. In: Vasić-Rački Đ, ed. Zbornik radova znanstveno-stručnog skupa "Tehnologije zaštite zraka"; Tuheljske toplice 2008. Zagreb: Akademija tehničkih znanosti Hrvatske; 2008: 53-5.

C125. ŠINKO G, ČALIĆ M, KOVARIK Z. Comparison of pyridinium aldoximes in their reaction with the cholinesterase substrate acetylthiocholine. In: Proceedings of the Sixth International Chemical and Biological Medical Treatment Symposium; Spiez, Switzerland 2006. Spiez: Spiez Laboratory; 2006. [CD].

C126. ŠINKO G, ČALIĆ M, BOSAK A, KOVARIK Z. Limitation of the Ellman Method: Cholinesterase activity measurement in the presence of oximes. In: Price R, Brodbeck U, Price B, Lehnherr I, eds. Proceedings of the Seventh International Chemical and Biological Medical Treatment Symposium "An Exploration of Present Capabilities and Future Requirements for Chemical, Biological and Radiological Medical Treatment"; Spiez, Switzerland 2008. Spiez: ASA; 2008: 1-6.

C127. ŠIŠOVIĆ A, VAĐIĆ V, HRŠAK J, ŠKRBEC A, PEHNEC G. Varijacije koncentracija žive u okolici odlagališta otpada Jakuševec. In: Milanović Z, ed. Zbornik radova VIII. Međunarodnog simpozija ”Gospodarenje otpadom” Zagreb 2004. Zagreb: Gospodarstvo i okoliš d.o.o. 2004: 663-70.

C128. ŠIŠOVIĆ A, ŠEGA K, FUGAŠ M, VAĐIĆ V. Koncentracije PAU mjerene u vanjskoj i unutarnjoj atmosferi. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa “Zaštita zraka ‘05” Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 209-15.

C129. ŠIŠOVIĆ A, VAĐIĆ Ž, ŠEGA K, BEŠLIĆ I, VAĐIĆ V. Analiza policikličkih aromatskih ugljikovodika u različitim veličinama lebdećih čestica. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa “Zaštita zraka ‘05”; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 139-47.

C130. ŠIŠOVIĆ A, BEŠLIĆ I, ŠEGA K, VAĐIĆ V. PAH mass concentrations measured in PM_{10} particle fraction. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli-Izmir: Altindag Grafik Matbaacilik; 2005: 710-7.

C131. ŠIŠOVIĆ A, BEŠLIĆ I, ŠEGA K, VADJIĆ V, GODEC R. Seasonal variations of PAH mass concentrations in Zagreb air. In: IUAPPA regional conference / 17th EFCA speciality conference “Air pollution and environmental health / from science to action: the challenge of particulate matter”; Lille, France 2006. Lille: APPA NPC. [CD].

C132. ŠIŠOVIĆ A, VAĐIĆ V, HRŠAK J, PEHNEC G. Praćenje koncentracija žive u okolici odlagališta otpada Jakuševec. In: Milanović Z, ed. Zbornik radova IX. međunarodnog simpozija “Gospodarenje otpadom 2006”. Zagreb 2006. Zagreb: Gospodarstvo i okoliš d.o.o.; 2006: 835-44.

C133. ŠIŠOVIĆ A, GODEC R, MATIĆ A, ŠEGA K, BEŠ- LIĆ I. Usporedba koncentracija PAU mjerenih na dva mjerna mjesta u Zagrebu In: Šega K, ed. Peti znanstveno-stručni skup “Zaštita zraka ’07”; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 183-91.

C134. ŠIŠOVIĆ A, VAĐIĆ V, PEHNEC G. Razine koncentracija žive u okolici odlagališta otpada In: Šega K, ed. Peti znanstveno-stručni skup “Zaštita zraka ’07”; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 341-7.

C135. ŠIŠOVIĆ A, VAĐIĆ V, GODEC R, ŠEGA K, BEŠLIĆ I. Comparison of PAH mass concentrations in Zagreb air measured at two different locations. In: Doley D, ed. Proceedings of the 14th IUAPPA World Congress 2007 incorporating 18th CASANZ Conference; Brisbane, Australia 2007. Brisbane: The Clean Air Society of Australia and New Zealand; 2007. [CD].

C136. ŠIŠOVIĆ A, VAĐIĆ V, PEHNEC G. Utjecaj sanacije odlagališta otpada na razinu žive u zraku. In: Vasić-Rački Đ, ed. Zbornik radova znanstveno-stručnog skupa "Tehnologije zaštite zraka"; Tuheljske toplice 2008. Zagreb: Akademija tehničkih znanosti Hrvatske; 2008: 71-6.

C137. TROŠIC I, BUŠLJETA I, MILKOVIĆ-KRAUS S, PAVIČIĆ I. Blood-forming system in rats after whole-body microwave exposure; Reference to the lymphocytes. In: Kostarakis P, ed. Proceedings of the 3rd International Workshop on Biological Effects of Electromagnetic Fields. Vol. II; Kos, Greece 2004. Athens, Greece: NCSR "Demokritos"; 2004: 847-52.

C138. TROŠIĆ I. Poduka o azbestu može spasiti živote. Stručno savjetovanje; zdravstvena ekologija. Zagreb. Stručni časopis za tehniku zaštite okoliša 2005;75:477.

C139. TROŠIĆ I, BUŠLJETA I, PAVIČIĆ I, MODLIC B. Kinetika mikronuklearnih stanica koštane srži i periferne krvi štakora tijekom subkroničnog izlaganja mikrovalovima. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 459-63.

C140. TROSIC I, BUSLJETA I, PAVICIC I, ZANINOVIC Lj, MILKOVIC-KRAUS S. Urinary 6-sulfatoxymelatonin excretion in rats after microwave irradiation. In: Kostarakis P, ed. Proceedings of the 4th International Workshop on Biological Effects of Electromagnetic Fields; Vol. II. Creta, Greece 2006. 2006: 1220-4.

C141. TROŠIĆ I, PAVIĆIĆ I. Utjecaj neionizirajućeg elektromagnetskog okruženja na živu jedinku. In: Srb N, ed. Proceedings EIS 2007, 14 International Conference "Electrical Engineering Symposium" Josip Lončar days; Šibenik 2007. Zagreb: Elektrotehničko društvo Zagreb; 2007: 24-7.

C142. TROSIC I, PAVICIC I, BUSLJETA I, PRLIC I. Do *in vitro* findings of the bioeffector radiofrequency electromagnetic radiation support *in vivo* investigation? In: Ng K-H, Montgomery ND, Tan L-K, eds. Edited Conference Proceedings, International EMF Conference 2007 Electromagnetic Fields, Bioeffects Research, Medical Applications, and Standards Harmonization; Kuala Lumpur, Malesia 2007. Kuala Lumpur: University of Malaya Press; p. 90-2.

C143. TROŠIĆ I. Biološka aktivnost elektromagnetskog smoga. In: Srb N, ed. Proceedings EIS 2008, 16 International Conference "Electrical Engineering Symposium" Josip Lončar Days. Šibenik 2007. Zagreb: Elektrotehničko društvo Zagreb; 2008: 39-44.

C144. TURK R, RADIĆ B, LJUBETIĆ V. Što donosi primjena Direktive 98/8/EC o biocidnim pripravcima u Hrvatskoj? In: Korunić Z, ed. Zbornik radova seminara „DDD i ZUPP 2004. Da li smo spremni za Europu?"; Rovinj 2004. Zagreb: Korunić d.o.o.; 2004: 257-64.

C145. TURK R. Centar za otrovanja – 24 satna telefonska potpora HMP. In: Knjiga radova Hrvatsko-slovenskog simpozija "Otrovanja 2004"; Topusko 2004. Zagreb: Hrvatska udruga medicinskih sestara, Zveza društev medicinskih sester in zdravstvenih tehnikov Slovenije; 2004: 108-11.

C146. TURK R, FUCHS R, RADIĆ B, LUCIĆ VRDOLJAK A. Program revizije aktivnih tvari u biocidnim pripravcima u Europskoj Uniji. In: Korunić Z, ed. Zbornik radova seminara "DDD i ZUPP 2005 - sigurna uporaba pesticida"; Rovinj 2005. Zagreb: Korunić d.o.o.; 2005: 313-8.

C147. TURK R, MACAN J, VARNAI VM, LJUBETIĆ V, BRAJEVIĆ I. Procjena izloženosti kod primjene kao obavezni dio dokumentacije za stavljanjeu promet sredstava za zaštitu bilja i biocidnih pripravaka. In: Korunić Z, ed. 18. seminar "DDD i ZUPP 2006 – bolje smjernice bolji rad"; Dubrovnik 2006. Zagreb: Korunić d.o.o.; 2006: 359-67.

C148. TURK R, VARNAI VM, BOŠAN-KILIBARDA I. Otrovanja plinovima: respiracijski iritansi i asfiksansi. In: Bošan-Kilibarda I, urednica. V. hrvatski kongres hitne medicine s međunarodnim sudjelovanjem; Zagreb 2007. Liječ Vjesn 2007;129(Supl. 5):119-23.

C149. TURK R, LJUBIČIĆ ČALUŠIĆ A. Procjena rizika za biocidne pripravke. In: Korunić Z, ed. DDD i ZUPP 2008 Globalno zatopljenje, biološke promjene; Šibenik 2008. Zagreb: Korunić d.o.o.; 2008: 253-9.

C150. VAĐIĆ V. Trends of lead, manganese and cadmium concentrations in Zagreb air [CD document 149]. Proceedings of the 13th World Clean Air and Environmental Protection Congress and Exhibition; London, UK 2004.

C151. VAĐIĆ V. Crni dim - povijesni pregled mjerenja u Zagrebu. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 27-37.

C152. VAĐIĆ V, HRŠAK J, ŽUŽUL S. Teški metali u ukupnim lebdećim česticama u zraku u Zagrebu In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005:149-58.

C153. VAĐIĆ V, HRŠAK J. Trends of lead in

suspended particulate matter in Zagreb air. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli- Izmir: Altindag Grafik Matbaacilik; 2005: 64-71.

C154. VAĐIĆ V, ŽUŽUL S. Zinc levels in suspended particulate matter in Zagreb air. In: IUAPPA regional conference / 17th EFCA speciality conference "Air pollution and environmental health / from science to action: the challenge of particulate matter"; Lille, France 2006. Lille: APPA NPC. [CD].

C155. VAĐIĆ V. Kategorizacija kakvoće zraka na području grada Zagreba prema starim i novim propisima. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 35-62.

C156. VAĐIĆ V, ŽUŽUL S. Copper levels in suspended particulate matter in Zagreb air. In: Doley D, ed. Proceedings of the 14th IUAPPA World Congress 2007 incorporating 18th CASANZ Conference; Brisbane, Australia 2007. Brisbane: The Clean Air Society of Australia and New Zealand; 2007.

C157. VAĐIĆ V. Razine olova u zraku – odraz promjene tehnologije automobila i vrste pogonskog goriva. In: Vasić-Rački Đ, ed. Zbornik radova znanstveno-stručnog skupa "Tehnologije zaštite zraka"; Tuheljske toplice 2008. Zagreb: Akademija tehničkih znanosti Hrvatske; 2008: 57-62.

C158. VARNAI VM, MACAN J, TURK R. Zdravstveni rizici dugotrajne izloženosti niskim razinama pesticida. In: Korunić Z, ed. 18. seminar „DDD i ZUPP 2006 – bolje smjernice bolji rad"; Dubrovnik 2006. Zagreb: Korunić d.o.o.; 2006: 41-52.

C159. VASILIĆ Ž, DREVENKAR V, BEŠLIĆ I, ŠEGA K. Poliklorirani bifenili u lebdećim česticama PM_{10} skupljenim u Zagrebu. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 175-81.

C160. VEBER D, PREJAC J, ŽELJEŽIĆ D, MLADINIĆ M, TERZIĆ D, IVIČIĆ N, KOPJAR N, MOMČILOVIĆ B. Training induced oxidative damage in professional soccer players. In: Milanović D, Prot F, eds. Proceedings Book, 5th International Scientific Conference on Kinesiology; Zagreb, 2008. Zagreb: Kineziološki fakultet Sveučilišta u Zagrebu; 2008: 210-2.

C161. VICULIN T, DŽUBUR S, KOPJAR N, GARAJVRHOVAC V. Homogeno ozračivanje malih uzoraka dozama od 1 mGy do 20 mGy. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005:146-50.

C162. ZGORELEC Ž, ŽUŽUL S, BAŠIĆ F, KISIĆ I, MESIĆ M, VAĐIĆ V, ORCT T. Arsen u zraku i tlu u okolišu središnje plinske stanice Molve. In: Šega K, ed. Peti znanstveno-stručni skup "Zaštita zraka '07"; Zadar 2007. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2007: 161-70.

C163. ZNAOR A, FUČIĆ A. Učestalost kromosomskih aberacija kao biomarker rizika za pojavu raka. In: Garaj-Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 222-6.

C164. ŽELJEŽIĆ D, GARAJ-VRHOVAC V. Fluorescencijska hibridizacija *in situ* u detekciji kromosomskih oštećenja ispitanika profesionalno izloženih ionizirajućem zračenju. In: Garaj- Vrhovac V, Kopjar N, Miljanić S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja; Stubičke Toplice 2005. Zagreb: Agraf; 2005: 189- 93.

C165. ŽUŽUL S, HRŠAK J, VAĐIĆ V, BALAGOVIĆ I. Teški metali u ukupnoj taložnoj tvari u okolici odlagališta otpada Jakuševec. In: Milanović Z, ed. Zbornik radova VIII. međunarodnog simpozija "Gospodarenje otpadom" Zagreb 2004. Zagreb: Gospodarstvo i okoliš d.o.o. 2004: 671-7.

C166. ŽUŽUL S, BEŠLIĆ I, ŠEGA K, VAĐIĆ V, HRŠAK J, BALAGOVIĆ I. Trend koncentracija PM_{10} čestica i metala olova, mangana i kadmija u njima u Zagrebu. In: Šega K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa "Zaštita zraka '05"; Zadar 2005. Zagreb: Hrvatsko udruženje za zaštitu zraka; 2005: 159-65.

C167. ŽUŽUL S, VAĐIĆ V, ŠOLIĆ-GAVRANOVIĆ M. Benzene in the air of Zagreb, Croatia – first study. In: Topcu S, Yardim MF, Bayram A, Elbir T, Kahya C, eds. Proceedings of the Third International Symposium on Air Quality Management at Urban, Regional and Global Scales, Volume II; Istanbul, Turkey 2005. Mersinli- Izmir: Altindag Grafik Matbaacilik; 2005: 817-22.

D. Books, chapters in books, and editors

Books

D1. JANEŽIČ D, MILIČEVIĆ A, NIKOLIĆ S, TRINAJSTIĆ N. Graph-Theoretical Matrices in Chemistry. Mathematical chemistry Monographs. No. 3. Kragujevac: University of Kragujevac and Faculty of Science; 2007. p. 1-205.

D2. RAOS N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004.

D3. RAOS N, RAIĆ-MALIĆ S, MINTAS M. Lijekovi u prostoru. Farmakofori i receptori. Sveučilišni udžbenik. Zagreb: Školska knjiga, 2005.

D4. RAOS N. Misli o (hrvatskoj) znanosti. Zagreb: Hrvatsko društvo kemijskih inženjera i tehnologa; 2007. p. 1-96.

D5. RAOS N. Metali života - metali smrti. Zagreb: Školska knjiga; 2008.

Chapters in books

D6. APOSTOLI P, TELIŠMAN S, SAGER PR. Reproductive and developmental toxicity of metals. In: Nordberg GF, Fowler BA, Nordberg M, Friberg LT, eds. Handbook on the Toxicology of Metals. 3. Edition. Amsterdam: Elsevier AP; 2007. p. 213-49.

D7. CVIJETIĆ S. Epidemiologija bolesti mišićno-koštanog sustava. In: Vorko-Jović A, Strnad M, Rudan I, eds. Epidemiologija kroničnih nezaraznih bolesti. Zagreb: Laser Plus; 2007. p. 185-200.

D8. DREVENKAR V. Što može reći plinska kromatografija o polikloriranim bifenilima u tlu. In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 177-86.

D9. DURAKOVIĆ Z, ČOROVIĆ N. Bolesti srca i krvnih žila u starijoj dobi. In: Duraković Z, ed. Gerijatrija - medicina starije dobi. Zagreb: C.T.-Poslovne informacije, d.o.o.; 2007. p. 45-7.

D10. FRANIĆ Z. Znanstvena diplomacija In: Božičević J, ed. Sustavsko mišljenje i proces integracije Hrvatske u Europsku uniju. Zagreb: Hrvatsko društvo za sustave CROSS; 2006. p. 100-8.

D11. FUČIĆ A. Ultrazvuk u medicini – procjena rizika. In: Hozo I, Karelović D, eds. Ultrazvuk u kliničkoj praksi. Udžbenik. Split: Hrvatsko gastroenterološko društvo; 2004. p. 437-42.

D12. FUČIĆ A, ZNAOR A, JAZBEC AM, SEDLAR M. Ecocytogenetics as a biomonitoring model for occupational exposure. In: Donnelly KC, Cizmas LH, eds. Environmental Health in Central and Eastern Europe. Dordrecht: Springer; 2006. p. 47-52.

D13. KOVARIK Z, RADIĆ Z, BERMAN HA, TAYLOR P. 106. Phosphonylation of acetylcholinesterase and the propensity for reactivation analyzed by chirality and mutagenesis. In: Silman I, Soreq H, Anglister L, Michaelson DM, Fisher A, eds. Cholinergic Mechanisms. London: Taylor & Francis; 2004. p. 611-2.

D14. KOVARIK Z, WONG L, RADIĆ Z, TAYLOR P. Phosphorylation of mouse cholinesterases and mutants by DDVP and reactivation of conjugates by HI-6 and 2-PAM. In: Inestrosa CE, Campus EO, eds. Cholinesterases in the Second Millenium: Biomolecular and Pathological Aspects. Santiago, Čile: Universidad Catolica de Chile - FONDAP Biomedicina; 2004. p. 219-21.

D15. KOVÁČIKOVÁ Z, PIECKOVÁ E, TÁTRAI E, PIVOVAROVÁ Z, MATAUŠIĆ-PIŠL M. Use of the *in vitro* model for the evaluation of toxic effects of metabolites produced by fungi. In: Brebbia CA, ed. Environmental Health Risk IV. Southampton: WIT Press; 2007. p. 79-84.

D16. LIŠČIĆ R. Neurosarkoidoza. In: Peroš-Golubičić T, ed. Sarkoidoza - Bolesti plućnog intersticija. Zagreb: Medicinska naklada; 2005. p. 188-93.

D17. LIŠČIĆ R. Rano otkrivanje demencija. In: Kremzir D, ed. Liječnici u trećoj dobi. Druga knjiga. 25. obljetnica Hrvatskog društva umirovljenih liječnika 1983.-2008. Zagreb: Hrvatsko društvo umirovljenih liječnika HLZ-a; 2008. p. 128-30.

D18. MILIČEVIĆ A, TRINAJSTIĆ N. Combinatorial enumeration in chemistry. In: Hinchliffe A, ed. Chemical Modeling: Applications and Theory. Vol. 4. Cambridge; RSC Publishing; 2006. p. 405-69.

D19. MOMČILOVIĆ B. Copper. In: Merrian E, Anke M, Ihnat M, Stoeppler M, editors. Elements and their Compounds in the Environment. Vol. 2. 2nd completely revised and enlarged edition. Weinheim, Njemačka: Wiley-VCH Verlag GmbH; 2004. p. 731-50.

D20. MOMČILOVIĆ B. Mjesto i značenje prehrane u liječenju kirurških bolesnika. In: Hančević J, ed. ABC kirurške svakidašnjice. Sveučilišni udžbenik. Zagreb: Medicinska naklada; 2005. p. 293-320.

D21. MOMČILOVIĆ B. Multielementni profil kose. In: Šitum M, Oremović L, eds. Trihologija. Jastrebarsko: Naklada Slap; 2007. p. 33-55.

D22. PAVIČEVIĆ L, BOBIĆ J. Smjernice za vještačenje straha prema zakonu o obveznim

odnosima. In: Gnjidić Ž, Bilić R, eds. Uvod u medicinsko vještačenje. Zagreb: Medicinska naklada; 2008. p. 61-4.

D23. PIASEK M, HENSON MC, BLANUŠA M, KOSTIAL K. Assessment of steroid disruption and metal concentrations in human placenta: effects of cigarette smoking. In: Fong CB, ed. Smoking and Health Research Frontiers. New York: Nova Science Publishers, Inc.; 2007. p. 119-61.

D24. RADIĆ B, LUCIĆ A. živčani bojni otrovi i njihovi protuotrovi. In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 163-76.

D25. RAOS N. Bioanorganska kemija-što je to? In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 201-14.

D26. RAOS N. Enigma: vodikova veza. In: Raos, N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 91-101.

D27. RAOS N. Konformacijska analiza – analiza oblika molekula. In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 75-90.

D28. RAOS N. Pojam materije u grčkoj filozofiji (I): arkhe. In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 15-23.

D29. RAOS N. Pojam materije u grčkoj filozofiji (II): atomizam. In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 25-36.

D30. RAOS N. Pojam materije u grčkoj filozofiji (III): Aristotel. In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 37-47.

D31. RAOS N. Što je dvodimenzijska struktura. In: Raos N, ed. Nove slike iz kemije. Zagreb: Školska knjiga i Hrvatsko kemijsko društvo; 2004. p. 63-74.

D32. REINER E, ŠINKO G, ŠTUGLIN A, SIMEON-RUDOLF V. 125. Peripheral binding of ethopropazine to horse serum butyrylcholinesterase. In: Silman I, Soreq H, Anglister L, Michaelson DM, Fisher A, eds. Cholinergic Mechanisms. London: Taylor & Francis; 2004. p. 673-4.

D33. REINER E, ŠINKO G,. ŠTUGLIN A,. SIMEONRUDOLF V, RADIĆ Z, TAYLOR P, STOJAN J, GOLIČNIK M. Kinetics of ethopropazine binding to butyrylcholinesterase in the absence and presence of acetylthiocholine. In: Inestrosa CE, Campus EO, eds. Cholinesterases in the Second Millenium: Biomolecular and Pathological Aspects. Santiago, Čile: Universidad Catolica de Chile - FONDAP Biomedicina; 2004. p. 187-9.

D34. REINER E, SIMEON-RUDOLF V. Methods for measuring cholinesterase activities in human blood. In: Gupta RC, ed. Toxicology of Organophosphate and Carbamate Compounds. Amsterdam: Elsevier Academic Press; 2006. p. 199-208.

D35. REINER E. Institut za medicinska istraživanja i medicinu rada. In: Vitale B, ed. Četiri stoljeća javnog zdravstva i biomedicine u Hrvatskoj. Zagreb: Medicinska naklada; 2007. p. 271-80.

D36. SABOLIĆ I. Bojenje proteina nakon elektroforetskog prijenosa na membranu. In: Ristov-Ambriović A, Brozović A, Bruvo-Mađarić B, Ćetković H, Herak-Bosnar M, Hranilović D, Katušić-Hećimović S, Meštrović-Radan N, Mihaljević S, Slade N, Vujaklija D, eds. Metode u molekularnoj biologiji. Zagreb: Institut Ruđer Bošković; 2007. p. 587-90.

D37. SABOLIĆ I. Poliklonska protutijela: produkcija poliklonskih protutijela u kuniću. In: Ristov-Ambriović A, Brozović A, Bruvo-Mađarić B, Ćetković H, Herak-Bosnar M, Hranilović D, Katušić-Hećimović S, Meštrović-Radan N, Mihaljević S, Slade N, Vujaklija D, eds. Metode u molekularnoj biologiji. Ruđer Bošković; 2007. p. 649-53.

D38. SABOLIĆ I, BALEN D, LJUBOJEVIĆ M, ŽLENDER V. Posredna imunofluorescencija: bojenje jednim ili dvama poliklonskim i/ ili monoklonskim protutijelima. In: Ristov-Ambriović A, Brozović A, Bruvo-Mađarić B, Ćetković H, Herak-Bosnar M, Hranilović D, Katušić-Hećimović S, Meštrović-Radan N, Mihaljević S, Slade N, Vujaklija D, eds. Metode u molekularnoj biologiji. Zagreb: Institut Ruđer Bošković; 2007. p. 622-6.

D39. SABOLIĆ I, BALEN D, LJUBOJEVIĆ M. Priprema uzoraka za razdvajanje proteina iz tkiva i stanica. In: Ristov-Ambriović A, Brozović A, Bruvo-Mađarić B, Ćetković H, Herak-Bosnar M, Hranilović D, Katušić-Hećimović S, Meštrović-Radan N, Mihaljević S, Slade N, Vujaklija D, eds. Metode u molekularnoj biologiji. Zagreb: Institut Ruđer Bošković; 2007. p. 565- 6.

D40. SABOLIĆ I, LJUBOJEVIĆ M, BALEN D. Posredna imunofluorescencija: metode otkrivanja antigena za vezanje primarnog protutijela u fiksiranim rezovima tkiva ili stanicama. In: Ristov-Ambriović A, Brozović A, Bruvo-Mađarić B, Ćetković H, Herak-Bosnar M, Hranilović D, Katušić-Hećimović S, Meštrović-Radan N, Mihaljević S, Slade N, Vujaklija D, urednice. Metode u molekularnoj biologiji. Zagreb: Institut Ruđer Bošković; 2007. p. 618-22.

D41. SABOLIĆ I, LJUBOJEVIĆ M, BALEN D. Pročišćavanje poliklonskog protutijela iz imunosnog seruma metodom adsorpcije na PVDF-membrani. In: Ristov-Ambriović A, Brozović A, Bruvo-Mađarić B, Ćetković H, Herak-Bosnar M, Hranilović D, Katušić-Hećimović S, Meštrović-Radan N, Mihaljević S,

Slade N, Vujaklija D, urednice. Metode u molekularnoj biologiji. Zagreb: Institut Ruđer Bošković; 2007. p. 653-6.

D42. SIMEON-RUDOLF V, ŠINKO G, ŠTUGLIN A, STOJAN J, GOLIČNIK M, REINER E. Comparison of two reaction schemes for the hydrolysis of acetylthiocholine by butyrylcholinesterase. In: Silman I, Soreq H, Anglister L, Michaelson DM, Fisher A, eds. Cholinergic Mechanisms. London: Taylor & Francis; 2004. p. 701-3.

D43. SKENDER Lj. GC-MS in analysis of drugs of abuse. In: Gross ML, Caprioli RM, Niessen WMA, eds. The Encyclopedia of Mass Spectrometry. Vol. 8. Hyphenated Methods. Amsterdam: Elsevier Ltd.; 2006. p. 862-72.

D44. ŠARIĆ M, LUCCHINI R. Manganese. In: Nordberg GF, Folwer BA, Nordberg M, Friberg LT, eds. Handbook on the Toxicology of Metals. 3. izdanje. Amsterdam: Elsevier AP; 2007. p. 645- 74.

D45. ŠARIĆ M, ŽUŠKIN E, MUSTAJBEGOVIĆ J. Zdravlje i okoliš u kojem živimo. In: Vitale B, ed. Četiri stoljeća javnog zdravstva i biomedicine u Hrvatskoj. Zagreb: Medicinska naklada; 2007. p. 417-22.

D46. ŠARIĆ M, ŽUŠKIN E, MUSTAJBEGOVIĆ J. Zdravstvena skrb o radnicima. In: Vitale B, ed. Četiri stoljeća javnog zdravstva i biomedicine u Hrvatskoj. Zagreb: Medicinska naklada; 2007. p. 443-7.

D47. ŠINKO G, RADIĆ Z, SIMEON-RUDOLF V, REINER E, TAYLOR P. 135. Kinetics of interaction of ethopropazine enantiomers with butyrylcholinesterase and acetylcholinesterase. In: Silman I, Soreq H, Anglister L, Michaelson DM, Fisher A, eds. Cholinergic Mechanisms. London: Taylor & Francis; 2004. p. 705-6.

Editors

D48. GARAJ-VRHOVAC V, KOPJAR N, MILJANIĆ S, eds. Zbornik radova Šestog simpozija Hrvatskog društva za zaštitu od zračenja. Zagreb: Hrvatsko društvo za zaštitu od zračenja, 2005.

D49. GARAJ-VRHOVAC V, guest ed. Šesti simpozij Hrvatskog društva za zaštitu od zračenja. Arh Hig Rada Toksikol 2006;57:1 148.

D50. KOVARIK Z, ed. Congress of the Croatian Society of Biochemistry and Molecular Biology on the occation of the 30th Anniversary with international participation. Book of Abstracts. Zagreb: Hrvatsko društvo za biokemiju i molekularnu biologiju, 2006.

D51. MACAN J, SABOLIĆ PIPINIĆ I, CAPAK K, eds. Znanstveni simpozij „Alergotoksikološka istraživanja okoliša u Hrvatskoj“, Knjiga sažetaka. Zagreb: Akademija medicinskih znanosti Hrvatske; 2008.

D52. RADIĆ Z, REINER E, guest eds. The EUROTOX 2006 / 6 CTDC Congress. Arh Hig Rada Toksikol 2007;58(3):273-386.

D53. SZINICZ L, REINER E, EYER P, WOREK F, guest eds. New Strategies in Medical Protection Against Organophosphorus Compounds. Toxicology 2007;233(1-3):1-124.

D54. ŠEGA K, ed. Zbornik radova Četvrtog hrvatskog znanstveno-stručnog skupa “Zaštita zraka ‘05”. Zagreb: Hrvatsko udruženje za zaštitu zraka, 2005.

D55. ŠEGA K, ed. Peti znanstveno-stručni skup “Zaštita zraka ’07”. Zbornik radova. Zagreb: Hrvatsko udruženje za zaštitu zraka, 2007.

D56. VAĐIĆ V, guest ed. Gospodarstvo i okoliš, broj 65. Velika Gorica: Gospodarstvo i okoliš d.o.o., 2004.

D57. VAĐIĆ V, guest ed. Gospodarstvo i okoliš, broj 66. Velika Gorica: Gospodarstvo i okoliš d.o.o., 2004.

D58. VARLJEN J, KOVARIK Z, REINER E, eds. 30. obljetnica Hrvatskog društva za biokemiju i molekularnu biologiju. Zagreb: Hrvatsko društvo za biokemiju i molekularnu biologiju; 2007. p. 1-71.

D59. VARLJEN J, KOVARIK Z, guest eds. Croat Chem Acta (Special Issue) 2008;81(1):1-222

E. Theses

E1. BENČIĆ N. Primjena mikroekstrakcije na čvrstoj fazi za ispitivanje sorpcije triazinskih spojeva u tlu i oksidima aluminija i silicija (Application of solid-phase microextraction for investigation of sorption of triazine compounds in soil and aluminium and silicon oxides) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentors: Fingler-Nuskern S, Drevenkar V.

E2. BENKOVIĆ V. Radioprotektivni učinak propolisa i njegovih polifenolnih sastavnica u miša (Radioprotective effects of propolis and their polyphenolic compounds in mice) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentors: Oršolić N, Kopjar N.

E3. BEŠLIĆ I. Interpretacija i procjena razina onečišćenja zraka u gradu Zagrebu na osnovi meteoroloških parametara (Interpretation and assessemnt of air pollution in Zagreb based on meteorological parameters) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Šega K.

E4. BOSAK A. Interakcija kolinesteraza s enantiomerima kinuklidin-3-olnih derivata (Interaction of cholinesterases with enantiomers of quinuclidin-3-ol derivatives) [M.Sc. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2004. Mentor: Simeon V.

E5. BRČIĆ I. Procjena izloženosti humane populacije određivanjem hlapljivih aromatskih ugljikovodika u urinu (Assessment of the exposure of human population by determination of volatile aromatic hydrocarbons in urine) [M.Sc. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2004. Mentor: Skender Lj.

E6. BUTKOVIĆ S. Određivanje bakra u pitkoj vodi elektrotermičkom atomskom apsorpcijskom spektrometrijom (Determination of copper in drinking water by electrothermal atomic absorption spectrometry) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2005. Mentors: Pizent A, Drevenkar V.

E7. ČAČKOVIĆ M. Razrada analitičkih metoda za određivanje aniona (Cl^-, NO_3^-, SO_4^{2-}) i kationa metala (Pb, Mn, Cd i Fe) u frakcijama različitih veličina lebdećih čestica u zraku (Evaluation of analytical methods for determination of anions (SO_4^{2-}, NO_3^-, Cl^-) and metallic cations (Pb, Mn, Cd and Fe) in different size fractions of particulate matter in the air) [Ph.D. thesis]. Zagreb: Faculty of Chemical Engineering and Technology, University of Zagreb; 2004. Mentor: Šoljić Z.

E8. ČIKEŠ D. Učinci kadmija, žive i cisplatine na ekspresiju prijenosnika organskih kationa OCT2 u bubregu štakora (Expression of organic cation transporter OCT2 in rat kidneys; effect of cadmium, mercury, and cisplatin) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentor: Sabolić I.

E9. DANOLIĆ S. Određivanje zearalenona u pšenici metodom tekućinske kromatografije visoke djelotvornosti (Determination of zearalenone in wheat using high performance liquid chromatography) [Graduation thesis]. Zagreb: Faculty of Pharmacy and Biochemistry, University of Zagreb; 2004. Mentors: Domijan A-M, Žuntar I.

E10. DOMAĆINOVIĆ J. Inhibicija butiril-kolinesteraze flavonoidima (Inhibition of butyrylcholinesterase by flavonoids) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2008. Mentors: Rusak G, Kovarik Z.

E11. DOMIJAN A-M. Mehanizam toksičnog djelovanja okratoksina A i fumonizina B_1 (Mechanism of ochratoxin A and fumonisin B_1 toxicity) [Ph.D. thesis]. Zagreb: Faculty of Pharmacy and Biochemistry, University of Zagreb; 2005. Mentor: Peraica M.

E12. DOMOVIĆ D. Utjecaj mikotoksina na katalitičku aktivnost antioksidacijskih enzima (Effects of mycotoxins on catalitic activity of antioxidant enzymes) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentors: Domijan A-M, Kopjar N.

E13. GAJSKI G. Procjena citogenetičkog učinka atorvastatina na ljudskim limfocitima u uvjetima *in vitro* (Assessment of atrovastatin genotoxicity on human lymphocytes *in vitro*) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentor: Garaj-Vrhovac V.

E14. GAMULIN M. Procjena mutagenih učinaka radioterapije na limfocitima periferne krvi bolesnika liječenih od solidnih tumora (The estimate of mutagenic effects of radiotherapy on lymphocytes from the peripheral blood in patients treated for solid tumors) [Ph.D. thesis]. Zagreb: School of Medicine, University of Zagreb; 2006. Mentor: Garaj-Vrhovac V.

E15. GERIĆ D. Prostorna i vremenska razdioba koncentracija dušikovog dioksida u zraku Zagreba (Spatial and temporal distribution of nitrogen dioxide concentrations in the air of Zagreb) [Ph.D. thesis]. Zagreb: Faculty of Pharmacy and Biochemistry, University of Zagreb; 2007. Mentors: Žuntar I, Pehnec G.

E16. HERCEG ROMANIĆ S. Analiza tragova organoklorovih pesticida i kongenera polikloriranih bifenila u zraku, bilju, humanom mlijeku i serumu (Trace analysis of

organochlorine pesticides and polychlorinated biphenyl congeners in air, plants, human milk and serum) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2004. Mentor: Krauthacker B.

E17. JUREŠA D. Utjecaj selenija na učinkovitost kompleksona za izlučivanje žive u štakora (The effect of selenium on mercury chelation and elimination in rats) [M.Sc. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2004. Mentor: Blanuša M.

E18. JUREŠA D. Determination of selenium metabolites in urine - analytical aspects and applications [Ph.D. thesis]. Graz, Austria: Institute of Chemistry, Karl-Francens University Graz; 2007. Mentor: Francesconi KA.

E19. KAPURALIN K. Procjena genotoksičnih učinaka strukturno srodnih flavonoida u uvjetima *in vitro* (Assessment of structural related flavonoids genotoxicity *in vitro* conditions) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Kopjar N.

E20. KOŠĆEC-ĐUKNIĆ A. Karakteristike spavanja i dnevna pospanost adolescenata (Sleep patterns and daytime sleepines in adolescents) [Ph.D. thesis]. Zagreb: Filozofski fakultet Sveučilišta u Zagrebu; 2006. Mentors: Radošević-Vidaček B, Tadinac M.

E21. KOVAČINA M. Procjena unosa kalcija hranom i vodom u žena s obzirom na dob (Evaluation of calcium intake with food and water among females according to age) [Graduation thesis]. Zagreb: Faculty of Food Technology and Biotechnology, University of Zagreb; 2007. Mentors: Colić-Barić I, Piasek M.

E22. KOŽUL D. Analiza i raspodjela poliklorbifenila i organoklorovih pesticida u borovim iglicama (Analysis and distribution of polychlorinated biphenyls and organochlorine pesticides in pine needles) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentors: Herceg Romanić S, Drevenkar V.

E23. LONČAR J. Procjena učinka pušenja na genom ljudskih limfocita izloženih γ-zračenju primjenom testa mikronukleusa i testa lomljivosti kromatida (Estimation of smoking effect on genome of human lymphocytes exposed to γ-radiation using micronucleus assay and chromatid breakage assay) [Graduation thesis]. Zagreb: Faculty of Food Technology and Biotechnology, University of Zagreb; 2005. Mentor: Garaj-Vrhovac V.

E24. LJUBOJEVIĆ M. Organski anionski transporteri OAT1 i OAT3 u bubregu štakora: raspodjela, spolne razlike i učinci teških metala (Organic anion transporters OAT1 and OAT3 in rat kidneys: distribution, gender differences, and effects of heavy metals) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Sabolić I.

E25. MAČEK N. Aktivnost kolinesteraza u plazmi tabunom otrovanog štakora nakon terapije oksimom (Plasma cholinesterases activity in rats upon tabun poisoning and oxime therapy) [Graduation thesis]. Zagreb: Faculty of Food Technology and Biotechnology, University of Zagreb; 2008. Mentors: Kovarik Z, Vorkapić-Furač J.

E26. MASLOV L. Određivanje poliklorbifenila u masti morskih kornjača (*Caretta caretta*) plinskom kromatografijom (Determination of polychlorinated biphenyls in fat of sea turtles (*Caretta caretta*) by gas chromatography) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2004. Mentors: Krauthacker B, Drevenkar V.

E27. MATOKANOVIĆ M. Ekspresija kanala za vodu AQP1 u bubrezima štakora različitog spola (Gender differences in distribution of water channel AQP1 along the rat nephron) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentor: Sabolić I.

E28. MENDAŠ G. Analiza metabolita u urinu kao biokemijskih pokazatelja izloženosti ljudi triazinskim herbicidima (Analysis of metabolites in urine as biochemical indicators of human exposure to triazine herbicides) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Drevenkar V.

E29. MIKLOŠ M. Primjena standardnog i modificiranog komet testa u određivanju oštećenja molekule DNA u ljudskim limfocitima nakon izlaganja ionizirajućem zračenju (Usage of the standard and modified comet assay in assessment of DNA damage in human lymphocytes after exposure to ionizing radiation) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2008. Mentor: Garaj-Vrhovac V.

E30. MIKOLČEVIĆ P. Učinci kadmija, žive i cisplatine na ekspresiju prijenosnika organskih kationa OCT1 u bubregu štakora (Expression of organic cation transporter OCT1 in rat kidneys; effect of cadmium, mercury, and cisplatin) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentor: Sabolić I.

E31. MILIČEVIĆ A. Razvoj modela za procjenu konstanti stabilnosti kompleksnih spojeva (Development of models for estimation of stability constants of complex compounds) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Raos N.

E32. MILIĆ M. Procjena genotoksičnosti bleomicina i mitomicina C metodom komet testa (Evaluation of the genotoxic activity of bleomycin and mitomycin C in human lymphocytes by the alkaline comet assay) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2004. Mentor: Kopjar N.

E33. MIOČIĆ S. Učinci radioprotektora amifostina i

melatonina na ljudske limfocite izložene γ-zračenju (Radioprotective effects of amifostine and melatonin on human lymphocytes irradiated with gamma γ-rays *in vitro*) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2005. Mentor: Kopjar N.

E34. MOTEJLKOVA A. Paraoxonasa/arylesterasa v seru pacientu s diabetes-mellitus II typu (Paraoxonase/arylesterase in serum of patients with type II diabetes mellitus) [Graduation thesis, in Czech]. Hradec Králové: Faculty of Pharmacy in Hradec Králové, Charles University in Prague; 2004. Mentor: Simeon V, Juretić D, Držata J.

E35. NIKOLIĆ M. Učinak spolnog ciklusa na ekspresiju organskog anionskog prijenosnika OAT1 u bubrezima ženki štakora (Expression of renal organic anion transporter OAT1 in hormonal cycle of female rats) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Sabolić I.

E36. PAVIČIĆ I. Biološki pokazatelji učinka radiofrekvencijskog mikrovalnog zračenja (935 MHz) na V79 stanice u kulturi (Biological markers of radiofrequency microwave radiation (935 MHz) effect on V79 cell culture) [M.Sc. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2005. Mentor: Trošić I.

E37. PAVIČIĆ I. Djelovanje radiofrekvencijskog zračenja na strukture citoskeleta stanica u kulturi (Influence of radiofrequency radiation on cytoskeleton structure of cells in culture) [Ph.D. thesis]. Zagreb: Prirodoslovno-matematički fakultet Svečilišta u Zagrebu; 2008. Mentor: Trošić I.

E38. PEHNEC G. Uloga ozona i peroksida u oksidacijskom kapacitetu atmosfere iznad Hrvatske i oksidativnom stresu (The role of ozone and peroxide in the oxidizing capacity of the atmosphere over Croatia and in oxidative stress) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentors: Vađić V, Klasinc L.

E39. PETEK MJ. Procjena biološke učinkovitosti tenocilkidina i adamantanskog derivata TAMORF-a u uvjetima *in vitro* i *in vivo* (Evaluation of biological efficiency of tenocyclidine and its adamantane derivative TAMORF *in vitro* and *in vivo*) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2008. Mentor: Lucić Vrdoljak A.

E40. PLEŠA N. Procjena genotoksičnosti irinotekana metodom komet testa (Assessment of irinotecan genotoxicity using the comet assay) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2005. Mentor: Kopjar N.

E41. RAVLIĆ S. Genotoksični učinak metabolita DDT-a u kulturi ljudskih limfocita primjenom mikronukleus testa (Assessment of DDT metabolities genotoxicity in the human lymphocyte culture using micronucleus assay) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentor: Garaj-Vrhovac V.

E42. RUDEŠ K. Djelovanje okratoksina A na proteinske karbonile u jetri štakora (The effect of ochratoxin A on protein carbonyls in rat liver) [Graduation thesis]. Zagreb: Faculty of Pharmacy and Biochemistry, University of Zagreb; 2006. Mentors: Domijan A-M, Žuntar I.

E43. RUK D. Kemijska i genotoksična svojstva otpadnih produkata nastalih u proizvodnji čelika (Chemical and genotoxic properties of wasteby-products of steel production) [M.Sc. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Garaj-Vrhovac V.

E44. SOKOLOVIĆ M. Genotoksični učinci T-2 toksina na genom limfocita periferne krvi pilića u uvjetima *in vivo* (Genotoxic effects of T-2 toxin of chicken peripheral lymphocyte genome in the *in vivo* conditions) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Garaj-Vrhovac V.

E45. ŠAFRANIĆ A. Procjena genotoksičnosti triptofola primjenom mikronukleus testa (Evaluation of tryptophol genotoxicity using micronucleus assay) [Graduation thesis]. Zagreb: Faculty of Food Technology and Biotechnology, University of Zagreb; 2006. Mentor: Kopjar N.

E46. ŠARIĆ M. Utjecaj mineralnih sastojaka i kiselosti prehrane na koštanu masu mladih štakora (Effects of dietary mineral elements and acid load on bone mass in young rats) [Ph.D. thesis]. Zagreb: School of Medicine, University of Zagreb; 2007. Mentor: Piasek M.

E47. ŠIMIĆ M. Određivanje omjera sfinganin/sfingozin u urinu kao pokazatelj izloženosti fumonizinima (The ratio sphinganine/sphingosine in urine as indicator of exposure to fumonisins) [Graduation thesis]. Zagreb: Faculty of Pharmacy and Biochemistry, University of Zagreb; 2006. Mentors: Domijan A-M, Žuntar I.

E48. ŠINKO G. Inhibicija kolinesterazâ enantiomerima etopropazina (Inhibition of cholinesterases with ethopropazine enantiomers) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Simeon V.

E49. ŠOŠTARIĆ N. Inhibicija acetilkolinesteraze i butirilkolinesteraze piridinijevim oksimima, 2-PAM i HI-6 (Inhibition of acetylcholinestrerase and butyrylcholinesterase by pyridinium oximes 2-PAM and HI-6) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb. Mentors: Simeon V, Kovarik Z.

E50. ŠTIMAC A. Utjecaj promjene primarne strukture acetilkolinesteraze na inhibiciju s karbamatom metaproterenola (Amino acid residues controlling the inhibition of acetylcholinesterase by metaproterenol carbamate) [Graduation

thesis]. Zagreb: Faculty of Science, University of Zagreb; 2008. Mentors: Kovarik Z, Weygand-Đurašević I.

E51. TURKALJ J. Mikrovalna ekstrakcija postojanih organoklorovih spojeva iz tla (Microwave-assisted extraction of persistent organochlorine compounds from soil) [Graduation thesis]. Zagreb: Faculty of Science, University of Zagreb; 2006. Mentors: Vasilić Ž, Drevenkar V.

E52. VELIKIĆ G. Terapijska djelotvornost derivate piridin klorida pri trovanju somanom. (Therapeutic effect pyridinium chloride derivatives against soman poisoning) [Graduation thesis]. Zagreb: Faculty of Pharmacy and Biochemistry, University of Zagreb; 2006. Mentor: Lucić Vrdoljak A.

E53. VISKOVIĆ T. Utjecaj odabranih parametara na biosintezu zearalenona s pomoću plijesni *Fusarium graminearum* ZMPBF 1244 (The effect of selected parameters on the biosynthesis of zearalenone using *Fusarium graminearum* ZMPBF 1244) [Graduation thesis]. Zagreb: Faculty of Food Technology and Biotechnology, University of Zagreb; 2004. Mentors: Domijan A-M, Duraković S.

E54. VRANJKOVIĆ B. Određivanje koncentracije okratoksina u mediju i LLC-PK1 staničnom lizatu (Determination of the ochratoxin A in media and lyzate of LLC-PK1 cells) [Graduation thesis]. Zagreb: Faculty of Pharmacy and Biochemistry, University of Zagreb; 2004. Mentors: Domijan A-M, Petrik J.

E55. VUCINIC D. Ridistribuzione delle particelle e delle fibre instillate per via tracheale nei polmoni di ratti Wistar (Redistribution of particles and fibres instaled through trachea into lungs of Winstar rats) [Graduation thesis, in Italian]. Milano, Italia: Universitá Degli Studi di Milano, Facoltá di Scienze Matematiche Fisiche e Naturali. Corso di Laurea in Scienze Biologiche; 2004. Mentors: Trošić I, Comolli R.

E56. ŽLENDER V. Učinci okratoksina A na ekspresiju prijenosnika organskih aniona Oat1, Oat2, Oat3 i Oat5 u bubregu štakora (Effects of ochratoxin A on the expression of organic anion transporters Oat1, Oat2, Oat3 and Oat5 in rat kidney) [Ph.D. thesis]. Zagreb: Faculty of Science, University of Zagreb; 2007. Mentor: Sabolić I.

List of staff

as on 31 December 2008

Scientific staff

Bakotić, Marija
Balen, Daniela
Berend, Suzana
Bešlić, Ivan
Bituh, Tomislav
Bobić, Jasminka
Bosak, Anita
Branica, Gina
Brajenović, Nataša
Brčić Karačonji, Irena
Breljak, Davorka
Brzica, Hrvoje
Cvijetić Avdagić, Selma
Čačković, Mirjana
Čorović, Naima
Drevenkar, Vlasta
Fingler Nuskern, Sanja
Flajs, Dubravka
Franić, Zdenko
Fučić, Aleksandra
Gajski, Goran
Garaj-Vrhovac, Verica
Godec, Rajka
Gomzi, Milica
Herceg Romanić, Snježana
Ivičić, Nikola
Jurasović, Jasna
Kašuba, Vilena
Katalinić, Maja
Katić, Anja
Katić, Jelena
Kljaković Gašpić, Zorana
Kopjar, Nevenka
Košćec-Đuknić, Adrijana
Kovač, Jadranka
Kovarik, Zrinka
Kožul, Darija
Lazarus, Maja
Liščić, Rajka
Lucić Vrdoljak, Ana
Ljubojević, Marija
Ljubičić Ćalušić, Anita
Macan, Jelena
Marković, Marijana
Marović, Gordana
Mataušić-Pišl, Mirjana
Mendaš Starčević, Gordana
Milić, Mirta
Miličević, Ante
Milković-Kraus, Sanja
Mladinić, Marin
Pavičić, Ivan
Pavlović, Mladen
Pehnec, Gordana
Peraica, Maja
Petrinec, Branko
Piasek, Martina
Pizent, Alica
Prester, Ljerka
Radić, Božica
Radošević-Vidaček, Biserka
Raos, Nenad
Rozgaj, Ružica
Sabolić, Ivan
Sabolić Pipinić, Ivana
Sabolović, Jasmina
Sambolec, Marija
Stipičević, Sanja
Surić Mihić, Marija
Šega, Krešimir
Šinko, Goran
Šišović, Anica
Tomljenović, Andrea
Tončić, Josip
Trošić, Ivančica
Vađić, Vladimira
Varnai, Veda Marija
Vasilić, Želimira
Vinković Vrček, Ivana
Želježić, Davor
Žužul, Silva

Professional staff

Čakalo, Dado
Franulović, Iva
Maračić, Manda
Meštrović, Tomislav
Micek, Vedran
Prlić, Ivica
Roić, Branka
Stankić Drobnjak, Spomenka
Skoko, Božena
Turk, Rajka
Zorić, Mate

Technical staff

Antolak, Marija
Balagović, Ivica
Dasović, Vjeran
Filipec, Ana
Frković, Zvonimir
Idrizi, Selvije
Gečić, Irma
Heršak, Eva
Horš, Nada
Janković, Katarina
Komesar, Mladen
Kralj, Mirjana

Kramarić, Marija
Kubelka, Zorica
Kujundžić Brkulj, Marija
Lieberth, Marija
Lipovac, Dunja
Luzar, Rajka
Matašin, Mirjana
Mataušić, Snježana
Meštrović, Maja
Milas, Marija
Mileković, Jasna
Nekić, Krešimir
Nikolić, Maja
Petroci, Ljerka
Senčar, Jasminka
Sokolović, Enis
Šilović, Martina
Šmaguc, Kata
Tkalčević, Biserka
Triva, Vesna

Administrative staff

Banovac Kostanjevec, Brankica
Đurđević, Dragica
Ferenčak, Verica
Horvat, Milica
Lakić, Daila
Lazanin, Vesna
Matić, Anđelka
Milošević, Dušanka
Rustić, Sanja

Auxiliary technical staff

Basar, Željko
Blažinović, Marica
Glumbić, Milorad
Golouh, Ljiljana
Knežević, Smilja
Mankić Perković, Ljiljana
Mikulec, Ivan
Novoselec, Snježana
Posavec, Ivan
Slivak, Anica
Smolčić, Štefica
Štrk, Jelena
Vidović, Barica
Vuković, Marica
Zajec, Julijus
Župetić, Božidar
Živanović, Kristina

Associate scientists

Blanuša, Maja
Kanceljak-Macan, Božica
Kostial, Krista
Krauthacker Blanka
Reiner, Elsa
Simeon, Vera
Šarić, Marko
Telišman, Spomenka

Retired between 2004 and 2008

Adžić, Mira
Barić, Janka
Blanuša, Maja
Breber, Nada
Breški, Đurđa
Ciganović, Marija
Frković, Vesna
Hajdarović, Stane
Hršak, Janko
Iveković, Nediljka
Kalinić, Nataša
Kanceljak-Macan, Božica
Karačić, Višnja
Krauthacker Blanka
Lokobauer, Nevenka
Malinar, Marta
Poduje, Marija
Pondeljak, Katarina
Sajko, Mirjana
Simeon, Vera
Skender, Ljiljana
Švast, Blaženka
Telišman, Spomenka
Varga, Božena

Left between 2004 and 2008

Bračanov, Vlatka
Bronzović, Maja
Čepelak, Slobodan
Domijan, Ana-Marija
Đurinec, Martina
Ferenčak, Zlatan
Gudelj Gračanin, Ana
Herak-Kramberger, Carol Mirna
Ilić, Darko
Jurak, Vladimir
Jureša, Dijana
Kmezić, Boro
Mak, Lora
Maloča, Ivana
Meštrović, Jurica
Momčilović, Berislav
Olčar, Hrvoje
Pažur, Daniela
Plavec, Davor
Ramić, Snježana
Suša, Martina
Šarić, Marija
Šimić, Diana
Šimunić, Suzana
Škarica, Mario
Tokić, Goran
Špoljarić, Igor
Žlender, Vilim