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# Genetics & Applications

An Aspiring Interdisciplinary Journal of Genetic Research

*special  
edition*

**2<sup>nd</sup> B&H SYMPOSIUM  
OF LABORATORY GENETICISTS  
AND MOLECULAR BIOLOGISTS  
(WITH INTERNATIONAL PARTICIPATION)**



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# **Genetics & Applications**

*An Aspiring Interdisciplinary Journal of Genetic Research*

Special edition

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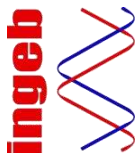
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(with International Participation)

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**2<sup>ND</sup> B&H SYMPOSIUM OF LABORATORY GENETICISTS AND MOLECULAR BIOLOGISTS  
(WITH INTERNATIONAL PARTICIPATION)**

**10<sup>TH</sup> - 11<sup>TH</sup> MAY 2024, BANJA LUKA, BOSNIA AND HERZEGOVINA**

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*The abstracts underwent a streamlined submission process, wherein authors retained full responsibility for both the content and the language therein.*

**2nd B&H SYMPOSIUM OF LABORATORY GENETICISTS AND  
MOLECULAR BIOLOGISTS (WITH INTERNATIONAL  
PARTICIPATION)**

<b>May 10th 2024</b>	<b>Friday - FIRST DAY</b>	
8:30-9:00	Registration of participants	
9:00-9:20	<b>Opening and welcome speech</b>	Radoslav Dekic, PhD, Dean of FNSM, Banja Luka Stojko Vidovic, PhD, Medical Faculty Banja Luka Marija Vukovic, PhD, University Clinical Center of the Republic of Srpska, Banja Luka
9:20-9:40	<b>Trends in psychiatric genetics</b>	Lejla Kapur Pojskic, PhD, INGEB, Sarajevo
9:40-10:00	<b>Neurodegenerative diseases –challenges and perspectives in molecular approach treatment</b>	Jasmin Ramic, PhD, INGEB, Sarajevo
10:00-10:20	<b>Molecular-genetic diagnostics autism spectrum disorders</b>	Nela Maksimovic, PhD, Institute for Human Genetics, Belgrade University, Medical Faculty
10:20-10:30	Discussion	
10:30-11:00	Coffee break	
11:00-11:30	<b>Genomics as a basis for personalized medicine</b>	Sonja Pavlovic, PhD, IMGGE, Belgrade
11:30-12:00	<b>Detection of copy number variants in genome and their significance in human diseases</b>	Dijana Perovic, PhD, Institute for Human Genetics, Belgrade University, Medical Faculty
12:00-12:30	<b>Cytogenetics in the era of molecular karyotyping</b>	Leona Morožin Pohovski, PhD, Children's Hospital Zagreb
12:30-13:00	<b>The role of genomic instability in the promotion and progression of malignant tumors - diagnostic and prognostic significance</b>	Nikola Tanic, PhD, The University of Belgrade, Institut for Biological Research "Sinisa Stankovic", Institut of National Interest for Republic of Serbia, Belgrade, Republic of Serbia

**2nd B&H SYMPOSIUM OF LABORATORY GENETICISTS AND  
MOLECULAR BIOLOGISTS (WITH INTERNATIONAL  
PARTICIPATION)**

13:00-13:15	Sponzorsko predavanje Profy: <b>OPTIMIZE YOUR MSI WORKFLOW WITH PROMEGA</b>	Kriti Pathak, Promega GmbH, Walldorf, Germany
13:15-14:15	Lunch	
14:15-14:40	<b>Conventional and molecular diagnostics of myeloproliferative neoplasms and acute myeloid leukemia – the experience of Clinic of Hematology UCCS</b>	Vesna Djordjevic, PhD, University Clinical Center of Serbia, Belgrade
14:40-15:05	<b>Diagnostics of chronic lymphocytic leukemia and multiple myeloma: from cytogenetic to NGS</b>	Marija Dencic, PhD, Medical Faculty, Belgrade
15:05-15:25	<b>Conventional cytogenetic analysis in chronic lymphocytic leukemia</b>	Jelica Jovanovic, spec.geneticist, University Clinical Center of Serbia, Belgrade
15:25-15:40	<b>Cytogenetic and molecular-genetic aberrations in acute lymphoblastic leukemia in adults- the experience of Clinic of Hematology UCCS</b>	Sandra Bizic Radulovic, spc.geneticist, University Clinical Center of Serbia, Belgrade
15:40-15:50	Discussion	
15:50-16:15	<b>Genetic influences on metabolic diseases development</b>	Malgorzata Wrzosek, PhD, Collegium Medicum, Jan Kochanowski University, Kielce, Poland 2) Department of Biochemistry and Pharmacogenomics, Faculty of Pharmacy, Medical University of Warsaw, Warsaw, Poland
16:15-16:30	<b>Human genetic variants modulating the course of COVID-19 infection in a subset of Bosnian-Herzegovinian patients.</b>	Adna Asic, PhD, Verlab Research Institute for biomedical engineering, medical devices and artificial intelligence
16:30-16:40	Discussion	
16:40-17:30	Poster Presentation	
20:00-24:00	Gala Dinner	Restaurant Integra-14.floor

**2nd B&H SYMPOSIUM OF LABORATORY GENETICISTS AND  
MOLECULAR BIOLOGISTS (WITH INTERNATIONAL  
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<b>May 11th 2024</b>	<b>Saturday - SECOND DAY</b>	
9:00-11:00	Satellite symposium-“ <b>Pharmacogenomics in the era of next-generation sequencing</b> ”.	<b>PharmGenHub project</b> granted by EU throughout program Horizon Widera 2021 - Twinning Western Balkan
11:00-11:30	Discussion	
11:30-12:00	Coffee break	
12:00-12:30	<b>Pharmacogenomics and pharmacotranscriptomics of acute myeloid leukemia in childhood: on the way to personalized medicine</b>	Branka Zukic, PhD, IMGGE, Belgrade
12:30-12:50	<b>Significance of TPMT genotyping in clinical practice</b>	Vanja Vidovic, PhD, Medical faculty, Banja Luka
12:50-13:10	<b>Genotipization of promotor variants of UGT1A1 gene as a pharmacogenetic marker in clinical practice</b>	Marija Vukovic, PhD, University Clinical Center of Republic of Srpska, Banja Luka
13:10-13:25	Sponzorsko predavanje Mikro&Polo: <b>A Novel Digital PCR Tool for Parallel Detection of Multiple Hallmark Mutations in BRAFV600 and EGFR exon19</b>	Dr. Ellen Bruske
13:25-13:30	Discussion	
13:30-14:30	Lunch	
14:30-14:50	<b>Application of molecular karyotyping in prenatal diagnostics</b>	Jadranka Vranekovic, PhD, University of Rijeka, Faculty of Medicine
14:50-15:10	<b>Genetic causes of male infertility; karyotyping and Y microdeletion analysis</b>	Nada Starcevic Cizmarevic, PhD, University of Rijeka, Faculty of Medicine
15:10-15:30	<b>Subfertility and sterility of couples: mutations associated with thrombophilia - more than a coagulation disorder and why both partners should be tested after re-occurring spontaneous abortions</b>	Zeljko Popovic, PhD, FNSM; GenoLab, Laboratory of Medical Biochemistry and Molecular Diagnostics, Novi Sad
15:30-15:45	<b>Pros and cons of dietary antioxidants: interindividual variability of flavonoids genotoxicity</b>	Maida Hadžić, PhD, INGEB, Sarajevo



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15:45-16:00	<b>Assessment of Immunomodulatory and Epigenetic Effects: A Comparative Study of Cytokine Profiles between Plant-Based and Omnivorous Diets</b>	Marta Despotovic, research assistant, Institute for Medical Research, Belgrade
16:00-16:10	Discussion	
16:10-17:00	Declaration of the best poster, Closing ceremony	
	Parallel sessions: The posters will be displayed continuously in the entrance hall of the Amphitheater. Presenting authors will be available for questions and discussion personally.	

## POSTERS

**KOŽIK BOJANA** (*Laboratory for Radiobiology and Molecular Genetics, Vinča Institute of Nuclear Sciences, National Institute of Republic of Serbia, University of Belgrade, Belgrade, Serbia*): SPATIAL EXPRESSION OF ZEB1 GENE AS A POTENTIAL PROGNOSTIC MARKER IN RECTAL CANCER

**KRAJNOVIĆ MILENA** (*"Vinča" Institute of Nuclear Sciences - National Institute of the Republic of Serbia, University of Belgrade, Laboratory for Radiobiology and Molecular Genetics, Mike Petrovića Alasa 12-14, 11001 Belgrade, Serbia*): SEQUENCE VARIABILITY OF HCV CORE REGION AND HOST GENETIC AND EPIGENETIC FACTORS CAN PREDICT THE RESPONSE TO COMBINED PEG-IFN/RBV THERAPY IN PATIENTS WITH CHRONIC HEPATITIS C INFECTION GENOTYPE 1B

**TOVILOVIĆ-KOVAČEVIĆ GORDANA** (*Institute for Biological Research "Siniša Stanković" – National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia*): ANTIHEPATOMA ACTIVITY OF METHANOL EXTRACTS FROM *THYMUS PANNONICUS* IN VITRO SHOOT CULTURES

**BOŽOVIĆ ANA** (*Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia*): ERB IS A POSSIBLE BIOMARKER OF BREAST CANCER

**ROLJIĆ ALEKSANDRA** (*Pan-European University Apeiron, Banja Luka, Bosnia and Herzegovina*): CORRELATION OF GENETIC FACTORS WITH SPORTS PREDISPOSITIONS

**ANDJELKOVIĆ MARINA** (*Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Belgrade, Serbia*): CHARACTERIZATION OF 16 NOVEL GENETIC VARIANTS IN GENES ASSOCIATED WITH EPILEPSY

**MALEŠEVIĆ BOJANA** (*University Clinical Centre of the Republic of Srpska, Banja Luka, Bosnia and Herzegovina*): A RARE TRISOMY OF CHROMOSOME 4 IN ACUTE MYELOID LEUKEMIA - CASE REPORT

**DEVANTIER-DU PLESSIS CARLA** (*Medical Faculty, University of Sarajevo, Sarajevo, Bosnia and Herzegovina*): DETERMINING SIBSHIP INDICES WITH 15 STR LOCI: CENTRAL BOSNIA STUDY

**BLAGOJEVIĆ DANIJELA** (*Public Health Institution Hospital "Sveti Vračevi", Bijeljina, Bosnia and Herzegovina*): CHALLENGES IN SARS-CoV-2 DIAGNOSTICS BY REAL TIME RT-PCR

**IGNJATOVIĆ ĐURĐICA** (*Institute for Biological Research "Siniša Stanković" - National Institute of Republic of Serbia, University of Belgrade, Belgrade, Republic of Serbia*): EFFECTS OF PRENATAL DEXAMETHASONE TREATMENT AND MODERATE POST-WEANING FRUCTOSE CONSUMPTION ON RECOGNITION MEMORY IN ADULT MALE WISTAR RAT OFFSPRING

**SOFTIĆ ADNA** (*Verlab Research Institute for Biomedical Engineering, Medical Devices and Artificial Intelligence, Sarajevo, Bosnia and Herzegovina*): ENHANCING SPORTS PERFORMANCE BY INSIGHTS FROM GENETIC TESTING OF YOUNG ATHLETES FROM BOSNIA AND HERZEGOVINA

**VUČIĆ GORDANA** (*Laboratory for Immunohistochemical and Molecular Diagnostics, Institute of Clinical Pathology, University Clinical Center, Banja Luka, Bosnia and Herzegovina*): FREQUENCY OF V600E MUTATION IN BRAF GENE AMONG PATIENTS WITH METASTATIC MELANOMA ON THE TERRITORY OF BOSNIA AND HERZEGOVINA

**ŠNJEGOTA DRAGANA** (*Faculty of Natural Sciences and Mathematics, University of Banja Luka, Banja Luka, Bosnia and Herzegovina*): THE INFLUENCE OF SEX ON THE GENETIC STRUCTURE OF THE JACKAL (*CANIS AUREUS*) OF BOSNIA AND HERZEGOVINA

**BRKLAČIĆ JELENA** (*Institute for Biological Research "Siniša Stanković" - National Institute of Republic of Serbia, University of Belgrade, Belgrade, Republic of Serbia*): DIETARY SUPPLEMENTATION WITH LIOPHILISED STRAWBERRY IMPROVES INSULIN SENSITIVITY AND REDOX STATUS IN MOUSE MODEL OF DIET INDUCED OBESITY

**KULIĆ JOVAN** (*Faculty of Medicine Foča, University of East Sarajevo, Foča, Republic of Srpska, Bosnia and Herzegovina*): THE ROLE OF ANGIOTENSIN I CONVERTING ENZYME INSERTION/DELETION POLYMORPHISM ON COVID-19 DISEASE SUSCEPTIBILITY

**KRISTEL KLAASSEN** (*Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Belgrade, Republic of Serbia*): GENETIC LANDSCAPE OF PHENYLKETONURIA IN SERBIA

**VIRIJEVIC MARIJANA** (*Clinic of Hematology University Clinical Center of Serbia, Faculty of Medicine University of Belgrade, Belgrade, Republic of Serbia*): NEW TERT VARIANT IN A FAMILY WITH APLASTIC ANEMIA

**CIMESA MLADEN** (*International Burch University, Department of Genetics and Bioengineering, Sarajevo, Bosnia and Herzegovina*): MICRORNA SIGNATURES IN ALZHEIMER'S DISEASE: A REVIEW OF DIAGNOSTIC POTENTIAL

**ŠUŠKALO NEVENA** (*University Clinical Centre of the Republic of Srpska, Banja Luka, Bosnia and Herzegovina*): CASE REPORT OF INHERITED TRANSLOCATION T(12;13)(Q24.33;Q21.2)

**MARJANOVIC IRENA** (*Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Republic of Serbia*): NEW GATA3 VARIANT IN A PATIENT WITH BARAKAT SYNDROME

**GABELJIĆ NUSRETA** (*International Burch University, Sarajevo, Bosnia and Herzegovina*): ADVANCING ALZHEIMER'S DISEASE MANAGEMENT THROUGH PERSONALIZED MEDICINE: INTEGRATING GENETIC, NEUROINFLAMMATORY, AND BIOMARKER INSIGHTS

**KONJHODŽIĆ RIJAD** (*Alea Genetic Center, Sarajevo, Bosnia and Herzegovina*): OPTIMIZING CUSTOM-DESIGNED PRIMERS FOR COMPLETE MITOCHONDRIAL GENOME SEQUENCING WITH ILLUMINA® NEXTERA® XT SYSTEM AND CONFIRMATORY SANGER SEQUENCING

**MASLIĆ SRETENKA** (*University Clinical Centre of the Republic of Srpska, Department of Medical Genetics, Banja Luka, Bosnia and Herzegovina*): CASE REPORT: PRENATAL DETECTION OF PSEUDOISODICENTRIC CHROMOSOME 18Q

**ZEKAVICA MAJA** (*Department of Laboratory Diagnostics, University Hospital Medical Center "Zvezdara", Belgrade, Republic of Serbia*): TUMOR NECROSIS FACTOR ALPHA GENE POLYMORPHISMS -238G>A AND -308G>A AS GENETIC MARKERS FOR THE DEVELOPMENT OF ALCOHOL RELATED LIVER CIRRHOSIS

## ANTIHEPATOMA ACTIVITY OF METHANOL EXTRACTS FROM *THYMUS PANNONICUS* IN VITRO SHOOT CULTURES

Tovilović-Kovačević Gordana, Ignjatović Đurđica, Krstić-Milošević Dijana, Tomić Mirko, Ćosić Tatjana

*Institute for Biological Research "Siniša Stanković" - National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia*

*Thymus pannonicus* All. (Lamiaceae) is a perennial plant native to Central and Eastern Europe and Russia. The dried herb is traditionally used to treat mild respiratory and gastrointestinal illnesses, due to enrichment with monoterpenes and sesquiterpenes. Other secondary metabolites found in *Thymus* species, namely phenolic acids, flavonoids, flavone glucuronides, show numerous additional health-promoting effects (antioxidant, antidiabetic, anticancer). In this work, the antihepatoma activity of methanol extracts from in vitro shoot cultures of *T. pannonicus* citral chemotype on human HEPG2 hepatoma cells was evaluated. Two methanol extracts were investigated: E1 – derived from shoots grown on a medium without plant growth regulators and E2 – derived from shoots grown in the presence of the plant hormone indole-3-acetic acid (1mg/ml). Quantitative spectrophotometric analysis revealed that total phenolic and flavonoid contents were higher in E2 (540.4mg/g and 9.84mg/g, respectively) than in E1 (265.4mg/g and 6.52mg/g, respectively). Further analysis using HPLC identified rosmarinic acid (RA) as the dominant phenolic acid in both extracts, with E2 containing a slightly higher amount of RA than E1. The extracts reduced growth of HEPG2 cells in a dose- and time-dependent manner with moderate IC<sub>50</sub> values (IC<sub>50</sub>(E1)=81.1μg/ml; IC<sub>50</sub>(E2)=77.8μg/ml, MTT, 96h), as shown by cell viability tests. Similarly, RA, used as a control, suppressed the growth of HEPG2 cells with an IC<sub>50</sub>=30.8μM (MTT, 96h). Flow cytometry of propidium iodide-stained cells showed that *T. pannonicus* extracts and RA arrested HEPG2 cells in the G<sub>2</sub>/M phase of the cell cycle, while fluorimetric measurement of cells loaded with dihydrorhodamine revealed mild elevation of intracellular ROS content induced by both extracts after 48h of treatment. Considering high content of RA in both extracts and similar antiproliferative effect of RA, E1 and E2 on HEPG2 cells, it could be proposed that RA is the active compound responsible for moderate antihepatoma activity of the investigated *T. pannonicus* extracts.

**Keywords:** *Thymus pannonicus*, in vitro shoot cultures, methanol extracts, rosmarinic acid, antihepatoma activity, antiproliferative effectx

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