

ICANAS 2025

**8. INTERNATIONAL CONFERENCE ON ADVANCES
IN NATURAL AND APPLIED SCIENCES**

**AĞRI İBRAHİM ÇEÇEN UNIVERSITY
OCTOBER 28-31, 2025**



BOOK OF ABSTRACTS

ISBN: 978-625-97879-5-4

2025

8. INTERNATIONAL CONFERENCE ON ADVANCES IN NATURAL AND APPLIED SCIENCES

ICANAS 2025

EDITORS

Ahmet Ocak AKDEMİR, PhD.

İbrahim HAN, PhD.

Hülya AKINCIOĞLU, PhD.

Aykut ÖZTEKİN, PhD.

Burak ALAYLAR, PhD.

Dilan ÖZMEN ÖZGÜN, PhD.

All papers have been peer reviewed.

SPONSORING ORGANIZATIONS

Ağrı İbrahim Çeçen University, Türkiye

University of Catania, Italy

Private University of Fez, Morocco

Institute of Applied Mathematics,

Baku State University, Azerbaijan

IC Foundation

IC Green Palace Hotel

HONORARY CHAIRS

Prof. Dr. İlhami GÜLÇİN

Rector of Ağrı İbrahim Çeçen University
Türkiye

İbrahim ÇEÇEN

Owner of IC Holding
Türkiye

CHAIR

Prof. Dr. Ahmet Ocak AKDEMİR

Ağrı İbrahim Çeçen University
Türkiye

EXECUTIVE BOARD

Prof. Dr. Hülya AKINCIOĞLU

Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. İbrahim HAN

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Burak ALAYLAR

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Aykut ÖZTEKİN

Ağrı İbrahim Çeçen University
Türkiye

Assist. Prof. Dr. Dilan ÖZMEN ÖZGÜN

Ağrı İbrahim Çeçen University
Türkiye

Dr. Meral DİNÇER

IC Foundation
Türkiye

INTERNATIONAL EXECUTIVE BOARD

Prof. Dr. Yakup KARATAŞ
Ađrı İbrahim Çeçen University
Türkiye

Prof. Dr. Fikret ALIEV
Baku State University- Institute of Applied Mathematics
Azerbaijan

Prof. Dr. Zakia HAMMOUCH
Moulay Ismail University
Morocco

Assist. Prof. Dr. Nimetullah ALDEMİR
Ađrı İbrahim Çeçen University
Türkiye

SCIENTIFIC PROGRAM COMMITTEE

Prof. Dr. Mucip GENİŞEL

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Erdal BAŞARAN

Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Kadriye URUÇ PARLAK

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Aydın KIZILASLAN

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Akın AKINCIOĞLU

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Ayşe Berivan BAKAN

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Tuba AYDIN

Ağrı İbrahim Çeçen University
Türkiye

**Assoc. Prof. Dr. Burcu DEMİR
GÖKMEN**

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Bünyamin AYGÜN

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Pınar BAYKAN

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Çetin BAYRAK

Ağrı İbrahim Çeçen University
Türkiye

**Assist. Prof. Dr. Berna ÖZTÜRK
KARAGÖZ**

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Kadirhan POLAT

Ağrı İbrahim Çeçen University
Türkiye

Assist. Prof. Dr. Gökhan AKYÜZ

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Yavuz ORUÇ

Ağrı İbrahim Çeçen University
Türkiye

Assist. Prof. Dr. Fatma OKUCU

Ağrı İbrahim Çeçen University
Türkiye

Assist. Prof. Dr. Sirer ALBAYRAK

Ağrı İbrahim Çeçen University
Türkiye

SECRETARY

**Assoc. Prof. Dr. Fazile Nur EKİNCİ
AKDEMİR**
University of Health Sciences
Türkiye

Assist. Prof. Dr. Rüya SAĞLAMTAŞ
Ağrı İbrahim Çeçen University
Türkiye

Lecturer Ahmet ÇAĞAN
Ağrı İbrahim Çeçen University
Türkiye

Lecturer Dr. Ahmet ÖZMEN
Ağrı İbrahim Çeçen University
Türkiye

Lecturer Güven BUDAK
Ağrı İbrahim Çeçen University
Türkiye

Res. Assist. Kübra ASLAN
Atatürk University
Türkiye

Res. Assist. Zehra ÇELİK ÇÖP
Ağrı İbrahim Çeçen University
Türkiye

TECHNICAL COMMITTEE

Lecturer Mehmet Mehdi KARAKOÇ
Ağrı İbrahim Çeçen University
Türkiye

Lecturer Burak KOÇAK
Ağrı İbrahim Çeçen University
Türkiye

Ayça KÖKTÜRK
IC Foundation
Türkiye

SCIENTIFIC COMMITTEE

Mathematics

Prof. Dr. Ali ÇAKMAK
Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Ercan ÇELİK
Türkiye Manas University
Kyrgyzstan

Prof. Dr. Mehmet Zeki SARIKAYA
Düzce University
Türkiye

Prof. Dr. Erhan SET
Ordu University
Türkiye

Prof. Dr. Miodrag SPALEVIC
University of Beograd
Serbia

Prof. Dr. Juan Luis García GUIRAO
Universidad Politécnica de Cartagena
Spain

Prof. Dr. Saad Ihsan BUTT
COMSATS University of Islamabad,
Lahore Campus
Pakistan

Prof. Dr. Khuram Ali KHAN
University of Sargodha
Pakistan

Prof. Dr. Nargiz SAFAROVA
Baku State University, Institute of
Applied Mathematics
Azerbaijan

Prof. Dr. Javanshir ZEYNALOV
Nahkcivan State University
Nahkcivan

Prof. Dr. Gamar MAMMADOVA
Baku State University, Institute of
Applied Mathematics
Azerbaijan

Prof. Dr. İlknur KOCA
Muğla Sıtkı Koçman University
Türkiye

Prof. Dr. Jihad AL JARADEN
Al Hussein Bin Talal University
Jordan

Assoc. Prof. Dr. Abdülğani ŞAHİN
Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Abdullah ÇAĞMAN
Erzurum Technical University
Türkiye

**Assoc. Prof. Dr. Mustafa Ali
DOKUYUCU**
Samsun Ondokuz Mayıs University
Türkiye

Assoc. Prof. Dr. Sait TAŞ
Atatürk University
Türkiye

Assist. Prof. Dr. Ebru KARADUMAN
Ağrı İbrahim Çeçen University
Türkiye

Physics

Prof. Dr. Murat AYGÜN
Bitlis Eren University
Türkiye

Assist. Prof. Dr. Mansur ALBAYRAK
Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Mustafa Tuğfan BİLKAN
Tokat Gazi Osman Paşa University
Türkiye

Prof. Dr. Mustafa Recep KAÇAL
Giresun University
Türkiye

Assoc. Prof. Dr. Bünyamin ALIM
Bayburt University
Türkiye

Prof. Dr. Sinan AKPINAR
Fırat University
Türkiye

Prof. Dr. Ekrem ALMAZ
Muş Alpaslan University
Türkiye

Prof. Dr. Aykut ASTAM
Erzincan Binali Yıldırım University
Türkiye

Prof. Dr. Ferdi AKMAN
Bingöl University
Türkiye

Prof. Dr. Mehmet BÜYÜKYILDIZ
Bursa Technical University
Türkiye

Prof. Dr. İkrım ORAK
Bingöl University
Türkiye

Prof. Dr. Ahmet ÇETİN
Manisa Celâl Bayar University
Türkiye

**Assist. Prof. Dr. Emine NARMANLI
HAN**
Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Betül CANIMKURBEY
Ankara Hacı Bayram Veli University
Türkiye

Assoc. Prof. Dr. Erdem ŞAKAR
Atatürk University
Türkiye

Prof. Dr. Necati ÇELİK
Gümüşhane University
Türkiye

Assist. Prof. Dr. Ahmet TAŞER
Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Ercan ERCAN
Bitlis Eren University
Türkiye

Chemistry

Prof. Dr. Ömer İrfan KÜFREYOĞLU

Atatürk University
Türkiye

Prof. Dr. Meryem TOPAL

Gümüşhane University
Türkiye

Prof. Dr. İlhami Gülçin

Atatürk University
Türkiye

Assist. Prof. Dr. Zeynebe BİNGÖL

Tokat University
Türkiye

Prof. Dr. Adil DENİZLİ

Hacettepe University
Türkiye

Prof. Dr. Murat GÜNEY

Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Uğur BOZKAYA

Hacettepe University
Türkiye

Prof. Dr. Kani ZİLBEYAZ

Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Hülya AKINCIOĞLU

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Züleyha ALMAZ

Muş Alparslan University
Türkiye

Prof. Dr. Deniz EKİNCİ

Ondokuz Mayıs University
Türkiye

Assist. Prof. Dr. Hatice SEÇİNTİ KLOPF

Bozok University
Türkiye

Prof. Dr. Ekrem KÖKSAL

Erzincan Binali Yıldırım University
Türkiye

Assoc. Prof. Dr. Mine AKSOY

Atatürk University
Türkiye

Prof. Dr. Ercan BURSAL

Muş Alparslan University
Türkiye

Assoc. Prof. Dr. Ufuk ATMACA

Atatürk University
Türkiye

Prof. Dr. Harun BUDAK

Atatürk University
Türkiye

Assoc. Prof. Dr. Uğur GÜLLER

İğdır University
Türkiye

Prof. Dr. Şükrü BEYDEMİR

Anadolu University
Türkiye

Assoc. Prof. Dr. Namık KILINÇ

İğdır University
Türkiye

Prof. Dr. Taha Abdulkadir ÇOBAN

Erzincan Binali Yıldırım University
Türkiye

Assist. Prof. Dr. Songül BAYRAK

Atatürk University
Türkiye

Prof. Dr. Süleyman GÖKSU
Atatürk University
Türkiye

Assoc. Prof. Dr. Akın AKINCIOĞLU
Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Hasan ÖZDEMİR
Atatürk University
Türkiye

Prof. Dr. Melda ŞİŞECİOĞLU
Atatürk University
Türkiye

Prof. Dr. Yavuz ONGANER
Atatürk University
Türkiye

Prof. Dr. Savaş KAYA
Cumhuriyet University
Türkiye

Prof. Dr. Zuhâl ALİM
Ahi Evran University
Türkiye

Prof. Dr. İrfan KOCA
Yozgat Bozok University
Türkiye

Prof. Dr. Mahfuz ELMASTAŞ
Sağlık Bilimleri University
Türkiye

Prof. Dr. S. Beyza ÖZTÜRK SARIKAYA
Gümüşhane University
Türkiye

Prof. Dr. Mustafa Soylak
Erciyes University
Türkiye

Assist. Prof. Dr. Ertuğrul CEYRAN
Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Fevzi TOPAL
Gümüşhane University
Türkiye

Biology

Prof. Dr. Kenan KARAGÖZ
Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Tayfun KARATAŞ
Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Furkan ORHAN
Ağrı İbrahim Çeçen University
Türkiye

**Assoc. Prof. Dr. Ekrem
DARENDELİOĞLU**
Bingöl University
Türkiye

Assist. Prof. Dr. Tülay DİZİKISA
Ağrı İbrahim Çeçen University
Türkiye

**Assist. Prof. Dr. Neblea Monica
ANGELA**
Pitesti University
Romania

**Assist. Prof. Dr. Mădălina Cristina
MARIAN**
Pitesti University
Romania

Assist. Prof. Dr. Yalçın Karagöz
Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Esin DADAŞOĞLU
Atatürk University
Türkiye

**Assist. Prof. Dr. Mohammed Naithel
RADHI**
University of Thi-Qar
Iraq

Engineering Sciences

Prof. Dr. Mohd Nizar Bin HAMIDON

University Putra
Malaysia

Dr. Ismayadi Bin ISMAIL

Universiti Putra Malaysia
Malaysia

Dr. Olga SZLACHETKA

Warsaw University of Life Science-SGGW
Poland

Prof. Dr. Mehmet ERTUĞRUL

Karadeniz Technical University
Türkiye

Prof. Dr. Naci GENÇ

Khoja Akhmet Yassawi International
Kazakh-Turkish University
Kazakhstan

Assoc. Prof. Dr. Hasan ÜZMÜŞ

Van Yuzuncu Yil University
Türkiye

**Assoc. Prof. Dr. Muhammed Emin
GÜLDÜREN**

Ağrı İbrahim Çeçen University
Türkiye

Assist. Prof. Dr. Mehmet Ali ÇELİK

Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Cihan YILDIRIM

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Kadir GELİŞ

Bolu Abant İzzet Baysal University
Türkiye

Assoc. Prof. Dr. Erdal BAŞARAN

Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Kamuran DİLSİZ

Bingöl University
Türkiye

Assoc. Prof. Dr. Çağlar DUMAN

Erzurum Technical University
Türkiye

Assoc. Prof. Dr. Hasan İLHAN

Ankara University
Türkiye

Prof. Dr. Adem KOÇYİĞİT

Bilecik Şeyh Edebali University
Türkiye

Assist. Prof. Dr. Furkan IŞIK

Ankara University
Türkiye

Medicine Sciences

Prof. Dr. Serkan YILDIRIM

Atatürk University
Kırgızistan-Türkiye Manas University-
Kyrgyzstan

Dr. Luigi MENGHINI

University of Chieti-Pescara
Italy

Dr. Simonetta Cristina DI SIMONE

University of Chieti-Pescara
Italy

Assoc. Prof. Dr. Ahmet Gökhan

AĞGÜL

Ağrı İbrahim Çeçen University
Türkiye

Assoc. Prof. Dr. Afak DURUR

KARAKAYA

Koç University
Türkiye

Prof. Dr. Irmak DURUR SUBAŞI

Medipol University
Türkiye

Assoc. Prof. Dr. Mustafa Can GÜLER

Atatürk University
Türkiye

Assoc. Prof. Dr. Ali AHISKALIOĞLU

Atatürk University
Türkiye

Assoc. Prof. Dr. Gülpınar ASLAN

Ağrı İbrahim Çeçen University
Türkiye

Prof. Dr. Khalid JAVED

Lahore University
Pakistan

Prof. Dr. Yasin BAYIR

Atatürk University
Türkiye

Dr. Tuğba GÜLER

Erzurum Regional Research and Training
Hospital
Türkiye

**Assoc. Prof. Dr. Hilal KIZILTUNÇ
ÖZMEN**

Atatürk University
Türkiye

Assoc. Prof. Dr. Özgür ÖZMEN

Atatürk University
Türkiye

Assoc. Prof. Dr. Eda BALKAN

Atatürk University
Türkiye

Assist. Prof. Dr. Beyza Ecem ÖZ BEDİR

Ankara Yıldırım Beyazıt University
Türkiye

Assist. Prof. Dr. Tuba ÖZDEMİR SANCİ

Ankara Yıldırım Beyazıt University
Türkiye

Assist. Prof. Dr. Emine TERZİ

Ankara Yıldırım Beyazıt University
Türkiye

Assoc. Prof. Dr. Ammad A. FAROOQI

Institute of Biomedical and Genetic
Engineering
Pakistan

**Assist. Prof. Dr. Hattf Bazool
FARHOOD**

University of Thi-Qar
Iraq

**Assoc. Prof. Dr. Airemwen Oveneri
COLLINS**

Cyprus International University
North Cyprus

Assist. Prof. Dr. Ezgi KARATAŞ
Ağrı İbrahim Çeçen University
Türkiye

**Assoc. Prof. Dr. Begüm EVRANOS
AKSÖZ**
Süleyman Demirel University
Türkiye

Assoc. Prof. Dr. Cem YAMALI
Çukurova University
Türkiye

**Assoc. Prof. Dr. Mehtap TUĞRAK
SAKARYA**

Tokat Gaziosmanpaşa University
Türkiye

Assoc. Prof. Dr. Ahmet TOPAL
Atatürk University
Türkiye

**Assoc. Prof. Dr. Mehmet Fatih
TURHAN**
Afyonkarahisar Medical Science
University
Türkiye

Page	Presenter	Title
KEYNOTE TALKS		
1	I. Erdogan ORHAN	NanoFiber-Based Solutions for Dermatological Care
2	Giuseppe CAMPIANI	The Role of EU Research Cooperation in Science Diplomacy for Shaping Europe's International Engagement and Beyond
3	Şükrü BEYDEMİR	Polyol Pathway and Metabolic Disorders The Silent Conversion of Sugar
4	Uğur BOZKAYA	Computation of Protein–Ligand Interactions with High-Level Quantum Chemical Methods and Quantum Simulations of Biological Systems
5	Emrah TIRAŞ	Exploring the Invisible: Neutrino Studies and Recent Advances in Particle Detector Development
6	Emília SOUSA	One Health as a Catalyst for Safe and Sustainable Natural Products Mimics
7	Gökhan ZENGİN	From Theory to Therapy: Recent Advances in Enzyme Inhibition Strategies
8	Maria Alessandra RAGUSA	Morrey Spaces, Structures and Their Interactions
9	Savaş KAYA	Conceptual Density Functional Theory (CDFT) Based Developments for the Chemical Property Prediction in Organic and Inorganic Molecules
ORAL PRESENTATIONS		
10	Murat YILDIRIM	Understanding the Roots of Psychological Well-Being and Its Consequences
11	Selma YILDIRIM	The Comparative Role of 2D vs. 3D Cell Culture Methods in Cancer Research
12	Büşra Nur BAYINDIRLI	Evaluation of the Antioxidant Potential of Ilex paraguariensis Extracts
13	Ayşen SAĞNAK	Apoptotic Mechanisms of the Repositioned Antipsychotic Drug Thioridazine Hydrochloride in Papillary Thyroid Cancer Cells
14	Pshtiwan Othman MOHAMMED	Generalization of Nabla Fractional Sums and Differences in Discrete Fractional Calculus
15	Jehad JARADEN	Classifying soluble group by using weakly c-normal subgroup and program Gap
16	Miodrag SPALEVIC	Error bounds of positive interpolatory quadrature rules for functions analytic on ellipses
17	Stefan SPALEVIC	A new class of quadrature rules for estimating the error in Gauss quadrature

18	Monther ALSBOUL	Investigation of Thermal Conductivity in Ethylene Glycol-Based Nanofluids Containing Er_2O_3 and Co_3O_4 Nanoparticles
19	Rahime ALTINTAŞ	Three Phase Partitioning for simultaneous Extraction and Characterization of Polysaccharides, Peroxidase and Oil Acids from Soybeans(<i>Glycine max</i> (L.))
20	Aslı Elif KULOĞLU	Synthesis of The 2-Alkylamino-4,5-Dihydroimidazole Compounds
21	Tuğba AĞBEKTAŞ	Alterations in GLIPR1 and TP53 Gene Expression: Anticancer Potential of <i>E. virgata</i> in HT-29 Colon Carcinoma and Healthy CCD-18Co Cell Lines
22	Ebru SENEMTAŞI ÜNAL	Measurement of Electromagnetic Fields Emitted from Base Stations and Evaluation of the Results in Terms of Public Health
23	Ebru SENEMTAŞI ÜNAL	Determining the Knowledge, Attitudes and Behaviors of the Personnel Working in the Faculty of Dentistry about Risks and Hazard
24	Pınar BAYKAN	Examination of Occupational Health and Safety Policies in Strategic Plans of Universities: A Comparative Analysis of Developed and Developing Countries
25	Pınar BAYKAN	Integration of Health and Safety into the Design Process in the Construction Industry
26	Zübeyir HUYUT	Determination of Periostin and Dkk1 Levels in Osteopenia and Osteoporosis: Their Role in Differential Diagnosis
28	Murat SAYGIN	Cathepsin-K and Sclerostin as Potential Biochemical Markers for the Differential Diagnosis of Osteopenia and Osteoporosis
30	Dilara TOĞRUL	In Silico Investigation of BRAF Target Protein of Vemurafenib Derivatives
31	Halime Sena EKMEKÇİ	Exploring Cell Death Pathways Triggered by Chalcone Complex and Valproic Acid in Papillary Thyroid Cancer Cells
32	Sinan ASLAN	Fractional Integral Inequalities via Atangana–Baleanu Operators on Co-ordinates
33	Sinan ASLAN	Fractional Inequalities of Milne-Type for Twice Differentiable strongly s-convex Functions
34	Aliaa BURQAN	Efficient Implementation of The Residual Function for Solving Systems of Ordinary Differential Equations
35	Ayşenur KAHRAMAN	Continuity, Openness, and Closedness on Raw Binary Structures

36	Mehmet Emin Şeker	Assessment of Nutritional and Toxic Element Content in Fruits from Giresun: Implications for Dietary Intake and Human Health Risks
37	Hüseyin Efe GENİŞ	Identification of Sheep, Goat, and Cow Milk Using Near-Infrared (NIR) Spectroscopy
38	Ebru SOLMAZ	Gamification Interventions in Sexual and Reproductive Health Education: Impacts on Knowledge, Attitudes, and Student Engagement
39	Mahmut Baran YERLİKAYA	A Rare Case: Elastofibroma Dorsi on the Back
40	Ersin AKGÖLLÜ	Identification of Pathogenic Bacteria in Cabbages and Characterization of Their Specific Bacteriophages
41	Kadriye URUÇ PARLAK	Alleviation of Nickel-Induced Oxidative Stress in Maize (<i>Zea mays</i> L.) through Salicylic Acid and EDTA Treatments
42	Sümeyra GÜRKÖK	Screening Approaches for Detecting Biosurfactant Production
43	İremnur AYDIN	A Bibliometric Analysis of Precision Livestock Farming Technologies
44	Hasan KARAGEÇİLİ	Estimation of the Antioxidant, Antidiabetic, Anti-Alzheimer and Antiglaucoma Effects of <i>Eminium rauwolfii</i> (Blume) Schott var. <i>rauwolfii</i> Species: Polyphenolic Profiling by LC-MS/MS Chromatography
45	Ahmet ÇAĞAN	Synthesis of New Sulfonamide Derivatives and Investigation of Their Inhibitory Effects against hCA I/II, AChE, and BChE Enzymes by In Silico and In Vitro Approaches
47	Ahmet ÇAĞAN	The synthesis of a series of Novel Bissulfonamide Derivatives and The Investigation of their Effects as Inhibitors Against hCA III, AChE and BChE Enzymes
49	Çetin BAYRAK	Synthesis and Biological Activities of Pyrazole-Linked Sulfonamide-Containing Compounds
50	Hasan GÖKBAŞ	A new generalization of Oresme sequences: biperiodic Oresme-Lucas sequence
51	Hasan GÖKBAŞ	The Mathematical Structure and Representations of (t,s)-Oresme and (t,s)-Oresme-Lucas Numbers
52	Bahar KULOĞLU	Exploring Condition Number, Singular Value Decomposition (SVD) For Data Compression with Geometric and Symmetric Geometric Rhaly Terraced Matrices
54	Engin ÖZKAN	k-Vieta-Fibonacci Sequence and Application to Hyperbolic Quaternions

55	Fatma OKUCU	Emergency Cesarean Anesthesia in a Patient with Guillain-Barré Syndrome: A Case Report
56	Gökhan AKYÜZ	Cesarean Section Is a Risk Factor That Prevents Organ Transplantation by Increasing the Development of Anti-HLA Antibodies in Women
58	Adem ASLAN	Endoscopy-Assisted Seton Placement: A Novel Technique for the Treatment of Anal Fistula
59	Filiz TAŞPINAR	Investigation of the Effects of Novel Bicyclic Molecules Containing an Imidazole Ring on Apoptotic, Autophagic, ER Stress, and DNA Repair Systems in Glioblastoma Cells
60	Ahmet ÖZMEN	IoT-Based PI Control for Wireless Voltage Regulation in DC-DC Converters
61	Ekrem ALMAZ	Monte Carlo Evaluation of LaBr \square and BGO Scintillation Detectors for Gamma-Ray Spectroscopy
62	Bünyamin AYGÜN	Investigation of Antioxidant and Cellular Protective Molecules as Novel Candidates for Radiation Protection
63	Bünyamin AYGÜN	Development of Phenolic Resin Based Composite Materials and Determination of Radiation Shielding Properties
64	Adnan AYNA	Structural Insights into Iodoacetamide-Mediated Inactivation of <i>Campylobacter jejuni</i> GAPDH
65	Adnan AYNA	Modulation of Diclofenac-Induced Cell Death by Chrysin in HT-29 Cells
66	Ekrem DARENDELİOĞLU	Integrated Bioinformatics and Experimental Validation Reveal Hub-Gene-Driven Drug Resistance in Lung Cancer
67	Ekrem DARENDELİOĞLU	Integrated In Silico and In Vitro Profiling of Drug Resistance Targets in NSCLC
68	Erkan KOCA	Integrating Mathematical Modeling into Classroom Practices to Support Mathematics Learning
69	Velimir KOROCIC	Internality of averaged Gauss quadrature rules for Jacobi measures modified by quadratic divisor
70	Fou'd AL-ALKARAKI	Fekete-Szegö Functional of A Subclass of Bi-Univalent Functions Associated with Gegenbauer and Horadam Polynomials
71	İrade ALIYEVA	Realization algorithm for defining fractional order in oscillating systems with liquid dampers
72	Emine Berra YILMAZ	Investigation of the Bioethanol Production Potential of Cold-Adapted Yeast Strains Isolated from Palandöken Mountain

73	Mehmet KARADAYI	Antibiotic Resistance Evaluation of Plant Growth-Promoting Rhizobacteria (PGPR) Isolated from Erzurum for Biofertilizer Development
75	İlknur Çolak	The Role of Astaxanthin in Maintaining Genomic Template Stability Against Metal Stress
76	Kamuran DİLSİZ	QCD Predictions of Higgs and Vector Bosons in the LCH and FCC Frontiers
77	Mücahit ÇALIŞAN	AI-Based Fault Detection in Solar Panels for Sustainable Energy Management
78	Mücahit ÇALIŞAN	Explainable AI-Based Cloud Image Classification for Weather Forecasting
79	Barış BORU	Sensor-Camera Data Fusion for Improved Environmental Perception for Autonomous Vehicles
81	Ersin KARATAŞ	Harnessing Rapid Hosts and Unconventional Biodiversity: <i>Vibrio natriegens</i> as a Next-Generation Factory for Plastic-Degrading Biocatalysts
82	Rüya SAĞLAMTAŞ	Green Synthesis of Silver Nanoparticles Using Samandağ Pepper (<i>Capsicum annuum</i>): Characterization, and Investigation of the Antimicrobial Effects
83	Emre Erden KOPAR	Synthesis and characterization of Zinc oxide nanoparticles obtained from <i>Olea europaea</i> leaves via green synthesis
84	Kader KELLE	Green synthesis of copper oxide nanoparticles using <i>Matricaria chamomilla</i> plant extract and characterization
85	Yaşar HASANOĞLU	Inhibition Effects of White Honey on Some Metabolic Enzymes
86	Çağrı KARAMAN	Some remarks on Golden-Walker Manifolds
87	Sedanur ADIYAMAN	On manifolds with Walker-Tachyon metrics
88	Betül ALAN	On FLWR type metric with a Golden Structure
89	Zeliha GEZER	On Walker Manifold with circulant structure
90	Ali ÇAKMAK	Fermi-Walker Derivation for Some Special the Vector Fields
91	Emine NARMANLI HAN	Rearrangement of Valence Orbital Occupations in Chromium-Nickel Alloys
92	Neşe AYKUT	Investigation of the Effect of Internship Practice on Nursing Students' Attitudes Toward Clinical Practice and Their Therapeutic Communication Skills
93	Ayşe Berivan BAKAN	Turkish adaptation of the test to asses the psychological dependence on smoking: A validity and reliability study

- 94 Volkan GÖKMEN Physiological Foundations of ERAS Protocols in Cardiac Surgery: Perioperative Nursing Approaches in Terms of Surgical Stress, Mobilization, Fluid Balance, and Pain Management
- 96 Sırer ALBAYRAK Work-Related Musculoskeletal Disorders and Affecting Factors Among Orthopaedic Surgeons: A Literature Review
- 97 Ekrem GÜLLÜCE Bioremoval of Malachite Green Dye from Aqueous Solutions Using Acer pseudoplatanus L. Fruits Biosorbent; Isotherm, Kinetic and Thermodynamic Studies
- 98 Ekrem GÜLLÜCE Bioremoval of Congo Red Dye from Aqueous Solutions by Acer negundo Biosorbent; Isotherm and Kinetic studies
- 99 Burcu ERGÖZ AZİZOĞLU Biodiversity and Faunal Composition of Lake Van and Its Surroundings
- 100 Erkan AZİZOĞLU Coastal Waterfowl Potential of the Göründü Delta (Lake Van Basin/Van)
- 101 Aytekin KÖSE Construction of Benzohydrazide- and Benzamide-Linked New Thieno[3,2-d]pyrimidin-4-ones with Potential Pharmacological Relevance
- 102 Ümmügülsüm POLAT KORKUNÇ Determination of the Uptake of Selenium in the Samples of Garlic Grown Hydroponically
- 103 Esra Elbir Investigation of the Antioxidant and Enzyme Inhibitory Effects of Autumn Mandrake (Mandragora Autumnalis)
- 104 Leyla POLAT KÖSE An Investigation on Ferula communis L. (Apiaceae) Extracts: Antioxidant and Antiradical Activities, and Phenolic Analysis via LS-MS/MS
- 105 Özgür ERDAĞ The Complex-type Fibonacci-circulant p-sequences
- 106 Zehra ÇELİK KARADENİZ On the Solvable Residuals And Involutions Of Maximal Subgroups Of $Sp(8,r)$
- 107 Bahar KULOĞLU Structural and self-similarity properties of higher-order Horadam numbers
- 108 Abdüllatif YALÇIN Fractional Calculus and Artificial Intelligence in the Modeling and Control of Mechatronic Systems
- 109 Rumeysa ÖZAYABAKAN The Effect of Paternal Skin-to-Skin Contact After Cesarean Section on the Breastfeeding Process: Randomized Controlled Study
- 110 Ebru SOLMAZ Marginal Placenta Previa: A Case with Stable Course
- 111 Emine Serap ÇAĞAN The effect of oketani massage on breastfeeding success and breast engorgement in mothers delivering by cesarean section: randomized controlled study

- 112 Yüksel DİL Evaluation of multi-trait plant growth promoting parameters of endophytic bacteria and fungi isolated from *Origanum vulgare* L. ssp. *Vulgare*
- 113 Gülçin GÜLER ÖZTEKİN Social Anxiety and Internet Addiction among Turkish University Students: A Chain Mediation Model of Loneliness and Rumination
- 114 Aydın KIZILASLAN The Effect of Assistive Technology-Based Science Instruction on Attitudes and Motivation for Individuals with Disabilities
- 115 Yusuf GÜLŞAHİN In Silico Evaluation of Apitoxin Components as Anticancer Agents Against Human Breast Tumor Cell Line (MCF-7)
- 116 Harun BAYRAM Perforated Jejunal Diverticulosis: A Rare Cause of Acute Abdomen
- 117 Şeyma TAŞBAŞI Inhibitory Potential of Flavonoid-Sulfonamide Hybrids Against Carbonic Anhydrase Isoforms: Bioassays and Docking Studies
- 118 Züleyha ALMAZ Determination of the Inhibitory Effects of Some Heavy Metal Nitrates on Lactoperoxidase Enzyme in Goat Milk
- 119 Esra ELBİR Nutraceutical and Therapeutic Potential of the Poisonous Plant *Spartium junceum* (Spanish Broom)
- 120 Lale DUYSAK Antioxidant and Enzyme Inhibitory Potential of the Water Extract of Red Calyces of *Hibiscus sabdariffa* L.
- 121 Mustafa Ali DOKUYUCU Analysis of the Water Pollution Model via Fractional Operator
- 122 Nalan DOKUYUCU The Role of Mathematical Models in Improving Mathematics Achievement
- 123 İlknur KOCA Analyzing Epidemic Dynamics through the Atangana-Strength Number
- 124 Burak ARMAĞAN Mathematical Modeling and Analysis of the Poem "Living Like Nothing"
- 125 Medine Sibel KARAĞAÇ Antiapoptotic Effects of Bergenin Against Lead Acetate-Induced Hepatotoxicity
- 126 Esra Nur YEŞİLKENT Protective Effect of Bergenin Against Lead Acetate-Induced Testicular Oxidative Stress and Inflammation
- 127 Yusuf GÜLŞAHİN Isolation and Molecular Characterization of an Azo Dye Degrading *Pseudomonas* BC1 Strain from Erzurum

- 128 Şeyma AKSU Identification of Potential Human Targets of Azorubine (E122, Carmosine) by in silico Target Fishing and Molecular Docking Approaches
- 129 Elif ÖRĞİ Determination of Some Transmembrane Proteins in the Digestive Tract of the Van Fish (*Alburnus tarichi* Guldenstädt, 1814) During Reproductive Migration
- 131 Reyhan ÖZKAN Extending the Shelf Life of Cimin Grapes with Reducing Atmosphere Packaging Method
- 132 Zeynep ÖZAYDINLIK Endophytic Bacteria Obtained from *Viscum album* L. Collected from Bolu province
- 133 Yüksel DİL Optimization of Indole-3-Acetic Acid Production Capacity of *Enterobacter* sp. Bacteria Isolated from Various Extreme Areas
- 134 Ertuğrul CEYRAN π - π Stacked Quercetin/Graphene Electrodes for High-Performance Supercapacitors
- 135 İlknur Ceyda ÇELİK Natural Carbonic Anhydrase Inhibitors: hCA-I and hCA-II Inhibition by *Xanthium strumarium* Leaf and Fruit Extracts
- 136 Tuba AYDIN Calcium-Alginate Beads of Tarragon (*Artemisia dracunculus*) Aqueous Extract: Formulation, Characterization, and Herniarin Quantification
- 137 Dilan ÖZMEN ÖZGÜN Awareness and Knowledge of Dermocosmetic Products: Evidence from Patients and Relatives Visiting Community Pharmacies
- 138 Davorka JANDRLIC A Linear-Time Approach to Single-Node Dominator Detection in SESE Graphs
- 139 Ufuk KAYA Investigation of Limit of Functions on Topological Spaces via Ideals
- 140 Alexander PEJCEV Error bounds for Gauss quadrature rules with respect to some modifications of Jacobi weight functions
- 141 Ali ÇAKMAK Temperley-Lieb Algebra from Potts Model to Knots
- 142 Burak KOÇAK Automatic Detection of Clinical Signs of Foot and Mouth Disease in Cattle with YOLO Based Image Processing
- 143 Faisal ALKASSASBEH An Extended complex valued Banach space
- 144 Fikret ALIEV Computational algorithm to solution of linear quadratic optimal control problem in oscillating systems with liquid dampers
- 145 Abdullah ERGÜN Vectorial Inverse Nodal Analysis for Singular Diffusion Equations

- 146 Deniz TİRYAKİ Effects of Triacantanol on Apoplastic Antioxidant System in Wheat Seedlings Under Raxil Fungicide
- 147 Gökçe KARADAYI Effects of Triacantanol on Apoplastic Antioxidant System in Wheat Seedlings Under Raxil Fungicide
- 148 Sılanur ÖZDOĞAN Investigation of the Applicability of Essential Oils of Chenopodium album Plant in Dermocosmetic Formulations
- 149 Ülkü ÜREYEN ESERTAŞ Proteomic Discovery of Antimicrobial Peptides from Galleria mellonella Larvae: Novel Biotechnological Strategies for Combating Multidrug Resistance and Enhancing Food Preservation
- 150 Murat KIZILKAYA Investigation of Potential Biomarkers in Multiple Myeloma through mRNA Expression Analysis
- 151 Pınar KALIN Design, Synthesis and Evaluation of Rasagiline and Phenethylamine Based Novel Urea Derivatives as Antioxidant Agents and Cholinesterases Inhibitors
- 152 Neslihan AYDEMİR Dual Inhibition Effect of Acetylcholinesterase and Butyrylcholinesterase by Sulfonamide Substituted Urea Derivates: In Vitro Activity and Antioxidant Properties
- 153 Zeynebe BİNGÖL Investigation of the Antioxidant Capacity of Arum Maculatum L. Collected from the Erzurum-Hınıs Region
- 154 Melike SEVİM Carbon Supported Silver-Nickel Nanocomposites and Catalytic Applications
- 155 Ceren Sultan ELMALI Matrices Corresponding to $(2,n)$ Torus Knot
- 156 Sibel TURANLI Some Notes on the Metric $(E^4=I)$ -Manifolds
- 157 Ayed Al e'damat Certain formulas associated with some quadruple hypergeometric functions
- 158 Dusan DJUKIC Interpolation formulas for α -harmonic functions on the unit circle
- 159 Mehtap AYDİN New Inequalities via the ψ -Fractional Integral Operator Involving Functions with Bounded Ratios
- 160 Mustafa GÜRBÜZ Integral Inequalities Derived by Means of Fractional Integral Operators for Bounded Functions
- 161 Rahşan NACİTAVHAM Some Integral Inequalities Established by Means of a Fractional Integral Operator for Convex Functions
- 162 Alper EKİNCİ Integral inequalities for Non-Newtonian Preinvex Functions
- 163 Erdal BAŞARAN High-Accuracy Tuberculosis Diagnosis with Vision Transformer and Explainable AI Techniques

- 164 Mustafa VAROL Microstructural Evolution of Al-Si Alloys Produced by Powder Metallurgy: The Role of Silicon Content and Sintering Temperature
- 165 Ma'mon Abu HAMMAD Properties of Conformable Fractional Lindley Probability Distribution
- 166 Neslihan BALCI Inhibitory Effect of Tetrafluoronaphthalene-Triazole Derivatives on Acetylcholinesterase and Their Potential in Alzheimer's Disease Treatment
- 167 Mehmet AKYÜZ Determination of the Antioxidant, Antidiabetic, Anticholinesterase, and Antidepressant Potentials of Seed Coat (Testa) and Kernel of Pistachio (*Pistacia vera* L.) Fruits
- 168 Sevim Beyza ÖZTÜRK SARIKAYA *Bryoria capillaris*: Mineral Content and Antioxidant Activity of Ethanol Extract
- 169 Aydın AKTAŞ Trifluoromethyl-substituted PEPPSI-type Pd(II)NHC complexes: Synthesis, characterization, and inhibition properties against Carbonic Anhydrase and Choline Esterases enzymes
- 170 Çetin YILDIZ Improved Fractional Hermite-Hadamard-Jensen-Mercer Type Inequalities Utilizing Constants λ and μ
- 171 Abdüllatif YALÇIN Advances on Minkowski Inequalities through Fractional Operators with Analytic Kernels
- 172 Barış ÇELİK New Fractional Integral Inequalities for s-Convex and P-Function via Modified Atangana-Baleanu Operator
- 173 Beyza TEKEOĞLU AKKAYA Balancing-like Polynomials
- 174 Kamal AL BANAWI A New Parametrization of an Oval of Constant Width in R^2
- 175 Mahmoud ALBATTAH Modeling Road Accident Severity in Amman Using Random Parameters Ordered Probit and Integrated Survey-GIS Analysis
- 176 Abdelghani LAKHDARI New Perspective of Hermite-Hadamard and Related Inequalities in G-Calculus
- 177 Abdulhadi Koşatepe Microstructural and Mechanical Properties of Equiatomic Al-Ti-Cr Alloys Produced by Mechanical Alloying
- 178 Sirer ALBAYRAK Physical Risk Factors in Photovoltaic Energy Production Sites: An Analysis of Dust and Noise Exposure
- 179 Filiz KOÇAK Scale Development for Determining the Competencies of Occupational Safety Experts: Validity and Reliability Assessment

- 181 Sinem GÜNAY Racing Against Time: The Relationship Between the 112 Command and Control Center and Response Times in Ordu Province
- 182 Tuğçe Ayşegül AI-Driven Cherenkov and Scintillation Discrimination for Next-Generation Neutrino Experiments
- 184 Şeydanur Elmas Oxidative Stress and Adhesion Alterations Induced by Short-Term Microplastic Exposure in Human Breast Cells
- 185 Erhan SET Integral Inequalities for n-Fractional Polynomial Convex Functions via AB-Fractional Integral Operators
- 186 Khalid A. Ibrahim Novel Corrosion Resistant and Tamper Evident Viscoelastic Polymers, Based on Hybrid Cyclic Phosphazene Materials
- 187 Erdal BAŞARAN Arrhythmia Detection from ECG Signals Using Gradient Boosting Algorithms
- 188 Burcu DEMİR GÖKMEN Are Rumination and Self-Compassion Associated with Sleep Disturbance in Older Adults?
- 189 Nur Sinem ARAZ Effects of N-Acetyl-L-Cysteine (NAC) Application on the Expression Levels of Stress-Related Genes in *Lactuca sativa* under Copper (Cu) Stress
- POSTERS**
- 190 Enes Mehmet ŞERBETÇİ Anticancer Effects of Chalcone–Valproic Acid Combination in Lung Cancer Cells
- 191 Yahya Bilal GÜLÇİN Chromosomal Asymmetry Patterns in Rodent Species
- 192 Eda BALKAN Diagnostic Value of EBV-Derived miRNAs in Lymphoma
- 193 Deniz TİRYAKİ Food Safety Assessment of Phthalates in Food Packaging Materials Using Target Fishing and Molecular Docking Approaches
- 194 Afife Büşra UĞUR KAPLAN The nanoemulsion-based patch formulations containing *Heracleum persicum* extract for the treatment of recurrent aphthous stomatitis: Preparation and in vitro characterization
- 195 Taha Yasin KOÇ Investigation of the Antimicrobial, Antibiotic Resistance and Technological Properties of *Limosilactobacillus fermentum* Isolated from Kars Kashar Cheese
- 196 Yusuf GÜLŞAHİN An Alternative Approach to Antibiotic Resistance: Molecular Docking Analysis of TEM-1 β -Lactamase Enzyme with Clavulanic Acid and Quercetin
- 197 Murat GÜNEY Evolution of 3-Hydroxyflavone-Based Sulfonate Esters as Acetylcholinesterase, Carbonic Anhydrase and α -Glycosidase Inhibitors

198	Büşra TOSUN	Effects of astaxanthin on gene expression in Lettuce plants against nickel stress
199	Mehmet KARADAYI	In silico Target Prediction and Molecular Docking Analysis of Food Colorant E102 (Tartrazine) on Human Proteins
200	Dilan ÖZMEN ÖZGÜN	Artificial Intelligence in Community Pharmacies: Enhancing OTC Counseling and Patient Safety
201	Mahmut Baran YERLİKAYA	Meshoma in a Case Evaluated with a Preliminary Diagnosis of Incisional Hernia
202	Moussa ABBAS	Removal of Toxic Ni(II) by Activated Olive Stone: Optimization of Analytical Parameters by Response Surface Methodology
203	Şeyma AKSU	Lutexin as a Potential Inhibitor for H1N1 Subtype of Influenza A Virus
204	Fevzi TOPAL	Azomethine Compounds and Metal Complexes as Carbonic Anhydrase Inhibitors
205	Meryem TOPAL	Cholinesterase Inhibition by Imine-Containing Compounds and their Metal Complexes
206	Medine GÜLLÜCE	Determination of PGPR Properties of Bacteria Isolated from Agricultural Fields in Aşkale, Erzurum
207	Tounsia AKSEL	Characterization studies on adsorption of Iodine using carbon derived from the crown of Oak
208	Hatice KIZILTAŞ	Phytochemical Composition, Antidiabetic–Antioxidant Potential, and Docking Analysis of <i>Arum rupicola</i> subsp. <i>Rupicola</i>
209	Şükrü BEYDEMİR	Immobilization, Characterization, and Enhanced Stability of Carbonic Anhydrase Enzyme on Iron Oxide Magnetic Nanoparticles
210	Burak ALAYLAR	Isolation and Molecular Characterization of Potential Zinc-Solubilizing Bacteria from Agricultural Areas in Ağrı Province
211	Gökçe KARADAYI	Effects of Triacantanol on Apoplastic Antioxidant System in Wheat Seedlings Under Raxil Fungicide

ID: KS-1

NanoFiber-Based Solutions for Dermatological Care

I. Erdogan Orhan^{1,2}, F.S. Şenol Deniz^{3,4}

¹Department of Pharmacognosy, Lokman Hekim University, Ankara, Türkiye, ORCID: 0000-0002-7379-5436

²CEO, Inovabella Biotechnology and R&D Industry Trade Incorporation Company, Ankara, Türkiye

³Department of Pharmacognosy, Gazi University, Ankara, Türkiye, ORCID: 0000-0002-5850-9841

⁴CTO, Inovabella Biotechnology and R&D Industry Trade Incorporation Company, Ankara, Türkiye

ABSTRACT

Nanocosmetics, a rapidly growing field, integrates nanotechnology to create personal care products with enhanced performance. This innovative approach utilizes nanocarriers to improve the targeted delivery and efficacy of active ingredients, which in turn maximizes their impact while minimizing potential side effects. Nanocosmetics also offer the advantage of combining multiple benefits, such as hydration, anti-wrinkle, anti-aging, anti-acne, and sun protection, into single products. The focus of our group is to develop innovative, plant-based cosmeceuticals using nanotechnology at a laboratory scale and prepare a prototype formulation. The authors employ a rigorous screening methodology that includes *in vitro* enzyme inhibition assays, *in silico* molecular docking, and toxicity and cell-based studies to identify effective plant extracts and natural compounds. For that purpose, we have successfully developed nanofiber wound dressing containing *Cotinus coggygria* extracts and hyaluronic acid for wound healing applications. We have also started a woman health-based project against vulvovaginal candidiasis, which is a globally common infection with high prevalence in women. Towards our goal, we aim to prepare a nanofiber-based pad loaded with the selected essential oils. In this talk, the newest outcomes and formulations achieved through our innovative approaches will be highlighted.

Acknowledgement: This work was financially supported by The Scientific and Technological Research Council of Türkiye (TÜBİTAK) through 1812 Technology Entrepreneurship Capital Support Program (BİGG) (Project code: 2250251).

ID: KS-2

The Role of EU Research Cooperation in Science Diplomacy for Shaping Europe's International Engagement and Beyond

Giuseppe Campiani
University of Siena – IT

ABSTRACT

Science Diplomacy is the interconnection of scientific, technological, and academic collaborations among regions, countries and societies. It aims to address common issues and to build sound international partnerships. The European Cooperation in Science and Technology (COST) established in 1971 was instrumental in integrating national approaches to science and technology paving the way to the European Research and Innovation Framework Programmes in 1984 and laid the ground for the European Research Area (ERA) launched in the year 2000. Science diplomacy has also been instrumental to the various enlargements of the EU: since 1984 no country has become a member of the EU without having been associated to the Research and Innovation Framework Programme before. COST Action Initiative is among the main actors involved in science diplomacy, it provides a coordination mechanism that enables the creation of networks, the so called quite diplomats, among scientists, innovators, policy makers, NGO, industries and other organizations combining their strong regional relevance and by addressing global challenges and the academic aspects of foreign affairs. COST Actions may contribute to implement the intersection of science, technology, and diplomacy, to tackle pressing global issues and other pre-eminent geopolitical challenges. COST Actions builds trust creating a fertile breeding ground for the development of much-needed new ideas, approaches and solutions. Consequently, COST Actions serve as tools for science diplomacy through their open and inclusive structure, which fosters long-term, trusted relationships between researchers from diverse backgrounds and countries. They also provide training and support for participants to engage with policymakers and effectively communicate scientific findings to a wider audience. COST initiative mission can be summarized as follows:

Create science ambassador,

- Support policy impact
- Facilitate international collaborations
- Build trust & relationships
- Includes and empowers underrepresented researchers
- Connects science to policy
- Promote scientific capacity

with three main priorities:

Promoting and Spreading Excellence

Fostering Interdisciplinary Research for Breakthrough Science

Empowering and Retaining Young Researchers – The next generation of scientists

Tips and tricks how to engage with COST Actions are provided and as case studies the description of two recent and running COST Actions at Siena University will be provided: EURESTOP and OHD. Situation in Turkey will be presented since in the 2024 Turkey ranked at the top in COST Action participation with a significant number of leadership positions.

Polyol Pathway and Metabolic Disorders

The Silent Conversion of Sugar

Şükrü Beydemir

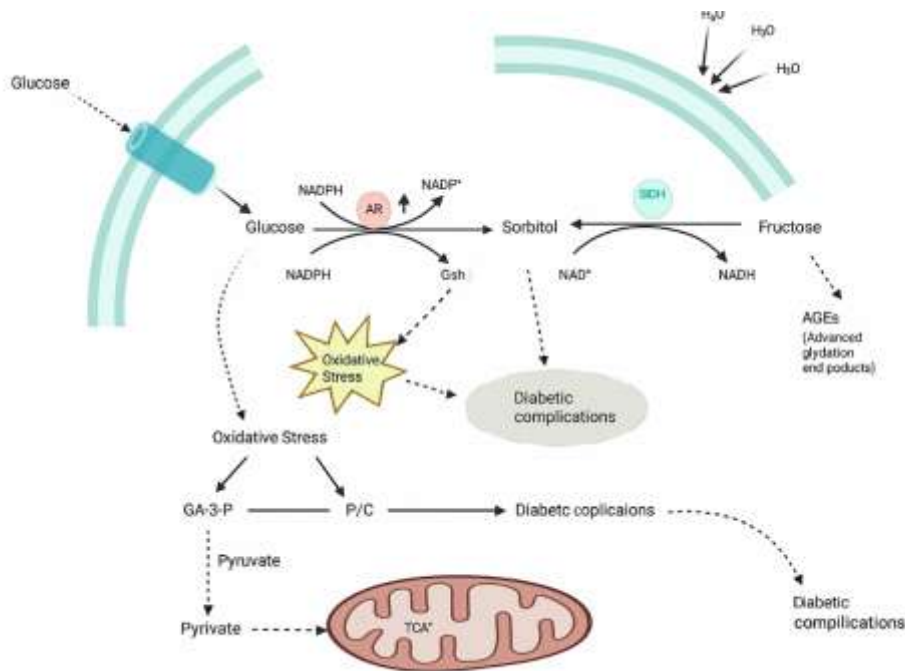
Anadolu University, Faculty of Pharmacy
Department of Basic Pharmaceutical Sciences, Division of Biochemistry
26470 Eskişehir, Türkiye

ABSTRACT

When describing biochemical pathways, attention is usually focused on major metabolic routes such as glycolysis, the citric acid cycle, and the pentose phosphate pathway. However, metabolism is a highly dynamic system, and sometimes a seemingly minor side pathway can play a vital role in cellular function.

The polyol pathway is a modest, two-step metabolic process. Yet, under hyperglycemic conditions — as seen in diabetic individuals — this pathway becomes silently activated. Over time, this activation can lead to clinically significant outcomes that should not be overlooked.

Therefore, the polyol pathway should not be regarded merely as a small series of reactions, but rather as a determinant of cellular fate.



ID: KS-4

Computation of Protein–Ligand Interactions with High-Level Quantum Chemical Methods and Quantum Simulations of Biological Systems

Uğur Bozkaya^a

^a Hacettepe University, Faculty of Science, Department of Chemistry, Ankara, 06800, Turkey
ugur.bozkaya@hacettepe.edu.tr

ABSTRACT

Computer-aided drug design methods have gained significant attention in recent years due to their essential role in the development of therapeutically important molecules. To determine interaction energies at the molecular level with high precision, quantum chemical methods are necessary. High-level coupled-cluster (CC) methods are considered as the most reliable and highly accurate quantum chemical methods in modern computational chemistry. However, the computational cost of the CCSD(T) method—considered the “gold standard” of computational chemistry—scales with the seventh power of the number of basis functions, limiting its use to small molecular systems. The goal is to achieve linear scaling of CC methods with system size, allowing their application to larger molecular systems. This study introduces the development of the Linear-Scaling Systematic Molecular Fragmentation (LSSMF) approach [1] for CC methods and explores its application to biological systems. Our results clearly show that the LSSMF approach offers both high accuracy and efficiency for large-scale systems.

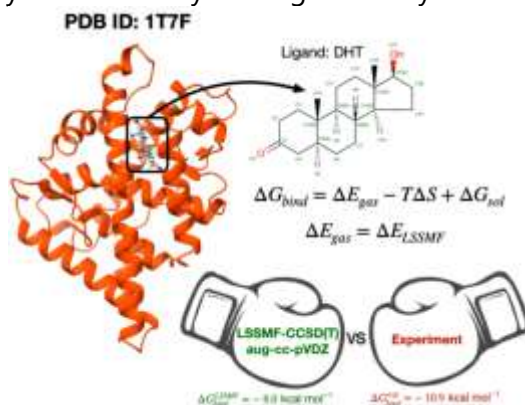


Figure 1. The binding affinity of the androgen receptor (PDB ID: 1T7F) and the DHT ligand was computed using the LSSMF-CCSD(T)/aug-cc-pVDZ method.

Keywords: Coupled-Cluster, Molecular Fragmentation, Macromolecule, Protein–Ligand Interaction.

Acknowledgment: Scientific and Technological Research Council of Turkey (TÜBİTAK), 125Z473.

References

[1] Bozkaya, U., Ermis, B. "Linear-Scaling Systematic Molecular Fragmentation Approach for Perturbation Theory and Coupled-Cluster Methods", *J. Chem. Theory Comput.*, 2022. 18(9), 5349-5359.

ID: KS-5

Exploring the Invisible: Neutrino Studies and Recent Advances in Particle Detector Development

Emrah TIRAŞ

H Department of Physics, Erciyes University, Kayseri.
Affiliated Research Scientist & Adjunct Faculty
Department of Physics and Astronomy, University of Iowa, Iowa City, Iowa, USA

ABSTRACT

Neutrinos remain among the most elusive particles in nature, yet they play a fundamental role in understanding the universe at its most basic level. The Erciyes Neutrino Research Group (ENRG) at Erciyes University actively engages in experimental and computational studies to advance neutrino physics and detector technologies. Our work spans international collaborations such as ANNIE, NOvA, and DUNE experiments at Fermilab and the EOS Experiment at UC-Berkeley, contributing to analyses of neutrino interactions, event reconstruction, and detector optimization.

At Erciyes, ongoing detector R&D efforts focus on scintillation and Cherenkov light separation, radiation-tolerant scintillator materials, and developing compact, cost-effective detection systems suitable for future neutrino and radiation monitoring applications. Simulation studies based on Geant4 and advanced machine learning algorithms are employed to model light transport, enhance particle identification, and guide prototype design.

This talk will present an overview of our group's research program, highlighting recent results, simulation-driven detector developments, and the growing role of the Erciyes Neutrino Research Group within the global neutrino community. By integrating experimental efforts, simulations, and interdisciplinary collaborations, the ENRG aims to contribute to the next generation of neutrino detection technologies and deepen our understanding of these "invisible" particles.

ID: KS-6

One Health as a Catalyst for Safe and Sustainable Natural Products Mimics

Emília Sousa,^{1,2*}

1Laboratory of Organic and Pharmaceutical Chemistry (LQOF), Department of Chemical Sciences, Faculty of Pharmacy, University of Porto, Porto, Portugal; 2CIIMAR-Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Porto, Portugal.

**esousa@ff.up.pt*

ABSTRACT

Recognizing the importance of the environmental impact of bioactive compounds with pharmaceutical and industrial applications and the interactions between animals, pathogens and/or humans, the “safe and sustainable by design” (SSbD) approach is being integrated in the synthesis of new bioactive compounds. One Health is aligned in this holistic framework, being an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems.

Working at the frontier of ocean knowledge and protection, at LQOF/CIIMAR, marine natural products represent an opportunity to apply the SSbD concept. In this communication, design, synthesis, and biological considerations to minimize the environmental footprint of new bioactive small molecules will be given. Marine alkaloids [1] and cyclic peptide mimics [2] as examples of new antimicrobials will be presented. To find eco-friendly solutions for marine hazards, approaches with siderophores [3] and antifouling xanthenes agents [4] will also be highlighted.

The case studies presented herein are expected to contribute to a multidisciplinary One Health vision in the discovery of natural products mimics with pharmaceutical and industrial applications.

Acknowledgments:

This research was funded by national funds through FCT – Fundação para a Ciência e a Tecnologia within the scope of the Strategic Funding UIDB/04423/2020 (<https://doi.org/10.54499/UIDB/04423/2020>), UIDP/04423/2020 (<https://doi.org/10.54499/UIDP/04423/2020>), and LA/P/0101/2020 (<https://doi.org/10.54499/LA/P/0101/2020>)

References

- [1] Long, S., Resende D., Kijjoo, A. et al. *RSC Advances* **2020**, *10*, 31187 - 31204.
- [2] Costa, L., Sousa, E., Fernandes, C. *Pharmaceuticals* **2023**, *16*, 996.
- [3] Gomes, A. F. R., Almeida, M. C., Sousa, E., Resende, D. I. S. P., *Sci. Total Environ.* **2024**, *932*, 173044.
- [4] Chinese patent (CN) ZL201980083159.5, **2023**. United States patent (US) 17/297,347, **2024**.

ID: KS-7

From Theory to Therapy: Recent Advances in Enzyme Inhibition Strategies

G. Zengin¹

¹*Department of Biology, Science Faculty, Selcuk University, Konya, Turkey, (gokhanzengin@selcuk.edu.tr)*

ABSTRACT

The theory of enzyme inhibition is a significant subject in scientific research. The rising incidence of global health issues highlights the pressing need for therapeutic solutions to tackle these conditions. Enzymes play a crucial role in drug discovery and development, with certain key enzymes being linked to disease progression. By inhibiting these enzymes, we can mitigate the adverse effects of diseases and manage them more effectively. For instance, inhibiting cholinesterase in Alzheimer's disease can raise acetylcholine levels in the synaptic clefts, thereby enhancing memory functions in individuals, a concept known as the cholinergic hypothesis, which underpins most Alzheimer's treatments. Moreover, obstructing amylase and glucosidase enzymes can significantly delay the elevation of blood sugar levels in diabetic patients. Targeting tyrosinase, the enzyme responsible for melanin production, offers potential for skin-specific treatments. The pharmaceutical industry has developed several chemical enzyme inhibitors, such as galantamine, kojic acid, and acarbose, for conditions like Alzheimer's, skin disorders, and diabetes. However, the use of these inhibitors is often limited due to toxicity concerns, leading to a demand for safer, natural alternatives. The study reviewed recent advancements, benefits, and limitations of enzyme inhibition techniques and their applications, paving the way for exploring new possibilities in enzyme inhibition strategies and their broader applications.

ID: KS-8

Morrey Spaces, Structures and their Interactions

Maria Alessandra Ragusa

University of Catania, Italy

ABSTRACT

Aim of this seminar is to study well posedness, existence and regularity properties of solutions of partial differential equations and systems. Preparatory to the study of partial differential equations is the action of some integral operators, that we will use extensively. Then, will be depth useful to obtain regularity properties of solutions of elliptic, parabolic and ultraparabolic equations of second order with discontinuous coefficients, and later of systems. partial differential equations having discontinuous coefficients.

ID: KS-9

Conceptual Density Functional Theory (CDFT) Based Developments for the Chemical Property Prediction in Organic and Inorganic Molecules

Savaş Kaya¹

¹*Sivas Cumhuriyet University, Faculty of Science, Department of Chemistry, Sivas, Türkiye,
ORCID: 0000 0002 0765 9751*

ABSTRACT

Conceptual Density Functional Theory (CDFT) [1] provides a theoretical foundation for understanding of the chemical reactivity of chemical systems through quantum chemical parameters such as hardness, Fukui potential, electrophilicity and polarizability. The principles of maximum hardness, minimum polarizability and minimum electrophilicity have found many applications in the literature by relating the corresponding parameter to stability [2]. In this presentation, in the part related to inorganic compounds, the methods based on the concepts of chemical hardness and Fukui potential that we propose for the calculation of lattice energies of inorganic ionic compounds will be given with their advantages [3,4]. Additionally, a generalized simple salt approximation for the prediction of the lattice energies of complex inorganic ionic systems will be introduced. The section on organic molecules will include the Property Prediction from Structural Differences (PPFSD) method [5,6], a group additive method that allows rapid and reliable calculation of polarizability, magnetic susceptibility and van der Waals volumes of such molecules.

References

- [1] N. Islam, S. Kaya, 2018. Conceptual density functional theory and its application in the chemical domain. CRC press.
- [2] L. von Szentpály, S. Kaya, N. Karakus, 2020. Why and when is electrophilicity minimized? New theorems and guiding rules, J. Phys. Chem. A., 124(51) (2016) 10897-10908.
- [3] S. Kaya, C. Kaya, 2015. A simple method for the calculation of lattice energies of inorganic ionic crystals based on the chemical hardness. Inorg. Chem., 54(17) (2015) 8207-8213.
- [4] S. Kaya, A. Robles-Navarro, E. Mejía, T. Gómez, C. Cardenas, 2022. On the prediction of lattice energy with the fukui potential: some supports on hardness maximization in inorganic solids. J. Phys. Chem. A., 126(27) (2022) 4507-4516.
- [5] S. Kaya, 2024. Property prediction from structural differences: I. Molar diamagnetic susceptibilities of organic chemical systems. Chem. Phys. Lett., 836 (2024) 141046.
- [6] S. Kaya, D.Ö. Işın 2024. "Property Prediction from Structural Differences": II. Application to the molar diamagnetic susceptibilities of amino acids. J. Mol. Liq., 404 (2024)124921.

ID: P-1

Understanding the Roots of Psychological Well-Being and Its Consequences

Murat Yıldırım¹

¹ *Department of Psychology, Ağrı İbrahim Cecen University, Ağrı, Türkiye, ORCID: 0000-0003-1089-1380. E-mail: muratyildirim@agri.edu.tr*

ABSTRACT

Psychological well-being involves both the presence of positive emotions and the capacity to function effectively and meaningfully in daily life. It reflects not only feeling good but also living in a way that fosters personal growth, purpose, and healthy relationships. This study aims to explore the origins and drivers of psychological well-being, including early life experiences, social and environmental factors, genetic predispositions, personality traits, and intentional behaviours that individuals can cultivate. It examines the consequences of well-being, such as enhanced cognitive flexibility, pro-social behaviour, stronger social connections, and improved physical health and longevity. The study also highlights the distinction between the drivers of psychological well-being and the factors contributing to mental ill-being, emphasizing that well-being is more than the mere absence of disorder. Finally, the research emphasizes the potential of both individual- and population-level interventions to enhance psychological well-being. Understanding these pathways provides a foundation for developing strategies that benefit individuals, strengthen communities, and promote healthier societies.

Keywords: psychological well-being, positive emotions, individual differences, early life experiences, health outcomes

ID: P-2

The Comparative Role of 2D vs. 3D Cell Culture Methods in Cancer Research

Selma Yıldırım¹, Özkan Özden²

¹ Department of Biotechnology, Kafkas University, Kars, Türkiye, ORCID: 0000-0003-3521-3383. E-mail: sselmayildirim@gmail.com

² Department of Bioengineering, Faculty of Engineering and Architecture, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-9467-3761, ozzkan1@gmail.com

ABSTRACT

Cancer, one of the leading causes of death worldwide, continues to increase the need for innovative diagnostic and therapeutic approaches. Cell culture plays an important role in the development of new and alternative methods for the disease. Two-dimensional (2D) cell culture methods have long been preferred due to their accessibility and ease of application. However, since 2D methods allow cells to grow only on a flat surface, they provide a limited representation of the tumour microenvironment. This also restricts cell-cell and cell-extracellular matrix (ECM) interactions, resulting in findings with weak adaptability to in vivo conditions. Therefore, three-dimensional (3D) cell culture methods provide a more realistic simulation of oxygen and nutrient gradients, as well as cellular interactions, thereby reflecting the tumour microenvironment more accurately. Consequently, they provide more reliable data for investigating cell proliferation, invasion, metastasis, and treatment responses. Recent advances in 3D culture methods have made significant contributions to oncology, particularly by enhancing predictive power in drug screening and personalised medicine applications. This study comparatively examines the roles of 2D and 3D cell cultures in cancer research, highlighting their advantages, limitations, and complementary aspects. It concludes that by applying both approaches in the right contexts, in vitro findings can be transferred more effectively to in vivo settings and eventually to clinical applications.

Keywords: Cancer, 2D cell culture, 3D cell culture, tumour microenvironment, extracellular matrix

ID: P-3

Evaluation of the Antioxidant Potential of Ilex Paraguariensis Extracts

B.N. Bayindirli¹, A.B. Ugur Kaplan^{1*} and M. Cetin¹

¹Atatürk University, Erzurum, Türkiye, ORCID: 0009-0007-5593-0853; ORCID: : 0000-0003-2222-8789; ORCID: 0000-0003-4009-2432

ABSTRACT

Ilex paraguariensis, commonly known as "yerba mate," is a South American plant with potent antioxidant properties due to its high polyphenol, flavonoid, saponin, and caffeine content [1,2]. The aim of this study was to evaluate the antioxidant potential of *Ilex paraguariensis* extracts in water, ethanol, and methanol. Extracts were prepared at a concentration of 25 µg/mL, and then the samples were analyzed using the FRAP, CUPRAC, and DPPH methods. To determine the equivalent antioxidant capacity of each sample, Trolox solutions were prepared at various concentrations, ranging from 10 to 100 µg/mL for FRAP and CUPRAC, and from 1 to 10 µg/mL for DPPH analysis. The absorbances were read using a microplate reader (Thermo Surveyor Multiskan Go). The calibration curves of Trolox were linear, and the coefficients of determination for the FRAP, CUPRAC and DPPH methods were found to be 0.9985, 0.9966 and 0.9906, respectively. The equivalent Trolox values of water, ethanol, and methanol extracts of *Ilex paraguariensis* were determined as 18.09, 16.77, and 11.73 µg/mL for the FRAP method, 22.14, 18.54, and 15.48 µg/mL for the CUPRAC method, and 10.78, 10.44, and 8.47 µg/mL for the DPPH method, respectively. The results indicate that *Ilex paraguariensis* extracts exhibit potent antioxidant properties, with water and ethanol extracts demonstrating higher antioxidant capacities than methanol extracts. This highlights the potential of this plant as a natural source of antioxidants.

References

- [1] J. Płatkiewicz, D. Okołowicz, R. Frankowski, T. Grześkowiak, M. Jeszka-Skowron, A. Zgoła-Grześkowiak, 2024. Antioxidant capacity, phenolic compounds, and other constituents of cold and hot yerba mate (*Ilex paraguariensis*) Infusions, *Antioxidants*, 13(12) 1467.
- [2] C.I. Heck, E.G. De Mejia, 2007. Yerba mate tea (*Ilex paraguariensis*): A comprehensive review on chemistry, health implications, and technological considerations, *Journal of Food Science*, 72(9) R138-R151.

ID: P-4

Apoptotic Mechanisms of the Repositioned Antipsychotic Drug Thioridazine Hydrochloride in Papillary Thyroid Cancer Cells

A Sagnak¹, S. Cinar Asa¹ and F Ari¹

¹Bursa Uludag University, Department of Biology, Bursa, Turkiye 0009-0004-0929-5236, 0000-0002-3064-6449, 0000-0002-6729-7908

ABSTRACT

Thyroid cancer remains a significant clinical concern, as approximately 20% of patients experience recurrence and 10% develop distant metastasis despite standard treatment protocols [1]. In this study, the antitumor effects of thioridazine hydrochloride (THC), a repositioned antipsychotic agent, were investigated in the papillary thyroid cancer cell line (TPC-1). Cell viability was assessed using the Sulforhodamine B (SRB) assay, while cell death was evaluated through Annexin V/Hoechst/Propidium iodide staining, specific inhibitors (Z-VAD-FMK, Necrosulfonamide and Necrostatin-1) treatments, Western blotting, and qPCR analyses. The findings revealed that THC significantly reduced TPC-1 cell viability in a dose- and time-dependent manner. Staining and inhibitor assays demonstrated that THC induced apoptosis as the primary mode of cell death. Moreover, Western blot and qPCR analyses showed that THC upregulated pro-apoptotic gene and protein expression through the extrinsic apoptotic pathway, while downregulating BCL-2, a key regulator of the intrinsic pathway. Collectively, these results indicate that THC exerts pronounced cytotoxic and pro-apoptotic effects in papillary thyroid cancer cells, highlighting its potential as a novel therapeutic agent.

Acknowledgement: This work was supported by the Bursa Uludağ University Research Fund under project number FYL-2024-1691.

References

- [1] M. A. Lee, K. N. Bergdorf, C. J. Phifer, C. Y. Jones, S. Y. Byon, L. M. Sawyer, J. A. Bauer, V. L. Weiss, (2020). Novel three-dimensional cultures provide insights into thyroid cancer behavior. *Endocrine-Related Cancer*, 27(2), (2020) 111-121.

ID: P-5

Generalization of Nabla Fractional Sums and Differences in Discrete Fractional Calculus

Pshtiwan Othman Mohammed¹, Thabet Abdeljawad² and Faraidun Kadir Hamasalh¹

¹*Department of Mathematics, College of Education, University of Sulaimani, Sulaymaniyah 46001, Iraq*

²*Department of Mathematics and Sciences, Prince Sultan University, P.O. Box 66833, Riyadh 11586, Kingdom of Saudi Arabia*

ABSTRACT

This article investigates a class of discrete nabla fractional operators by using the discrete nabla convolution theorem. Inspired by this, we define the discrete generalized nabla fractional sum and differences of Riemann-Liouville and Caputo types. In the process, we give a relationship between the generalized discrete delta fractional operators introduced by Ferreira [1] and the proposed discrete generalized nabla fractional operators via the dual identities. Also, we present some test examples to justify the relationship. Moreover, we define discrete generalized nabla Atangana-Baleanu-like (or Caputo-Fabrizio-like) fractional sums and differences. Inspired by the above operators, we prove the fundamental theorem of calculus for the defined discrete generalized nabla fractional operators at the end of the article.

References

- [1] Ferreira, R.A.C. Generalized discrete operators. *J. Frac. Calc. & Nonlinear Sys.* **2021**, 2, 18--23.
- [2] Mohammed, P.O.; Abdeljawad, T. Discrete generalized fractional operators defined using h-discrete Mittag-Leffler kernels and applications to AB fractional difference systems. *Math. Meth. Appl. Sci.* **2020**, 46, 7688-7713.
- [3] Goodrich, C.; Peterson, A.C. *Discrete Fractional Calculus*; Springer, New York, 2015.

ID: P-6

Classifying Soluble Group by Using Weakly c-Normal Subgroups and Program GAP

Jehad J. Al Jaraden

Department of Mathematics, Al-Hussein Bin Talal University

ABSTRACT

Following Jaraden [1], we say that a subgroup H of a group G is weakly c -normal in G if there exists a subnormal in G subgroup T such that $G=HT$ and $T \cap H \leq H_G$, where H_G is the largest normal subgroup of G contained in H .

In this paper we give new condition for soluble subgroups using the notion weakly c -normal subgroup, and we we use program GAP To give some application.

Acknowledgement: This work was supported by Al Hussein Bin Talal University.

References

- [1] J. Jehad, Some conditions for solubility, *Math. J. Okayama Univ.* 42 (2000), 1–5.
- [2] J. J. Jaraden and A. N. Skiba, On c -normal subgroups of finite groups, *Comm. Algebra* 35 (2007), no. 11, 3776– 3788.
- [3] J. Buckley, Finite groups whose minimal subgroups are normal, *Math. Z.*, 15 (1970), 15–17.
- [4] D. Jaraden, A. Atewi and J. Jaraden, The influence of c -subnormality subgroups on the structure of finite groups, *Georgian Mathematical Journal*, 2024. <https://doi.org/10.1515/gmj-2024-2036>
- [5] M. Ramadan, Influence of normality on maximal subgroups of Sylow subgroups of a finite group, *Acta Math. Hungar.*, 59 (1992), 107–110.
- [6] Y. Wang, c -normality of groups and its properties, *J. Algebra*, 180 (1996), 954–965.
- [7] D. Li, X. Guo, The influence of c -normality of subgroups on the structure of finite groups, II, *Comm. Algebra*, 26 (1998), 1913–1922.
- [8] R. Laue, Dualization for saturation for locally defined formations, *J. Algebra*, 52 (1978), 347–353.
- [9] H. Wei, On c -normal maximal and minimal subgroups of Sylow subgroups of finite groups, *Comm. Algebra*, 29 (2001), 2193–2200.

ID: P-7

Error Bounds of Positive Interpolatory Quadrature Rules for Functions Analytic on Ellipses

M.M. Spalević¹

¹ *Department of Mathematics, University of Beograd, Faculty of Mechanical Engineering, Belgrade, Serbia, ORCID: 0000-0001-5292-0085*

ABSTRACT

There are lots of specific error bounds of the Gaussian quadrature rules with simple and multiple nodes for functions analytic in a region of the complex plane that contains the interval of integration. They depend on the kind of a quadrature and the measure relative to which the quadrature is considered. We are aware of only one kind of error bound for the standard Gauss quadrature rule with respect to a general measure, given by von Sydow [3], and its generalization to the Gauss-Turán quadrature rule, given by the author [1]. In this paper we consider that kind of the general error bound for the positive interpolatory quadrature rules, in particular for some of their important subclasses. In many numerical experiments we performed (cf. [2]), the results show that the proposed general error bound is of the same range as the existing specific error bounds.

Acknowledgement: Research of M.M. Spalević is supported in part by the Serbian Ministry of Science, Technological Development, and Innovations, according to Contract 451-03-137/2025-03/200105 dated on February 4, 2025.

References

- [1] M.M. Spalević, 2014. Error bounds and estimates for Gauss-Turán quadrature formulae of analytic functions, *SIAM J. Numer. Anal.* 52 (2014) 443-467.
- [2] M.M. Spalević, 2025. Error bounds of positive interpolatory quadrature rules for functions analytic on ellipses, *TWMS J. Pure Appl. Mathematics* (2025), in press.
- [3] B. von Sydow, 1997. Error estimates for Gaussian quadrature formulae, *Numer. Math.* 29 (1997) 59–64.

ID: P-8

A New Class of Quadrature Rules for Estimating the Error in Gauss Quadrature

S.M. Spalević¹

¹ *Department of Mathematics, University of Beograd, Faculty of Mechanical Engineering, Belgrade, Serbia, ORCID: 0000-0003-0926-7345*

ABSTRACT

Averaged Gaussian quadrature rules are introduced as alternatives to the Gauss-Kronrod quadrature rules, when we use them for estimating the error of the corresponding Gauss quadrature rules. Their lack might be that they are not always internal. In those cases, we introduce the new averaged Gaussian quadratures NAG, which can be used as an alternative to the averaged Gaussian quadrature rules, especially in the cases when the former rules are internal and the latter are not. We present here in short a part of the results that are obtained jointly with A.V. Pejčev, L. Reichel, and M.M. Spalević [1].

Acknowledgement: Research of S.M. Spalević is supported in part by the Serbian Ministry of Science, Technological Development, and Innovations, according to Contract 451-03-137/2025-03/200105 dated on February 4, 2025.

References

[1] A.V. Pejčev, L. Reichel, M.M. Spalević, S.M. Spalević, 2024. A new class of quadrature rules for estimating the error in Gauss quadrature, *Appl. Numer. Math.* 204 (2024) 206-221.

ID: P-9

Investigation of Thermal Conductivity in Ethylene Glycol-Based Nanofluids Containing Er_2O_3 and Co_3O_4 Nanoparticles

Monther Alsboul^{1,*}, Mohd Sabri Mohd Ghazali², Mohamed R. Gomaa³, Aliashim Albani⁴

¹*Physics Department, College of Science, Al Hussein Bin Talal University, Jordan*

²*School of Fundamental Science, Universiti Malaysia Terengganu, Malaysia*

³*Mechanical Engineering Department, Faculty of Engineering, Al Hussein Bin Talal University, Jordan*

⁴*Renewable Energy & Power Research Interest Group (REPRIG), Eastern Corridor Renewable Energy (ECRE), Faculty of Ocean Engineering Technolog*

ABSTRACT

Ethylene glycol is a widely utilized chemical in many industrial demands. The current study investigates the effect of adding Er_2O_3 -based Ethylene glycol and Co_3O_4 -based Ethylene glycol nanofluid on thermal conductivity. The effects of nanoparticle concentration at different solid volume fractions (0, 0.0625, 0.125, 0.25, and 0.5%) were examined at a temperature range of 20-50 °C. A magnetic stirrer and ultrasonic homogenizer were used to prepare the nanofluid following the two-step method. The thermal conductivity coefficient of the nanofluid was measured using the KD2-Pro thermal analyzer. Findings showed mass fractions of Er_2O_3 and Co_3O_4 nanoparticles, and temperatures affected the thermal conductivity. Results showed that the $\text{Er}_2\text{O}_3/\text{EG}$ and $\text{Co}_3\text{O}_4/\text{EG}$ nanofluid recorded higher thermal conductivity than the base fluid. Results also showed the nanofluid thermal conductivity increased by almost 2.26% and 5.38% at 20 °C and 50 °C, respectively, at 0.5 vol%. Measurements found that the maximum thermal conductivity of 6.85% prevailed at 50 °C in the volume fraction of 0.5 vol %. The obtained thermal conductivity results in the present experimental of Co_3O_4 nanofluid are compared with previous literature study results. Finally, these results are promising about using $\text{Er}_2\text{O}_3/\text{EG}$ and $\text{Co}_3\text{O}_4/\text{EG}$ nanofluid in a solar thermal application.

References

- [1] Alsboul, Monther, Mohd Sabri Mohd Ghazali, Mohamed R. Gomaa, and Aliashim Albani, *Nanomaterials* 12, 2779 (2022).
- [2] Alsboul, Monther, Mohd Sabri Mohd Ghazali, Mohamed R. Gomaa, and Aliashim Albani, *Chemical Engineering & Technology* 45, 2139-2149 (2022).
- [3] Behera, U.S., Sangwai, J.S. and Byun, H.S. *Renewable and Sustainable Energy Reviews*, 207, 114901 (2025).
- [4] Zou, Quanle, Tengfei Ma, Jinyan Liang, Bochao Xu, and Qican Ran. *International Journal of Rock Mechanics and Mining Sciences* 188, 106056 (2025).

ID: P-10

Three Phase Partitioning for simultaneous Extraction and Characterization of Polysaccharides, Peroxidase and Oil Acids from Soybeans (*Glycine max* (L.))

Rahime ALTINTAS¹, Amina İBRAHİMOVA² and Melda ŞİŞECİOĞLU³

^{1,2,3}*Department of Molecular Biology and Genetics, Faculty of Science, Ataturk University, 25240,Erzurum,*

Turkey

¹0000-0003-0740-2312, ²0009-0000-2775-5372 ³ 0000-0002-7371-8959

ABSTRACT

Three phase partitioning (TPP) technique was used to extract oil, peroxidase and polysaccharides simultaneously from soybean. The fatty acid composition of soybean oil (SBO) and structure of soybean peroxidase (SBP) and soybean polysaccharides (SBPs) were analyzed. Under the optimal conditions of (NH₄)₂SO₄ concentration 50% (w/v), slurry to t-butanol ratio 1.0:2.0 (v/v), pH 7, extraction temperature 25 °C and extraction time 1 h, the highest extraction yields of SBO, SBP and SBPs were 60%, 160% and 50%, respectively. The fatty acid composition of SBO was analyzed by GC, the structure of SBP was analyzed by characterization and SDS-PAGE, and the structure of SBPs was analyzed by FTIR. Additionally, the antioxidant properties of SBO and SBPs were examined. The results were similar to those obtained by other methods. Therefore, TPP can be used as an effective technology for simultaneous extraction of oil, protein and polysaccharide from soybean.

Keywords: Three phase partitioning (TPP), soybean, Polysaccharides, Peroxidase, Oil Acids

References

- [1] Three phase partitioning for simultaneous extraction of oil, protein and polysaccharide from rice bran
- [2] Dennison, C., & Lovrien, R. (1997). Three phase partitioning: concentration and purification of proteins. *Protein expression and purification*, 11(2), 149-161.
- [3] Mohan, C. C., Harini, K., Aafrin, B. V., Babuskin, S., Karthikeyan, S., Sudarshan, K., ... & Sukumar, M. (2018). Extraction and characterization of polysaccharides from tamarind seeds, rice mill residue, okra waste and sugarcane bagasse for its Bio-thermoplastic properties. *Carbohydrate Polymers*, 186, 394-401.

ID: P-11

Synthesis of The 2-Alkylamino-4,5-Dihydroimidazole Compounds

Aslı Elif Kulođlu¹, Süleyman Servi²

¹*Ađrı İbrahim Çeçen University, Ađrı, Türkiye, ORCID: 0000-0002-2762-4716*

²*Firat University Faculty of Science Department of Chemistry, Elazığ, Türkiye, ORCID: 0000-0003-0827-8624*

ABSTRACT

Imidazolines are compounds containing an imine bond in a five-membered heterocyclic ring and are classified as 2-, 3-, or 4-imidazolines depending on the position of the double bond. In particular, 2-substituted imidazolines are frequently encountered in various fields such as pesticides, anticorrosives, ionic liquids, N-heterocyclic carbene (NHC) derivatives, and pharmaceuticals [1,2]. In this study, 2-alkylamino-imidazoline derivatives were synthesised via a nucleophilic substitution reaction between the starting reagent 2-methylthio-4,5-dihydroimidazole hydroiodide and various aliphatic amines. In the classical synthesis method, reaction parameters such as the reactant ratio, solvent type, and temperature were varied to determine the optimal conditions, and the four new compounds synthesized were converted into salt forms with different organic acids to increase their chemical and physical stability. The structural characterisation of the compounds was elucidated using instrumental techniques such as IR, ¹H NMR, and ¹³C-NMR. Biological activity studies of the synthesised compounds are ongoing and are being conducted using computer-aided drug design methods targeting various biological molecules.

Acknowledgement: This work was supported by Firat University Scientific Research Projects Coordination Unit (Project No: FF.12.16).

References

- [1] M. Ouakki, M. Galai, M. Cherkaoui, 2022. Imidazole derivatives as efficient and potential class of corrosion inhibitors for metals and alloys in aqueous electrolytes: a review. *J Mol Liq* 345:117815.
- [2] K. Shalini, P.K. Sharma, N. Kumar, 2010. Imidazole And İts Biological Activities, *Der. Chemica Sinica*, 1 (3), 36-47.

ID: P-12

Alterations in *GLIPR1* and *TP53* Gene Expression: Anticancer Potential of *E. virgata* in HT-29 Colon Carcinoma and Healthy CCD-18Co Cell Lines

Tugba Agbektas¹, Eda Sönmez Gürer²

¹Department of Food Processing Technologies, Yıldızeli Vocational School, Sivas Cumhuriyet University, 58140, Sivas, Türkiye, ORCID:0000-0003-3433-8870

²Department of Pharmacognosy, Faculty of Pharmacy, Sivas Cumhuriyet University, 58140, Sivas, Türkiye, ORCID: 0000-0003-0319-6312

ABSTRACT

Euphorbia virgata (*E. virgata*), a member of the Euphorbiaceae family, naturally grows in various regions worldwide. Its rich phytochemical composition, particularly phenolics and alkaloids, contributes to its wide range of biological activities [1]. This study aimed to evaluate the effects of the ethanol extract obtained from the aerial parts of *E. virgata* on HT-29 colon adenocarcinoma cells and CCD-18Co normal colonic fibroblasts, with a specific focus on the expression profiles of *GLIPR1* and *TP53* genes. The cell culture and cytotoxicity procedures were performed according to the methods described by Sönmez Gürer, E. et al. [2]. The ethanol extract of *E. virgata* was administered to HT-29 and CCD-18Co cells at different doses, and its antiproliferative activity was assessed using the MTT assay. Gene expression levels of *GLIPR1* and *TP53* were analyzed using RT-PCR based on the $\Delta\Delta C_t$ method. The results demonstrated that treatment with *E. virgata* extract alone led to a significant downregulation of *GLIPR1* in HT-29 colon cancer cells compared with CCD-18Co healthy control cells. Although the *TP53* gene exhibited a 3.14-fold increase in HT-29 cells, this elevation was not statistically significant. Overall, these findings indicate that *E. virgata* may play an important role in modulating *GLIPR1* and *TP53* gene expression in colon cancer cells and may represent a potential therapeutic candidate for preventing the progression of colon adenocarcinoma.

References

[1] S. El-Guendouz, et al., 2020. Chemical composition, antioxidant, anti-inflammatory and cytotoxic activities of *Euphorbia* species, *Plants* 9 (4), 455.

[2] Sönmez Gürer, E., Tunçbilek, Z., Zontul, C., Kutlay, A., Kumar, A., & Jhaa, G. (2025). Evaluation and DFT Analysis of In Vitro Anticancer Activity of *Consolida orientalis*, *Smyrniium rotundifolium*, and *Euphorbia virgata* Plant Extracts in Colorectal Cancer. *Pharmaceuticals*, 18(7), 943.

Measurement of Electromagnetic Fields Emitted from Base Stations and Evaluation of the Results in Terms of Public Health

P. Akbulut¹ and E. Senemtaşı Ünal²

¹*Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0000-0002-0730-9102*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0000-0002-8530-9423*

ABSTRACT

With the advancement of technology, the use of electronic devices, especially mobile phones, has led to an increase in the number of base stations and, consequently, to electromagnetic field pollution reaching dangerous levels. Electromagnetic field measurements must be taken to determine the levels of electromagnetic pollution. This study aimed to measure the electromagnetic fields emitted by 19 base stations located in the center of Ağrı province. For this purpose, measurements of electric field strength (E), magnetic field strength (H), and equivalent plane wave power density (S) were taken at specified points. The study utilized a handheld Aaronia Spectran Analyzer HF-6085 spectrum analyzer capable of measuring over a wide frequency range both instantaneously and continuously. Measurements were taken at distances of 5 m, 10 m, and 15 m distances, and at four different time intervals morning 09:00-10:00, 12:00-13:00, afternoon 15:00-16:00, and 18:00-19:00 on the same day, a total of 12 measurements were taken for each base station at three different distances and four different time intervals. To ensure meaningful results, each measurement was conducted for a minimum of six minutes. The results (E, H, and S) were found to be below the limit values established by the ICNIRP (International Commission on Non-Ionizing Radiation Protection).

Acknowledgement: This work was produced from the master's thesis titled "Measurement of the Electromagnetic Field Emitted from the Base Stations in the City Center of Ağrı" carried out by Pınar Akbulut under the supervision of Assoc. Prof. Dr. Ebru SENEMTAŞI ÜNAL at Ağrı İbrahim Çeçen University Graduate Education Institute.

ID: P-14

Determining the Knowledge, Attitudes and Behaviors of the Personnel Working in the Faculty of Dentistry about Risks and Hazard

E. Urkan¹ and E. Senemtaşı Ünal²

¹*Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0009-0000-9552-9051*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0000-0002-8530-9423*

ABSTRACT

This study was conducted to evaluate the knowledge, attitudes, and behaviors of faculty of dentistry employees regarding the risks and hazards they are exposed to in their work environment. To this end, a survey was conducted with a total of 201 employees using the survey method, one of the qualitative research methods, and the employees' risks, attitudes, and behaviors were determined. In the survey, knowledge, attitudes, and behaviors were divided into three groups and applied in the context of employees and managers. For employees, three dimensions were created; knowledge, attitudes, and behaviors. For managers, four dimensions were created; behaviors, attitudes, precautions, and training. The survey questions related to these dimensions were determined and coded using letters and numbers. According to the analysis results, 63 (31.3%) of the 201 participants had experienced a workplace accident, and 54 had contracted an occupational disease. Additionally, 151 staff members experienced needle sticks, 143 were exposed to radiation, 149 were attacked by patients, 158 had direct contact with patients' bodily fluids, 171 experienced poor posture, 150 faced excessive workloads, 170 faced staff shortages, and 169 viewed sharp objects as hazards piercing objects as hazards.

Acknowledgement: This article is derived from the Master's thesis titled "Conducting Risk Analysis in the Faculty of Dentistry and Evaluating the Knowledge, Attitudes, and Behaviors of the Staff Regarding Risks and Hazards: The Case of Erzurum Province," conducted under the supervision of Assoc. Prof. Dr. Ebru SENEMTAŞI ÜNAL by Elif URKAN at Ağrı İbrahim Çeçen University Graduate School of Education.

ID: P-15

Examination of Occupational Health and Safety Policies in Strategic Plans of Universities: A Comparative Analysis of Developed and Developing Countries

Y. Taşdelen¹ and P. Baykan²

¹*Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0009-0000-1542-4891*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0001-5279-3872*

ABSTRACT

Strategic planning is a critical tool for enhancing the effectiveness of occupational safety and health (OSH) policies and creating a sustainable working environment. The strategic planning process enables organizations to set OSH objectives, plan the resources necessary to achieve these objectives, and regularly evaluate their performance. This study examines how occupational health and safety (OHS) policies are represented in the strategic plans of universities in developed and developing countries, aiming to identify similarities and differences across contexts. Using a qualitative research design, the study employed document analysis on the strategic plans of twelve universities (six from developed countries and six from developing countries). Content analysis revealed three main themes: (T1) the inclusion of OHS in strategic plans, (T2) OHS implementation strategies and management approaches, and (T5) the relationship between OHS policies, sustainability, and social responsibility. Findings indicate that universities in developed countries address OHS policies with a holistic perspective, linking them to inclusiveness, psychosocial safety, diversity management, employee well-being, and sustainability. In both groups, a common focus on creating a "healthy and safe working environment" was observed. The study concludes that while developed countries adopt a value-oriented and sustainability-focused approach, developing countries tend to approach OHS from a compliance-based. These findings highlight the importance of integrating OHS not only as a legal requirement but also as a strategic component of institutional culture and sustainable development in higher education.

Acknowledgement: This study is derived from the thesis titled "Analysis of Occupational Health and Safety Policies in the Strategic Plans of Universities in Developed and Developing Countries" by Yunus Taşdelen, a student in the Occupational Health and Safety Department at Ağrı İbrahim Çeçen University.

ID: P-16

Integration of Health and Safety into the Design Process in the Construction Industry

B. Kaya¹ and P. Baykan²

¹*Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0009-0008-7260-8337*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0001-5279-3872*

ABSTRACT

The construction industry is a sector that keeps the economy alive in almost every country in terms of employment. Serving many sub-sectors and employing a large workforce, the construction industry is referred to as the "locomotive of the economy." At the same time, it is also known as the sector with the highest accident and injury rates compared to other sectors. The "Safe Design" approach aims to identify potential hazards and risks during the design phase and eliminate them through safe design choices; thus, the goal is to ensure health and safety throughout the entire life cycle of the structure, including construction, use, and demolition. This study aims to reveal the views of architects on the process of integrating the safe design approach into projects in the construction industry. This study, which used a qualitative research method, was conducted using a case study design. In this context, face-to-face interviews were conducted with 25 architects. The data were analyzed using content analysis. The findings show that there is no clear consensus on the stage of the project process at which safe design should be applied and that this process needs to be clarified. It was emphasized that the integration of safe design into projects needs to be developed and disseminated, and that training on this subject needs to be increased. Furthermore, it was concluded that existing legislation needs to be strengthened, the methods used by architects need to be developed, occupational safety experts need to be included in the process, and employers need to be informed about the importance of safe design throughout the building life cycle.

Acknowledgement: This study is derived from the thesis titled " The Role of Architects in Integrating Health and Safety into the Design Process in the Turkish Construction Sector" by Berivan KAYA, a student in the Occupational Health and Safety Department at Ağrı İbrahim Çeçen University.

ID: P-17

Determination of Periostin and Dkk1 Levels in Osteopenia and Osteoporosis: Their Role in Differential Diagnosis

Z. Huyut¹, S. Ilter², M.T. Huyut³, H. Karakuş⁴, M. Saygın¹

¹Van Yüzüncü Yıl University, Faculty of Medicine, Department of Medical Biochemistry, Van, Türkiye. ORCID: 0000-0002-7623-1492

²Van Yüzüncü Yıl University, Faculty of Medicine, Department of Internal Medical Sciences, Division of Physical Medicine and Rehabilitation, Van, Türkiye. ORCID: 0000-0001-5436-7500

³Erzincan Binali Yıldırım University, Faculty of Medicine, Department of Basic Medical Sciences, Biostatistics and Medical Informatics Division, Erzincan, Türkiye. ORCID: 0000-0002-2564-991X

⁴Van Yüzüncü Yıl University, Faculty of Medicine, Medical Student, Van, Türkiye.

¹Van Yüzüncü Yıl University, Faculty of Medicine, Department of Medical Biochemistry, Van, Türkiye. ORCID: 0000-0002-7115-802X

ABSTRACT

Osteoporosis is a significant public health problem in older individuals, especially postmenopausal women. Although dual-energy X-ray absorptiometry (DXA) is widely utilized for diagnosing osteoporosis, various serum biomarkers have recently been proposed to predict osteoporosis and differentiate healthy individuals from those with osteoporosis. This study aims to investigate the levels of novel biochemical markers, Periostin and Dkk-1, in patients with osteopenia and osteoporosis, and to examine their correlation with bone mineral density (BMD), evaluating their potential to serve as alternatives or adjuncts to DXA in osteoporosis diagnosis. Ninety postmenopausal women aged over 50 years, admitted to the Physical Medicine and Rehabilitation outpatient clinics of Van Yüzüncü Yıl University Faculty of Medicine, were included in the study and categorized into three groups based on DXA measurements: control (n=20), osteopenia (n=35), and osteoporosis (n=35). Serum Periostin and Dkk-1 levels were measured using the ELISA method, and the results were compared with DXA outcomes. Our results showed that periostin and Dkk-1 levels were significantly higher in patients with osteoporosis and osteopenia compared to the control group ($p<0.05$). In addition, periostin levels were higher in the osteopenia group than in the osteoporosis group, while Dkk-1 levels were higher in the osteoporosis group than in the osteopenia group, unlike periostin. According to ROC analysis, periostin and Dkk-1 showed high sensitivity and specificity in distinguishing healthy individuals from patients and in differentiating osteopenia from osteoporosis. In particular, periostin levels (98% accuracy, AUC=0.98) had a higher diagnostic value than Dkk-1 levels (95% accuracy, AUC=0.95). In conclusion, periostin and Dkk-1 were found that may be potentially useful biomarkers in the diagnosis of osteoporosis and in the follow-up of the transition from osteopenia to osteoporosis. Considering the limitations of DXA, such as its high cost, exposure to a small amount of radiation, and accessibility challenges, the diagnostic value of these biomarkers becomes significant. However, more comprehensive studies are needed to validate the findings and expand their clinical applications.

Key words: Osteoporosis, DXA, Bone markers, DKK-1, Periostin

Acknowledgement: This work was supported by the Scientific Research Projects Coordination Unit of Van Yüzüncü Yıl University within the scope of the project number TLO-2024-10919.

References

- [1] Aibar-Almazán, A., et al., *Current Status of the Diagnosis and Management of Osteoporosis*. International Journal of Molecular Sciences, 2022. **23**(16): p. 9465 %* <http://creativecommons.org/licenses/by/3.0/> %U <https://www.mdpi.com/1422-0067/23/16/9465>.
- [2] Saad, M.A., R.A. Aboelwafa, and E.H. Elsayed, *Could procollagen type I N-terminal propeptide (PINP) and bone alkaline phosphatase (B-ALP) be valid alternative diagnostic markers to dual X-ray absorptiometry (DEXA) in elderly females with osteoporosis? An Egyptian radiological and laboratory monocentric study*. Egyptian Rheumatology and Rehabilitation, 2021. **48**(1): p. 20 %U <https://doi.org/10.1186/s43166-021-00069-y>.
- [3] Martiniakova, M., et al., *Current knowledge of bone-derived factor osteocalcin: its role in the management and treatment of diabetes mellitus, osteoporosis, osteopetrosis and inflammatory joint diseases*. Journal of Molecular Medicine, 2024. **102**(4): p. 435-452 %U <https://doi.org/10.1007/s00109-024-02418-8>.
- [4] Peng, J., et al., *Bone Sclerostin and Dickkopf-related protein-1 are positively correlated with bone mineral density, bone microarchitecture, and bone strength in postmenopausal osteoporosis*. BMC MUSCULOSKELETAL DISORDERS, 2021. **22**(1): p. 480 %U <https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-021-04365-8>.
- [5] Yigitdol, I., et al., *Serum Periostin Levels are Significantly Higher in Patients with Primary Hyperparathyroidism and Closely Related to Osteoporosis*. Experimental and Clinical Endocrinology & Diabetes, 2023. **131**: p. 449-455 %* Georg Thieme Verlag KG Rüdigerstraße 14, 70469 Stuttgart, Germany %U <https://www.thieme-connect.de/products/ejournals/abstract/10.1055/a-2053-8090>.
- [6] Guo, Y.-M., et al., *Serum Periostin Level and Genetic Polymorphisms Are Associated with Vertebral Fracture in Chinese Postmenopausal Women*. Genes, 2022. **13**(3): p.439 %* <http://creativecommons.org/licenses/by/3.0/> %U <https://www.mdpi.com/2073-4425/13/3/439>.

ID: P-18

Cathepsin-K and Sclerostin as Potential Biochemical Markers for the Differential Diagnosis of Osteopenia and Osteoporosis

Z. Huyut¹, S. İlter², M.T. Huyut³, T. Pulat⁴, M. Saygın¹

¹Van Yüzüncü Yıl University, Faculty of Medicine, Department of Medical Biochemistry, Van, Türkiye. ORCID: 0000-0002-7623-1492

²Van Yüzüncü Yıl University, Faculty of Medicine, Department of Internal Medical Sciences, Division of Physical Medicine and Rehabilitation, Van, Türkiye. ORCID: 0000-0001-5436-7500

³Erzincan Binali Yıldırım University, Faculty of Medicine, Department of Basic Medical Sciences, Biostatistics and Medical Informatics Division, Erzincan, Türkiye. ORCID: 0000-0002-2564-991X

⁴Van Yüzüncü Yıl University, Faculty of Medicine, Medical Student, Van, Türkiye.

¹Van Yüzüncü Yıl University, Faculty of Medicine, Department of Medical Biochemistry, Van, Türkiye. ORCID: 0000-0002-7115-802X

ABSTRACT

Osteoporosis is a systemic skeletal disorder characterized by an imbalance between bone formation and resorption, leading to an increased risk of fractures. Dual-energy X-ray absorptiometry (DXA), considered the gold standard for diagnosing of osteoporosis, measures bone mineral density (BMD); however, its application is limited by high cost, radiation exposure, and restricted accessibility. Consequently, there is a growing need for alternative diagnostic methods that are more accessible and reflect bone turnover at the biochemical level. The aim of this prospective study was to evaluate the diagnostic value of Cathepsin-K and Sclerostin in distinguishing osteopenia and osteoporosis. A total of 90 postmenopausal women evaluated by DXA at Van Yuzuncu Yil University were included in the study and divided into control (n=20), osteopenia (n=35) and osteoporosis (n=35) groups. Serum Cathepsin-K and Sclerostin levels were analyzed using the ELISA method. According to the findings, both biomarkers were significantly elevated in the osteopenia and osteoporosis groups compared to the control group ($p<0.05$). Cathepsin-K levels exceeding 4.56 ng/mL (AUC: 0.92) and Sclerostin levels above 10.12 ng/mL (AUC: 0.94) demonstrated high diagnostic accuracy in distinguishing osteopenia and osteoporosis from healthy individuals. For differentiating between osteopenia and osteoporosis, Sclerostin levels below 12.16 ng/mL (AUC: 0.99) had greater discriminative power than Cathepsin-K levels below 5.22 ng/mL (AUC: 0.96). In conclusion, these biomarkers may offer clinically valuable information for the early diagnosis of osteoporosis and for distinguishing between osteopenia and osteoporosis.

Key words: Osteoporosis, Cathepsin-K, Sclerostin, Bone mineral density, Postmenopausal osteoporosis.

Acknowledgement: This work was supported by the Scientific Research Projects Coordination Unit of Van Yüzüncü Yıl University within the scope of the project number TLO-2023-10884.

References

- [1] Adugani, S., Bannimath, G., Sastry, P., 2021. A Review on Biomarkers in Clinical Osteoporosis - Significance of Hydroxyproline. *Biomedical and Biotechnology Research Journal (BBRJ)* 5, 245 %U https://journals.lww.com/bbrj/fulltext/2021/05030/a_review_on_biomarkers_in_clinical_osteoporosis__05032.aspx.
- [2] Aibar-Almazán, A., et al., Current Status of the Diagnosis and Management of Osteoporosis. *International Journal of Molecular Sciences*, 2022. **23**(16): p. 9465 %* <http://creativecommons.org/licenses/by/3.0/> %U <https://www.mdpi.com/1422-0067/23/16/9465>.
- [3] Kalem, M.N., Kalem, Z., Akgun, N., Bakırarar, B., 2017. The relationship between postmenopausal women's sclerostin levels and their bone density, age, body mass index, hormonal status, and smoking and consumption of coffee and dairy products. *Archives of Gynecology and Obstetrics* 295, 785-793.
- [4] Zhang, L., Cheng, J., Su, H., Wang, Z., Dai, W., 2024. Diagnostic value of circulating bone turnover markers osteocalcin, cathepsin K, and osteoprotegerin for osteoporosis in middle-aged and elderly postmenopausal women. *Archives of Medical Science : AMS* 20, 1727-1730.
- [5] Peng, J., et al., Bone Sclerostin and Dickkopf-related protein-1 are positively correlated with bone mineral density, bone microarchitecture, and bone strength in postmenopausal osteoporosis. *BMC MUSCULOSKELETAL DISORDERS*, 2021. **22**(1): p. 480 %U <https://bmcmusculoskeletaldisord.biomedcentral.com/articles/10.1186/s12891-021-04365-8>.
- [6] Palacios, S., 2022. Medical treatment of osteoporosis. *Climacteric* 25, 43-49 %U <https://www.tandfonline.com/doi/full/10.1080/13697137.13692021.11951697>.

In Silico Investigation of BRAF Target Protein of Vemurafenib Derivatives

Dilara Toğrul¹, Ahmet Çağan², Akın Akıncioğlu²

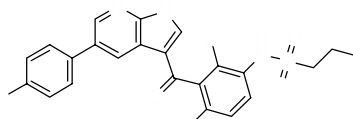
¹Ağrı İbrahim Çeçen University, Graduate Education Institute, Department of Chemistry, 04100-AĞRI, TURKEY

²Ağrı İbrahim Çeçen University, Central Research and Application Laboratory, 04100-AĞRI, TURKEY

dilaratogrul21@gmail.com

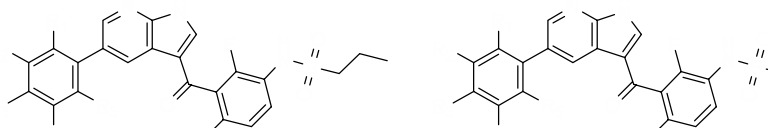
ABSTRACT

Cancer is one of the most common and lethal diseases worldwide, characterized by the uncontrolled proliferation of cells [1]. Skin cancer is a rapidly increasing health problem due to ultraviolet light exposure and genetic factors [2]. BRAF inhibitors play an important role in the treatment of aggressive skin cancers such as melanoma. Vemurafenib (**1**), a BRAF inhibitor used for this purpose, targets the growth of cancer cells [3].



DS:-10.3

In this study, the interactions of Vemurafenib derivatives **2-18** with BRAF protein (PDB: 4RZV) were investigated by molecular docking method; scores ranging from -10.4 to -12.8 of the derivatives revealed that Vemurafenib (**1**) showed higher inhibitory potential compared to -10.3.



Cl, =R =R =R =H; DS:-10.7
 =R =Br, =R =R =H; DS:-11.1
 =R =F, =R =R =H; DS:-10.6
 =R =F,R =R =R =H; DS:-11.0
 =R =I, =R =R =H; DS:-10.8
 =R =F,R =R =R =H; DS:-10.5
 =R =F,R =R =R =H; DS:-10.4

=R =Br,R =R =R =H, =CH DS:-12.0
10 =R =Cl,R =R =R =H, =CH DS:-12.0
11 =R =I,R =R =R =H, =CH DS:-11.7
12 =Cl,R =R =R =R =H,R =NH DS:-12.0
13 =R =I,R =R =R =H, =NH DS:-12.7
14 =R =Cl,R =R =R =H, =NH DS:-12.1
15 =Cl,R =R =R =R =H, =NH DS:-12.7
16 =R =Cl,R =R =R =H, =NH DS:-12.8
17 =R =Br,R =R =R =H, =NH DS:-12.2
18 =R =I,R =R =R =H,R =NH DS:-11.9

*DS: Docking score

References

- [1] Brown, J. S., Amend, S. R., Austin, R. H., Gatenby, R. A., Hammarlund, E. U., & Pienta, K. J. (2023). Updating the definition of cancer. *Molecular Cancer Research*, 21(11), 1142-1147.
- [2] Ahmed, B., Qadir, M. I., & Ghafoor, S. (2020). Malignant melanoma: skin cancer – diagnosis, prevention, and treatment. *Critical Reviews™ in Eukaryotic Gene Expression*, 30(4).
- [3] Karoulia, Z., Gavathiotis, E., & Poulikakos, P. I. (2017). New perspectives for targeting RAF kinase in human cancer. *Nature Reviews Cancer*, 17(11), 676-691.

ID: P-20

Exploring Cell Death Pathways Triggered by Chalcone Complex and Valproic Acid in Papillary Thyroid Cancer Cells

H. S. EKMEKÇİ¹, O. AKGÜN¹, G. TUNA¹, D. COSKUN², F. ARI¹

¹ Bursa Uludağ University, Department of Biology, Bursa, Türkiye, 0000-0001-9439-428X, 0000-0002-8410-1786, 0000-0003-2567-8056, 0000-0002-6729-7908

²Firat University, Department of Organic Chemistry Bursa, Türkiye, 0000-0001-7141-6909

ABSTRACT

Papillary thyroid carcinoma (PTC) is the most common thyroid malignancy, and aggressive subtypes may render current treatments insufficient, highlighting the need for novel therapeutic approaches [1]. Chalcones, flavonoid-derived compounds, possess anticancer potential [2], while valproic acid (VPA), an anticonvulsant, exerts antitumor activity through histone deacetylase inhibition [3]. In this study, we investigated the cytotoxic and molecular effects of combining the chalcone derivative 4-hydroxy-3-methoxyphenyl with VPA in TPC-1 papillary thyroid cancer cells. Cell viability was assessed using the Sulforhodamine B assay, and cell death mechanisms were examined via Annexin V/PI staining. To elucidate the mode of cell death, specific inhibitors (Z-VAD-FMK, N-acetyl-L-cysteine, and Necrostatin-1) were applied. ROS generation was analyzed using dihydroethidium staining, and Western blotting was conducted to explore protein-level mechanisms. Based on the results, the combination treatment enhanced cytotoxicity, induced ROS-mediated ER stress, and activated extrinsic apoptosis. These findings suggest that the chalcone–VPA combination may be a promising therapeutic strategy for PTC.

Acknowledgement: This work was supported by the Bursa Uludağ University Research Fund under project number FYL-2024-1705.

References

- [1] H. Y. Cha, B. S. Lee, J. W. Chang, J. K. Park, J. H. Han, Y. S. Kim, Y. S. Shin, H. K. Byeon, C. H. Kim, 2016. Downregulation of Nrf2 by the combination of TRAIL and Valproic acid induces apoptotic cell death of TRAIL-resistant papillary thyroid cancer cells via suppression of Bcl-xL, *Cancer Lett.*, 372(1) (2016) 65–74.
- [2] Y. Ouyang, J. Li, X. Chen, X. Fu, S. Sun, Q. Wu, 2021. Chalcone Derivatives: Role in Anticancer Therapy, *Biomolecules*, 11(6) (2021) 894.
- [3] D. Singh, S. Gupta, I. Verma, M. A. Morsy, A. B. Nair, A. F. Ahmed, 2021. Hidden pharmacological activities of valproic acid: A new insight, *Biomed. Pharmacother.*, 142 (2021) 112021.

ID: P-21

Fractional Integral Inequalities via Atangana–Baleanu Operators on the Co-ordinates

Sinan ASLAN¹ and Ahmet Ocak AKDEMİR²

¹*Ağrı Türk Telekom Social Sciences High School, Ağrı, Türkiye, ORCID: (0000-0001-5970-1926)*

²*Department of Mathematics, Faculty of Arts and Sciences, Agri Ibrahim Çeçen University, Agri, Türkiye, ORCID: (0000-0003-2466-0508)*

ABSTRACT

In this paper, we define the Atangana–Baleanu fractional integral operators on the coordinates and establish a new lemma that serves as the foundation for our main results. The introduced lemma is then utilized to derive several integral inequalities by employing fundamental tools from mathematical analysis, including the concepts of convexity together with Hölder’s and Young’s inequalities. The proposed approach not only extends and generalizes a variety of well-known results but also demonstrates the potential of Atangana–Baleanu operators with Mittag–Leffler kernels in the study of inequalities involving convex functions. In particular, the obtained results highlight the significance of fractional operators in capturing nonlocal features of functions and provide a systematic technique for generating new families of inequalities in two variables. The findings presented in this work contribute to the growing literature on fractional integral inequalities and offer a useful framework for further research and possible applications in both pure and applied sciences.

Keywords: Convex function, Hölder inequality, Young inequality, Atangana–Baleanu fractional integral operators, Co-ordinates

References

- [1] T. Abdeljawad and D. Baleanu, Integration by parts and its applications of a new nonlocal fractional derivative with Mittag-Leffler nonsingular kernel, *J. Nonlinear Sci. Appl.*, 10 (2017), 1098-1107.
- [2] A. O. Akdemir, A. Karaođlan, M. A. Ragusa, E. Set, Fractional Integral Inequalities via Atangana-Baleanu Operators for Convex and Concave Functions, *Journal of Function Spaces*, Volume 2021, Article ID 1055434, 10 pages.
- [3] A. Atangana and D. Baleanu, New fractional derivatives with non-local and non-singular kernel, *Theory and Application to Heat Transfer Model*, *Thermal Science*, Year 2016, Vol. 20, No. 2, pp. 763-769.

ID: P-22

Fractional Inequalities of Milne-Type for Twice Differentiable Strongly s -Convex FUNCTIONS

Sinan ASLAN¹

¹*Ağrı Türk Telekom Social Sciences High School, Ağrı, Türkiye, ORCID: (0000-0001-5970-1926)*

ABSTRACT

This paper focuses on the development of new fractional Milne-type inequalities by utilizing a classical identity associated with twice differentiable functions, widely employed in the study of mathematical inequalities. By incorporating this identity into the framework of Riemann–Liouville fractional integrals, a variety of refined inequalities are established for functions whose second derivatives, in absolute value, satisfy the condition of strongly s -convexity. This approach extends the scope of convexity-based analysis in fractional calculus and offers a systematic methodology for deriving inequalities of broader applicability.

To enhance the obtained results, auxiliary tools such as Hölder’s inequality and Young’s inequality are employed, providing sharper estimates and complementary findings. The novelty of this study lies in the integration of classical techniques with fractional operators, which produces inequalities that generalize and improve upon existing results in the literature. Overall, the contributions not only deepen the theoretical understanding of strongly s -convex functions but also provide a versatile framework for further developments in fractional integral inequalities.

Keywords: Strongly s -convex, Milne-type inequalities, Fractional integrals, Inequalities.

References

- [1] Almoneef A. A., Hyder A. A., Budak H., Barakat M. A., Fractional Milne-type inequalities for twice differentiable functions, *AIMS Mathematics*, 9(7), 2024, 19771-19785.
- [2] S. Aslan, E. Karaduman, A. O. Akdemir, (2025). Fractional inequalities of milne-type for twice differentiable strongly convex functions. *Turkish J. Ineq*, 9(1), 16-26.
- [3] M. Z. Sarikaya, E. Set, M. E. Özdemir, (2013). On new inequalities of Simpson’s type for functions whose second derivatives absolute values are convex. *Journal of applied mathematics, statistics and informatics*, 9(1), 37-45.
- [4] M. Shepherd, R. Skinner, A. D. Booth, (1976). A numerical method for calculating Green’s functions. *Canadian Electrical Engineering Journal*, 1(3), 14-17.

ID: P-23

Efficient Implementation of the Residual Function for Solving Systems of Ordinary Differential Equations

Malek Abu Kharrob¹, Aliaa Burqan¹, Tariq Alsmadi²

¹*Department of Mathematics, Faculty of Science, Zarqa University, Zarqa 13110, Jordan*

²*Department of Mathematics, Faculty of Science, Eastern Washington University, Cheney WA 99004, United States*

ABSTRACT

In this paper, analytical solutions for systems of ordinary differential equations are provided by implementing the limit residual function technique. The proposed technique efficiently constructs power series solutions when the residual functions are analytic, truncating the series allows us to determine the coefficients of the solution directly. Unlike traditional methods that require linearization, perturbation, or discretization, this analytical approach provides both numerical and analytical solutions with reduced computational complexity. The method's broad applicability to linear, nonlinear, homogeneous, and non-homogeneous systems makes it a powerful tool for solving systems of differential equations.

Keywords: System of ordinary differential equations, Power series, Residual function, Initial value problem.

ID: P-24

Continuity, Openness, and Closedness on Raw Binary Structures

Aysenur KAHRAMAN¹, Kadirhan POLAT²

¹*Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0009-0001-0894-4044*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0000-0002-3460-2021*

ABSTRACT

In this study, the basic topological notions such as continuity, openness, and closedness on raw binary structures are considered again, and the conditions under which these notions hold are examined in detail. Based on the definitions and theorems in classical topology, the results are restructured on the left, right, and output sets of raw binary structures. Thus, it has been showed that continuity and openness tests are also applicable in the context of raw binary structures.

References

- [1] Bruck, R.H. 1971. A survey of binary systems , volume 20 Springer
- [2] Clifford, A. H. and Preston, G. B. 1967. The algebraic theory of semigroups, Volume II, volume 2. American Mathematical Soc.
- [3] Dummit, D. S. and Foote, R. M. 2004. Abstract algebra, volume 3. Wiley Hoboken.
- [4] Fraleigh, J. B. 2003. A rst course in abstract algebra. Pearson Education India
- [5] Gallian, J. 2012. Contemporary abstract algebra. Nelson Education.
- [6] Grätzer, G. 2008. Universal algebra. Springer Science & Business Media.
- [7] Jin, Q., Li, L., Ma, Z., and Yao, B. 2021. A note on the relationships between generalized rough sets and topologies. Int. J. Approx. Reason., 130:292-296.
- [8] Kelley, J. L. 2017. General topology. Courier Dover Publications.
- [9] Kuratowski, K. 2014. Topology: Volume I, volume 1. Elsevier

Assessment of Nutritional and Toxic Element Content in Fruits from Giresun: Implications for Dietary Intake and Human Health Risks

M. E. ŞEKER¹ and M. KARAKÖSE²

¹Manisa Celal Bayar University, School of Tobacco Expertise, Akhisar, 45200 Manisa, Türkiye, ORCID: 0000-0003-4463-6898

² Giresun University, Program of Medicinal and Aromatic Plants, Espiye, 28600 Giresun, Türkiye, ORCID: 0000-0003-0534-3996

ABSTRACT

Fruits and dried fruits are recognized for their significance to health owing to their abundant micro and macroelements. This study conducted elemental analysis of ten fruit varieties (apple, pear, persimmon, fig, rosehip, plum, blackberry, scented grape, blueberry, and mulberry) sourced from Giresun, utilizing inductively coupled plasma mass spectrometry (ICP-MS) following microwave-assisted acid digestion. The research examined the presence of magnesium (Mg), calcium (Ca), sodium (Na), iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), chromium (Cr), nickel (Ni), arsenic (As), cadmium (Cd), and lead (Pb) in the fruits. The results were utilized to establish recommended daily allowances (RDA) and evaluate health hazards. Persimmons, rosehips, blackberries, and blueberries exhibit elevated manganese content; for instance, it has been determined that the daily consumption of 50g of rosehips or blackberries provides almost 50% of the required daily allowance of manganese (especially if consumed dry). Blackberries are notable for magnesium; and mulberries are distinguished by iron. Apples, blackberries, grapes, blueberries, and mulberries exhibited elevated levels of copper (Cu). Regarding target hazard quotient (THQ) for non-carcinogenic toxicity, all fruits were shown to be well below the threshold value (THQ<1). In the carcinogenic risk (CR) evaluation, apples were determined to have a moderate risk alone for Cr (1.2×10^{-5}), which does not present a significant threat. The levels established for other potentially toxic elements were CR< 10^{-6} for and are deemed safe. The research indicated that fruits from the Giresun region are abundant in macro and microelements, with no potentially toxic elements identified as a danger.

References

- [1] Şeker, M. E., Erdoğan, A., & Ay, E. (2025). Comparative Analysis of Phenolic, Carotenoid, and Elemental Profiles in Three Crataegus Species from Şebinkarahisar, Türkiye: Implications for Nutritional Value and Safety. *Molecules*, 30(14), 2934.
- [2] Şeker, M. E. (2023). Elemental analysis and health risk assessment of different hazelnut varieties (*Corylus avellana* L.) collected from Giresun-Turkey. *Journal of Food Composition and Analysis*, 122, 105475.
- [3] Erdoğan, A., Şeker, M. E., Yüksel, B., Ustaoglu, F., & Yazman, M. M. (2024). Elemental composition and nutritional values of chocolate bars available in Turkish markets: An integrated health risk assessment study. *Journal of Food Composition and Analysis*, 135, 1066

ID: P-26

Identification of Sheep, Goat, and Cow Milk Using Near-Infrared (NIR) Spectroscopy

H.E. Genis¹, and İ.H. Boyacı²

¹*Agri Ibrahim Cecen University, Agri, Türkiye*

²*Hacettepe University, Ankara, Türkiye*

ABSTRACT

This study investigated the potential for the detection of milk from three different animal species: cows, sheep, and goats, using near-infrared (NIR) spectroscopy. The performance of NIR spectroscopy in the separation of different types of milk was measured, and its field applicability was evaluated. Twenty samples from each type of milk were obtained for this purpose, and NIR spectra were obtained using a system with 908.1 and 1676.2 nm characteristics. Principal component analysis (PCA) was applied to the obtained spectra, demonstrating that different types and mixtures of different types can also be separated from each other.

References

- [1] Melfsen, A., Hartung, E., Haeussermann A., 2012. Accuracy of milk composition analysis with near infrared spectroscopy in diffuse reflection mode. *Biosystems Engineering* 112(3): 210-217.
- [2] Üçüncüoğlu, D., İlaslan, K., Boyacı, İ.H., Özay, D.S., 2013. Rapid detection of fat adulteration in bakery products using. *Eur. Food Res. Technol.* 237: 703-710.
- [3] Wang, Y., Ding, W., Kou, L., Li, L., Wang, C., Jurick, W.M., 2015. A Non-destructive method to assess freshness of raw bovine milk using FT-NIR spectroscopy. *J. Food Sci. Technol.* 52(8): 5305-5310.
- [4] Aernouts, B., Polshin, E., Lammertyn J., Saeys W., 2011. Visible and near-infrared spectroscopic analysis of raw milk for cow health monitoring: reflectance or transmittance? *J. Dairy Sci.* 94(11): 5315-5329.
- [5] Mlcek, J., Dvorak, L., Sustova K., Szwedziak K., 2016. Accuracy of the FT-NIR method in evaluating the fat content of milk using calibration models developed for the reference methods according to Rose-Gottlieb and Gerber. *J. AOAC Int.* 99(5): 1305-1309.

ID: P-27

Gamification Interventions in Sexual and Reproductive Health Education: Impacts on Knowledge, Attitudes, and Student Engagement

Ebru Solmaz¹

¹*Agri Ibrahim Cecen University, Faculty of Health Sciences, Department of Midwifery, Agri, Turkey, ORCID: 0000-0003-1962-8669*

ABSTRACT

Gamification interventions have gained significant attention as innovative approaches to improving sexual and reproductive health education (SRHE), especially when addressing sensitive topics among young people and health students [1]. This study aimed to synthesise existing evidence on the impacts of gamification strategies on knowledge, attitudes, and engagement in SRHE. A narrative review approach was used to examine studies published between 2015 and 2025 across major academic databases. Studies focusing on gamification or game-based learning interventions in SRHE among adolescents, young adults, or health students were included. Findings were categorised into three main outcomes: knowledge improvement, attitudinal change, and learner engagement. Gamification strategies were consistently found to enhance knowledge acquisition by making learning interactive and accessible. Game elements such as storytelling, challenges, and rewards created emotionally safe learning environments, reduced discomfort surrounding sensitive health topics, and fostered positive attitudinal shifts towards SRHE [2]. Additionally, incorporating gamification led to higher levels of student engagement, motivation, and participation compared to traditional teaching methods, facilitating collaborative learning and sustained interest in SRHE topics. Gamification represents a promising strategy for advancing SRHE by improving knowledge, shaping positive attitudes, and promoting active engagement. Future research should explore hybrid models combining gamification with other digital learning tools and assess long-term impacts on behavioural and health outcomes.

References

- [1] L. Nobre-Maluf, C. Drummond, 2020. *Game-based learning in sexual and reproductive health education: A narrative review*, *J. Nurs. Educ. Pract.*, 10(7) (2020) 36–44.
- [2] J. L. Borges, M. Ferreira, A. Cunha, 2022. *Gamification in reproductive health education: Impact on attitudes and motivation among university students*, *Nurse Educ. Today*, 117 (2022) 105493.

A Rare Case: Elastofibroma Dorsi of the Back

M. Baran Yerlikaya¹

¹*Department of General Surgery, Ağrı Ibrahim Cecen University, Türkiye*

ABSTRACT

Elastofibroma dorsi (ED) is a rare benign soft tissue tumor of the thoracic wall, typically located at the inferior angle of the scapula, beneath the rhomboid major and latissimus dorsi muscles. Although its pathogenesis remains unclear, repetitive microtrauma and friction between the scapula and thoracic wall are considered possible contributing factors.

A 55-year-old male manual laborer presented with a five-month history of pain and a palpable mass in the left subscapular region. On physical examination, a deep-seated, mobile, and tender mass was palpated beneath the inferomedial angle of the scapula. Ultrasonography revealed an 11-cm, relatively well-defined solid lesion. Magnetic resonance imaging (MRI) demonstrated a capsular-free, heterogeneous mass composed of fibrous tissue and interspersed fat, located beneath the scapula. Clinical and radiological findings were consistent with elastofibroma dorsi. Due to persistent symptoms, the lesion was surgically excised.

Elastofibroma dorsi is a rare benign lesion that can be diagnosed based on its characteristic localization and radiological appearance. However, histopathological confirmation is essential to exclude malignant soft tissue tumors. Surgical excision remains the definitive treatment in symptomatic patients.

ID: P-29

Identification of Pathogenic Bacteria in Cabbages and Characterization of Their Specific Bacteriophages

E. Akgöllü¹, Ü.Z.Ü. Esertaş¹, A.O. Kılıç², E. Karataş¹

¹ Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0000-0003-3636-401X (E.A.), 0000-0001-9897-5313 (Ü.Z.Ü. E.), 0000-0001-6848-7618 (E.K.)

² Karadeniz Technical University, Faculty of Medicine, Department of Medical Microbiology, Trabzon, Türkiye, ORCID: 0000-0002-5506-0866 (A.O. K.)

ABSTRACT

Several bacterial diseases, such as black rot, bacterial spot, and soft rot, affect high-value crops like cabbages, reducing yield and causing economic losses. Antibiotics and copper-based chemicals are commonly used for control, but their broad-spectrum activity can harm non-target organisms and contaminate soil and groundwater, posing environmental risks as well as causes resistant bacterial populations (1). Bacteriophages, which specifically infect and kill bacteria, offer an environmentally friendly alternative. Bacteriophages are promising alternatives to antibiotics because they are species-specific, do not induce resistance, can multiply at infection sites, and rapidly eliminate pathogens (2). The aim of this study was to isolate and identify pathogenic bacteria from infected white cabbages grown in the Ağrı region, and to isolate and characterize bacteriophages specific to these pathogens from soil samples collected near the infected plants. Bacteria and bacteriophages were isolated from infected cabbage and soil samples using two different isolation methods. The bacteria were cultured on Petri dishes, while the phages were stored as lysates (3). Phage lysates were then applied to the pathogenic bacteria cultured on Petri dishes using the drop method, and the formation of clear zones indicating lytic activity was observed (3). As a result of the identification of pathogenic bacteria, the species *Pantoea agglomerans* and *Pantoea ananatis* were determined. In the phage assays conducted with these species, four distinct phages were obtained and subsequently sent for sequencing analysis to characterize them.

Acknowledgement: This work was supported by Ağrı İbrahim Çeçen University Scientific Research Project Unit (Project number: PMYO.23.002).

References

- [1] K.L. Johnson, G.V. Minsavage, T. Le, J.B. Jones, and R.R. Walcott, 2011. Efficiency of a Nonpathogenic *Acidovorax citrulli* Strain as a Biocontrol Seed Treatment for Bacterial Fruit Blotch of Cucurbits. *Plant Disease*, 95 (2011) 697-704.
- [2] K. Hyeongsoon, et al. 2022. Development of a Bacteriophage Cocktail against *Pectobacterium carotovorum* Subsp. *carotovorum* and Its Effects on *Pectobacterium* Virulence. *Applied and Environmental Microbiology* 88.19 (2022): e00761-22.
- [3] J.A. Lim, et al. 2013. Biocontrol of *pectobacterium carotovorum* subsp *carotovorum* using bacteriophage PP1. *J Microbiol Biotechnol* 23 (2013) 1147–1153.

Alleviation of Nickel-Induced Oxidative Stress in Maize (*Zea mays* L.) through Salicylic Acid and EDTA Treatments

K. Uruç Parlak

Agri Ibrahim Cecen University, Faculty of Science and Letters, Department of Molecular Biology and Genetics, Agri, Turkey, ORCID: 0000-0002-1474-1868

ABSTRACT

Heavy metal contamination poses a critical environmental challenge, adversely affecting agricultural productivity by disturbing cellular homeostasis, impairing photosynthesis, and inducing oxidative stress. Among these metals, nickel (Ni) can accumulate to toxic levels in plant tissues, perturbing redox equilibrium and triggering excessive generation of reactive oxygen species (ROS). This leads to enhanced lipid peroxidation and compromised membrane integrity [1,2]. Additionally, Ni toxicity restricts photosynthetic efficiency through chlorophyll degradation and structural alterations of chloroplasts. The present study evaluated the impact of Ni stress on maize (*Zea mays* L.) growth and examined the protective potential of salicylic acid (SA) and EDTA applications. Plants were organized into five treatments: control, Ni, Ni+SA, Ni+EDTA, and Ni+SA+EDTA. Key indicators of antioxidant defense, including lipid peroxidation (MDA), hydrogen peroxide (H₂O₂), proline accumulation, and activities of catalase (CAT) and superoxide dismutase (SOD), were assessed. Nickel exposure substantially increased oxidative stress markers while suppressing CAT activity. EDTA application partially mitigated these effects, while SA exhibited a stronger protective influence by reducing ROS accumulation and enhancing physiological performance. The combined SA+EDTA treatment provided the most pronounced alleviation of Ni-induced oxidative damage [3,4]. These findings suggest that co-application of SA and EDTA offers an effective strategy to enhance plant resilience under heavy metal stress.

Keywords: Nickel toxicity; Proline; Oxidative stress; Salicylic acid; EDTA

References

- [1] S. S. Sharma, K. J. Dietz, 2009. The relationship between metal toxicity and cellular redox imbalance, *Trends Plant Sci.*, 14(1) (2009) 43–50.
- [2] E. Gajewska, M. Skłodowska, 2007. Effect of nickel on ROS content and antioxidative enzyme activities in wheat leaves, *Biometals*, 20(1) (2007) 27–36.
- [3] R. L. Sun, Q. X. Zhou, F. H. Sun, C. X. Jin, 2011. Antioxidative defense and proline/phytochelatin accumulation in a newly discovered Cd-hyperaccumulator, *Solanum nigrum* L., *Environ. Exp. Bot.*, 71(2) (2011) 276–283.
- [4] B. Ali, S. Hayat, Q. Fariduddin, A. Ahmad, 2015. Salicylic acid: An efficient elicitor of plant defense responses, *J. Plant Interact.*, 10(1) (2015) 1–15.

ID: P-31

Screening Approaches for Detecting Biosurfactant Production

S. Gürkök¹ and A.W. Ayan²

¹Atatürk University, Faculty of Science, Department of Biology, Erzurum, Türkiye, ORCID: 0000-0002-2707-4371

²Atatürk University, Institute of Natural and Applied Sciences, Erzurum, Türkiye, ORCID: 0009-0006-4884-3201

ABSTRACT

Biosurfactants are microbially derived amphiphilic compounds that combine hydrophilic and hydrophobic moieties—such as sugars, peptides, or fatty acids—to efficiently reduce surface and interfacial tension while enhancing emulsion stability. Unlike conventional synthetic surfactants derived from petrochemical sources—which account for approximately 90 % of the global market but pose environmental persistence and toxicity concerns—biosurfactants are biodegradable, non-toxic, and sustainable. Their remarkable stability under extreme conditions (e.g., high temperature, wide pH range) enables low critical micelle concentration (CMC) usage, increasing their functional efficiency in tough industrial environments. Owing to these properties, the applications of biosurfactants are impressively broad. Surfactants are widely employed in detergents, cosmetics, and the oil industries in addition to the food, medicine, and pharmaceutical sectors.

Given the structural diversity and functional versatility of biosurfactants, continuous exploration of novel microbial sources is essential. The isolation and screening of new strains not only expand the catalog of biosurfactant producers but also enable the discovery of molecules with unique physicochemical properties and broader application potential. Therefore, targeted screening strategies play a crucial role in identifying promising candidates for industrial and environmental biotechnology. This study highlighted screening approaches used to determine the capacity of bacteria to produce biosurfactants. The use of the *Aeromonas caviae* LipT51 strain was given as an example. To induce biosurfactant synthesis, the bacteria were cultured in an olive oil-supplemented medium, and production was systematically evaluated using a series of qualitative and quantitative tests. These included the oil spreading test, emulsification index (E24), Parafilm M test, CTAB agar plate method, foam formation test, hemolytic activity test, and phenol-sulfuric acid method (Gurkok, 2022; Gurkok and Ozdal, 2023).

Acknowledgement: This research was supported by the Atatürk University Scientific Research Projects Coordination Unit under project number [FYL-2024-13379].

References

- [1] S. Gurkok, 2022. Screening of high yield biosurfactant producing strains of agribiotechnological importance. In Applications of Biosurfactant in Agriculture (pp. 163-180). Academic Press.
- [2] S. Gurkok, M. Ozdal, (2023). Screening Methods for Biosurfactant-Producing Microorganisms. In Multifunctional Microbial Biosurfactants (pp. 1-24). Cham: Springer Nature Switzerland

ID: P-32

A Bibliometric Analysis of Precision Livestock Farming Technologies

İremnur AYDIN¹, Esranur SAYGILI ÜĞDÜL² Derya GÜLER³ and Zeynep SÖNMEZ⁴

¹ Atatürk University, Faculty of Agriculture, Department of Animal Science, Erzurum, Turkey, 0000-0003-3374-4586

² Atatürk University, Faculty of Agriculture, Department of Animal Science, Erzurum, Turkey, 0000-0002-9701-1544

³ Atatürk University, Faculty of Agriculture, Department of Animal Science, Erzurum, Turkey, 0000-0002-5019-120X

⁴ Atatürk University, Faculty of Agriculture, Department of Animal Biotechnology, Erzurum, Turkey, 0000-0003-2696-9138

ABSTRACT

Precision livestock technologies (PLF) are techniques applied by using sensors that enable real-time monitoring of animal data in order to increase animal production data due to increasing population density in our globalising world, to increase arable agricultural areas and to use these areas efficiently for their intended purpose, to protect animal production against global warming factors, and to raise farm animals in accordance with their health and welfare. This study provides a bibliometric analysis of global research trends in PLF technologies using major scientific databases. In our research, Scopus, Web of science (WOS) and PubMed databases were searched using the keywords "Precision Livestock Farming Technologies" and original articles, reviews, book chapters, and works published as congress proceedings were collected. Data were analysed graphically and by network analyses using VOSviewer and Biblioshiny (R package) software. Bibliometric analyses identified research hotspots in livestock research around topics such as automated monitoring, sensor integration, animal welfare and sustainable animal husbandry. The results provide a comprehensive overview of the intellectual landscape and the evolving research environment of the PLF and provide insights into future directions in smart agriculture and livestock innovation.

Keywords: PLF, Bibliometric Analysis, Livestock, VOSviewer, R studio.

ID: P-33

Estimation of the Antioxidant, Antidiabetic, Anti-Alzheimer and Antiglaucoma Effects of *Eminium rauwolffii* (Blume) Schott var. *rauwolffii* Species: Polyphenolic Profiling by LC-MS/MS Chromatography

Veysel Tahiroğlu¹, Hasan Karageçili^{2*}, Kübra Aslan³, Emrah Yerlikaya⁴,
Mustafa Abdullah Yılmaz⁵, Mehmet Fidan⁶, İlhami Gülçin^{3,7*}

¹Şırnak University, Şırnak, Türkiye, ORCID: 0000-0003-3516-5561:

²Siirt University, Siirt, Türkiye, ORCID: 0000-0001-6912-3998:

³Ataturk University, Erzurum, Türkiye, ORCID: 0000-0001-8388-5470:

⁴Siirt University, Siirt, Türkiye, ORCID: 0000-0003-4050-0790:

⁵Dicle University, Diyarbakır, Türkiye, ORCID: 0000-0002-4090-7227:

⁶Siirt University, Siirt, Türkiye, ORCID: 0000-0002-0255-9727:

⁷Agri Ibrahim Cecen University, Agri, Türkiye, ORCID: 0000-0001-5993-1668:

ABSTRACT

Eminium rauwolffii (Blume) Schott var. *rauwolffii* is a member of the Araceae a large, mainly tropical family throughout the world. The IC₅₀ values for ethanol extract of *E. rauwolffii* for radical scavenging capacities were determined to be almost higher than reference antioxidant standards as measured 25.35±1.42 µg/mL for ABTS^{•+} and lower than references as 106.80±1.88 µg/mL for DPPH[•], consequently. The total phenolic and flavonoid quantities in water extract of *E. rauwolffii* and ethanol extract of *E. rauwolffii* were measured in the range of 189.78±0.01 to 298.54±0.01 mg GAE/g and 89.37±0.01 to 178.95±0.01 mg QE/g, respectively. The IC₅₀ values for ethanol and water extracts of *E. rauwolffii* against α-glycosidase, acetylcholinesterase (AChE), butyrylcholinesterase (BChE) and carbonic anhydrase I and II (hCA I, hCA II) enzymes were 10.79±5.61 to 13.18±5.77, 36.14±4.61 to 62.63±1.67, 69.37±7.36 to 37.48±0.27, 81.30±5.95 to 62.35±8.03 and, 29.34±1.38 to 115.90±3.3 µg/mL respectively. The content of compounds was determined using LC-MS/MS towards 53 standards. The obviously indicated that phenolic and flavonoid antioxidant-rich *E. rauwolffii* has potential usage in amelioration of glaucoma, Alzheimer's disease, diabetes, cardiovascular disease, cancerous, and epilepsy disorders.

Keywords: *E. rauwolffii*; antioxidant; acetylcholinesterase; α-glycosidase; carbonic anhydrase; phenolic compounds.

References

[1] Z. Ergün, 2021. Determination of Fatty Acid Composition of Seed and Tuber Oils of. *Karaelmas Sci Eng J.*,11(1):28-32. doi:10.7212/ karaelmasfen.794287M.M.

Synthesis of New Sulfamoylureas Derivatives and Investigation of Their Inhibitory Effects Against hCA I/II, AChE, and BChE Enzymes by *In Silico* and *In Vitro* Approaches

Ahmet Çağan², İbrahim Çelik¹, Necla Öztaşkın¹, Akın Akıncıoğlu^{2,3},
Rüya Sağlamtaş^{2,4}, Hülya Akıncıoğlu⁵, Süleyman Göksu¹

¹Atatürk University, Faculty of Science, Department of Chemistry, Erzurum, TÜRKİYE

²Ağrı İbrahim Çeçen University, Central Researching Laboratory, 04100, Ağrı, TÜRKİYE

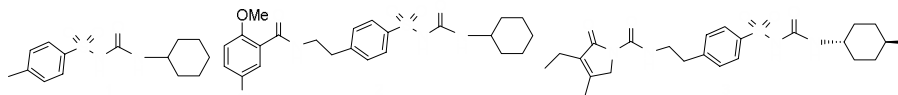
³Vocational School, Ağrı İbrahim Çeçen University, 04100, Ağrı, TÜRKİYE

⁴Ağrı İbrahim Çeçen University, Vocational School of Health Services, Medical Services and Techniques Department, 04100-Ağrı, TÜRKİYE

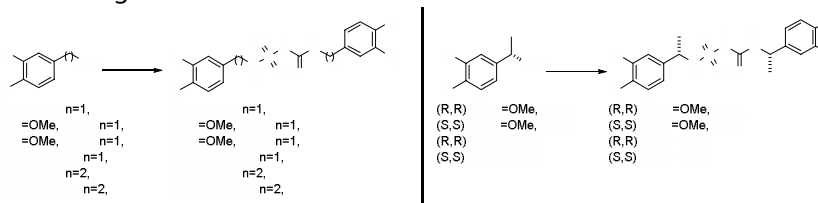
⁵Ağrı İbrahim Çeçen University, Faculty of Arts and Science, 04100-Ağrı, TÜRKİYE

ABSTRACT

Sulfamoylureas derivatives are known for their diverse pharmacological effects, which include antidiabetic¹, antibacterial², antitubercular³, cytotoxic⁴, anticonvulsant⁵, antimalarial⁶, and anti-inflammatory⁷ activities. Tolbutamide (**1**), Glibenclamide (**2**), and Glimepiride (**3**) are drugs used in the management of type 2 diabetes and are among the commonly prescribed medications⁸⁻⁹.



In this study, sulfamoylureas derivative compounds **10-15**, (R,R)-**18-19** and (S,S)-**18-19** were synthesized, and their inhibitory activities against carbonic anhydrase I and II (hCA I/II) isoenzymes, as well as acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) enzymes, were investigated using both *in silico* and *in vitro* methods.



Acknowledgement: We are greatly indebted to Atatürk University and Ağrı İbrahim Çeçen University for financial supports of this work.

References

- [1] Jawale, D. V., Pratap, U. R., Rahuja, N., Srivastava, A. K. Mane, R. A. Synthesis and antihyperglycemic evaluation of new 2,4-thiazolidinediones having biodynamic aryl sulfonylurea moieties. *Bioorg Med Chem Lett.* 2012, 22, 436-439.
- [2] Faidallaha, H. M., Khan, K. A., Asiri, A. M. Synthesis and biological evaluation of new 3,5-di(trifluoromethyl)-1,2,4-triazolesulfonylurea and thiourea derivatives as antidiabetic and antimicrobial agents. *J Fluorine Chem.* 2011,132(11), 870-877.

- [3] Pan, L., Jiang, Y., Liu, Z., Xing-Hai, L., Zhuo, L., Gang, W., Zheng-Ming; L., Wang, D. Synthesis and evaluation of novel monosubstituted sulfonylurea derivatives as antituberculosis agents. *Eur J Med Chem.* 2012, 50,18-26.
- [4] Zhang, Z. J., Tian, J., Wang, L. T., Wang, M. J., Nan, X., Yang, L., Liu, Y. Q., Morris-Natschke, S. L., Lee, K. H. Design, synthesis and cytotoxic activity of novel sulfonylurea derivatives of podophyllotoxin. *Bioorg Med Chem.* 2014, 22, 204-210.
- [5] Masereel B., Lambert, D. M., Dogné, J. M., Poupaert, J. H., Delarge, J. Anticonvulsant Activity of Pyrid-3-yl-Sulfonyl Ureas and Thioureas. *Epilepsia.* 1997,38(3), 334-337.
- [6] León, C., Rodrigues, J., de Dominiques, N. G., Charris, J., Gut, J., Rosenthal, P. J., Domínguez, J. N., Synthesis and evaluation of sulfonylurea derivatives as novel antimalarials. *Eur J Med Chem.* 2007, 42(6),735-742.
- [7] Cui, W., Zhang, S., Cai, Z., Hu, X., Zhang, R., Wang, Y., Li, N., Chen, Z., Zhang, G. The antidiabetic agent glibenclamide protects airway hyperresponsiveness and inflammation in mice. *Inflammation.* 2015, 38, 835–845.
- [8] Knowler, W. C., Barrett-Connor, E., Fowler, S. E., Hamman, R. F., Lachin, J. M., Walker, E. A., Nathan, D. M. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med.* 2002, 346, 393–403.
- [9] Ortega, F. J., Gimeno-Bayon, J., Espinosa-Parrilla, J. F., Carrasco, J. L., Batlle, M., Pugliese, M., Mahy, N., Rodríguez, M. J. ATP-dependent potassium channel blockade strengthens microglial neuroprotection after hypoxia-ischemia in rats. *Exp. Neurol.* 2012, 235, 282–296.

ID: P-35

The Synthesis of a Series of Novel Bissulfonamide Derivatives and The Investigation of Their Effects as Inhibitors Against hCA I/II, AChE and BChE Enzymes

Ahmet Çağan², Uğur Canoğlu¹, Akın Akıncioğlu^{2,3}, Necla Öztaşkın¹, Rüya Sağlamtaş^{2,4}, Hülya Akıncioğlu⁵, Süleyman Göksu¹

¹Department of Chemistry, Faculty of Science, Atatürk University, 25240-Erzurum, Türkiye

²Ağrı İbrahim Çeçen University, Central Researching Laboratory, 04100-Ağrı, Türkiye

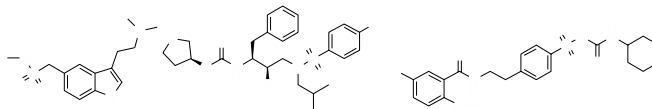
³Ağrı İbrahim Çeçen University, Vocational School, 04100-Ağrı, Türkiye

⁴Ağrı İbrahim Cecen University, Vocational School of Health Services, Medical Services and Techniques Department, 04100-Ağrı, Türkiye

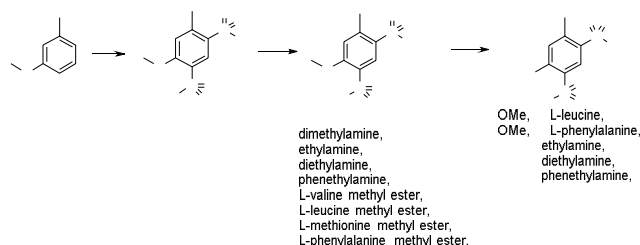
⁵Ağrı İbrahim Cecen University, Faculty of Arts and Sciences, Chemistry Department, 04100-Ağrı, Türkiye

ABSTRACT

Sulfonamides possess many biological activities such as anticancer¹, anticonvulsant², antidiabetic³, anti-inflammatory⁴, antimicrobial, antimalarial, antiviral, acetylcholine esterase inhibitory and carbonic anhydrase (hCA) inhibitory effects. A well-known sulfonamide derivative, sumatriptan (**1**), is a 5-HT_{1B}/5-HT_{1D} receptor agonist and is used for the treatment of migraine headaches. Another sulfonamide derivative, amprenavir (**2**), is a protease inhibitor and is recommended for the treatment of HIV infection and AIDS. Glibenclamide (**3**) is used for the treatment of type-2 diabetes mellitus.



In this study, considering the broad biological activities of compounds containing the sulfonamide functional group, a series of **6-19** bissulfonamide derivatives were synthesized, and their properties against hCA I/II isoenzymes and AChE and BChE enzymes were investigated both *in silico* and *in vitro*.



Acknowledgement: We are greatly indebted to Atatürk University and Ağrı İbrahim Çeçen University for financial supports of this work.

References

- [1] T. Lu, A. W. Goh, M. Yu, J. Adams, F. Lam, T. Teo, P. Li, B. Noll, L. Zhong, S. Diab, O. Chahrouh, A. Hu, A. Y. Abbas, X. Liu, S. Huang, C. J. Sumby, R. Milne, C. Midgley, S. Wang. Discovery of (E)-3-((styrylsulfonyl)methyl)pyridine and (E)-2-((styrylsulfonyl)methyl)pyridine derivatives as anticancer agents: synthesis, structure-activity relationships, and biological activities. *J. Med. Chem.* 2014, 57, 2275-2291.

- [2] N. Siddiqui, A. Rana, S. A. Khan, M.A. Bhat, S. E. Haque. Synthesis of benzothiazole semicarbazones as novel anticonvulsants--the role of hydrophobic domain. *Bioorg. Med. Chem. Lett.* 2007, 17, 4178-4182.
- [3] Y. Du, Y. Zhang, H. Ling, Q. Li, J. Shen. Discovery of novel high potent and cellular active ADC type PTP1B inhibitors with selectivity over TC-PTP via modification interacting with C site. *Eur. J. Med. Chem.* 2018, 144, 692-700.
- [4] H. Suleyman, E. Cadirci, A. Albayrak, Z. Halici. Nimesulide is a selective COX-2 inhibitory, atypical non-steroidal anti-inflammatory drug. *Curr. Med. Chem.* 2008, 15, 278-283.

Synthesis and Biological Activities of Pyrazole-Linked Sulfonamide-Containing Compounds

Cetin Bayrak^{1,2} Songul Bayrak¹

¹Dogubayazit Ahmed-i Hani Vocational School, Agri Ibrahim Cecen University, Agri 04400, Turkey

²Department of Chemistry, Faculty of Science, Ataturk University, Erzurum 25240, Turkey

ABSTRACT

Pyrazole is an aromatic heterocyclic compound containing N–N bonds in a five-membered ring. This unique heterocycle ring possesses various important biological activities such as cytotoxic, COX-2 inhibitory, anti-inflammatory and antimicrobial properties [1]. Pyrazole benzenesulfonamide moiety have inhibitory effects against carbonic anhydrase (CA) [2]. In recent years, it has been observed that these compounds also have an inhibitory effect on the aldose reductase enzyme. There are many drugs that contain the pyrazole benzenesulfonamide moiety [3]. (Fig. 1)

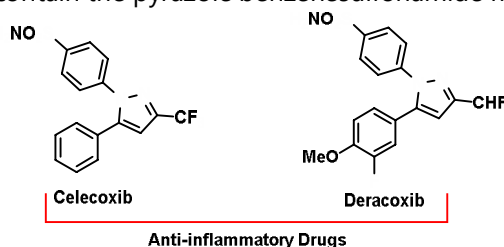
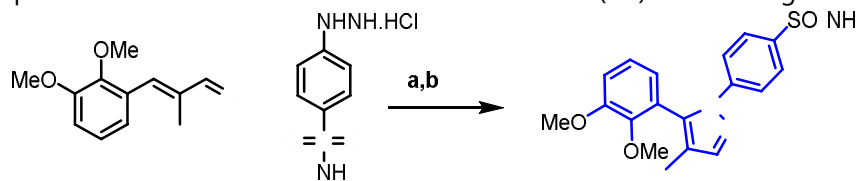


Figure 1. Structures of pyrazole and sulfonamide containing drugs

We have synthesized α,β -unsaturated aldehyde compounds as a starting material for the construction of pyrazole benzenesulfonamide (**3**) and their derivatives. Compound **3** and their derivatives were obtained from reactions of corresponding α,β -unsaturated aldehyde compounds with **2**, and 2,3-Dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) respectively. The inhibitory effect of these compounds on recombinant human aldose reductase (AR) was investigated.



a) CH₃CO (Cat.), EtOH, Reflux. **b)** DDQ, CH₂Cl₂, Rt

Schema 1. Synthesis of pyrazole sulfonamide compounds

Acknowledgements

This study was carried out at Ataturk University, Department of Chemistry and Agri Ibrahim Cecen University. The author is indebted to Agri Ibrahim Cecen University (Project no: FBE.21) for financial support.

References

- [1] A.A. Abdel-Aziz, A.S. El-Azab, S. Bua, A. Nocentini, M.A. Abu El-Enin, M. M. Alanazi, N.A. AlSaif, M.M. Hefnawy, C.T. Supuran, *Bioorg. Chem.* (2019), 87, 425–431.
- [2] H.I. Gul, E. Mete, P. Taslimi, I. Gulcin, C.T. Supuran, *J. Enzyme Inhib. Med. Chem.* (2017), 32 (1), 189–192.
- [3] C. Bayrak, *Bioorg Chem.* (2022), 128, 106086

A New Generalization of Oresme Sequences: Biperiodic Oresme-Lucas Sequence

H. Gökbaş¹

¹Science and Arts Faculty, Bitlis Eren University, Bitlis, Turkey, ORCID: 0000-0002-3323-8205

ABSTRACT

Fibonacci sequence has fascinated mathematicians and scientists alike with its beauty and tendency to appear in unexpected places for years. When it came to the rabbit issue, Leonardo de Pisa could not have predicted how useful and interesting the number sequences would be. There are several other mathematical fields such as graph theory, computer algorithms, Pythagorean triples, Pascal's triangle, and many more that use the Fibonacci numbers [1]. For any two nonzero real numbers a and b , the biperiodic Fibonacci sequence is defined recursively by

$$F_0^{a,b} = 0, F_1^{a,b} = 1, F_n^{a,b} = \begin{cases} aF_{n-1}^{a,b} + F_{n-2}^{a,b}, & n \text{ even,} \\ bF_{n-1}^{a,b} + F_{n-2}^{a,b}, & n \text{ odd.} \end{cases}$$

These sequences occur in the study of continued fractions of quadratic irrationals and combinatorics on words or dynamical system. One can get the classical Fibonacci sequence when $a = b = 1$ [2].

The famous French naturalist and philosopher Nicole Oresme introduced the Oresme sequence $O_n = \frac{n}{2^n}$ for $n = 0, 1, 2, \dots$. We can learn from Horadam's work [3] that Oresme's work was not published and the features of the series he described. This sequence is found intriguing as a response to a question involving the calculation of ratios in subsequent generations, given that the ratios of grandparents and parents with different genotypes are known. These numbers form a second order sequence and are defined by the recurrence relation

$$O_0 = 0, O_1 = \frac{1}{2}, O_n = O_{n-1} - \frac{1}{4}O_{n-2} \text{ and } OL_0 = 2, OL_1 = 1, OL_n = OL_{n-1} - \frac{1}{4}OL_{n-2}, n \geq 2, \text{ when the initial conditions change, the sequence is called Oresme-Lucas [4].}$$

In this work, biperiodic sequence will be defined and a variety of their algebraic properties will be presented. Some identities, such as Binets formula and generating function formula, as well as a matrix representation of the biperiodic Oresme-Lucas sequence, will be given.

References

- [1] M. Edson, O. Yayenie, A New Generalization of Fibonacci Sequences and the Extended Binet's Formula, *Inyegers Electron. J. Comb. Number Theor.*, 9 (2009), 639-654.
- [2] A. F. Horadam, Oresme numbers, *Fibonacci Quart.*, 12(3) (1974), 267-270.
- [3] Y. Soykan, Generalized Oresme numbers, *Earthline Journal of Mathematical Sciences*, 7(2) (2021), 333-367.
- [4] S. Falcon, A. Plaza, On the Fibonacci k-numbers, *Chaos, Solitons & Fractals*, 32(5) (2007), 1615-1624.

The Mathematical Structure and Representations of (t,s)-Oresme and (t,s)-Oresme-Lucas Numbers

H. Gökbaş¹

¹Science and Arts Faculty, Bitlis Eren University, Bitlis, Turkey, ORCID: 0000-0002-3323-8205

ABSTRACT

Fibonacci sequence has fascinated mathematicians and scientists alike with its beauty and tendency to appear in unexpected places for years. When it came to the rabbit issue, Leonardo de Pisa could not have predicted how useful and interesting the number sequences would be. There are several other mathematical fields such as graph theory, computer algorithms, Pythagorean triples, Pascal's triangle, and many more that use the Fibonacci numbers [1]. The famous French naturalist and philosopher Nicole Oresme introduced the Oresme sequence $O_n = \frac{n}{2^n}$ for $n = 0, 1, 2, \dots$. We can learn from Horadam's work [2] that Oresme's work was not published and the features of the series he described. This sequence is found intriguing as a response to a question involving the calculation of ratios in subsequent generations, given that the ratios of grandparents and parents with different genotypes are known. These numbers form a second order sequence and are defined by the recurrence relation

$O_0 = 0, O_1 = \frac{1}{2}, O_n = O_{n-1} - \frac{1}{4}O_{n-2}$ and $OL_0 = 2, OL_1 = 1, OL_n = OL_{n-1} - \frac{1}{4}OL_{n-2}, n \geq 2$, when the initial conditions change, the sequence is called Oresme-Lucas [3].

For positive real number k , the k -Oresme and k -Oresme-Lucas sequences are defined recursively by

$O_0^k = 0, O_1^k = \frac{1}{k}, O_n^k = O_{n-1}^k - \frac{1}{k^2}O_{n-2}^k$ and $OL_0^k = 2, OL_1^k = 1, OL_n^k = OL_{n-1}^k - \frac{1}{k^2}OL_{n-2}^k$

These sequences occur in the study of continued fractions of quadratic irrationals and combinatorics on words or dynamical system. One can get the classical Oresme and Oresme-Lucas sequences when $k = 1$ [4].

In this work, (t,s)-Oresme and (t,s)-Oresme-Lucas sequences will be defined and a variety of their algebraic properties will be presented. Some identities, such as Binets formula and generating function formula, as well as a matrix representation of the (t,s)-Oresme and (t,s)-Oresme-Lucas sequences, will be given.

References

- [1] M. Edson, O. Yanyenie, A New Generalization of Fibonacci Sequences and the Extended Binet's Formula, *Inyegers Electron. J. Comb. Number Theor.*, 9 (2009), 639-654.
- [2] A. F. Horadam, Oresme numbers, *Fibonacci Quart.*, 12(3) (1974), 267-270.
- [3] Y. Soykan, Generalized Oresme numbers, *Earthline Journal of Mathematical Sciences*, 7(2) (2021), 333-367.
- [4] E. Özkan, H. Akkuş, A new approach to k-Oresme and k-Oresme-Lucas sequences, *Symmetry*, 16 (2024), 1407.

ID: P-39

Exploring Condition Number, Singular Value Decomposition (SVD) For Data Compression with Geometric and Symmetric Geometric Rhaly Terraced Matrices

B. Kuloğlu¹

¹*Department of Engineering Basic Sciences, Sivas University of Science and Technology, Sivas, Türkiye, ORCID: 0000-0001-7624-8270*

ABSTRACT

This study presents a comprehensive theoretical and numerical investigation of geometric and symmetric geometric Rhaly Terraced matrices. At the theoretical level, explicit formulas for the norms, characteristic polynomials, and spread of these special matrices are derived, providing a rigorous mathematical foundation. To illustrate the applicability of these results, Fibonacci numbers are employed in numerical examples, confirming the accuracy of the derived bounds and highlighting their structural implications.

A key finding of this work is the distinct role of the scaling parameter r in shaping matrix behavior: when $r < 1$, symmetric geometric Rhaly matrices exhibit more favorable stability and tighter spectral bounds, whereas for $r > 1$, geometric Rhaly Terraced matrices yield superior results, particularly in terms of spectral spread and norm behavior. Singular value decomposition (SVD) analysis further reveals that these matrices possess strong low-rank structures, enabling effective approximations that preserve most of the essential features of the original matrices. Such properties underscore their potential in data compression, dimensionality reduction, and numerical modeling.

Interestingly, while SVD highlights compressibility and energy concentration in leading singular values, it simultaneously increases the condition number, indicating a trade-off between approximation efficiency and numerical stability. This duality suggests that the choice between geometric and symmetric geometric forms should be guided by application-specific requirements favoring one for compression-oriented tasks and the other for stability-sensitive computations. Overall, the interplay of theoretical rigor and numerical validation demonstrates the versatility of Rhaly Terraced matrices across a wide spectrum of mathematical and applied domains.

References

- [1] Almasri, I. (2016). Absolutely Summing Terraced Matrices. *Concrete Operators*, 3(1), 1-7. <https://doi.org/10.1515/conop-2016-0001>
- [2] Akbıyık, S. Y., Akbıyık, M., Yılmaz, F. (2021), One Type of Symmetric Matrix with Harmonic Pell Entries, Its Inversion, Permanents and Some Norms, *Mathematics*, 9 (5):539
- [3] Candès, E. J., & Recht, B. (2009). Exact matrix completion via convex optimization. *Foundations of Computational Mathematics*, 9(6), 717–772. <https://doi.org/10.1007/s10208-009-9045-5>.

- [4] Durna, Nuh and Yildirim, Mustafa (2016) Generalized terraced matrices. *Miskolc Mathematical Notes*, 17 (1). pp. 201-208. ISSN 1787-2405 (print), 1787-2413 (online)
- [5] Eckart, C., & Young, G. (1936). The approximation of one matrix by another of lower rank. *Psychometrika*, 1(3), 211–218. <https://doi.org/10.1007/BF02288367>
- [6] Hoggatt, Verner E., Jr. (1969). *Fibonacci and Lucas Numbers*. Boston, MA: Houghton-Mifflin, Chs.5,7.
- [7] Horn, R. A., and Charles R. J. (2013). *Matrix Analysis*. 2. baskı, Cambridge University Press.
- [8] Kızılateş, C., & Tuglu, N. (2018). On the Norms of Geometric and Symmetric Geometric Circulant Matrices with the Tribonacci Number. *Gazi University Journal of Science*, 31(2), 555-567.
- [9] Kuloğlu, B., Eser, E., & Özkan, E. (2023). On the Properties of r-Circulant Matrices Involving Generalized Fermat Numbers. *Sakarya University Journal of Science*, 27(5), 956-964. <https://doi.org/10.16984/sofenbilder.1280572>
- [10] Kuloğlu, B., Eser, E., and Özkan, E., (2023). The r-circulant Matrices Associated with k-Fermat and k-Mersenne Numbers. *Wseas Transactions on Mathematics*, vol.22, 531-543.
- [11] Rhaly, H.C. (1989). p-Cesàro matrices. *Houston Journal of Mathematics*. 15(1): 137-146.
- [12] Shannon, A.G., Kuloğlu, B. & Özkan, E. Rhaly terraced sequences their generalizations, properties and applications. *Comp. Appl. Math.* **44**, 226 (2025). <https://doi.org/10.1007/s40314-025-03179-x>
- [13] Sloane, N.J.A. (2024). OEIS Foundation Inc., The On-Line Encyclopedia of Integer Sequences, <http://oeis.org>.

ID: P-40

k-Vieta-Fibonacci Sequence and Application to Hyperbolic Quaternions

Engin Özkan¹ and Hakan Akkuş²

¹Marmara University, Istanbul, Türkiye, ORCID: 0000-0002-4188-7248

²Erzincan Binali Yıldırım University, Erzincan, Türkiye, ORCID: 0000-0001-9716-9424

ABSTRACT

In this study we introduce the k -Vieta-Fibonacci sequence. Also we present key properties such as Binet formulas, generating functions, and summation formulas. The relationships between the terms of the sequences are explored, and classical identities like Cassini's and D'Ocagne's are derived for this. Additionally, the k -Vieta-Fibonacci sequence is linked to known sequences and such as Fibonacci, Pell, Balancing, and Mersenne sequences. For specific values of k , connections are made to sequences in the OEIS database. The study also we explore applications of this sequence to hyperbolic quaternions, deriving properties such as their Binet formulas and Catalan identity. Finally, it establishes connections between the k -Vieta-Fibonacci sequence and their corresponding hyperbolic quaternion forms.

Acknowledgement: This work was supported by Marmara University Rectorship under "The Scientific and Research Project of Marmara University", Project Code: ADF-2025-11437.

ID: P-41

Emergency Cesarean Anesthesia in a Patient with Guillain-Barré Syndrome: A Case Report

Fatma OKUCU¹

¹*Agri Ibrahim Cecen University, Faculty of Medicine, Agri, TÜRKİYE, ORCID: 0000-0002-5518-8659*

ABSTRACT

Guillain-Barré Syndrome (GBS) is a rapidly progressive demyelinating disorder affecting peripheral nerves and nerve roots. Anesthesia management in these patients requires special consideration due to autonomic dysfunction and increased sensitivity to muscle relaxants.

A 27-year-old woman at 36 weeks of gestation had previously been diagnosed with GBS in early pregnancy but had not attended regular follow-ups after IVIG therapy. Due to fetal distress, an emergency cesarean section was scheduled. Preoperative evaluation revealed full muscle strength and normal sensory examination. Because the patient had not fasted adequately, rapid sequence induction with low-dose propofol and rocuronium was performed. After delivery, anesthesia was maintained with propofol and remifentanyl infusion. The infant's Apgar score was 7/7. Hemodynamics remained stable throughout the surgery, and no perioperative complications occurred. Postoperative neurological status remained unchanged, and the patient was transferred to the ward after intensive care monitoring without complications.

Emergency surgical interventions in GBS patients require individualized anesthesia planning. Considering autonomic dysfunction and sensitivity to muscle relaxants, our experience suggests that rapid sequence induction with low-dose non-depolarizing muscle relaxants can be performed safely in these patients.

Cesarean Section Is a Risk Factor That Prevents Organ Transplantation by Increasing the Development of Anti-HLA Antibodies in Women

Gökhan Akyüz¹, Hasan Doğan ²

¹*Department of Medical Biology, Faculty of Medicine, Ataturk University, Erzurum, Turkey ORCID: 0000-0002-5936-0938*

²*Department of Medical Biology, Faculty of Medicine, Ataturk University, Erzurum, Turkey ORCID: <https://orcid.org/0000-0002-5232-4336>*

ABSTRACT

The formation of antigens called human leukocyte antigens (HLA), which are found in almost all cells of the human body but are first displayed in leukocytes, is under the control of a gene region called major histocompatibility complex (MHC). The MHC gene region antigens exhibit a high degree of polymorphism and play a role in recognizing the body's structures, distinguishing endogenous/exogenous antigens, and in many autoimmune, allergic, infectious diseases, or malignancies. Additionally, these antigens can also have an impact on the variable progression of diseases among individuals [1, 2]. The term panel reactive antibody (PRA) is used for anti-HLA antibodies, which represent HLA antibodies formed against HLA antigens different from one's own. Due to the highly polymorphic nature of the HLA gene region, even the smallest differences can lead to antibody formation. This plays a significant role in tissue transplantation, rejection of transplanted tissue, the success of the transplant, and the development of post-transplant complications. Anti-HLA antibodies are the major barrier to organ transplantation and particularly limit or eliminate treatment options for individuals with high PRA positivity. Therefore, it is important to perform PRA screening, especially before procedures such as renal transplantation and bone marrow transplantation [3]. Pregnancy is not limited to the period of pregnancy and postpartum; it is a process that extends beyond that. Factors during pre-pregnancy, pregnancy, childbirth, and the postpartum period, as well as the method of delivery, can impact women's subsequent pregnancies and future lives. In this study, based on the higher prevalence of PRA positivity in women compared to men, we aimed to evaluate the relationship between cesarean section and vaginal delivery. This relationship could potentially be a factor in scenarios such as the development of post-pregnancy anti-HLA antibodies, which could influence a person's treatment chances and guide treatment decisions. In this study, prenatal and postnatal blood samples were taken from pregnant women who had 35 or more gestational weeks and had not developed anti-HLA positivity yet. The aim of this study was to evaluate the factors that may be effective in the development of panel reactive antibody (PRA) positivity during pregnancy. PRA testing was studied by taking the blood of 86 pregnant women 1 month before birth. Blood was taken again 1 month after birth from these women with prenatal PRA negative and it was checked whether PRA positivity developed. As a control group, 40 women without

pregnancy were selected for the study. Of the 86 pregnant, 42 (48.8%) had cesarean sections, 44 (51.2%) had normal births, and PRA positivity developed in 14 (32.5%) of cesarean deliveries and three (8.0%) of normal births. In the control group, there were three (7.5%) PRA positivity. A statistically significant difference was found between cesarean delivery, normal delivery, and control group. Moreover, when compared with the control group, it was found statistically significant that all deliveries increased the development of HLA Class II antibodies. Cesarean delivery was associated with increased PRA positivity compared to normal birth. The new information presented in this study will pave the way for further research and enable healthcare professionals to consider both the individual's potential future need for organ transplantation and the positive impact on public health and more effective management of healthcare costs when making decisions regarding cesarean section.

Acknowledgement: This work was supported by BAP of Erzurum Ataturk University.

References

- [1] E. Thorsby, "A Short History of HLA," *Tissue Antigens* 74, no. 2 (2009): 101–116.
- [2] T. Nakamura, T. Shirouzu, K. Nakata, N. Yoshimura, and H. Ushigome, "The Role of Major Histocompatibility Complex in Organ Transplantation-Donor Specific Anti-Major Histocompatibility Complex Antibodies Analysis Goes to the Next Stage," *International Journal of Molecular Sciences* 20, no. 18 (2019): 4544.
- [3] Z. Y. Kang, C. Liu, W. Liu, and D. H. Li, "Effect of C1q-Binding Donor-Specific Anti-HLA Antibodies on the Clinical Outcomes of Patients After Renal Transplantation: A Systematic Review and Meta-Analysis," *Transplant Immunology* 72 (2022): 101566.

ID: P-43

Endoscopy-Assisted Seton Placement: A Novel Technique for the Treatment of Anal Fistula

Adem Aslan

Faculty of Medicine, İbrahim Çeçen University, Turkey

ABSTRACT

Anal fistula remains a challenging condition for surgeons due to its high recurrence rate and risk of sphincter damage. Conventional seton techniques provide drainage but are associated with patient discomfort and variable outcomes.

We present a novel, minimally invasive approach using endoscopy-assisted seton placement, designed to improve visualization, ensure precise tract identification, and minimize sphincter injury.

The technique involves endoscopic exploration of the fistula tract, followed by accurate placement of a seton under direct vision. This approach allows for better delineation of the internal opening and secure seton positioning.

Preliminary clinical experience demonstrated favorable outcomes with reduced postoperative pain, faster recovery, and low complication rates. Patients reported higher satisfaction compared to conventional seton procedures.

Endoscopy-assisted seton placement is a promising, innovative technique for anal fistula management. It combines the safety of conventional methods with the precision of endoscopic guidance, potentially improving both functional and clinical results. Further prospective studies with larger cohorts are warranted.

Keywords: Anal fistula, Seton technique, Endoscopy, Minimally invasive surgery, Novel surgical method

Investigation of the Effects of Novel Bicyclic Molecules Containing an Imidazole Ring on Apoptotic, Autophagic, ER Stress, and DNA Repair Systems in Glioblastoma Cells

Filiz Taşpınar¹, Fazile Nur Ekinçi Akdemir²

¹Aksaray University, Faculty of Medicine, Department of Physiology, Aksaray, Türkiye.

²Erzurum Health Sciences University, Faculty of Medicine, Department of Physiology, Erzurum, Türkiye.

ABSTRACT

Aim: Glioblastoma (GBM) is the most aggressive and common primary malignant brain tumor in adults, characterized by rapid proliferation, extensive infiltration, and marked genetic heterogeneity. The limited efficacy and substantial toxicity of conventional therapies underscore the urgent need for novel treatment strategies. The identification of novel molecular entities suitable for integrative chemotherapeutic strategies represents an urgent need in glioblastoma treatment. This study was designed to develop and characterize potential molecular candidates with therapeutic relevance for glioblastoma.

Methods: Two novel bicyclic compounds, designated as compound 1 (C1) and compound 2 (C2), each incorporating an imidazole ring, were synthesized. Their cytotoxic activities were assessed in the U87-MG glioblastoma cell line using the MTT assay. To further elucidate the molecular mechanisms underlying the activity of compound 1, the expression profiles of genes involved in endoplasmic reticulum stress, autophagy, apoptosis, and DNA repair pathways were determined by RT-qPCR. Statistical analyses were performed using IBM SPSS Statistics.

Results: In U-87 MG cells, the IC₅₀ values of C1 and C2 were 22.46 µM and 43.15 µM, respectively for 48h. Based on its higher cytotoxic potency, C1 was selected for mechanistic pathway analysis. Treatment with C1 resulted in a significant upregulation of endoplasmic reticulum stress markers (GRP78 and CHOP; $p < 0.01$), autophagy-related genes (ATG6 and AMBRA1; $p < 0.01$), and apoptosis-associated genes (CASP3, CASP8, CASP9, BAX, and BAD; $p < 0.01$). Additionally, a marked increase in the expression of the DNA repair genes MLH1 and MSH2 was observed, whereas PARP1 expression remained unchanged.

Conclusions: C1 exhibited a stronger cytotoxic effect on U-87 MG cells than C2. It induced ER stress-mediated apoptosis accompanied by activation of autophagy and DNA repair responses. These results indicate that C1 triggers multifactorial cell-death mechanisms and may serve as a promising lead for the development of therapies against glioblastoma.

ID: P-45

IoT-Based PI Control for Wireless Voltage Regulation in DC-DC Converters

A. Özmen¹ and M.A. Celik²

¹*Department of Electronics and Automation, Vocational School, Agri Ibrahim Cecen University, Agri, Turkey, ORCID: 0000-0002-3631-4883*

²*Electrical and Energy Department, Vocational School, Agri Ibrahim Cecen University, Agri, Turkey, ORCID: 0000-0001-9221-1099*

ABSTRACT

This paper presents an IoT-based PI control approach in a DC-DC converter structure developed to increase stability and reliability in wireless power transmission systems. In the designed system, current and voltage samples are collected through IoT modules and transmitted wirelessly to the control unit, and the PI algorithm processes these data and dynamically generates the switching signals of the converter. Thus, the stability of the output voltage against variable input conditions is ensured and the regulation performance of the system is improved. The unique contribution of the study is the realisation of PI control with IoT-based wireless data transfer, eliminating the need for cable connections between the controller and the converter. This approach not only increases the flexibility and reliability of the system, but also paves the way for cable-independent, more scalable and innovative control architectures in future smart power electronics applications.

Keywords: DC-DC Converter, PI Control, IoT

Acknowledgement: This work was supported by Agri Ibrahim Cecen University Scientific Research Projects (BAP) Coordinatorship [Project Number: MYO.23.002].

ID: P-46

Monte Carlo Evaluation of LaBr₃ and BGO Scintillation Detectors for Gamma-Ray Spectroscopy

Pinar Kus¹, Ekrem Almaz²

¹Mus Alparslan University, Science Institute, Mus, Turkey, ORCID:

²Mus Alparslan University, Physics Department, Mus, Turkey, ORCID:0000-00028708-2189

ABSTRACT

Lanthanum bromide (LaBr₃: Ce) and bismuth germanate (BGO) are widely used scintillation detectors, each with unique strengths for γ -ray spectroscopy. In this study, Monte Carlo simulations using the MCNP code were performed to compare the detection efficiency of LaBr₃ and BGO detectors across a range of photon energies relevant to nuclear spectroscopy. The results show that BGO achieves higher intrinsic efficiency due to its high density (7.13 g/cm³) and effective atomic number, making it more effective in absorbing high-energy photons. This property is particularly advantageous for applications requiring maximum detection probability or high-throughput measurements. Conversely, LaBr₃: Ce, with its higher light yield and much shorter decay constant, provides superior energy resolution and timing characteristics. These attributes make LaBr₃ especially well-suited for radionuclide identification and fast coincidence experiments, despite its relatively lower absorption efficiency compared to BGO. Overall, the simulations highlight the trade-off between efficiency and resolution that guides scintillator selection. While BGO excels in efficiency at higher energies, LaBr₃ offers sharper spectral peaks and improved timing. The findings underscore the value of Monte Carlo modeling in optimizing detector choice for specific experimental needs in spectroscopy and demonstrate how computational tools can aid in tailoring detector systems to balance sensitivity, accuracy, and speed.

ID: P-47

Investigation of Antioxidant and Cellular Protective Molecules as Novel Candidates for Radiation Protection

Bünyamin AYGÜN¹, Abdulhalik KARABULUT², Mucip GENİŞEL³ and Turgay KORKUT⁴

¹*Agri Ibrahim Cecen University, Vocational School, Department of Electronics and Automation, Agri, Türkiye*
, ORCID:<https://orcid.org/0000-0002-9384-1540>

²*Atatürk University, Science Faculty of Physics, Department of Atom and Molecule, Erzurum, Türkiye*
, ORCID: <https://orcid.org/0000-0003-2290-9007>

³*Department of Pharmaceutical Botany, Faculty of Pharmacy, Ağrı Ibrahim Çeçen University, Agri, 04100 Türkiye, ORCID: <https://orcid.org/0000-0002-9339-9334>*

⁴*Department of Nuclear Energy Engineering, Faculty of Engineering, Sinop University, Sinop, 57000, Turkey, ORCID: <https://orcid.org/0000-0002-1333-6123>*

ABSTRACT

This study aims to investigate the potential of several bioactive molecules ergothioneine, ectoine, nicotinamide riboside (NR), nicotinamide mononucleotide (NMN), pterostilbene, and tiliroside as novel candidates for radiation protection. Although these compounds are well-documented for their antioxidant, anti-inflammatory, and protective effects on DNA integrity and mitochondrial function, their gamma-ray and fast neutron shielding capabilities have not yet been systematically studied.

The gamma-ray shielding parameters, including mass attenuation coefficient (MAC), linear attenuation coefficient (LAC), mean free path (MFP), and half-value layer (HVL), were evaluated using the WinXCom software. In addition, fast neutron shielding properties such as macroscopic cross-section, MFP, HVL, and transmitted neutron flux were theoretically simulated with the GEANT4 Monte Carlo code. Experimental validation was performed using a ²⁴¹Am–Be fast neutron source to determine equivalent dose absorption and to compare the experimental findings with the theoretical predictions.

Preliminary results highlight the potential of these molecules as dual-function candidates, combining biochemical radioprotection (via antioxidant and mitochondrial pathways) with physical radiation shielding properties. This dual mechanism may open new perspectives for the development of next-generation radioprotective agents suitable for applications in nuclear medicine, radiotherapy, and occupational radiation safety.

References

- [1] Y. Li, 2024. Ergothioneine protects against UV-induced oxidative stress through the PI3K/Akt/Nrf2 signaling pathway, *Free Radic. Res.*, 58(2), 211–223.
- [2] T. Yue, 2025. Nicotinamide riboside alleviates ionizing radiation-induced intestinal senescence via SIRT6/SIRT7 activation and mTORC1 inhibition, *Aging Cell*, 24(11), e14012.
- [3] S. Huang, 2024. Mitochondria-targeted nitronyl nitroxide radical nanoparticles (NPs-TPP-NIT) protect against X-ray induced oxidative damage in vitro and in vivo, *Cancers*, 16(2), 351.
- [4] T. Wen, 2025. The roles and functions of ergothioneine in metabolic diseases and specific mechanisms, *Biochim. Biophys. Acta Mol. Basis Dis.*, 1872(5), 134–144.
- [5] A. Stasiłowicz-Krzemien, 2024. Glycyrrhizin, a mitochondria-targeted antioxidant, mitigates radiation-induced sialadenitis by preserving mitochondrial integrity and attenuating HMGB1/TLR5-mediated apoptosis, *J. Radiat. Res. Appl. Sci.*, 17(4), 289–302.

ID: P-48

Development of Phenolic Resin Based Composite Materials and Determination of Radiation Shielding Properties

Bünyamin AYGÜN¹, Abdulhalik KARABULUT², Akın AKINCIOĞLU³ and Sümeyra BEYZADE⁴

¹Agri Ibrahim Cecen University, Vocational School, Department of Electronics and Automation, Agri, Türkiye
, ORCID: <https://orcid.org/0000-0002-9384-1540>

²Atatürk University, Science Faculty of Physics, Department of Atom and Molecule, Erzurum, Türkiye
, ORCID: <https://orcid.org/0000-0003-2290-9007>

³Agri Ibrahim Cecen University, Central Researching Laboratory, Agri, Türkiye
, ORCID: <https://orcid.org/0000-0002-6473-6338>

⁴Agri Ibrahim Cecen University, Vocational School, Department of Electronics and Automation, Agri, Türkiye
, ORCID: <https://orcid.org/0009-0002-6145-1780>

ABSTRACT

This study reports the design and development of phenolic resin-based composite materials for radiation shielding applications. Novel composites were fabricated by incorporating polyurethane (PU), lithium fluoride (LiF), glass fiber (CF), nickel oxide (NiO), iron oxide (Fe₂O₃), titanium dioxide (TiO₂), lithium borate (Li₂B₄O₇), chromium oxide (Cr₂O₃), aramid fiber, tungsten trioxide (WO₃), and zirconium oxide (ZrO₂). The gamma-ray shielding parameters, including mass attenuation coefficient (MAC), linear attenuation coefficient (LAC), mean free path (MFP), and half-value layer (HVL), were evaluated using WinXCom software. Fast neutron shielding properties such as macroscopic cross-section, MFP, HVL, and transmitted neutron flux were simulated with the GEANT4 Monte Carlo code, while experimental validation was conducted using a ²⁴¹Am-Be fast neutron source. The results demonstrated that the developed composites exhibited enhanced gamma attenuation and superior neutron absorption compared to conventional shielding materials such as paraffin, ordinary concrete, hematite-serpentine concrete, ilmenite-limonite concrete, basalt-magnetite concrete, and ilmenite concrete. These findings highlight the potential of metal oxide-reinforced phenolic resin composites as efficient candidates for nuclear and medical radiation protection.

Acknowledgement: This work was supported by Agri Ibrahim Cecen University Scientific Research Projects Coordination, MYO.24.003 number Project

References

- [1] M. I. Sayyed, G. Lakshminarayana, M. G. Dong, J. Kaewkhao, I. V. Kityk, 2019. Radiation shielding performance of newly developed materials: A review. *Radiat. Phys. Chem.*, 165, 108410.
- [2] A. M. El-Khatib, M. Dong, M. S. Badawi, M. I. Sayyed, 2020. Gamma and neutron shielding competence of some developed heavy concretes. *Prog. Nucl. Energy*, 118, 103120.
- [3] M. Kurudirek, 2021. A review on the recent studies of polymer composites for radiation shielding applications. *J. Nucl. Mater.*, 556, 153153.
- [4] M. I. Sayyed, K. A. Mahmoud, M. M. Taki, H. O. Tekin, F. Akman, 2021. Monte Carlo simulation of gamma-ray shielding parameters of selected polymers. *Radiat. Phys. Chem.*, 179, 109258.
- [5] İ. Akkurt, M. Kurudirek, 2022. Investigation of heavy metal oxide reinforced composites for gamma and neutron radiation shielding applications. *Ceram. Int.*, 48(3), 3556–3565.

ID: P-49

Structural Insights into Iodoacetamide-Mediated Inactivation of *Campylobacter jejuni* GAPDH

Adnan Ayna¹, Peter Moody²

¹ Bingol University, Faculty of Science and Literature, Department of Chemistry, Bingöl, Türkiye, ORCID: 0000-0001-6801-6242

² Leicester University, Department of Molecular Cell Biology, Leicester, United Kingdom, ORCID: 0000-0003-1762-9238

ABSTRACT

The inactivation of *Campylobacter jejuni* glyceraldehyde-3-phosphate dehydrogenase (cjGAPDH) by iodoacetamide (IA) was investigated using X-ray crystallography. Crystals of the IA-treated enzyme grew within three days, diffracted to 2.23 Å resolution, and belonged to the I4₁22 space group. Structural analysis revealed covalent modification of the active site cysteine (Cys150) to cysteine-S-acetamide, confirming successful carbamidomethylation. This modification abolished NADP⁺ binding due to steric clash between the modified cysteine and the coenzyme, consistent with earlier biochemical findings that IA prevents GAPDH–NAD⁺ complex formation. Refinement statistics (R_{work} = 0.20, R_{free} = 0.25) validated the model, which showed local rearrangements at the active site, including positioning of His177 relative to Cys150. Unlike previous GAPDH–iodoacetate complexes where NAD⁺ remained bound, the cjGAPDH–IA structure demonstrated complete exclusion of the coenzyme, highlighting mechanistic differences in inhibitor interactions. These findings provide new insights into the molecular basis of GAPDH inhibition by IA and further elucidate the structural determinants of coenzyme binding and inactivation in bacterial GAPDHs.

ID: P-50

Modulation of Diclofenac-Induced Cell Death by Chrysin in HT-29 Cells

Adnan Ayna¹, Sedanur Özbolat²

¹ Bingol University, Faculty of Science and Literature, Department of Chemistry, Bingöl, Türkiye, ORCID: 0000-0001-6801-6242

² Bingol University, Faculty of Science and Literature, Department of Chemistry, Bingöl, Türkiye, ORCID: 0000-0001-7597-5388

ABSTRACT

Colorectal cancer therapies often rely on nonsteroidal anti-inflammatory drugs (NSAIDs), yet their cytotoxic actions can be influenced by natural compounds such as flavonoids. This study aimed to examine whether chrysin modifies diclofenac-induced cell death in HT-29 colon cancer cells. Cells were exposed to diclofenac alone or together with chrysin, and oxidative stress parameters alongside apoptotic markers were assessed. Diclofenac treatment led to elevated reactive oxygen species, lipid peroxidation, lactate dehydrogenase release, and up-regulation of pro-apoptotic proteins, accompanied by a reduction in Bcl-2 expression. Co-treatment with chrysin significantly mitigated these effects, lowering oxidative stress, reducing apoptotic signaling, and decreasing overall cell death. These findings indicate that chrysin exerts a protective effect against diclofenac-induced cytotoxicity, highlighting the importance of considering potential interactions between dietary flavonoids and NSAIDs in cancer therapy.

Funding: This work was supported by a grant from Bingol University Independent Research Projects Office (BÜBAP), (Turkey). (Grant Number: BAP-FEF.2019.00.006).

ID: P-51

Integrated Bioinformatics and Experimental Validation Reveal Hub-Gene–Driven Drug Resistance in Lung Cancer

Ekrem DARENDELİOĞLU¹, Onur KASKI²

¹ *Bingol University, Faculty of Science and Literature, Department of Molecular Biology and Genetics, Bingöl, Türkiye, ORCID: 0000-0002-0630-4086*

² *Bingol University, Faculty of Science and Literature, Department of Molecular Biology and Genetics, Bingöl, Türkiye, ORCID: 0009-0002-3721-5761*

ABSTRACT

Lung cancer is a heterogeneous disease driven by genetic and environmental factors, with NSCLC as the predominant subtype and adenocarcinoma frequently observed. This study aimed to identify molecular targets associated with drug resistance in lung cancer and evaluate their therapeutic relevance using integrated in silico pipelines and in vitro validation. A literature-derived gene set was enriched for KEGG pathways using Enrichr; protein–protein interactions were assembled in STRING, visualized in Cytoscape, and hub genes ranked by CytoHubba, while clinical relevance was assessed in KM-Plotter. Molecular docking of paclitaxel and cisplatin against hub gene products employed CB-Dock2 with PDB/AlphaFold structures. A549 cells were treated with graded doses; viability was measured by XTT to determine IC₅₀ and hub-gene mRNA levels were quantified by RT-qPCR using the 2^{-ΔΔCT} method. The network prioritized five hubs—KRAS, PIK3CA, TP53, PTEN, and EGFR. Paclitaxel and cisplatin yielded IC₅₀ values of 10.36 nM and 27.11 μM, respectively. Paclitaxel did not significantly alter KRAS, PIK3CA, PTEN or EGFR transcripts, whereas cisplatin selectively upregulated TP53 in A549 cells. Docking suggested higher binding scores for paclitaxel than cisplatin across representative hub proteins, supporting differential target engagement. Overall, these findings indicate that lung cancer drug resistance is multifactorial, with the PI3K/AKT/PTEN axis, EGFR signaling, and TP53 activation underpinning key adaptive responses. The identified hub genes constitute candidate biomarkers and therapeutic targets, warranting protein-level validation, functional assays, and in vivo studies to inform personalized strategies against resistance.

ID: P-52

Integrated In Silico and In Vitro Profiling of Drug Resistance Targets in NSCLC

Ekrem DARENDELİOĞLU¹, Ceylan BOZYİĞİT²

¹ *Bingöl University, Faculty of Science and Literature, Department of Molecular Biology and Genetics, Bingöl, Türkiye, ORCID: 0000-0002-0630-4086*

² *Bingöl University, Faculty of Science and Literature, Department of Molecular Biology and Genetics, Bingöl, Türkiye, ORCID: 0009-0002-5900-0593*

ABSTRACT

Lung cancer remains a leading cause of cancer mortality, with NSCLC as the predominant subtype; heat shock proteins (HSPs) shape tumor stress responses and immunity, making them attractive therapeutic targets. To identify drug-resistance-associated molecular targets in NSCLC and assess their therapeutic potential with a focus on HSPs. A literature-derived gene set underwent KEGG enrichment in Enrichr; protein-protein interaction networks were built in STRING, visualized in Cytoscape, and hub genes ranked with CytoHubba; prognostic relevance was evaluated in KM-Plotter; molecular docking of MPC-3100 and VER-155008 to hub proteins employed CB-Dock2 with PDB/AlphaFold structures; A549 cells were treated with graded doses to determine IC₅₀ by XTT, and RT-qPCR quantified hub-gene mRNA after 24 h at IC₅₀. Network analysis prioritized HSP90, HSP70, and HSP27 as central hubs. MPC-3100 and VER-155008 exhibited IC₅₀ values of 17.85 nM and 2.33 μM, respectively. MPC-3100 increased HSP90, HSP70, and HSP27 transcripts, whereas VER-155008 caused no significant changes; docking supported specific ligand-protein interactions for both compounds. HSP90, HSP70, and HSP27 emerge as biomarker candidates and therapeutic targets for overcoming drug resistance in NSCLC; MPC-3100 shows stronger in vitro potency than VER-155008, and adaptive HSP27 upregulation suggests combination strategies targeting multiple HSPs to mitigate resistance, warranting validation across additional models and clinical samples.

ID: P-53

Integrating Mathematical Modeling into Classroom Practices to Support Mathematics Learning

E. Koca

Silkar Günlükbaşı Secondary School, Fethiye/Muğla, Türkiye, ORCID: 0000-0001-5680-3222

ABSTRACT

Mathematics learning requires not only procedural fluency but also the development of higher-order skills such as reasoning, generalization, and abstraction. Mathematical modeling offers a structured approach to bridge the gap between theoretical knowledge and classroom practice, enabling teachers to monitor and enhance students' achievement levels [1–3]. This study emphasizes the use of modeling techniques to design classroom activities, diagnose learning barriers, and guide effective instructional interventions. Special attention is given to the role of predictive models and adaptive frameworks in tailoring learning experiences to different student profiles. By combining analytical methods with modern computational tools, mathematical modeling supports the identification of individual strengths and weaknesses while providing strategies for long-term academic growth. The findings underscore that embedding modeling approaches into everyday teaching practices contributes to more engaging, personalized, and sustainable mathematics education.

Acknowledgement: This project is not supported by any organization.

References

- [1] Armutcu, Y., & Bal, A. P. (2023). The Effect of Mathematical Modelling Activities on Students' Mathematical Modelling Skills in the Context of STEM Education. *International Journal of Contemporary Educational Research*, 10(1), 42–55. <https://doi.org/10.33200/ijcer.1131928>.
- [2] Hochmuth, R., Peters, J., Rønning, F. et al. Modelling mathematics for educational research and practice: a comparison of two theoretical approaches. *Educ Stud Math* 118, 153–168 (2025)..
- [3] Arseven, Ayla. "Mathematical Modelling Approach in Mathematics Education." *Universal Journal of Educational Research*, 3.12 (2015): 973-980.

Internality of averaged Gauss quadrature rules for Jacobi measures modified by quadratic divisor

Velimir Ćorović¹ and M.M. Spalević²

¹University of Montenegro, Faculty of Science and Mathematics, Podgorica, Montenegro, <https://orcid.org/0009-0004-8540-3753>

² Department of Mathematics, University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia, <https://orcid.org/0000-0001-5292-0085>

ABSTRACT

The internality of quadrature rules is an important property in applications, enabling the approximation of integrals whose integrands are defined only on the support interval of the measure. The internality of both the averaged Gauss and the optimal averaged Gauss quadrature formulas, with respect to Jacobi measures modified by a linear divisor, has been investigated in recent studies (cf. [1,2]). In this paper, we extend the investigation to the internality of these quadratures with respect to Jacobi measures modified by a quadratic divisor. Specifically, we consider the modified measures:

$$\tilde{w}(t) = \frac{(1-t)^a(1+t)^b}{(t-z)(t-\bar{z})} = \frac{(1-t)^a(1+t)^b}{(t-x)^2 + y^2}$$

where $a, b > -1$, and $z = x + iy$, with $x \in \mathbb{R}$ and $y > 0$. We show that, under certain conditions and for a sufficiently large number of quadrature nodes, the internality property holds. Particular attention is devoted to modifications of the Chebyshev measures of the first and third kinds.

References

- [1] D.Lj. Djukić, R.M. Mutavdžić Djukić, L. Reichel, and M.M. Spalević, Internality of averaged Gauss quadrature rules for certain modification of Jacobi measures, *Appl. Comput. Math.* 22 (2023) no. 4, 426–442.
- [2] D.Lj. Djukić, R.M. Mutavdžić Djukić, L. Reichel, and M.M. Spalević, Internality of generalized averaged Gauss quadrature rules and truncated variants for modified Chebyshev measures of the first kind, *J. Comput. Appl. Math.* 398 (2021) 113696.
- [3] W. Gautschi, *Orthogonal Polynomials: Computation and Approximation*, Oxford University Press, Oxford, 2004.
- [4] M.M. Spalević, On generalized averaged Gaussian formulas, *Math. Comp.* 76 (2007) 1483–1492.
- [5] D.P. Laurie, Anti-Gaussian quadrature formulas, *Math. Comp.* 65 (1996) 739–747.

ID: P-55

Fekete-Szego Functional of A Subclass of Bi-Univalent Functions Associated with Gegenbauer and Horadam Polynomials

Waleed Al-Rawashdeh^{1, *} and Fou'd Al-Alkaraki²

ABSTRACT

In this paper, we introduce and investigate firstly two classes of Bi-bazilvic functions, denoted by $B_{\Sigma}(\lambda; G_{\alpha})$ and $B_{\Sigma}^*(\lambda; \psi)$, that depends on Gegenbauer Polynomials and Horadam Polynomials. For functions in these classes, we derived the estimations for the initial Taylor-Maclaurin coefficients $|a_2|$ and $|a_3|$. Moreover, we obtain the classical Fekete-Szego inequality of functions belonging to this class.

ID: P-56

Realization Algorithm for Defining Fractional Order in Oscillating Systems with Liquid Damper

Hajiyeva N.S.¹, Alieva I.V.²

¹*Institute of Applied Mathematics, Baku State University, Baku, Azerbaijan*

²*Republican Seismic Survey Center of the Azerbaijan National Academy of Sciences, Baku, Azerbaijan*

nazile.m@mail.ru

ABSTRACT

In the paper the problem of defining the fractional order in oscillating systems with liquid damper. Firstly, the equation of the object is reduced to the Volterra integral equation of the second kind with respect to the second order derivative of the phase coordinate. Based on the statistical data the quadratic functional has been constructed. Using the method of successive approximations the obtained Volterra integral equation has been solved and its solution has the form of the Neumann series. By means of the least squares method, we ensure that the theoretical results coincide with the statistical data, and as a result, a more effective fractional order is determined. Then, an effective algorithm is proposed. Since some steps of this algorithm need explanation, the issue of the implementation of the algorithm is considered.

References

- [1] Samko S., Marichev O., Kilbas A., (1987), Fractional Integrals and Derivatives and Some of Their Applications, Science and Technica, Minsk.
- [2] Bonilla B., Rivero M., Trujillo J.J., (2007), On systems of linear fractional differential equations with constant coefficients, Appl. Math. Comput., (187), pp.68-78.
- [3] Mittag-Leffler G., (1905), Sur la representation analytique d'une branche uniforme d'une fonction monogene: cinquieme note, Acta Mathematica, 29, pp.101-181.
- [4] Monje C.A., Chen Y.Q, Vinagre B.M, Xue D., Feliu V., (2010), Fractional-Order Systems and Controls Fundamentals and Applications, London: Springer, 414p.
- [5] Miller K.S., Ross B., (1993), An Introduction to the Fractional Calculus and Fractional Differential Equations, New York:Wiley, 336p.
- [6] Aliev F.A., Aliev N.A., Rasulzade A.F., Hajiyeva N.S., Alieva I.V., (2024), Development of discrete asymptotic algorithm for the optimal trajectory and control in oscillatory systems with liquid damper, SOCAR Proceedings, (2), pp.122-127.

ID: P-57

Investigation of the Bioethanol Production Potential of Cold-Adapted Yeast Strains Isolated from Palandöken Mountain

Y. Gülşahin¹, E.B. Yılmaz¹, E. Güllüce¹, N.S. Araz¹, Z. Özaydınlık¹, B. Tosun¹ and M. Karadayı²

¹*Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116; ORCID: 0009-0005-3674-8912; ORCID: 0000-0003-2290-3799; ORCID: 0009-0001-8238-6036; ORCID: 0009-0009-5635-766X*

²*Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-2473-0409*

ABSTRACT

The depletion of fossil fuel reserves and the environmental damage caused by their use have increasingly driven interest towards sustainable and eco-friendly energy sources. In this context, bioethanol, as a renewable energy resource, stands out due to its environmentally friendly nature, compatibility with existing energy infrastructure, and advancements in biotechnological production processes. The adaptation of yeast strains used in bioethanol production to environmental conditions is of critical importance. Psychrotolerant yeasts, which remain metabolically active at low temperatures, can enhance energy efficiency and reduce production costs [1].

Within this study, soil samples were collected from 10 distinct sites in Palandöken Mountain during winter season in 2024 to isolate cold-adapted yeast strains suitable for bioethanol production. From these samples, 120 cold-tolerant yeast isolates were obtained, and among them, 10 strains with high bioethanol production potential were selected and microscopically characterized.

The results demonstrated that among the 10 yeast isolates obtained from the natural environment of Palandöken, species belonging to genera *Saccharomyces*, *Torulaspota*, *Zygotorulaspota*, *Kluyveromyces*, *Schizosaccharomyces*, and *Rhodotorula* exhibited significant bioethanol production potential. These findings indicate that high-altitude and cold climate regions harbor potential yeast resources for bioethanol production, providing an important basis for the integration of local microbial diversity into biotechnological applications.

Acknowledgement: This work was supported by the Atatürk University Coordinatorship of Scientific Research Projects under [Grant number FHD-2025-14179].

References

- [1] R. Singh, A. Gaur, P. Soni, R. Jain, G. Pant, D. Kumar, 2025. A review of biofuels and bioenergy production as a sustainable alternative: opportunities, challenges and future perspectives. *Journal of Environmental Health Science and Engineering* (2025) 23.2: 23.

ID: P-58

Antibiotic Resistance Evaluation of Plant Growth-Promoting Rhizobacteria (PGPR) Isolated from Erzurum for Biofertilizer Development

M. Karadayı¹, M. Güllüce¹, Ü. Küçüközdemir², G. Karadayı³ and Y. Gülşahin⁴

¹*Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-2473-0409
ORCID: 0000-0002-5957-8259*

²*East Anatolia Agricultural Research Institute, 25240 Erzurum, Türkiye.*

³*Department of Molecular Biology and Genetics, Faculty of Science, Atatürk University, Erzurum, Türkiye,
ORCID: 0000-0003-2044-9609*

⁴*Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116;*

ABSTRACT

Today, the emergence and rapid spread of antibiotic resistance is a significant global problem that endangers public health. Recent research clearly demonstrates that the introduction of new-generation biofertilizer formulations without adequate assessment of antibiotic susceptibility contributes to this negative situation. The majority of the recent studies on plant growth-promoting bacteria have focused on their applicability in sustainable agriculture and the potential for developing new commercial formulations. However, a significant number of these bacteria have been reported to harbor antibiotic resistance genes. Furthermore, it is known that horizontal gene transfer, a key mechanism of bacterial evolution, increases with increasing microbial density in the rhizosphere. As a result, antibiotic resistance genes are introduced into the soil along with biofertilizers, spreading to the soil's natural microbial communities and from there, potentially being transmitted to many species, including humans. Therefore, the widespread use of preparations developed with PGPR strains that have not been evaluated for antibiotic resistance will likely increase the spread of antibiotic resistance in the near future, ultimately leading to negative impacts on the ecosystem and, ultimately, public health. To prevent this negative situation, it is vital to evaluate candidate PGPR strains for antibiotic resistance before formulation development and to continue studies by selecting susceptible isolates that are not resistant to antibiotics [1-4]. For this purpose, within the scope of the present research, 167 bacterial isolates previously obtained from agricultural areas in Erzurum were smeared on Nutrient Agar and the antibiotic susceptibilities of the test strains were determined using standard ampicillin (10 µg), clindamycin (2 µg), erythromycin (15 µg), gentamicin (10 µg), kanamycin (30 µg), tetracycline (30 µg), vancomycin (30 µg), streptomycin (10 µg), cephalothin (30 µg) and penicillin G (10 U) disks. The study findings showed that all 34 identified isolates belonging to the genera *Bacillus*, *Pseudomonas*, *Enterobacter*, *Exiguobacterium*, *Enterococcus*, *Acinetobacter*, *Rhizobium*, and *Pantoea*, and all other 133 isolates tested were susceptible to ampicillin, clindamycin, erythromycin, tetracycline, streptomycin, and penicillin G. However, some isolates were found to be resistant to gentamicin, kanamycin, vancomycin, and cephalothin. In conclusion, the study findings were evaluated as playing an active role in the selection of

promising isolates for use in the development of safe microbial fertilizer formulations in view of the development of global antibiotic resistance.

Acknowledgement: This study was funded and supported by TÜBİTAK (Project Number: 123O666).

References

- [1] Lee, J.H., Park, K.S., Jeon, J.H., Lee, S.H., 2018. Antibiotic resistance in soil. *The Lancet Infectious Diseases*, 18 (12), 1306-1307.
- [2] Mahdi, I., Fahsi, N., Hijri, N., Sobeh, M., 2022. Antibiotic resistance in plant growth promoting bacteria: A comprehensive review and future perspectives to mitigate potential gene invasion risks. *Frontiers in Microbiology*, 13, 1-22.
- [3] Popa, O., Dagan, T., 2011. Trends and barriers to lateral gene transfer in prokaryotes. *Current Opinion in Microbiology*, 14 (5), 615-623.
- [4] Wash, P., Batool, A., Mulk, S., Nazir, S., Yasmin, H., Mumtaz, S., Alyemini, M.N., Kaushik, P., Hassan, M.N., 2022. Prevalence of antimicrobial resistance and respective genes among *Bacillus* spp., a versatile bio-fungicide. *International Journal of Environmental Research and Public Health*, 19 (22), 1-14.

The Role of Astaxanthin in Maintaining Genomic Template Stability Against Metal Stress

I.Colak¹, G. Agar², E. Yildirim³, N.S. Araz¹, M. Yuçe³, and G. Karadayi¹

¹Ataturk University, Dept of Molecular Biology and Genetics, Erzurum, Türkiye

²Ataturk University, Dept of Biology, Erzurum, Türkiye

³Ataturk University, Dept of Horticulture, Erzurum, Türkiye

ABSTRACT

Nickel (Ni), an essential micronutrient for plants, increasingly accumulates in soils due to environmental pollution. However, its excessive presence disrupts nutrient uptake and metabolism, leading to adverse effects on plant growth, photosynthesis, water relations, oxidative mechanisms, protein synthesis, and genomic as well as physiological functions. [1]. Sustainable and environmentally friendly biological enrichment is among the methods used to increase the stress tolerance of plants. Astaxanthin (ATX) is a carotenoid characterized by a unique biphenolic structure and significant biological activity. It is known to increase tolerance to stress when given exogenously to plants [2]. Therefore, our study aimed to determine the polymorphism rates occurring in the *Lactuca sativa* genome using ATX to remedy Ni stress.

For this purpose, Genomic Template Stability (GTS) rates were determined using the Randomly Amplified Polymorphic DNA (RAPD) method in *Lactuca sativa* treated conducted with eight groups—Control, 50 µM ATX, 100 µM ATX, 200 µM ATX, Ni, Ni+50 µM ATX, Ni+100 µM ATX, and Ni+200 µM ATX, respectively.

Ni was found to cause a decrease in GTS rates, with the highest normalization observed in the Ni+50 µM ATX group. Contrary to expectations, ATX also caused a dose-dependent decrease in GTS rates. Although ATX prevents polymorphism in the genome against Ni stress, excessive use can reverse this. In light of these findings, ATX is considered a promising compound that may contribute to the development of tolerance mechanisms by mitigating changes in the genome caused by metal stress in plants.

References

- [1] Hassan, M. U., Chattha, M. U., Khan, I., Chattha, M. B., Aamer, M., Nawaz, M., Ali, A., Khan, M. A. U., & Khan, T. A. (2019). Nickel toxicity in plants: reasons, toxic effects, tolerance mechanisms, and remediation possibilities-a review. *Environmental science and pollution research international*, 26(13), 12673–12688.
- [2] Du, Z., Liang, M., Wang, X., Liu, Y., Du, S., Shi, D., Sun, Y., Ji, C., Zhang, C., Cui, H., Li, R., & Xue, J. (2025). Astaxanthin biofortification enhances tobacco tolerance to lead stress through boosting antioxidant defense, reducing Pb accumulation, and modulating detoxification pathways. *Journal of advanced research*, S2090-1232(25)00567-3.

ID: P-60

QCD Predictions of Higgs and Vector Bosons in the LCH and FCC Frontiers

Kamuran Dilsiz¹

¹ *Bingöl University, Faculty of Engineering and Architecture, Department of Electrical and Electronics Engineering, Bingöl, Türkiye, ORCID: 0000-0003-0138-3368*

ABSTRACT

This study presents a QCD analysis of Higgs and vector boson production with a focus on theoretical uncertainties and charge asymmetry. The cross-section calculations of WH and ZH channels are performed at NNLO QCD using Monte Carlo methods and modern PDF libraries. With a focus on the scaling behavior of cross sections and the influence of renormalization and factorization scales, our study extends LHC predictions to higher-energy scenarios, such as the HL-LHC, HE-LHC, and FCC. The results show that NNLO QCD improves experimental data alignment and lowers uncertainty. The analysis of W boson charge asymmetry in various Higgs decay pathways shows that asymmetry decreases with increasing energy and is strongly dependent on final states and proton structure. These results improve the accuracy of measurements of the Higgs property and offer a framework for exploring novel phenomena at upcoming colliders.

Acknowledgement: This study was funded by the Scientific and Technological Research Council of Türkiye (TÜBİTAK) 1002-A Grant No 122F270. The numerical calculations reported in this paper were fully/partially performed at TÜBİTAK ULAKBİM, High Performance and Grid Computing Center (TRUBA resources).

ID: P-61

AI-Based Fault Detection in Solar Panels for Sustainable Energy Management

Mücahit ÇALIŞAN¹, Nevzat OLGUN²

¹*Bingöl University Computer Engineering Department, Bingöl, Türkiye, ORCID: 0000-0003-2651-5937*

²*Afyon Kocatepe University Software Engineering Department, Afyon, Türkiye, ORCID: 0000-0003-2461-4923*

ABSTRACT

The increasing global demand for energy and the environmental impact of fossil fuels have significantly raised the importance of renewable energy sources. In this context, solar energy stands out as one of the fastest-growing and most widely used alternatives among sustainable energy resources. However, the accumulation of dust, snow, bird droppings, and other environmental factors on the surface of photovoltaic (PV) panels, as well as electrical and physical damages, substantially reduce energy production efficiency and negatively affect system performance. Failure to detect such issues at an early stage leads to increased maintenance costs, greater energy losses, and interruptions in sustainable energy management. Since traditional inspection methods are time-consuming, costly, and prone to human error, the development of AI-based automated fault detection systems has become a necessity. In this study, solar panels were classified into six categories: clean, dusty, bird-drop, electrical-damage, physical-damage, and snow-covered. Various data augmentation techniques were applied during the training phase to address data imbalance and improve generalization. For fault detection, transfer learning-based deep learning models, namely ResNet50, EfficientNet, and MobileNet, were trained with different layer configurations and hyperparameter settings, and their performances were compared. Experimental results demonstrated that AI-based approaches achieved high accuracy and generalization capability in multi-class fault detection. The findings indicate that the proposed approach can contribute to the automation of maintenance processes, the minimization of energy losses, and the enhancement of sustainable energy management in solar energy systems.

Keywords: Solar Energy, Photovoltaic Panels, Deep Learning, Transfer Learning, Multi-Class Classification

ID: P-62

Explainable AI-Based Cloud Image Classification for Weather Forecasting

Nezhat OLGUN¹, MÜCAHİT ÇALIŞAN²

¹*Afyon Kocatepe University Software Engineering Department, Afyon, Türkiye, ORCID: 0000-0003-2461-4923*

²*Bingöl University Computer Engineering Department, Bingöl, Türkiye, ORCID: 0000-0003-2651-5937*

ABSTRACT

Cloud types play a critical role in understanding atmospheric processes and improving the accuracy of weather forecasting. The formation characteristics of different cloud types have a direct impact on precipitation, temperature, and other climatic variables. However, the manual classification of clouds is a limited approach, as it requires high expertise, is time-consuming, and is subject to observer bias. Therefore, the automatic classification of cloud types is of great importance in increasing the accuracy and efficiency of meteorological observations. In recent years, deep learning methods have provided powerful solutions to this problem with their success in image processing, while Explainable Artificial Intelligence (XAI) techniques have enhanced the transparency and reliability of model decision-making processes. The cloud images used in this study consist of seven classes: High Cumuliform, Cumulus, Cirriform, Stratocumulus, Clear Sky, Stratiform, and Cumulonimbus. Due to the imbalanced distribution within the dataset, data augmentation techniques were applied to improve the representation of underrepresented classes. For the classification task, a baseline Convolutional Neural Network (CNN) was employed alongside transfer learning-based architectures such as ResNet and Inception, as well as Vision Transformers (ViT). The performance of these models was comprehensively evaluated using multiple performance metrics including accuracy, F1-score, and cross-validation techniques. In addition, the Grad-CAM technique was applied to visualize and analyze the regions of the cloud images that the models focused on during classification. This enabled the identification of image regions considered in the decision-making process, thereby enhancing the interpretability and reliability of the system. Experimental results revealed that transfer learning-based CNN models achieved higher success in distinguishing cloud types and, when supported with XAI techniques, can be reliably employed in meteorological applications. The findings further demonstrated that transfer learning-based CNN architectures provided higher accuracy and generalization, particularly in imbalanced datasets. In addition, Vision Transformers exhibited strong performance in capturing multi-scale cloud features. Combined with explainability techniques, these results indicate that AI-based cloud classification systems can serve as reliable and effective tools for meteorological observations, climate research, and weather forecasting.

Keywords: Cloud Classification, Weather Forecasting, Explainable Artificial Intelligence, Transfer Learning

ID: P-63

Sensor-Camera Data Fusion for Improved Environmental Perception for Autonomous Vehicles

Davut Can Akbaş^{1,4}, Barış Boru² and Ahmet Kutluhan Boz^{3,4}

¹ *Sakarya University of Applied Sciences Graduate Education Institute, Dept. of Electrical and Electronics Engineering Sakarya, Türkiye, ORCID: 0009-0001-6649-001X*

² *Sakarya University of Applied Sciences, Dept. of Mechatronics Engineering Sakarya, Türkiye, ORCID: 0000-0002-0993-3187*

³ *Sakarya University of Applied Sciences, Graduate Education Institute, Dept. of Computer Engineering Sakarya, Türkiye, ORCID: 0009-0006-1244-9640*

⁴ *ARM R&D Robotics Software Engineering Co., Sakarya TechnoPark, Sakarya Türkiye*

ABSTRACT

Robust detection of moving surrounding objects plays critical role in autonomous vehicles. Navigation in real life is only possible with a strong environmental perception. While camera sensors provide sufficient data for object detection and semantic classification (e.g., pedestrian, vehicle), 2D LiDAR sensors offer precise and unambiguous position information in the vehicle's motion plane. However, using these sensors alone leads to detection errors due to factors such as depth uncertainty and field-of-view (FOV) limitations of the camera or the lack of semantic information in LiDAR. This work presents a hybrid fusion and tracking architecture that combines the semantic detection capabilities of the camera with the positional accuracy of 2D LiDAR. Our methodology uses a state-of-the-art deep learning model, such as YOLO11, to detect objects in camera images. These 2D detections are geometrically verified and correlated by projecting clustered points from the 2D LiDAR onto the camera plane. A 4-state Kalman Filter (KF) is used to track the motion state (position and velocity) of objects and estimate their velocity over time. The key contribution of our paper is an intelligent "handover" mechanism that activates when an object leaves the camera's field of view. This mechanism updates the KF's state estimates only with 2D LiDAR data, preserving the object's class identity (e.g., "Pedestrian") and continuing tracking without interruption. This hybrid approach increases the robustness of environmental sensing by maintaining situational awareness even in sensor blind spots.

Acknowledgement: This work was supported by ARM R&D Robotics Software Engineering Co.. The authors would like to thank the ROS 2 community, the Ultralytics team, and open source software contributors.

References

- [1] Wojke, N., Bewley, A., Paulus, D., 2017. Simple Online and Realtime Tracking with a Deep Association Metric, 2017 IEEE International Conference on Image Processing (ICIP), 3645-3649.

- [2] Teichmann, M.; Weber, M.; Zoellner, M.; Cipolla, R.; Urtasun, R. Multinet: Real-time joint semantic reasoning for autonomous driving. In Proceedings of the 2018 IEEE Intelligent Vehicles Symposium (IV), Changshu, China, 26–30 June 2018; pp. 1013–1020.
- [3] Sobh, I.; Amin, L.; Abdelkarim, S.; Elmadawy, K.; Saeed, M.; Abdeltawab, O.; Gamal, M.; El Sallab, A. End-To-End multi-modal sensors fusion system for urban automated driving. In Proceedings of the 2018 NIPS MLITS Workshop: Machine Learning for Intelligent Transportation Systems, Montreal, QC, Canada, 3–8 December 2018.
- [4] Bernardin, K., Stiefelhagen, R., 2008. Evaluating Multiple Object Tracking Performance: The CLEAR MOT Metrics, J. Image Video Process.

Harnessing Rapid Hosts and Unconventional Biodiversity: *Vibrio natriegens* as a Next-Generation Factory for Plastic-Degrading Biocatalysts

Ersin KARATAŞ¹, Güven BUDAK²

¹Ağrı İbrahim Çeçen University, Patnos Vocational School, Department of Medical Services and Techniques, Ağrı, TURKEY ORCID: 0000-0001-6848-7618

²Ağrı İbrahim Çeçen University, Patnos Vocational School, Property Protection and Security, Ağrı, TURKEY ORCID: 0009-0007-4203-3926

ABSTRACT

The rapid expansion of computational enzyme discovery and metagenomic sourcing has produced numerous candidate sequences for polymer depolymerization, yet the translation of these sequences into analytically validated, process-relevant biocatalysts remain a critical bottleneck. This presentation argues that *Vibrio natriegens* constitutes a strategically advantageous expression platform for accelerating the design–build–test cycle and facilitating the production of plastic-degrading enzymes at scales suitable for rigorous characterization. *V. natriegens* offers markedly shorter doubling times, high protein synthesis capacity, and emerging compatibility with pET-style expression logic, promoter/RBS tuning, chaperone co-expression and secretion strategies; collectively, these traits reduce time-to-result, increase construct throughput, and mitigate common expression failures encountered in *Escherichia coli* [1].

Concurrently, insect-associated systems—exemplified by *Galleria mellonella* larvae and their secretions/microbiota—represent an under-exploited reservoir of catalytic diversity relevant to hydrophobic and polymeric substrates. Enzymes and accessory factors sourced from these niches may possess novel substrate-interaction motifs, secretion signals or oxidative mechanisms that broaden the mechanistic repertoire available for PET, and potentially PE/PS, depolymerization. Integrating insect-derived discovery with a rapid, tolerant production host therefore aligns discovery yield with practical producibility [2]. By prioritizing candidates for novelty and tractability and iterating computational redesign with expression in *V. natriegens*, we can rapidly obtain milligram-scale active enzymes for material-level assays, thereby accelerating validation and producing high-quality datasets that bridge discovery to scalable enzyme-based remediation.

References

- [1] Sanluis-Verdes, et. al. (2022). Wax worm saliva and the enzymes therein are the key to polyethylene degradation by *Galleria mellonella*. *Nature Communications*, 13, 5568.
- [2] Xu, J., Qiao, Y., La, J., Chen, J., & Xiong, H. (2021). *Vibrio natriegens* as a pET-compatible expression host complementary to *Escherichia coli*. *Frontiers in Microbiology*, 12, 627181.

Green Synthesis of Silver Nanoparticles Using Samandağ Pepper (*Capsicum annuum*): Characterization, and Investigation of the Antimicrobial Effects

Rüya SAĞLAMTAŞ¹, Cemil YAKUT²

Agri Ibrahim Cecen University, Agri, Türkiye, 0000-0002-4400-2302

Agri Ibrahim Cecen University, Agri, Türkiye, 0009-0005-1854-9389

ABSTRACT

Nanotechnology has attracted growing attention as a pivotal technology of the twenty-first century. Currently, green synthesis is recognized as a primary branch within nanotechnology, where environmentally friendly methods are employed to synthesize nanostructures [1]. Plant extracts have been identified to play a crucial role in initially reducing and subsequently stabilizing metallic ions [2]. The objective of this study was to synthesize silver nanoparticles (AgNPs) using Samandağ pepper (*Capsicum annuum*) extract via a green synthesis method. The reduction and stabilization processes were attributed to the natural phytochemicals present in the extract. Characterisation of the prepared AgNPs was conducted employing Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDX), and zeta potential analysis, which revealed their morphological features, elemental composition, and surface stability. The antimicrobial activity of the AgNPs was evaluated against Gram-negative (*Escherichia coli*, *Salmonella typhimurium*) and Gram-positive (*Staphylococcus aureus*) bacteria using the disk diffusion method, with gentamicin serving as a positive control. The prepared AgNPs showed remarkable antibacterial activity, especially against *E. coli* and *S. aureus*. Altogether, the results demonstrate that the synthesis of nanoparticles using Samandağ pepper is an environmentally friendly, inexpensive, and non-toxic method for AgNP formation. These nanoparticles hold great promise in various biomedical fields, food preservation, and environmental remediation.

References

- [1]. D.Dutta, B.M.Das, 2021. Scope of Green Nanotechnology towards Amalgamation of Green Chemistry for Cleaner Environment: A Review on Synthesis and Applications of Green Nanoparticles. Environ. Nanotechnol. Monit.(2021),15:100418.
- [2]. A. Verma, S.P. Gautam, K.K. Bansal, N. Prabhakar, J.M. Rosenholm, 2019. Green nanotechnology: advancement in phytoformulation research. Medicines,(2019), 6(1), 39.

ID: P-66

Synthesis and Characterization of Zinc Oxide Nanoparticles Obtained from *Olea europaea* Leaves Via Green Synthesis

Kader KELLE, Emre ERDEN KOPAR*, Nurdan PAZARLIOGLU
Ege University, Faculty of Science, Department of Biochemistry, Bornova-Izmir/Türkiye
ORCID: 0000-0002-6641-4367

ABSTRACT

Zinc oxide nanoparticles (ZnO-NPs) are widely used in fields such as the cosmetics and textile industries due to their high specific surface areas and antibacterial properties ¹. Although various methods (physical, chemical, biological) are available for the synthesis of NPs, the green synthesis method stands out over other methods due to its environmental friendliness and lack of toxic substances. The green synthesis method uses bacteria, microalgae, yeast, and plant extracts ².

Olea europaea, one of the oldest known trees belonging to the Oleaceae family, possesses medicinal and therapeutic properties. The bioactive compounds contained in *O. europaea* (phenolic compounds, carotenoids, flavonoids) have made it attractive for various green synthesis methods ³.

In this study, the leaves of the *Olea europaea* plant extract was used for the synthesis of ZnO-NPs by green synthesis. In this context, the temperature, pH, synthesis time, and reducing agent concentration required for the synthesis of ZnO-NPs were optimized. The synthesized NPs were characterized by UV-Vis spectrum scanning, SEM, FT-IR, and XRD. Also, their antimicrobial activity against *E. coli*, *S. aureus*, *K. pneumoniae*, and *C. albicans* microorganisms were investigated.

Acknowledgement: This project is supported by Scientific Research Projects (BAP) of Ege University. (Project no: 32727)

References

- [1] A. Thakur, P. Thakur, S.P. Khurana (Eds.), 2022. Synthesis and applications of nanoparticles, Vol. 1, Springer, Singapore, 2022.
- [2] J.A. Alsulami, K. Perveen, M.R. Alothman, L.A. Al-Humaid, F.M. Munshi, R.A.A. Ahmad, S. Khan, 2023. Microwave-assisted green synthesis of silver nanoparticles by extracts of fig fruits and myrrh oleogum resin and their role in antibacterial activity, *J. King Saud Univ. Sci.* 35(10) (2023) 102959.
- [3] A. Alesci, A. Miller, R. Tardugno, S. Pergolizzi, 2022. Chemical analysis, biological and therapeutic activities of *Olea europaea* L. extracts, *Nat. Prod. Res.* 36(11) (2022) 2932–2945.

ID: P-67

Green Synthesis of Copper Oxide Nanoparticles Using *Matricaria chamomilla* Plant Extract and Characterization

Kader KELLE*, Emre ERDEN KOPAR, Nurdan PAZARLIOGLU
Ege University, Faculty of Science, Department of Biochemistry, Bornova-Izmir/Türkiye
ORCID: 0009-0000-0437-039X

ABSTRACT

In recent years, with the increase in developments in the field of nanotechnology, interest in nanoparticles (NPs) has also increased. Physical, chemical, and biological methods are used for the synthesis of NPs ¹. Among the biological methods, the 'green synthesis method' has attracted great interest in recent years because it is environmentally friendly, economical, sustainable, and does not use toxic chemicals. Metal and metal oxide nanoparticles are synthesized using the green synthesis method. Metal oxide nanoparticles (MONPs) exhibit unique physical and chemical properties due to their limited size and high edge or corner density ^{1,2}.

Commonly known as German chamomile, *Matricaria chamomilla*, belongs to the Asteraceae family. This medicinal plant, which is rich in antioxidants, is known to have antimicrobial, anti-inflammatory, and anticancer effects ³.

In this study, copper oxide nanoparticles (CuO-NP) were synthesized using a green synthesis method with an extract obtained from *M. chamomilla*. Within this scope, the values of temperature, pH, synthesis time, and reducing agent concentration, which are known to affect the structure of CuO-NP, were optimized. The synthesized NPs were characterized using UV-Vis spectroscopy, SEM, FT-IR, and XRD, and their antimicrobial activity against *E. coli*, *S. aureus*, *K. pneumoniae*, and *C. albicans* microorganisms were investigated.

Acknowledgement: This project is supported by Scientific Research Projects (BAP) of Ege University. (Project no: 32727)

References:

- [1] A. Vinukonda, N. Bolledla, R.K. Jadi, R. Chinthala, V.R. Devadasu, 2025. Synthesis of nanoparticles using advanced techniques, *Next Nanotechnol.* 8 (2025) 100169.
- [2] R.K. Singh, D. Nallaswamy, S. Rajeshkumar, S.S. Varghese, 2025. Green synthesis of silver nanoparticles using neem and turmeric extract and its antimicrobial activity of plant mediated silver nanoparticles, *J. Oral Biol. Craniofac. Res.* 15(2) (2025) 395–401.
- [3] O. Singh, Z. Khanam, N. Misra, M.K. Srivastava, 2011. Chamomile (*Matricaria chamomilla* L.): an overview, *Pharmacogn. Rev.* 5(9) (2011) 82.

Inhibition Effects of White Honey on Some Metabolic Enzymes

¹Yaşar HASANOĞLU, ²Hülya AKINCIOĞLU

¹ Ağrı İbrahim Çeçen University, Faculty of Education, Ağrı, Türkiye, ORCID: 0000-0001-8139-6331
³ Ağrı İbrahim Çeçen University, Faculty of Science and Letters, Ağrı, Türkiye, ORCID: 0000-0001-5453-0953

ABSTRACT

White honey is a unique bee product produced in limited geographical regions and attracts attention with its rich biological composition. In this study, the inhibition effects of white honey obtained from the Narman district of Erzurum province on acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) enzymes were investigated. Enzyme inhibition analyses revealed that white honey significantly suppressed both AChE and BChE activities in a concentration-dependent manner. The calculated IC₅₀ values demonstrated that white honey possesses remarkable pharmacological inhibition potential.

	AChE		BChE		α-Glucosidase	
	IC ₅₀ µM	R ²	IC ₅₀ µM	R ²	IC ₅₀ µM	R ²
White Honey	163,89	0,9452	203,37	0,9576	394,59	0,9514
Tacrine	108,23	0,9858	3,77	0,9860	-	-
Acarbose	-	-	-	-	93,95	0,9862

The results indicate that white honey may serve as a potential natural source in combating neurodegenerative diseases such as Alzheimer's and Parkinson's through the inhibition of cholinesterase enzymes. Furthermore, the biological activities of white honey open new perspectives for the development of functional foods and pharmaceutical products.

References

1. Gülçin, İ. (2020). Antioxidants and antioxidant methods: An updated overview. *Archives of Toxicology*, 94(3), 651–715. <https://doi.org/10.1007/s00204-020-02689-3>
2. Orhan, I. E., & Şener, B. (2009). Cholinesterase inhibitory potential of various extracts and fractions of Anatolian medicinal plants. *Food and Chemical Toxicology*, 47(1), 246–249. <https://doi.org/10.1016/j.fct.2008.11.006>
3. Yılmaz, H., & Şahin, H. (2020). Determination of phenolic compounds in honey by LC-MS/MS and evaluation of their antioxidant activities. *Journal of Food Composition and Analysis*, 87, 103403. <https://doi.org/10.1016/j.jfca.2020.103403>

ID: P-69

Some Remarks on Golden-Walker Manifolds

C. Karaman¹, K. Akbulut¹

¹*Department of Mathematics, Faculty of Science, Ataturk University, Erzurum, Turkiye, ORCID:
<https://orcid.org/0000-0001-6532-6317>, ORCID: <https://orcid.org/0000-0002-2829-4712>*

ABSTRACT

In this study, we introduce and study a new geometric structure, namely the golden-Walker manifold, defined as a four-dimensional Walker manifold equipped with a golden structure. A golden structure φ on a manifold is defined as an endomorphism satisfying the equation

$$\varphi^2 = \varphi + I,$$

where I is the identity transformation. After establishing the fundamental properties of this manifold, we investigate the curvature characteristics of golden-Walker manifolds, providing explicit conditions under which special curvature behaviors arise. Furthermore, we examine geometric soliton structures associated with this manifold, including conditions for the existence of Ricci and other soliton types.

Keywords: Walker metric, golden structure, Ricci-solitons.

References

- [1] M. Savas, M. Ozkan, M. Iscan, 2016. On 4-dimensional golden-Walker structures, *Journal of Science and Arts*, 2(35) (2016) 89-100.
- [2] A. S. Diallo, F. Massamba, 2017. Some properties of four-dimensional Walker manifolds, *New Trends in Mathematical Sciences*, 5(3) (2017) 253-261.
- [3] A. Gezer, N. Cengiz, A. Salimov, 2013. On integrability of golden Riemannian structures, *Turkish Journal of Math.*, 37(4) (2013) 693-703.

ID: P-70

On Manifolds with Walker-Tachyon Metrics

S. Adiyaman¹, C. Karaman¹, A. Gezer¹

¹Department of Mathematics, Faculty of Science, Ataturk University, Erzurum, Turkiye, ORCID: <https://orcid.org/0009-0006-9844-4508>, ORCID: <https://orcid.org/0000-0001-6532-6317>, ORCID: <https://orcid.org/0000-0001-7505-0385>

ABSTRACT

In this work, we introduce a new geometric structure called the Walker–Tachyon metric. Starting with the three-dimensional Walker metric

$$[g_{ij}] = \begin{bmatrix} 0 & 0 & 1 \\ 0 & \epsilon & 0 \\ 1 & 0 & f(x, y, z) \end{bmatrix},$$

we define a modified metric of the form

$$G_{ij} = g_{ij} + \partial_i T \partial_j T,$$

where $T = T(x, y, z)$ is a smooth function. This structure can be interpreted as the sum of the products of the Walker metric and the gradients of T . The resulting metric is a new Riemannian metric, which we call the Walker-Tachyon metric. We investigate the differential geometric properties of this metric in detail. In particular, the curvature tensors, Ricci tensor, and scalar curvature are explicitly computed, and several structural theorems are established. Furthermore, we examine the associated soliton equations in the context of this geometry and obtain significant results concerning their solutions.

Keywords: Walker-3 metric, tachyon metric, solitons.

References

- [1] T. Mehen, B. Wecht, 2003. Gauge fields and scalars in Rolling tachyon backgrounds, Institute of Physics publishing for SISSA/ISAS, (2003) 1-13.
- [2] G. W. Gibbons, 2003. Thoughts on tachyon cosmology, *Classical and quantum gravity*, 20 (2003) 321-346.
- [3] V. Pirhadi, G. Fasihi-Ramandi, S. Azami, 2023. Generalized Ricci solitons on three-dimensional Lorentzian Walker manifolds, *J. Nonlinear Math. PPhys*, 30(4) (2023) 1409-1423.

ID: P-71

On FLRW Type Metric with a Golden Structure

B. Alan¹, C. Karaman¹, A. Gezer¹ and K. Akbulut¹

¹Department of Mathematics, Faculty of Science, Ataturk University, Erzurum, Turkiye, ORCID: <https://orcid.org/0009-0009-3247-3551>, ORCID: <https://orcid.org/0000-0001-6532-6317>, ORCID: <https://orcid.org/0000-0001-7505-0385>, ORCID: <https://orcid.org/0000-0002-2829-4712>

ABSTRACT

In this study, we investigate the geometry of a differentiable manifold equipped with a (2+1)-dimensional Friedmann–Lemaître–Robertson–Walker (FLRW) type metric together with a golden structure. More precisely, we consider the metric

$$G = \text{diag}(1, -a(t), -a(t))$$

which represents a (2+1)-dimensional FLRW space with scale factor $a(t)$. On the same manifold, we introduce a golden structure which satisfies the purity condition with respect to the metric G . By considering the compatibility between the FLRW metric and the golden structure, we investigated the curvature properties, integrability conditions, and established a natural geometric framework in which the differential geometric invariants of the corresponding manifold can be analyzed.

Keywords: FLRW metric, golden manifold, curvature tensor, solitons.

References

- [1] S. Engineer, K. Srinivasan, T. Padmanabhan, 1998. A formal analysis of (2+1)-dimensional Gravity, The Astrophysical Journal, 512 (1998) 1-8.
- [2] G. Gecim, Y. Sucu, 2017. Dirac field as a source of the inflation in 2+1 dimensional teleparallel gravity, Advances in High Energy physics, (2017) 1-9.
- [3] A. Gezer, N. Cengiz, A. Salimov, 2013. On integrability of golden Riemannian structures, Turkish Journal of Math., 37(4) (2013) 693-703.

ID: P-72

On Walker Manifold with Circulant Structure

Z. Gezer¹, C. Karaman¹, A. Gezer¹

¹*Department of Mathematics, Faculty of Science, Ataturk University, Erzurum, Turkiye, ORCID: <https://orcid.org/0009-0004-7326-3634>, ORCID: <https://orcid.org/0000-0001-6532-6317>, ORCID: <https://orcid.org/0000-0001-7505-0385>*

ABSTRACT

In this work, we investigate Walker 3-manifolds endowed with a circulant structure F of type (1,1) satisfying the algebraic condition $F^3 = I$, where I denotes the identity transformation. The integrability of this structure is analyzed through the Nijenhuis tensor, and its interaction with the Walker metric is examined. The geometry of the twin metric obtained with the Walker metric and the circulant structure is investigated. The curvature properties and soliton properties of this metric are examined.

Keywords: Walker metric, circulant structure, solitons.

References

- [1] G. Dzhelepov, I. Dokuzova, D. Razpopov, 2011. On a three-dimensional Riemannian manifold with an additional structure, Plovdiv. Univ. Paisii Khilendarski Nauchn. Trud. Mat., 38(3) (2011) 17-27.
- [2] I. Dokuzova, Almost Einstein manifolds with circulant structures, J. Korean Math. Soc., 54(5) (2017) 1441-1456.
- [3] V. Pirhadi, G. Fasihi-Ramandi, S. Azami, 2023. Generalized Ricci solitons on three-dimensional Lorentzian Walker manifolds, J. Nonlinear Math. PPhys, 30(4) (2023) 1409-1423.

ID: P-73

Fermi-Walker Derivation for Some Special the Vector Fields

A. Çakmak¹ and S. Y. Tıraşçı²

¹*Agri Ibrahim Cecen University, Ağrı, Turkey, ORCID: <https://orcid.org/0000-0002-2783-9311>*

²*Agri Ibrahim Cecen University, Ağrı, Turkey, ORCID: <https://orcid.org/0009-0006-3002-3870>*

ABSTRACT

In 1922, Fermi established the Fermi derivative for observers that accelerate. The Fermi derivative on hypersurfaces specified for any curve α (the curve the observer moves on, the path he tracks) and, more generally, the Fermi-Walker derivative on space curves were later described by Walker in 1932. The Fermi-Walker derivative has typically been physically explained in research, but geometric evaluations have received less attention. Thus, in their research from 2012 to 2018, Karakuş and Yaylı incorporated the geometric interpretation and assessments of the Fermi-Walker derivative. In this study, Bertrand and Mannheim curves are defined separately in 3-dimensional Euclidean space, and the Fermi-Walker derivatives of Bertrand and Mannheim curve pairs along the Serret-Frenet vector fields are calculated.

References

- [1] R. Balakrishnan, 2005. Space curves, anholonomy and nonlinearity. *Pramana Journal of Physics*, 64(4), 607-615.
- [2] I.M. Benn, R.W. Tucker, 1989. Wave mechanics and inertial guidance. *The American Physical Society*, 39(6), 1594-1601.
- [3] M. Do Carmo, 1976. *Differential Geometry of Curves and Surfaces*. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.
- [4] R. Dandoloff, 1989. Berry's phase and Fermi-Walker parallel transport. *Physics Letters A*. Jul 24;139(1-2):19-20.
- [5] F. Karakuş, Y. Yaylı, 2012. On the Fermi-Walker Derivative and Non-rotating Frame. *International Journal of Geometric Methods in Modern Physics*, 9(8),1250066-1-11.
- [6] F. Karakuş, Y. Yaylı 2015. The Fermi Derivative in the hypersurfaces, *International Journal of Geometric Methods in Modern Physics*, 12(01), 1550002.
- [7] T. Şahin, F. Karakuş, Y. Yaylı, 2018. The Fermi-Walker derivative and non-rotating frame in dual space, *Advances in Applied Clifford Algebras*, 28(1), 10.

Rearrangement of Valence Orbital Occupations in Chromium-Nickel Alloys

Emine NARMANLI HAN¹, Bünyamin ALIM² and Ibrahim HAN³

¹*Ağrı İbrahim Çeçen University, Vocational School, Department of Nuclear Technology and Radiation Safety, Ağrı, TÜRKİYE, ORCID: 0000-0002-4939-9409*

²*Bayburt University, Technical Scientific Vocational School, Department of Electricity and Energy, Bayburt, TÜRKİYE, ORCID: 0000-0002-4143-9787*

³*Ağrı İbrahim Çeçen University, Arts and Sciences Faculty, Department of Physics, Ağrı, TÜRKİYE, ORCID: 0000-0003-2766-861X*

ABSTRACT

This study focused on determining the valence electron occupation ratios of the Ni-based Ni₆₂Cr₃₄Mo₄ alloy using the energy dispersive X-ray fluorescence (EDXRF) technique. Furthermore, it aimed to explain the relocation of valence electrons between atoms, which affects bond strengths within the alloy structure, through charge transfer and delocalization phenomena. In this context, the K-shell X-ray intensity ratios of the Ni₆₂Cr₃₄Mo₄ alloy and the pure Ni, Cr, and Mo elements that constitute its structure were first calculated. Then, the valence electron structure of the alloy was determined using the obtained intensity ratios via MCDF (multi-configurations Dirac-Fock) calculations. Additionally, the electron populations of the 3d and 4(s,p) levels of individual atoms within the alloy structure were calculated. According to the results obtained, it was determined that the valence electron populations of the atoms in the alloy structure deviated from the values obtained for pure metal atoms. This deviation can be attributed to the superposition of electron levels of the alloying element atoms that form bonds during the alloying process. As a result, it was concluded that in the alloy studied, electron transfer occurred from the valence orbit of Mo atoms to the 3d levels of Ni atoms based on the superposition of electron levels formed during atomic placements according to the principles of diffusion while the alloy structure was being established, and the electron order was re-formed by delocalization due to the desire of Cr atoms to preserve their spherical symmetry.

References

- [1] I. Han, L. Demir, Valence-electron configuration of Fe, Cr, and Ni in binary and ternary alloys from K β -to-K α X-ray intensity ratios, Phys. Rev. A 80 (2009) 052503.
- [2] I. Han, L. Demir, Valence-electron configuration of Ti and Ni in Ti_xNi_{1-x} alloys from K β -to-K α X-ray intensity ratios studies, Appl. Radiat. Isot. 68 (2010a) 1035e1039.
- [3] B. Alım, I. Han, L. Demir, Effect of external magnetic field on valence-electron structures of Fe and Ni in Invar, Permalloy and the other FeNi alloys by using K β -to-K α X-ray intensity ratios, Appl. Radiat. Isot. 112 (2016) 5e12.

ID: P-75

Investigation of the Effect of Internship Practice on Nursing Students' Attitudes Toward Clinical Practice and Their Therapeutic Communication Skills

Neşe Aykut¹, Burcu Demir Gökmen², Ayşe Berivan Bakan³

¹Ağrı İbrahim Çeçen University, Faculty of Health Sciences, Department of Nursing, Ağrı, Türkiye, ORCID: <https://orcid.org/0000-0003-4261-3991>

²Ağrı İbrahim Çeçen University, Faculty of Health Sciences, Department of Nursing, Ağrı, Türkiye, ORCID: <https://orcid.org/0000-0003-2058-8924>

³Ağrı İbrahim Çeçen University, Faculty of Health Sciences, Department of Nursing, Ağrı, Türkiye, ORCID: <https://orcid.org/0000-0002-0052-9890>

ABSTRACT

This study aimed to examine the effect of internship practice on nursing students' attitudes toward clinical practice and their therapeutic communication skills.

The research was conducted using a single-group pretest-posttest quasi-experimental design without a control group. Data were collected between March 2025 and June 2025. The study population consisted of final-year students in the Department of Nursing at Ağrı İbrahim Çeçen University, Faculty of Health Sciences. Data were collected using the Information Form, the Attitude Scale Toward Clinical Practices for Nursing Students, and the Therapeutic Communication Skills Scale for Nursing Students. Paired t-test was used to analyze the data.

73% of the students agreed to participate in the study. The mean age of the students was 23.07 ± 2.37 ; 64.9% were female and 35.1% were male. Of the students, 52.6% chose the department willingly, and 56.1% reported being satisfied with their department. While 52.6% of the students stated that their communication skills were good, the same proportion reported frequently using therapeutic communication skills. The mean pretest and posttest scores on the Attitude Scale Toward Clinical Practices were 93.60 ± 17.48 and 103.82 ± 17.06 , respectively. The mean pretest and posttest scores on the Therapeutic Communication Skills Scale were 64.60 ± 10.74 and 69.39 ± 12.73 , respectively.

The internship practice was found to have a positive effect on students' attitudes toward clinical practice and their therapeutic communication skills.

Keywords: Nursing student, internship, clinical adaptation, therapeutic communication.

Turkish Adaptation of the Test to Assess the Psychological Dependence on Smoking: A Validity and Reliability Study

Gülpınar Aslan¹, Ayşe Berivan Bakan² and Betül Aktaş³

¹Agri Ibrahim Cecen University Faculty of Health Science, Agri, Turkey,

²Agri Ibrahim Cecen University Faculty of Health Science, Agri, Turkey

³ Izmir Kâtip Celebi University Faculty of Health Science, Izmir, Turkey

ABSTRACT

Smoking is one of the most serious public health problems today. While the nicotine it contains causes physical dependence, behavioral and psychological dependence may also develop over time [1,2]. Identifying psychological dependence in smokers is important for the smoking cessation process.

This study aimed to adapt the Test to Assess the Psychological Dependence on Smoking scale into Turkish. This methodological study was conducted between June 2022 and May 2023 in a province in eastern Türkiye with the participation of 284 adult smokers who agreed to take part in the research. No items were removed during the content validity assessment. Confirmatory Factor Analysis indicated that the model fit indices were within acceptable limits and that the factor structure was consistent with the original scale. The Cronbach's alpha coefficient of the scale was 0.95. A strong and statistically significant linear correlation was found between the mean scores of the long and short forms of the scale ($r=0.86$, $p<0.001$). The Turkish version of the scale was found to be valid and reliable.

Keywords: Smoking, Psychological dependence, Scale, Validity, Reliability

References

- [1] S. Acar, D.Ş. Kaylı, G. Yararbaş, 2019. Sigara kullanan, sigara bırakma tedavisi alan ve sigara kullanmayan bireylerin psikolojik dayanıklılık ve stresle başa çıkma tutumları bakımından karşılaştırılması. The Turkish Journal on Addictions 6 (2019) 539-566.
- [2] D. Kale, K. Stautz, A. Cooper, 2018. Impulsivity related personality traits and cigarette smoking in adults: A meta-analysis using the UPPS-P model of impulsivity and reward sensitivity. Drug and Alcohol Dependence 185 (2018) 149-167.

Physiological Foundations of ERAS Protocols in Cardiac Surgery: Perioperative Nursing Approaches in Terms of Surgical Stress, Mobilization, Fluid Balance, and Pain Management

Volkan GÖKMEN¹, and Dursun Alper YILMAZ²

¹*Ağrı İbrahim Çeçen University, Ağrı, Türkiye, ORCID: 0000-0001-6490-8913*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye,, ORCID: 0000-0001-8096-5504*

ABSTRACT

This review examines perioperative nursing practices based on Enhanced Recovery After Surgery (ERAS) protocols in adult patients undergoing cardiac surgery, emphasizing their relationship to physiological processes. Nursing interventions within ERAS—such as minimizing surgical stress, maintaining hemodynamic stability, promoting early mobilization, optimizing fluid-electrolyte balance, and applying multimodal pain management—are evaluated as central to physiological recovery and improved outcomes. A systematic literature review was conducted in accordance with PRISMA guidelines using PubMed, Web of Science, Scopus, PMC, and MDPI databases between January 2021 and May 2025. Search terms included “ERAS,” “cardiac surgery,” “perioperative nursing,” “surgical stress response,” “hemodynamic stability,” and “early mobilization.” Randomized controlled trials, systematic reviews, and meta-analyses evaluating ERAS interventions in adult cardiac surgery were included (1,2).

Findings from 13 studies revealed that ERAS implementation leads to significant improvements in both physiological recovery and clinical outcomes. Surgical stress was reduced through patient education, psychosocial support, and multimodal analgesia, maintaining endocrine and immune balance (2,3). Early mobilization enhanced venous return and reduced deep vein thrombosis and pulmonary complications (4,5). Optimized fluid therapy promoted hemodynamic stability and decreased cardiac complications (6,7). Effective pain control minimized heart rate and blood pressure fluctuations, supporting autonomic balance (8).

In conclusion, ERAS-based perioperative nursing interventions positively influence both physiological mechanisms and postoperative recovery. Strengthening nursing education and ensuring standardized ERAS protocols are essential for sustainable and high-quality perioperative care in cardiac surgery.

References

1. Chen, B., Xie, G., Lin, Y., Chen, L., Lin, Z., You, X., & Xie, X. (2021). A systematic review and meta-analysis of the effects of early mobilization therapy in patients after cardiac surgery. *Medicine*, 100(16), e25376. <https://doi.org/10.1097/MD.00000000000025376>.
2. Jalili, S., Allahbakhshian, A., & Khalili, A. F. (2024). Effects of early mobilization on hemodynamics and pain after coronary artery bypass graft surgery: A randomized controlled trial. *Journal of Caring Sciences*, 14(1), 14–24.
3. Hendy, A., DiQuinzo, C., & O'Reilly, M. (2023). Implementation of enhanced recovery in cardiac surgery: An experimental study with control group. *Asian Cardiovascular and Thoracic Annals*, 31(2), 88–96. <https://doi.org/10.1177/02184923221138504>.
4. Ahmed, H. (2019). The effect of early ambulation on hemodynamic and perfusion indices post cardiac surgery. *American Journal of Nursing*, 7(4), 490–498.
5. Ishfaq, N., Javed, S., Haider, N., & Awan, F. N. (2025). Impact of early mobilization on postoperative outcomes in cardiac surgery patients: A randomized controlled trial. *Insights Journal of Health Research*, 3(4), 611–617.
6. Putzu, A., Cassina, T., & Santambrogio, L. (2016). Hemodynamic challenge to early mobilization after cardiac surgery: A pilot study. *Annals of Cardiac Anaesthesia*, 19(3), 354–359. <https://doi.org/10.4103/0971-9784.185540>.
7. Silvetti, S., Aloisio, T., & Bertini, P. (2024). Post-operative implications in ERAS cardiac surgery protocols. In *Cardiac Surgery in the Era of ERAS* (pp. 303–318). Springer. https://doi.org/10.1007/978-3-031-70899-2_20.
8. Ziyaeifard, M., Khoo, F. G. B., & Lotfian, S. (2018). Effects of early mobilization protocol on cognitive outcome after cardiac surgery. *Anesthesia and Critical Care*, 3(1), 1–8.

Work-Related Musculoskeletal Disorders and Affecting Factors Among Orthopaedic Surgeons: A Literature Review

Melike YAĞCI¹, Siner ALBAYRAK² and Mehmet Fatih Aksay³

¹ Department of Physical Therapy and Rehabilitation, Recep Tayyip Erdoğan University, Rize, Turkey,

² Program of Occupational Health and Safety, Ağrı İbrahim Çeçen University, Ağrı, Turkey,

³ Faculty of Medicine, Ağrı İbrahim Çeçen University, Ağrı, Turkey

ABSTRACT

Musculoskeletal disorders (MSDs) are inflammatory and degenerative conditions affecting muscles, tendons, ligaments, and bones (1). These disorders are common among healthcare professionals, particularly orthopedic surgeons, due to repetitive movements, prolonged standing, and nonergonomic working postures (3).

Orthopedic surgeons experience high rates of work-related musculoskeletal disorders (WrMSDs), which can impair surgical performance and shorten career longevity (4). Studies show that up to 87% of orthopedic surgeons report at least one musculoskeletal injury, most commonly involving the neck, back, and wrists (3, 4). Occupational risk factors include heavy or vibrating instruments, long operations, inadequate rest, and poor ergonomic design of operating rooms (5).

The growing aging population increases the demand for orthopedic care, further intensifying surgeons' workloads and exposure to ergonomic risks (6, 7). Preventive measures such as ergonomic education, physical conditioning, and improved operating room design are essential to reduce discomfort and maintain surgeons' health and efficiency. Ergonomics, defined as the harmony between people and their work environment, is key to ensuring safety, productivity, and sustainability in surgical practice.

Keywords: Orthopedic surgeon, Operating room, Work-related musculoskeletal disorders, Ergonomic risks, Occupational health

Referances

- [1] Özcan, E., Esmailzadeh, S., & Başat, H. (2011). Bilgisayar Kullanıcılarında Üst Ekstremité İşe Bağlı Kas İskelet Hastalıkları ve Ergonomi Girişiminin Etkinliği. *Journal of Physical Medicine & Rehabilitation Sciences*, 14.
- [2] Swank, K. R., Furness, J. E., Baker, E., Gehrke, C. K., & Rohde, R. (2022). A survey of musculoskeletal disorders in the orthopaedic surgeon: identifying injuries, exacerbating workplace factors, and treatment patterns in the orthopaedic community. *JAAOS Global Research & Reviews*, 6(5), e20.
- [3] Tan, K., & Kwek, E. (2020). *Musculoskeletal occupational injuries in orthopaedic surgeons and residents. Malays Orthop J* 14 (1): 24–27.
- [4] Lester, J. D., Hsu, S., & Ahmad, C. S. (2012). Occupational hazards facing orthopedic surgeons. *Am J Orthop (Belle Mead NJ)*, 41(3), 132-139.
- [5] Ismail, Z., Ahmad, W. I. W., Hamjah, S. H., & Astina, I. K. (2021). The impact of population ageing: A review. *Iranian journal of public health*, 50(12), 2451.
- [6] <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health> (Access date: 15.09.2025)
- [7] Janki, S., Mulder, E. E., IJzermans, J. N., & Tran, T. K. (2017). Ergonomics in the operating room. *Surgical endoscopy*, 31(6), 2457-2466.

ID: P-79

Bioremoval of Malachite Green Dye from Aqueous Solutions Using *Acer pseudoplatanus* L. Fruits Biosorbent; Isotherm, Kinetic and Thermodynamic Studies

E. Güllüce¹, Y. Gülşahin¹, M. Karadayı², V. Yıldırım² and E.B. Yılmaz¹

¹*Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0003-2290-3799; ORCID: 0000-0002-3770-2116; ORCID: 0009-0005-3674-8912*

²*Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-2473-0409; ORCID: 0000-0002-1708-359X*

ABSTRACT

Synthetic dyes are widely used in industries such as dye, paper, cosmetics, and textiles. Synthetic dyes pose risks to both human health and for the living aquatic organisms due to their mutagenic, carcinogenic, and tetra genic properties [1]. Therefore, wastewater containing synthetic dyes must be treated before being discharged into the receiving environment. Wastewater treatment processes such as membrane filtration, ion exchange, filtration, and coagulation/flocculation are used to remove synthetic dyes from aqueous solutions [2]. These processes have disadvantages such as high cost, chemical use, and large space requirements. In recent years, biosorption process has come to the fore to remove synthetic dyes from aqueous solutions using various biosorbents that are abundant in nature and have no economic value [3]. In this presented study, biosorption process was used to remove malachite green dye from aqueous solutions by using the *Acer pseudoplatanus* L. fruits (APF) biosorbent. Parameters including pH, contact time, biosorbent dose, initial dye concentration, and temperature were investigated in this study. According to the findings obtained from the studies out at pH: 6, biosorbent dose: 1 g, initial dye concentration: 10 mg/L and stirring speed: 150 rpm, Malachite green dye was removed 96% from aqueous solutions using APF biosorbent. Isotherm, kinetic, and thermodynamic studies were also investigated. The R² value of the Freundlich isotherm model (R²=0.976) best fitted compared to other isotherm models (Langmuir (R²=0.931), Elovich (R²=0.815), and Temkin (R²=0.92)). In the kinetic studies, the R² value of the pseudo-second-order kinetic model (R²=0.994) best fitted compared to the R² value of the pseudo-first-order kinetic model (R²=0.932). Since ΔG values were negative in the thermodynamic study, the biosorption process occurred spontaneously. Consequently, it was observed that the APF biosorbent successfully removed MG from aqueous solutions.

References

- [1] Gul, S., Afsar, S., Shah, T. A., Gul, H., Aziz, T., Zahra, N., ... & Alamri, A. S. (2025). White clover components as an effective biosorbent for the elimination of toxic malachite green from wastewater. *Biomass Conversion and Biorefinery*, 1–13.
- [2] Karadayı, M., Güllüce, E., Gülşahin, Y., Çolak, İ., Karadayı, G., Aksu, Ş., & Güllüce, M. (2025). Molecular docking assisted toxicity assessment of Congo Red and detoxification potential of *Fraxinus excelsior* L. (Oleaceae) biosorbent application. *Biomass Conversion and Biorefinery*, 1–20.
- [3] Güllüce, E., Karadayı, M., Gülşahin, Y., Çolak, İ., Koç, T. Y., Hıdıroğlu İspirli, N., & Güllüce, M. (2025). Removal of crystal violet dye from aqueous solutions using *Robinia pseudoacacia* L. (Fabaceae) Fruits biosorbent. *International Journal of Phytoremediation*, 27(5), 688–699.

Bioremoval of Congo Red Dye from Aqueous Solutions by *Acer negundo* Biosorbent; Isotherm and Kinetic Studies

Y. Gülşahin¹, E. Güllüce¹ and M. Karadayı²

¹Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye,

²Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye,

ABSTRACT

In recent years, approximately 700,000 tons of synthetic dyes have been produced in various industries, including paint, fabric, cosmetics, and textiles. 450,000 tons of the effluent of these synthetic dyes are discharged into the environment [1]. Because synthetic dyes have mutagenic, toxic, and carcinogenic effects, the discharge of wastewater from these dyes poses a serious environmental problem [2]. Wastewater treatment processes such as coagulation/flocculation, flotation, ozonation, membrane separation are used in the removal of synthetic dyes. However, these processes have disadvantages due to their high cost, use of chemicals, and high energy requirements. In recent years, biosorption processes have emerged for the removal of synthetic dyes using various biosorbents. The biosorption process offers advantages such as being sustainable, easy to operate and eco-friendly [3]. Present study, a biosorption process was applied to remove Congo red from aqueous solutions using the *Acer negundo* (AN) biosorbent. Parameters affecting the biosorption process, including pH, contact time, biosorbent dose, initial dye concentration, and temperature, were investigated. Congo red dye was removed by 85% from aqueous solutions by using AN biosorbent under optimum conditions (pH=6, initial dye concentration= 10 mg/L, contact time=30 min, biosorbent dose=1 g and temperature= 303 K). Isotherm and kinetic studies were also investigated. In the isotherm studies, the correlation coefficient of the Langmuir isotherm ($R^2=0.989$) best fitted compare to the Freundlich ($R^2=0.841$), Temkin ($R^2=0.819$), and Elovich ($R^2=0.769$) isotherm models. In the kinetic studies, the R^2 value of the pseudo-second-order kinetic model ($R^2=0.962$) provided best fit than the pseudo-first-order kinetic model ($R^2=0.924$). Consequently, it was observed that the AN biosorbent was effective in removing Congo Red from aqueous solutions.

References

- [1] Skanda, S., Bharadwaj, P. S. J., Kar, S., Sai Muthukumar, V., & Vijayakumar, B. S. (2023). Bioremoval capacity of recalcitrant azo dye Congo red by soil fungus *Aspergillus arcovardensis* SSSIHL-01. *Bioremediation Journal*, 27(1), 32–43.
- [2] Lemos, E. S., Fiorentini, E. F., Bonilla-Petriciolet, A., & Escudero, L. B. (2023). Malachite green removal by grape stalks biosorption from natural waters and effluents. *Adsorption Science & Technology*, 2023, 6695937.
- [3] Karadayı, M., Güllüce, E., Gülşahin, Y., Çolak, İ., Karadayı, G., Aksu, Ş., & Güllüce, M. (2025). Molecular docking assisted toxicity assessment of Congo Red and detoxification potential of *Fraxinus excelsior* L. (Oleaceae) biosorbent application. *Biomass Conversion and Biorefinery*, 15, 25253–25272.

Biodiversity and Faunal Composition of Lake Van and Its Surroundings

E. Azizoglu^{1,2}, E. Çelik^{3,4} and B. Ergöz Azizoğlu⁵

¹Department of Plant and Animal Production, Çölemerik Vocational School, Hakkari University, Hakkari, Türkiye, ORCID: 0000-0002-4895-4298

²Hakkari University, Center for Biodiversity Application and Research, 30100, Hakkari, Türkiye

³Hunting and Wildlife Program, Department of Forestry, Vocational School of Technical Sciences, Iğdir University, Iğdir, Türkiye, ORCID: 0000-0003-1274-4122

⁴Ornithology Research and Application Centre (ORNITHOCEN), Iğdir University, Iğdir, Türkiye,

⁵Department of Plant and Animal Production, Yüksekova Vocational School, Hakkari University, Hakkari, Türkiye, ORCID: 0000-0002-7002-3801

ABSTRACT

Lake Van, one of Türkiye's important wetlands located in the Lake Van Basin, is located on the south-north migration route in the zoogeographic region of the Western Palearctic. Due to this location, it provides a living environment for many wild organisms in the area. Records were created in the area between April 2018 and November 2024 using direct observations of fauna elements and literature data. In determining the bird species in the area, Raster Carding and Line Transect - Point Counts methods were applied. For herpetological studies, specimens were identified by hand or scoop capture. Representative samples of mammalian species were obtained using live-catch traps, insect nets, and fishing nets. Fish species were identified by catching them using spreading net techniques. As a result of the research, important findings were obtained in terms of biological diversity in Lake Van and its immediate surroundings. In this context, 5 amphibian species belonging to 5 families and 16 reptile species belonging to 5 families were identified in the region. In addition, a total of 229 bird species belonging to 21 orders and 58 families and 39 mammal species belonging to 17 families were identified. The region also detected the presence of 14 fish species belonging to 5 families. As a result, a total of 303 faunal elements were identified in Lake Van and its surroundings, thus revealing the faunal diversity of the region. The high species diversity of the area is of great faunistic importance as it provides breeding and feeding grounds for many living species. With these features, the necessity of protecting Lake Van and its surroundings was revealed.

References

- [1] Elp, M., Atıcı, A. A., Şen, F., & Duyar, H. A. 2016. Van Gölü Havzası balıkları ve yayılım bölgeleri. *YYÜ Tar Bil Derg*, 26(4), 563-568.
- [2] Karataş, A., Filiz, H., Erciyas-Yavuz, K., Özeren, S.C., & Tok, C.V. 2021. The Vertebrate Biodiversity of Turkey. Biodiversity, Conservation and Sustainability in Asia: Volume 1: Prospects and Challenges in West Asia and Caucasus, 175
- [3] Yıldız, M. Z., İçci, N., Akman, B. (2021): Herpetofaunal inventory of Van Province, eastern Anatolia. *Journal of Threatened Taxa* 13: 17670–17683
- [4] Burgin, C. J Colella, J. P. Kahn P. L. and Upham, N. S. 2018. "How many species of mammals are there?" *Journal of Mammalogy*, vol. 99, Num. 1, pp. 1-14, 2018.
- [5] Adızel, Ö., Yıldız, M. Z., Ünal, M., Azizoğlu, E., Öztürk, F., & Akman, B. 2017. Biodiversity of Van Reed, Eastern Turkey. *Commagene Journal of Biology*, 1(1), 31-41.
- [6] Toyran, K., Şengül, E., 2022. Bitlis İlindeki *Nannospalax xanthodon* (Nordmann, 1840) Türünün Biyoekolojisi (Mammalia: Rodentia). *Bitlis Eren Üniversitesi Fen Bilimleri Dergisi*, 11 (1): 131-139

ID: P-82

Coastal Waterfowl Potential of the Göründü Reeds (Lake Van Basin/Van)

E. Azizoglu^{1,2}, E. Çelik^{3,4} and Ö. Özdemir²

¹Department of Plant and Animal Production, Çölemerik Vocational School, Hakkari University, Hakkari, Türkiye, ORCID: 0000-0002-4895-4298

²Hakkari University, Center for Biodiversity Application and Research, 30100, Hakkari, Türkiye

³Hunting and Wildlife Program, Department of Forestry, Vocational School of Technical Sciences, Iğdir University, Iğdir, Türkiye, ORCID: 0000-0003-1274-4122

⁴Ornithology Research and Application Centre (ORNITHOCEN), Iğdir University, Iğdir, Türkiye,

ABSTRACT

The Göründü Reeds, one of the important wetlands in the Lake Van Basin, offers a habitat for many coastal and waterfowl due to its location and habitat diversity. In this study, coastal and waterfowl species in Göründü Reeds and its immediate surroundings were investigated. Observation studies on coastal and waterfowl species were conducted between March 2020 and November 2024. . As a result of the observations, 74 coastal and waterfowl species belonging to 7 orders and 12 families were recorded in Göründü Reeds and its surroundings. When the migration status of the species was evaluated, it was determined that 32 species were resident (R), 29 species were summer visitors (SV), 6 species were transit migrants (T) and 6 species were winter visitors (WV). According to IUCN conservation criteria, it was determined that 1 species Endangered (EN), 2 species are Vulnerable (VU), 6 species are Near Threatened (NT) and 64 species are Least concern (LC).

References

- [1] Atabey, A., & Karakaş, R. 2024. The bird diversity and conservation recommendations for Mount Zülküf in southeast Anatolia, Türkiye. *Journal of Animal Diversity*, 6(1), 12-20.
- [2] Azizoğlu, E. & Adızel, Ö. 2017. Determination of Seasonal Habitat Usage and Population Distributions of Bird Species Detected in and Around of Yüksekova Nehil Reed (Hakkari -Turkey), *ADYÜTAYAM*, 5 (1): 10-19.
- [3] Çelik, E. & Durmuş, A. 2017. Determining the Seasonal Ornithological Potential of the Dönemeç (Engil) Delta and Generate the Digital Maps Using Geographical Information Systems (GIS), *Iğdir Üni. Fen Bilimleri Enstitüsü Dergisi/ Iğdir University Journal Insitute. Science. & Technology*, 7(3): 73-77.
- [4] Holm, E. T. & Clausen, P. 2006. Effects of water level management on autumn staging waterbird and macrophyte diversity in three Danish coastal lagoons, *Biodiversity and Conservation*. 15: 4399-4423.
- [5] Karakaş, R. 2017. Ornithological importance of artificial ponds: a case study at Kabaklı Pond, south-eastern Anatolia, Turkey. *Paddy and Water Environment*, 15, 919-930.
- [6] Kızıroğlu, İ. 2015. *Türkiye Kuşları Cep Kitabı*, 577, Sarıyıldız Ofset ve Matbaacılık, Ankara, Türkiye.
- [7] Uysal, İ. 2021. Suvla Tuz Gölü (Çanakkale/Türkiye)'nün ornithofaunası ve su kuşları çeşitlilik göstergeleri'nin aylık değişimi. *Environmental Toxicology and Ecology*, 7(1), 14-26.

Construction of Benzohydrazide- and Benzamide-Linked New Thieno[3,2-*d*]pyrimidin-4-ones with Potential Pharmacological Relevance

A. Köse¹, F. Çakır², H. Şenol³ and F.S. Tokalı⁴

¹Aksaray University, Faculty of Science and Letters, Department of Chemistry, Aksaray, Turkey, ORCID: 0000-0003-2448-3716

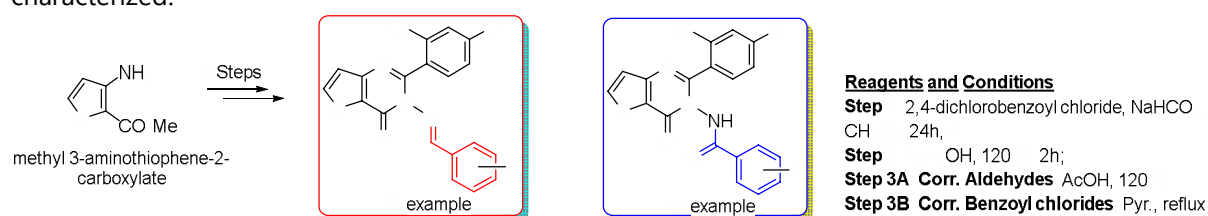
²Bezmilem Vakif University, Faculty of Pharmacy, Department of Pharmaceutical Chemistry, İstanbul, Turkey ORCID: 0000-0002-6925-1655

³Bezmilem Vakif University, Faculty of Pharmacy, Department of Pharmaceutical Chemistry, İstanbul, Turkey ORCID: 0000-0002-8333-035X

⁴Kafkas University, Kars Vocational School, Department of Material and Material Processing Technologies, Kars, Turkey ORCID: 0000-0001-5532-8802

ABSTRACT

Thieno[3,2-*d*]pyrimidin-4-ones are thiophene- and pyrimidine-based compounds that can be synthesized through various structural modifications within fused ring systems[1]. These scaffolds represent an important class of heterocyclic compounds, exceptionally well integrated among fused heteroaromatic frameworks. The synthesis of this heterocyclic family through straightforward and highly selective methodologies, coupled with their broad spectrum of biological activities-including immunosuppressive, antihypertensive, anti-inflammatory, antioxidant, anticancer, antiviral, and antimicrobial properties-renders them highly attractive targets within the field of synthetic chemistry [2]. In the present study, starting from methyl 3-aminothiophene-2-carboxylate, a series of fifteen thieno[3,2-*d*]pyrimidin-4-one derivatives incorporating a benzohydrazide moiety were synthesized in three steps using various substituted benzaldehydes. Similarly, thirteen novel thieno[3,2-*d*]pyrimidin-4-one derivatives bearing a benzamide unit were obtained through reactions with substituted benzoyl chlorides, and all newly synthesized compounds were fully characterized.



Acknowledgement: This work was supported by Bezmialem Vakif University (Scientific Research Projects Coordination Unit, Project number: 20250514).

References

- [1] A. El-Mekabaty, A.E.S Fouda, I.E.I. Shaaban, Convenient synthesis of functionalized thieno[2,3-*d*]pyrimidine-4-ones and thieno[2,3-*b*]pyridine-4-ones bearing a pyridine moiety with anticipated antioksidant activity, *J. Het. Chem.*, 57(7), (2020), 2928–2935. **b**) I. Iliev, A. Mavrova, D. Yancheva, D. Dimov, G. Staneva, A. Nesheva, I. Tsoneva, B. Nikolova, 2-Alkyl-Substituted-4-Amino-Thieno[2,3-*d*]Pyrimidines: Anti-Proliferative Properties to In Vitro Breast Cancer Models, *Molecules*, 28(17), (2023), 6347.
- [2] O.T. Devinyak, M.V. Slivka, Mar V. Slivka, V.M. Vais, V.G. Lendel, Quantitative structure-activity relationship study and directed synthesis of Thieno[2,3-*d*]pyrimidine-2,4-diones as monocarboxylate transporter 1 inhibitors, *Med. Chem. Res.*, 21, (2012), 2263–2272. **b**) R.K. Russell, J.B. Press, R.A. Rampulla, J.J. McNally, R. Falotico, J.A. Keiser, D.A. Bright, A. Tobia, Thiophene systems. 9. Thienopyrimidinedione derivatives as potential antihypertensive agents, *J. Med. Chem.*, 31, (1988), pp. 1786. **c**) P. Rashmi, G.N. Laxmivenkatesh, H. Kuntal, Thienopyrimidines as novel anti-inflammatory agents and antioxidants, *Chem. Sin.*, 2 (2011), pp. 165-171. **d**) P. Workman, P.A. Clarke, F.I. Raynaud, R.L.M. van Montfort, Drugging the PI3 kinase: from chemical tools to drugs in the clinic, *Cancer Res.*, 70 (2010), pp. 2146-2157.

ID: P-84

Determination of the Uptake of Selenium in the Samples of Garlic Grown Hydroponically

Ümmügülsüm Polat Korkunç¹, Betül Arı Engin², Sezgin Bakırdere^{1,3}, Emine Karakuş¹

¹*Yıldız Technical University, İstanbul, Türkiye ORCID: 0000-0001-6942-9532, 0000-0002-7730-3304*

²*TUBITAK National Metrology Institute, Kocaeli, Türkiye ORCID: 0000-0002-8223-2184*

³*Turkish Academy of Sciences (TÜBA), Ankara, Türkiye ORCID: 0000-0001-9746-3682*

ABSTRACT

Garlic is a plant that has been grown from stems and leaves for a very long time. Garlic contains a variety of chemicals and minerals, including carbs, fiber, protein, magnesium, and potassium. Sulfur and selenium are closely related. In a number of metabolic processes, selenium (Se) can take the place of sulfur (S). Because selenium and sulfur have similar chemical and physical properties, selenium can be utilized in place of sulfur in plant metabolism. Because of this, they compete with one another in terms of absorption, transportation, and assimilation in plants. Using the same assimilation mechanism as sulfate (SO_4^{2-}), selenium (SeO_4^{2-}) is chemically reduced to form selenium-containing amino acids, including selenocysteine (SeCys) and selenomethionine (SeMet). This process replaces the sulfur-containing amino acids cysteine and methionine. It is assumed that SeCys and SeMet can be incorporated into proteins. In the present study, garlic samples were sown in a soilless media before being moved to a hydroponic growing medium that included three distinct concentrations of sodium selenite (Na_2SeO_3). While the total selenium content of the enzyme-extracted leaves and roots was 10.3 ± 2.0 and 10.6 ± 5.9 mg/kg (n=4), the total selenium content of the lyophilized 150 μM garlic extracts' roots and leaves was 43.8 ± 33.2 and 62.7 ± 16.4 mg/kg (n=4).

References

- [1] Lopez-Bellido, F. J., Lopez-Bellido, R. J., Muñoz-Romero, V., Fernandez-Garcia, P., & Lopez-Bellido, L. (2016). New phenological growth stages of garlic (*Allium sativum*). *Annals of Applied Biology*, 169(3), 423-439.
- [2] Espinoza, T., Valencia, E., Albarrán, M., Díaz, D., Quevedo, R., Díaz, O., & Bastías, J. (2020). Garlic (*Allium sativum* L) and its beneficial properties for health: A Review. *Agroindustrial Science*, 10(1), 103-115.
- [3] Ghasemi, K., Bolandnazar, S., Tabatabaei, S., Pirdashti, H., Arzanlou, M., Ebrahimzadeh, M., & Fathi, H. (2015). Antioxidant properties of garlic as affected by selenium and humic acid treatments. *New Zealand Journal of Crop and Horticultural Science*, 43(3), 173-181
- [4] Abdalla, M. A., Lentz, C., & Mühling, K. H. (2022). Crosstalk between Selenium and Sulfur Is Associated with Changes in Primary Metabolism in Lettuce Plants Grown under Se and S Enrichment. *Plants*, 11(7), 927.

Investigation of the Antioxidant and Enzyme Inhibitory Effects of Autumn Mandrake (*Mandragora Autumnalis*)

E. Elbir¹, Y. Bıçakcı², K. Aslan³, I. Gulcin,⁴

^{1,2,3}Ataturk University, Erzurum, Türkiye, ORCID¹: 0009-0004-4674-4221 ORCID²: 0009-0000-7966-4288
ORCID³: 0000-0001-8388-5470

⁴Agri İbrahim Cecen University, Agri, Türkiye, ORCID⁴: 0000-0001-5993-1668

ABSTRACT

Mandragora autumnalis, commonly known as Autumn Mandrake, is a poisonous plant species that grows in Türkiye. Inspired by Paracelsus's famous statement, "Every medicine is a poison; the dose is what counts," this study aimed to investigate the biological potential of *M. autumnalis* [1]. Ethanolic extracts of the plant were prepared and subjected to comprehensive bioactivity assays. Antioxidant activity was assessed using multiple *in vitro* methods, including diphenyl-2-picrylhydrazyl (DPPH), 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS), Cupric Reducing Antioxidant Capacity, Ferric Reducing Antioxidant Power, and Fe³⁺ ion-reduction assays [2]. The IC₅₀ values for DPPH (5.55 µg/mL) and ABTS (5.13 µg/mL) radical scavenging activities were determined, while reducing power assays revealed that *M. autumnalis* extracts displayed stronger activity than the reference antioxidant. Furthermore, the therapeutic potential of the extract was evaluated by enzyme inhibition studies targeting metabolic disease-related enzymes, including acetylcholinesterase, butyrylcholinesterase, and human carbonic anhydrases I and II [2]. The results were benchmarked against commercially available drugs used as standard inhibitors of the respective enzymes. Lastly, phenolic and flavonoid contents were determined to derive a structure-function relationship. The findings demonstrate that *M. autumnalis*, despite its toxic nature, possesses significant antioxidant and enzyme inhibition properties. These results highlight the importance of dose-dependent evaluation for its potential therapeutic applications.

Acknowledgement: This work was supported by TÜBİTAK 2209-A (1919B012428503).

References

- [1] K. Aslan, K. Kelle, M. A. Yılmaz, E. Erden Kopar, and I. Gulcin, "Investigation of Cuckoo-Pint's (*Arum maculatum*) Phytochemistry, In Vitro Antioxidant Potential, Enzyme Inhibition, and Antimicrobial Activity," *ChemistrySelect*, vol. 9, no. 37, Oct. 2024, doi: 10.1002/slct.202403588.
- [2] A. Z. Tel, K. Aslan, M. A. Yılmaz, and İ. Gulcin, "A multidimensional study for design of phytochemical profiling, antioxidant potential, and enzyme inhibition effects of ışgın (*Rheum telianum*) as an edible plant," *Food Chem X*, vol. 25, Jan. 2025, doi: 10.1016/j.fochx.2024.102125.

ID: P-86

An Investigation on *Ferula communis* L. (*Apiaceae*) Extracts: Antioxidant and Antiradical Activities, and Phenolic Analysis via LS-MS/MS

L. Polat Köse¹, İ. Gülçin², A.C. Gören³

¹Department of Pharmacy Services, Vocational School, İstanbul Beykent University, 34500, İstanbul, Türkiye
leylakose@beykent.edu.tr, ORCID: 0000-0001-5759-7889

²Faculty of Science, Department of Chemistry, Ataturk University, Erzurum, Türkiye,
igulcin@agri.edu.tr, ORCID: 0000-0001-5993-1668

³Faculty of Basic Sciences, Department of Chemistry, Gebze Technical University, Gebze, Kocaeli, Türkiye
acgoren@gtu.edu.tr, ORCID: 0000-0002-5470-130X

ABSTRACT

The genus *Ferula*, which belongs to the *Apiaceae* family, includes more than 170 species [1]. *Ferula communis* L. (*Apiaceae*) is mainly distributed across the mountainous areas of the Eastern Mediterranean in Turkey, as well as in East Africa and Central Asia [2]. Many species of *Ferula* have been used as herbal remedies for intestinal parasites and as aphrodisiacs, as well as for treating gastrointestinal diseases such as asthma and bronchitis. They have also been utilized for their spasmolytic, antifatulent, and antidiarrheal properties [3]. This study aimed to evaluate the antioxidant and radical scavenging activities of water and ethanol extracts derived from *Ferula communis* grown in the Erzurum region of Türkiye. Total phenolic content (TPC) and total flavonoid content (TFC) were quantified as gallic acid equivalents (GAE) and quercetin equivalents (QE), respectively. Finally, the phenolic compounds included in the extracts were identified via LC-MS/MS analysis [4]. The radical scavenging capacities of the extracts were examined through DPPH[•] and ABTS^{•+} assays. Also, their reducing abilities were determined using the CUPRAC (Cu²⁺-Cu⁺), Fe³⁺-Fe²⁺, and FRAP ([Fe³⁺-(TPTZ)₂]³⁺-[Fe²⁺-(TPTZ)₂]²⁺) methods and compared to standard antioxidants. The results demonstrated that both extracts exhibited notable antioxidant activity.

References

- [1] M. G. Pimenov, M. V. Leonov, 2010. The genera of the umbelliferae: a nomenclator. Edinb. J. Bot. 52, (2010) 92–93.
- [2] F. Uslu, Y. Uslu, 2024. Biosynthesis and Characterization of Silver Nanoparticles Mediated by *Cistus salviifolius* L. and *Ferula communis* L. Extracts and Evaluation of Their Antioxidant, Antibacterial, and Cytotoxic Potentials, *Biology Bulletin*, 51, 4, (2024) 845–856.
- [3] I. Ed-Dahmani, M. El Fadili, G. Nouioura, F. Kandsi, Y. El Atki, H. A. Abuelizz, R. Conte, F. Z. Lafdil, A. Taleb, A. Abdellaoui, M. Taleb, 2025. *Ferula communis* leaf extract: antioxidant capacity, UHPLC–MS/MS analysis, and in vivo and in silico toxicity investigations, *Front. Chem.* 12, (2025) 1485463.
- [4] L. Polat Köse, 2025. An Investigation on Yellow (*Sinapis alba*) and Black (*Brassica nigra*) Mustard Seed Extracts: Antioxidant, Anticholinergic Activities, and Phenolic Analysis via Liquid Chromatography-Tandem Mass Spectrometry, *Chemistry&Biodiversity*, (2025) 0:e00762

ID: P-87

The Complex-type Fibonacci-Circulant p -Sequences

Özgür ERDAĞ¹ and Ömür DEVECİ²

¹*Kafkas University, Faculty of Science and Letters, Department of Mathematics, Kars, Turkey, ORCID: 0000-0001-8071-6794*

²*Kafkas University, Faculty of Science and Letters, Department of Mathematics, Kars, Turkey, ORCID: 0000-0001-5870-52984*

ABSTRACT

In this paper, we define a new sequence which is called the complex-type Fibonacci-circulant p -sequence and we obtain the generating matrix of this sequence. We also derive the determinantal and permanental representations. Then, using the roots of the characteristic polynomial of the complex-type Fibonacci-circulant p -sequence, we produce the Binet formula for this defined sequence. In addition, we give the combinatorial representations, the generating function, the exponential representation and the sums of the complex-type Fibonacci-circulant p -numbers.

References

- [1] Ö. Deveci, E. Karaduman, C.M. Campbell, 2017. The Fibonacci–circulant sequences and their applications, *Iran. J. Sci. Technol. Trans. A Sci.*, 41(4) (2017) 1033–1038.
- [2] Ö. Deveci, A.G. Shannon, E. Karaduman, 2022. The complex-type Fibonacci p -Sequences, *An. Univ. Craiova Math. Comput. Sci.*, 49(2) (2022) 260–269.
- [3] A.F. Horadam, 1963. Complex Fibonacci numbers and Fibonacci quaternions, *Amer. Math. Monthly*, 70(3) (1963) 289–291.

ID: P-88

On the Solvable Residuals and Involutions of Maximal Subgroups of $Sp(8, r)$

Zehra ÇELİK KARADENİZ¹, Abdullah ÇAĞMAN² and Kadirhan POLAT³

¹*Ağrı İbrahim Çeçen Üniversitesi, Ağrı, Türkiye, ORCID: 0000-0002-7268-7388*

²*Erzurum Teknik Üniversitesi, Erzurum, Türkiye, ORCID: 0000-0002-0376-7042*

³*Ağrı İbrahim Çeçen Üniversitesi, Ağrı, Türkiye, ORCID: 0000-0002-3460-2021*

ABSTRACT

In this work, we will give the solvable residuals of maximal subgroups of $Sp(8, r)$ where r is prime and discuss involutions of some perfect subgroups of maximal subgroups of $Sp(8, r)$.

Acknowledgement: This work was supported by TÜBİTAK (Project number: 121F477).

References

- [1] Aschbacher, M., 1984. On the maximal subgroups of finite classical groups. *Invent.Math.*, 76(3), 469-514.
- [2] Bray, J., Holt, D. and Rooney-Dougal, C., 2013. *The maximal subgroups of the low dimensional finite classical groups*. Cambridge University Press, 438.
- [3] Brooksbank, P. and Niemeyer, A.C. and Seress, A., 2006. A reduction algorithm for matrix groups with an extraspecial normal subgroup. *Finite Geometries, Groups and Computation*, deGruyter, 1-16.
- [4] Grove, L.C., 2002. *Classical Groups and Geometric Algebra*. American Mathematical Society, 169p, Providence, Rhode Island, USA.

Structural and Self-Similarity Properties of Higher-Order Horadam Numbers

B. Kuloğlu¹, J. F. Peters², M. Uysal³ and E. Özkan⁴

¹Department of Engineering Basic Sciences, Sivas University of Science and Technology, Sivas, Türkiye,
ORCID: 0000-0001-7624-8270

²Department of Electrical & Computer Engineering, University of Manitoba, Winnipeg, Manitoba, R3T 5V6,
Canada

ORCID: 0000-0002-1026-4638

³Department of Mathematics, Erzincan Binali Yıldırım University, Yalnızbağ Campus, 24100, Erzincan, Türkiye.
ORCID: 0000-0002-2362-3097

⁴Department of Mathematics, Marmara University, İstanbul, Türkiye
ORCID: 0000-0002-4188-7248

ABSTRACT

In this study, we introduce and investigate higher-order Horadam numbers as a natural generalization of classical number sequences such as Fibonacci, Lucas, Pell, Jacobsthal, and Mersenne. We derive their fundamental properties including recurrence relations, Binet-type formulas, generating functions, summation formulas, and matrix representations. Furthermore, we explore Catalan transforms of higher-order Horadam numbers and analyze their structural behaviors. Particular emphasis is placed on the emergence of self-similarity phenomena in nonlinear graphs constructed from the generating functions of these sequences. The study highlights how self-similarity, inherent in higher-order Horadam numbers, provides insights into infinite complexity within finite structures and reveals potential applications in fields such as fractal compression, financial modeling, and biological sequence analysis. Our results offer a comprehensive framework for understanding higher-order Horadam numbers and open new perspectives for future theoretical and applied research.

Acknowledgement: This study was supported by the Scientific Research Projects (BAP) Coordination Unit of Marmara University under project number ADF-2025-11437.

References

- [1] M. Randić, D. A. Morales and O. Araujo, "Higher-order Fibonacci numbers", *J. Math. Chem.*, 20, 79-94 (1996).
Doi: 10.1007/BF01165157
- [2] C. K. Cook and M. R. Bacon, "Some identities for Jacobsthal and Jacobsthal-Lucas numbers satisfying higher order recurrence relations", *Ann. Math. Inform.*, 41, 27– 39 (2013).
- [3] E. Özkan and M. Uysal, "On quaternions with higher order Jacobsthal numbers components", *Gazi Univ. J. Sci.*, 36(1), 336-347 (2023). Doi: 10.35378/gujs. 1002454.
- [4] F. Horadam, "A generalized Fibonacci sequence", *Am. Math. Mon.*, 68(5), 455-459 (1961).
- [5] P. Barry, "A Catalan transform and related transformations on integer sequences", *J. Integer Seq.*, 8, 5.4.4, 1-24 (2005).
- [6] N.J.A. Sloane, "The On-Line Encyclopedia of Integer Sequences".
<https://oeis.org/search?q=1%2c2%2c5%2c14%2c42%2c132%2c&language=english&go=search>.
(Accessed November 12, 2024)

ID: P-90

Fractional Calculus and Artificial Intelligence in the Modeling and Control of Mechatronic Systems

Abdüllatif YALÇIN¹

¹ Yıldız Technical University, Faculty of Arts and Science

Department of Mathematics, Istanbul, Turkey

*Corresponding author: abdullatif.yalcin@std.yildiz.edu.tr

ABSTRACT

The dynamic behavior of mechatronic systems is often described by nonlinear differential equations that incorporate uncertainties and memory effects. Classical integer-order models are insufficient to capture these complex characteristics. In recent years, fractional calculus has emerged as a powerful mathematical tool for representing viscoelasticity, damping, and hereditary properties of engineering systems. On the other hand, artificial intelligence (AI) methods, particularly neural networks and evolutionary algorithms, provide efficient numerical solutions for such models, where analytical approaches are often intractable.

This paper aims to integrate fractional-order modeling techniques with AI-based solution methods in the context of mechatronic applications. Fractional differential equations are employed to describe vibration control in robotic manipulators, trajectory optimization in unmanned aerial vehicles, and fault-tolerant strategies in intelligent manufacturing systems. The proposed framework leverages AI algorithms to approximate fractional operators and accelerate convergence, while maintaining theoretical guarantees of stability through inequality-based analysis.

The results demonstrate that the synergy of fractional analysis and AI provides a novel paradigm for mechatronics: mathematical rigor is preserved while computational efficiency is achieved. This interdisciplinary perspective bridges abstract mathematics and practical engineering, suggesting new research avenues for control, optimization, and system identification in mechatronics.

Key words: Fractional integrals; Artificial intelligence; Fractional differential equations; Intelligent manufacturing; Mechatronic systems.

References

- [1] Podlubny, I. (1999). *Fractional Differential Equations*. Academic Press..
- [2] Lin, J., & Chen, D. (2019). A survey on fractional-order control for intelligent mechatronic systems. *ISA Transactions*, 91, 30–45.
- [3] Chen, Y., Petráš, I., & Xue, D. (2011). Fractional order control—A tutorial. *Automatica*, 47(12), 2089–2099.

ID: P-91

The Effect of Paternal Skin-to-Skin Contact After Cesarean Section on the Breastfeeding Process: Randomized Controlled Study

Emine Serap Çağın¹, Ebru Solmaz¹, Rumeysa Özeyabakan¹, Rozerin Balcı²,

¹*Agri Ibrahim Cecen University, Faculty of Health Sciences, Department of Midwifery, Agri, Turkey, ORCID: 0000-0002-3261-0431 (E.S. Çağın), 0000-0003-1962-8669 (E. Solmaz), 0000-0001-5176-157X (R.*

Özeyabakan)

²*Bitlis Eren University, Faculty of Health Sciences, Department of Midwifery, Bitlis, Turkey; ORCID: 0000-0003-3188-6732*

ABSTRACT

This study aimed to examine the effect of paternal skin-to-skin contact on breastfeeding behaviors following cesarean section. Skin-to-skin contact is an evidence-based practice known to strengthen early bonding and support breastfeeding in newborns. The study was conducted between April and August 2023 in the obstetrics clinic of a hospital located in eastern Turkey. A total of 126 postpartum women who had undergone cesarean delivery participated. Data were collected using a socio-demographic information form, a skin-to-skin contact and breastfeeding questionnaire, and the LATCH Breastfeeding Assessment Tool. The mean time to initiate breastfeeding was 67.54 ± 10.69 minutes in the paternal skin-to-skin contact group and 86.38 ± 35.14 minutes in the control group. The mean LATCH score was 8.13 ± 1.27 in the intervention group compared to 6.13 ± 1.69 in the control group. Statistically significant differences were found between groups regarding time to initiate breastfeeding, first breastfeeding duration, newborn latch-on behavior, swallowing movement during sucking, post-feeding behaviors, supplemental feeding, and LATCH scores at both postpartum assessment and discharge ($p < 0.05$). These findings indicate that skin-to-skin contact provided by fathers after cesarean section positively influences breastfeeding behaviors and supports successful initiation of breastfeeding.

ID: P-92

Marginal Placenta Previa: A Case with Stable Course

Ebru Solmaz¹, Emine Serap aan¹, Rumeysa zayabakan¹

¹*Agri Ibrahim Cecen University, Faculty of Health Sciences, Department of Midwifery, Agri, Turkey, ORCID: 0000-0003-1962-8669 (E. Solmaz), 0000-0002-3261-0431 (E.S. aan), 0000-0001-5176-157X (R. zayabakan),*

ABSTRACT

A 39-year-old woman, G3P1 at 31 weeks of gestation, presented to the emergency department with six hours of intermittent and mild vaginal bleeding. The bleeding had started suddenly while she was sitting at work, and she had used only one sanitary pad in total. At the time of examination, the bleeding had decreased. She denied abdominal pain, contractions, trauma, or fluid leakage. The pregnancy had been largely uncomplicated, although she had missed her last ultrasound appointment. Her obstetrician had previously mentioned that the placenta was low-lying. Fetal movements were reported as normal. Her past medical history included a first-trimester miscarriage, appendectomy, and a previous cesarean delivery. On examination, her vital signs were stable (BP: 112/74 mmHg, HR: 96 bpm, T: 36.9 °C). She was in no acute distress. Abdominal examination revealed a gravid, non-tender uterus. On genital examination, mild dark red spotting was observed, with no active bleeding or clots. Laboratory findings showed hemoglobin at 11.8 g/dL and hematocrit at 35.5%. Platelet count and coagulation parameters were within normal limits. Ultrasound revealed an anterior placenta located 2.5 cm from the internal cervical os. Transvaginal ultrasound confirmed the diagnosis of marginal placenta previa. No retroplacental hematoma was identified, and fetal heart rate and movements were reassuring. The patient remained hemodynamically stable. Intravenous fluids were administered, and continuous fetal monitoring was performed. Corticosteroid therapy was given for fetal lung maturation. Bleeding decreased spontaneously, and no urgent intervention was required. After 48 hours of stable observation, the patient was discharged with a plan for close follow-up. This case highlights that marginal placenta previa may present with a mild clinical course and can be managed safely with a conservative approach.

ID: P-93

The Effect of Oketani Massage on Breastfeeding Success and Breast Engorgement in Mothers Delivering by Cesarean Section: Randomized Controlled Study

Emine Serap Çağan¹, Rumeysa Özayabakan¹, Ebru Solmaz¹, Rozerin Balcı², Elmin Eminov³

¹Agri Ibrahim Cecen University, Faculty of Health Sciences, Department of Midwifery, Agri, Turkey, ORCID: 0000-0002-3261-0431 (E.S. Çağan), 0000-0001-5176-157X (R. Özayabakan), 0000-0003-1962-8669 (E. Solmaz)

²Bitlis Eren University, Faculty of Health Sciences, Department of Midwifery, Bitlis, Turkey; ORCID: 0000-0003-3188-6732

³Duzce University, Faculty of Medicine, Department of Surgical Medical Sciences, Division of Obstetrics and Gynecology, Duzce, Turkey; ORCID: 0000-0003-1587-1821

ABSTRACT

The aim of this study is to examine the effect of Oketani massage on breastfeeding success and breast engorgement in mothers who give birth by cesarean section. The study is a randomized controlled, two-group comparison, experimental study conducted in a city hospital in eastern Turkey between December 2022 and April 2023 and 116 women participated. The LATCH score was 9.25 ± 1.25 in the massage group and 8.08 ± 2.38 in the control group. breast engorgement scale score was 1.26 ± 0.48 in the massage group and 1.45 ± 0.53 in the control group. There was a statistically significant difference between the massage group and the control group in terms of LATCH score and breast engorgement scale mean score. In this study, it was found that Oketani massage reduces breast engorgement, which is an important problem for the continuation of breastfeeding, and positively affects successful breastfeeding.

ID: P-94

Optimization of Indole-3-Acetic Acid Production Capacity of *Enterobacter* sp. Bacteria Isolated from Various Extreme Areas

Burak Alaylar ¹, Akın Akıncıoğlu², Mehmet Karadayı ³, Medine Güllüce ⁴, Yüksel Dil ⁵, Yusuf Gülşahin ⁶

¹ Department of Molecular Biology and Genetic, Faculty of Arts and Sciences, Agri Ibrahim Cecen University, Agri, Türkiye, balaylar@agri.edu.tr Orcid ID: 0000-0001-6737-3440

² Central Research and Application Laboratory, Agri Ibrahim Cecen University, Agri, Türkiye, akinakincioglu@gmail.com Orcid ID: 0000-0002-6473-6338

³ Department of Biology, Faculty of Sciences, Ataturk University, Erzurum, Türkiye, mkaradayi@atauni.edu.tr Orcid ID: 0000-0002-2473-0409

⁴ Department of Biology, Faculty of Sciences, Ataturk University, Erzurum, Türkiye, gullucem@atauni.edu.tr Orcid ID: 0000-0002-5957-8259

⁵ Institute of Natural and Applied Sciences, Ataturk University, Erzurum, Türkiye, yuxel61@hotmail.com Orcid ID: 0000-0002-2238-061X

⁶ Institute of Natural and Applied Sciences, Ataturk University, Erzurum, Türkiye, yusufgulsahinn@gmail.com Orcid ID: 0000-0002-3770-2116

ABSTRACT

Indole-3-acetic acid (IAA) is the most common and naturally occurring plant hormone of the auxin class (1). Some microorganisms have the ability to synthesize IAA, and among them, IAA produced particularly by plant growth-promoting bacteria is considered a critical factor for plant development (2). In this study, 11 *Enterobacter* spp. strains isolated from the rhizospheric and endophytic regions of *Origanum vulgare* L. ssp. *vulgare* grown in various extreme areas of Erzurum province were evaluated. The strains were cultured in LB broth supplemented with 0.1% L-tryptophan, and their IAA production was analyzed. Based on the measurements, two strains showing the highest activity, designated as BY-4 and BY-7, were selected. The IAA production potential of these strains was characterized and optimized under different physiological conditions. During the optimization process, environmental factors such as carbon sources, pH, and temperature were tested. Initially, each parameter was evaluated individually while keeping others constant; subsequently, different combinations were tested to determine the conditions providing the highest activity. The results showed the highest IAA production was observed at 30 °C, pH 6.5, and when sucrose was used as the carbon source. In ongoing studies, it is aimed to isolate IAA at high purity from bacterial cultures grown under optimized conditions. For this purpose, IAA purification is planned using silica gel column chromatography or ion exchange chromatography methods.

Acknowledgement: This work was supported by Scientific Research Projects Coordination Unit (BAP) of Agri Ibrahim Cecen University (FEF.24.010)

References

- [1] Duca, D. R., & Glick, B. R. (2020, September 2). Indole-3-acetic acid biosynthesis and its regulation in plant-associated bacteria. *Applied Microbiology and Biotechnology*, s. 8607–8619.
- [2] Feng, Y., Tian, B., Xiong, J., Lin, G., Cheng, L., Zhang, T., Li, X. (2024). Exploring IAA biosynthesis and plant growth promotion mechanism for tomato root endophytes with incomplete IAA synthesis pathways. *Chemical and Biological Technologies in Agriculture*, 11(1), 187.

ID: P-95

Social Anxiety and Internet Addiction among Turkish University Students: A Chain Mediation Model of Loneliness and Rumination

G. G. Öztekin¹, H. H. Turp², N. A. Alshehri³, A. M. A. Alkhulayfi⁴ and M. Yıldırım⁵

¹*Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0001-6205-642X*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0003-2052-3127*

³*Hafr Al Batin University, Hafar Al Batin, Saudi Arabia: ORCID: 0009-0007-7352-1949*

⁴*King Abdul-Aziz University, Jeddah, Saudi Arabia: ORCID: 0009-0009-7333-8161*

⁵*Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0003-1089-1380*

ABSTRACT

With the rapid development of technology, the internet has unquestionably transformed various aspects of life. This transformation, alongside its numerous advantages, has also brought with it potential dangers. One of these dangers is the risk of internet addiction. It is of great importance to gain awareness about this issue and to address ways to reduce this risk. The present study aimed to examine the serial mediating effect of loneliness and rumination in the link between social anxiety and internet addiction. 1717 Turkish university students with a mean age of 21.70 (SD= 1.90) participated in this study. The findings indicated a positive relationship between social anxiety and internet addiction. Loneliness acted as a mediator in the link between social anxiety and internet addiction. Rumination mediated the effect of social anxiety on internet addiction. The association between social anxiety and internet addiction was serially mediated by loneliness and rumination. Individuals with high levels of social anxiety tend to avoid social situations; this avoidance may lead them to experience loneliness, which in turn can intensify negative thought cycles or rumination, thereby turning the internet into a maladaptive coping mechanism. This model reveals that internet addiction is not just an individual behavioral problem, but a public health problem shaped by psychosocial processes. Considering the adverse impacts of internet addiction on physical health as well as mental health, research findings contribute to the development of holistic interventions to protect mental health and reduce the burden of physical health across society. In this respect, the current study supports a multidisciplinary perspective in health sciences and can directly inform clinical practice, psychoeducation programs, and public health policies.

ID: P-96

The Effect of Assistive Technology-Based Science Instruction on Attitudes and Motivation for Individuals with Disabilities

A. Kizilaslan¹,

¹*Agri Ibrahim Cecen University, Agri, Turkey, ORCID: 0000-0003-3033-9358*

ABSTRACT

Science courses are considered to be one of the most difficult courses since they contain difficult and abstract concepts for the individual who needs special education. Because traditional science teaching is mostly based on visual teaching. However, it is emphasized that there are very few studies in the literature examining the effects of these methods and practices on affective behaviors such as attitude, perception, anxiety and self, as well as success. For this reason, it is necessary to select tools and equipment for visually impaired students and to use appropriate teaching techniques, methods and strategies consciously. The aim of this study is to examine the effects of teaching activities on the concept of speed and heat transfer designed for visually impaired students and to discuss the effect of this teaching plan on students' attitudes and motivation. The average scores of Likert-type scales are "very low" for values between 1.23-1.88, "low" for values between 1.89-2.47, "medium" for values between 2.47-3.29, "High" for values between 2.02-3.09, "high" for values between 4.09-4-99. It was rated as "very high". Non-parametric Wilcoxon signed rank test was performed to determine whether there was a statistically significant difference between the pre-test and post-test scores obtained from the scales. The students' prepost test scores are at a high level and they mostly agree with the statements in the scales. Additionally, the findings obtained from the Wilcoxon signed-rank test showed that there was no statistically significant difference between the students' pre-test and post-test scores.

ID: P-97

***In Silico* Evaluation of Apitoxin Components as Anticancer Agents Against Human Breast Tumor Cell Line (MCF-7)**

Y. Gülşahin¹, N.S. Araz¹, S. Doğan², Ş. Aksu³ and M. Karadayı²

¹*Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116; ORCID: 0009-0001-6279-1720*

²*Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0003-0499-2169; ORCID: 0000-0002-2473-0409*

³*Department of Molecular Biology and Genetics, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-0844-5130*

ABSTRACT

Breast cancer is the most commonly diagnosed cancer among women worldwide and is associated with high mortality rates. Conventional treatments such as chemotherapy, radiotherapy, and immunotherapy are often accompanied by adverse side effects, highlighting the need for more effective and safer alternative therapies. In this context, the anticancer potential of natural products has garnered increasing attention in recent years [1]. Bee venom (apitoxin) and its bioactive components including melittin, apamin, phospholipase A2, adolapin, and mast cell degranulating peptide (MCD) have been reported to exhibit therapeutic effects against various types of cancer. Research on breast cancer is of critical importance in improving current treatments, reducing mortality, and developing effective future strategies [2]. In this regard, molecular docking is a powerful *in silico* approach for identifying potential inhibitors of key receptor targets involved in oncogenesis. This study aims to investigate the interactions between major components of bee venom and cancer-related proteins using molecular docking methods [3]. For this purpose, the molecular structures of apitoxin and its components were retrieved from the PubChem database. Structural minimization of each ligand was carried out using UCSF Chimera 1.17.3, and ligand preparation was completed with AutoDockTools 1.5.7. The target proteins of the MCF-7 breast cancer cell line Progesterone receptor (PDB: 1A28), Estrogen receptor alpha (PDB: 1A52), Epidermal growth factor receptor (PDB: 1NQL), HER2 (PDB: 3PP0), and p53 (PDB: 4MZI) were obtained from the RCSB Protein Data Bank and prepared using AutoDockTools. Docking simulations were performed with AutoDock Vina, and visualizations were conducted using BIOVIA Discovery Studio. The docking results demonstrated high binding affinities of bee venom compounds to the target proteins. The best binding scores were observed between apitoxin and the Progesterone receptor (-6.2 kcal/mol), melittin and p53 (-6.9 kcal/mol), phospholipase A2 and Estrogen receptor alpha (-6.7 kcal/mol), and apamin and the Epidermal growth factor receptor (-6.1 kcal/mol). These findings reveal the potential anticancer properties of apitoxin and its interaction mechanisms with key proteins. In conclusion, this study suggests that apitoxin and its components may have significant inhibitory potential against MCF-7 breast cancer targets and could contribute to the development of novel cancer treatment strategies.

References

- [1] J. Zhang, Y. Wu, Y. Li, S. Li, J. Liu, X. Yang, G. Xia, G. Wang, 2024. Natural products and derivatives for breast cancer treatment: From drug discovery to molecular mechanism. *Phytomedicine* 129 (2024): 155600.
- [2] N.Y. Kwon, S.H. Sung, H.K. Sung, J.K. Park, 2022. Anticancer activity of bee venom components against breast cancer. *Toxins*, 14(7) (2022), 460.
- [3] G.H. Mansour, M.A. El-Magd, D.H. Mahfouz, I.A. Abdelhamid, M.F. Mohamed, N.S. Ibrahim, A.H.A.A. Wahab, E.M. Elzayat, 2021. Bee venom and its active component Melittin synergistically potentiate the anticancer effect of Sorafenib against HepG2 cells." *Bioorganic Chemistry* 116 (2021): 105329.

ID: P-98

Perforated Jejunal Diverticulosis: A Rare Cause of Acute Abdomen

Harun Bayram¹

¹*Department of General Surgery, Faculty of Medicine, Ağrı İbrahim Çeçen University, Ağrı, Turkey, ORCID: 0000-0002-4845-1578*

ABSTRACT

Jejunal diverticulosis is an uncommon entity of the small intestine, usually asymptomatic but capable of causing severe complications such as perforation. Perforation often presents with acute abdomen and carries a high mortality risk.

A 72-year-old male with no comorbidities presented with sudden-onset abdominal pain and nausea. Physical examination revealed diffuse abdominal tenderness, guarding, and rebound. Laboratory tests showed leukocytosis (12,000/mm³) and elevated CRP (12 mg/L). Contrast-enhanced abdominal CT demonstrated free air and fluid between small bowel loops, suggesting gastrointestinal perforation. Emergency laparotomy revealed multiple jejunal diverticula extending from 40 cm distal to the Treitz ligament along a 60 cm segment. One diverticulum was perforated with fibrin coverage. No intra-abdominal abscess was noted. Segmental small bowel resection including all diverticula with side-to-side anastomosis was performed. The postoperative course was uneventful, oral feeding started on day 3, and the patient was discharged on day 7.

Perforated jejunal diverticulosis is a rare but life-threatening condition. It should be considered in the differential diagnosis of acute abdomen, especially in elderly patients. Early surgical intervention with segmental resection and primary anastomosis remains the treatment of choice.

ID: P-99

Inhibitory Potential of Flavonoid-Sulfonamide Hybrids Against Carbonic Anhydrase Isoforms: Bioassays and Docking Studies

Ş. Taşbaşı¹, N. Stellenboom² and A. Öztekin³

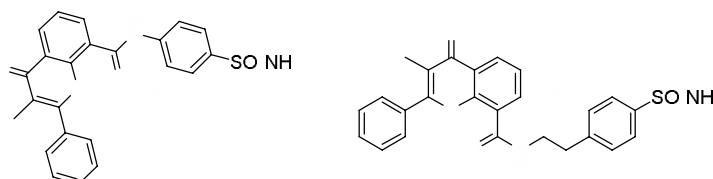
¹Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0001-9093-3928

²Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0002-7405-2669

³Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0003-1418-179X

ABSTRACT

Carbonic anhydrases (CAs) are involved in respiration and pH control by regulating the $\text{CO}_2\text{-HCO}_3^-$ balance; their dysfunction is associated with various diseases such as glaucoma, epilepsy, cancer and kidney diseases. Flavonoids are potent antioxidant polyphenols that contain diphenylpropane units. Sulfonamides represent a fundamental class of compounds that stand out in both synthetic chemistry and drug design due to their broad pharmacological spectrum. This functional group constitutes the common structural core of numerous therapeutic agents and bioactive molecules characterized by antimicrobial, antitumor, anti-inflammatory, hypoglycemic, anti-psychotic activities. In this study, Flavonoid-Sulfonamide hybrids were synthesized according to the previously described method [1], and their inhibitory effects on the human CA (hCA) I and II enzymes were investigated *in vitro* and *in silico*.



As a result, the compound **4** exhibited the highest inhibition effect on the hCA I enzyme with an IC_{50} value of 87 nM and was also found to bind strongly to the enzyme active site (binding score: -9.6 kcal/mol). On the other hand, the most effective inhibitor for the hCA II enzyme was identified as the compound **1**, with an IC_{50} value of 53 nM, which showed stronger interactions with the amino acid residues located in the enzyme active site (binding score: -9.4 kcal/mol).

References

- [1] Öztekin, A., & Stellenboom, N. (2024). Synthesis of flavonoid/sulfonamide hybrid molecules as potential inhibitors of cholinesterases: In vitro, molecular docking, molecular dynamic and DFT studies. *ChemistrySelect*, 9(34), e202403212.

ID: P-100

Determination of the Inhibitory Effects of Some Heavy Metal Nitrates on Lactoperoxidase Enzyme in Goat Milk

Züleyha Almaz¹

¹ *Department of Molecular Biology and Genetics, Faculty of Arts and Sciences, Muş Alparslan University, 49250 Muş, Türkiye, <https://orcid.org/0000-0002-4532-4311>*

ABSTRACT

Lactoperoxidase (LPO; E.C. 1.11.1.7) is a glycoprotein containing a heme prosthetic group, found in the milk, tears, and saliva of mammals [1]. Similar to other peroxidases, LPO catalyzes the oxidation of molecules such as phenols, aromatic amines, pyrogallol, 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS), and guaiacol in the presence of hydrogen peroxide (H₂O₂) [1,2]. One of the most critical issues in environmental toxicology is exposure to heavy metal ions, which cause various adverse effects in plants, including yield loss, and may subsequently affect animals and humans through the food chain. These metals, originating from atmospheric deposition, fertilizers, wastewater, and inorganic pesticides, can accumulate in soils and enter organisms through air, water, and food. Once incorporated, they exert toxic effects on metabolism through different mechanisms. Binding of metal ions to different sites of proteins may alter enzyme conformation, leading to either activation or inhibition of enzymatic activity [3].

In this study, the in vitro effects of some heavy metal nitrate salts, namely mercury(II) nitrate (Hg(NO₃)₂), silver nitrate (AgNO₃), and cadmium nitrate (Cd(NO₃)₂), on LPO enzyme activity were investigated. For this purpose, LPO was purified using a novel affinity gel, Sepharose-4B-L-tyrosine-sulfonamide, and the inhibitory effects of these metals were evaluated spectrophotometrically at 412 nm in the presence of ABTS substrate. The results demonstrated that these heavy metal nitrate salts significantly inhibited the activity of LPO.

References

- [1] Kumar, R., Bhatia, K. L., Dauter, Z., Betzel, C. H., & Singh, T. P. (1995). Purification, crystallization, and preliminary X-ray crystallographic analysis of lactoperoxidase from buffalo milk. *Acta Crystallographica Section D: Biological Crystallography*, 51(6), 1094-1096.
- [2] Dumontet, C., & Rousset, B. (1983). Identification, purification, and characterization of a non-heme lactoperoxidase in bovine milk. *Journal of Biological Chemistry*, 258(23), 14166-14172.
- [3] Zakaria, A. M., Âmin, Y. A., Zakaria, H. M., Farrag, F., Fericean, L., Banatean-Dunea, I., ... & Mohamed, R. H. (2024). Impact of grazing around industrial areas on milk heavy metals contamination and reproductive ovarian hormones of she-camel with the assessment of some technological processes on reduction of toxic residue concentrations. *BMC Veterinary Research*, 20(1), 34.

ID: P-101

Nutraceutical and Therapeutic Potential of the Poisonous Plant *Spartium junceum* (Spanish Broom)

Y. Bıçakcı¹, E. Elbir², K. Aslan³, I. Gulcin,⁴

^{1,2,3}Ataturk University, Erzurum, Türkiye, ORCID¹: 0009-0004-4674-4221 ORCID²: 0009-0000-7966-4288
ORCID³: 0000-0001-8388-5470

⁴Ağrı İbrahim Cecen University, Ağrı, Türkiye, ORCID⁴: 0000-0001-5993-1668

ABSTRACT

Spartium junceum L., widely known as Spanish broom, is a perennial shrub belonging to the Fabaceae family and has been employed in folk medicine as a diuretic, purgative, and anti-inflammatory agent; however, its toxicity at higher doses has been well established [1]. Given that *Spartium junceum* is reported to exhibit both medicinal benefits and toxic risks, the present study aimed to systematically assess the antioxidant and enzyme inhibitory properties of its extracts. Initially, ethanolic extracts of the plant's aerial parts were prepared and subjected to multiple antioxidant assays. Radical scavenging activity was determined using the diphenyl-2-picrylhydrazyl (DPPH, IC₅₀ = 15.65 µg/mL) and the 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS, IC₅₀ = 6.63 µg/mL) assays, whereas reducing power was assessed by the Cupric Reducing Antioxidant Capacity (CUPRAC, A_{0.5} = 30.24 µg/mL; concentration required to reach an absorbance of 0.5), Ferric Reducing Antioxidant Power (FRAP, A_{0.5} = 61.51 µg/mL), and Fe³⁺ ion-reduction methods (A_{0.5}=104.90 µg/mL)

The therapeutic relevance of *S. junceum* was explored through enzyme inhibition studies against acetylcholinesterase, butyrylcholinesterase, and human carbonic anhydrases I and II, with inhibitory activity compared to standard drugs. In addition, total phenolic and flavonoid contents were quantified, revealing their contribution to both antioxidant and enzyme inhibitory activities [2]. Overall, while *S. junceum* is known to be toxic at high doses, the present findings demonstrate significant bioactivities at controlled concentrations, underscoring the importance of dose-dependent evaluation for its potential therapeutic applications

Acknowledgment: This study was funded by TÜBİTAK 2209-A. (1919B012428503)

References

- [1] J. Brad and A. Felicia, "A Comparative Study on Antioxidant and Enzyme Inhibitory Activities of *Spartium junceum* L.," *International Open Access Journal*, vol. 10, no. 5, pp. 123–136, 2022.
- [2] K. Aslan, K. Kelle, M. A. Yilmaz, E. E. Kopar, and I. Gulcin, "Investigation of Cuckoo-Pint's (*Arum maculatum*) Phytochemistry, *In Vitro* Antioxidant Potential, Enzyme Inhibition, and Antimicrobial Activity," *ChemistrySelect*, vol. 9, no. 37, Oct. 2024, doi: 10.1002/slct.202403588.

ID: P-102

Antioxidant and Enzyme Inhibitory Potential of the Water Extract of Red Calyces of *Hibiscus sabdariffa* L.

Lale Duysak¹, Merve Becit-Kızılkaya² Adem Ertürk³, İlhami Gülçin⁴

¹ Department of Biochemistry, Faculty of Pharmacy, Ataturk University, 25240-Erzurum, Türkiye, 0000-0001-7872-3880

² Department of Pharmaceutical Toxicology, Faculty of Pharmacy, Afyonkarahisar Health Sciences University, 03200-Afyon, Türkiye, 0000-0002-8084-4419

³ Department of Chemistry, Faculty of Science, Ataturk University, 25240-Erzurum, Türkiye, 0000-0002-1750-1966

⁴ Rectorate of Ağrı İbrahim Çeçen University, 04100-Ağrı, Türkiye, 0000-0001-5993-1668

ABSTRACT

Hibiscus sabdariffa L. (Malvaceae), commonly known as roselle and referred to as karkadeh in Sudan, is widely cultivated in tropical and subtropical regions, and is believed to have been domesticated in western Sudan prior to 4000 BC [1, 2]. This study comprehensively investigated the antioxidant capacity and enzyme inhibition potential of *Hibiscus sabdariffa* L. extract. Antioxidant activity evaluations were performed using FRAP, CUPRAC, and iron reduction assays, demonstrating that the extract exhibited a linear increase in activity with rising concentrations. In radical scavenging analyses, the extract showed remarkable activity in DPPH and ABTS assays. Enzyme inhibition studies revealed potent activity against carbonic anhydrase isoenzymes (CA I: IC₅₀=0.0149 µg/mL; CA II: IC₅₀=0.0273 µg/mL), strong acetylcholinesterase inhibition (IC₅₀=0.0044 µg/mL), and superior α-glucosidase inhibition compared to acarbose (IC₅₀=0.0116 µg/mL). Dose-dependent enzyme inhibition profiles confirmed strong interactions between the extract and target enzymes. The obtained sub-microgram IC₅₀ values indicate that the extract possesses significant therapeutic potential for diseases such as diabetes, Alzheimer's disease, and glaucoma. These findings demonstrate that *Hibiscus sabdariffa* L. should be evaluated as a multi-target natural drug source and provide an important contribution to the field of natural product-based drug development. Overall, this study establishes *Hibiscus sabdariffa* L. as a promising candidate for natural drug discovery and fills a significant gap in the scientific literature.

Keywords: *Hibiscus sabdariffa* L., antioxidant activity, enzyme inhibition.

[1] B. B. Mohamed, 2021. Roselle (*Hibiscus sabdariffa* L.) in Sudan: production and uses, in *Roselle*: Elsevier, (2021) 121-127.

[2] S. Yagi, A. I. Uba, K. I. Sinan, D. Piatti, G. Sagratini, G. Caprioli, S.M. Eltigani, I. Lazarova, G. Zengin, 2023. Comparative study on the chemical profile, antioxidant activity, and enzyme inhibition capacity of red and white *Hibiscus sabdariffa* variety calyces *ACS omega*, 8 (45) (2023) 42511-42521.

ID: P-103

Analysis of the Water Pollution Model via Fractional Operator

Mustafa Ali DOKUYUCU¹, Gülpınar YALÇIN² and Ayşe ÇOBAN²

¹*Department of Mathematics, Ondokuz Mayıs University, Samsun, Türkiye, ORCID: 0000-0001-9331-8592*

²*Graduate Education Institute, Samsun, Türkiye, ORCID:0009-0003-1613-3633, ORCID: 0009-0009-8149-4930*

ABSTRACT

This paper presents a novel analysis of the water pollution model [1] by utilizing a fractional operator. The study focuses on addressing the limitations of classical integer-order models in accurately capturing complex and memory-dependent pollution dynamics. By incorporating a fractional derivative [2-4], the model is enhanced to better describe the long-term effects and anomalous diffusion observed in real-world water systems.

The research investigates the existence and uniqueness of solutions for the proposed fractional model, employing fixed-point theory and other analytical techniques. Numerical simulations are also conducted to validate the model's behavior and demonstrate its superior predictive capabilities compared to traditional methods. The results show that the fractional model provides a more realistic representation of pollution spread and decay, offering a valuable tool for environmental scientists and policymakers. This work contributes significantly to the field of fractional calculus applications in environmental science and provides a more robust framework for predicting and managing water quality.

References

- [1] N.H. Shah, S.N. Patel, M.H. Satia, F.A. Thakkar, 2018. Optimal control for transmission of water pollutants. *Int. J. Math. Eng. Manag. Sci*, 3(4), 381-391.
- [2] M. Caputo, M. 1967. Linear models of dissipation whose Q is almost frequency independent—II. *Geophysical journal international*, 13(5), 529-539.
- [3] M. Caputo, M. Fabrizio, 2015. A new definition of fractional derivative without singular kernel. *Progress in fractional differentiation & applications*, 1(2), 73-85.
- [4] A. Atangana, D. Baleanu, 2016. New fractional derivatives with nonlocal and non-singular kernel: theory and application to heat transfer model. *Thermal Science.*, 20(2), 763-769.

ID: P-104

The Role of Mathematical Models in Improving Mathematics Achievement

Erkan Koca¹ and Nalan Dokuyucu²

¹*Silkar Günlükbaşı Secondary School, Muğla, Türkiye, ORCID: 0000-0001-5680-3222*

²*Samsun Şehit İlhan Hamlı Vocational and Technical Anatolian High School, Samsun, Türkiye, ORCID: 0000-0001-9792-6931*

ABSTRACT

Mathematics education plays a fundamental role in developing students' analytical thinking, problem-solving, and logical reasoning skills. Among the approaches to improving mathematics achievement at the primary and secondary school levels, the use of mathematical models has gained increasing importance [1-3]. This study discusses various mathematical modeling approaches used to evaluate students' learning processes, achievement levels, and conceptual development. In particular, it focuses on success prediction, identification of learning difficulties, modeling of individual differences, and measuring the effectiveness of teaching strategies.

Mathematical modeling not only measures students' current performance but also provides opportunities to predict future outcomes and design personalized learning pathways. In this context, a wide range of modeling techniques from deterministic and stochastic models to AI-supported prediction methods are explored for their integration into the educational process.

The findings suggest that mathematics education can become more efficient, sustainable, and individualized through these approaches.

References

- [1] Armutcu, Y., & Bal, A. P. (2023). The Effect of Mathematical Modelling Activities on Students' Mathematical Modelling Skills in the Context of STEM Education. *International Journal of Contemporary Educational Research*, 10(1), 42–55.
- [2] Hochmuth, R., Peters, J., Rønning, F. et al. Modelling mathematics for educational research and practice: a comparison of two theoretical approaches. *Educ Stud Math* 118, 153–168 (2025)..
- [3] Arseven, Ayla. "Mathematical Modelling Approach in Mathematics Education." *Universal Journal of Educational Research*, 3.12 (2015): 973-980.

ID: P-105

Analyzing Epidemic Dynamics through the Atangana-Strength Number

İ. Koca¹

¹Muğla Sıtkı Koçman University, Muğla, Türkiye, <https://orcid.org/0000-0003-4393-1588>:

ABSTRACT

The Atangana-Strength Number (ASN) is a recently developed tool that plays a crucial role in evaluating the strength and sustainability of epidemic transmission. While the classical basic reproduction number R_0 has long served as the standard threshold parameter, it remains limited to describing only the initial growth of an epidemic and cannot capture the full spectrum of possible dynamical behaviors. In contrast, ASN provides a richer analytical framework by linking outbreak thresholds with stability properties and by predicting whether epidemic trajectories will approach equilibrium monotonically or exhibit oscillatory patterns with multiple waves.

In this study, we conduct a detailed ASN-based analysis of epidemic models, focusing on its theoretical importance and practical applications [1-2]. By deriving ASN from the governing system of ordinary differential equations, we demonstrate how it functions as a unifying criterion that simultaneously incorporates outbreak potential, equilibrium stability, and wave-type classification. This approach allows for the identification of conditions under which epidemics may fade out, persist at endemic levels, or generate recurrent oscillations.

Acknowledgement: This project is not supported by any organization.

References

- [1] Atangana, A. & Koca, I., Reproductive momentum unleashed: A novel delay-differential equation model for asymmetric epidemic waves. 2025. (hal-05024277).
- [2] Kermack, W. O. & M. c. Kendrick, A. G. (1927). A contribution to the mathematical theory of epidemics. Proceedings of the royal society of London. Series A, Containing papers of a mathematical and physical character, 115(772), 700-721.

ID: P-106

Mathematical Modeling and Analysis of the Poem “Living Like Nothing”

Mustafa Ali DOKUYUCU¹, Burak ARMAĞAN²

¹*Department of Mathematics, Ondokuz Mayıs University, Samsun, Türkiye, ORCID: 0000-0001-9331-8592*

²*Department of Education, Amasya University, Amasya, Türkiye, ORCID: 0000-0002-6966-9656*

ABSTRACT

Erdem Bayazıt, a sustainer of tradition and civilization, has a problematic relationship with modernity/the age. The apparent replacement of traditional thought, shaped by a spiritual climate, with a materialist understanding is a target of his criticism. The artist, struggling with a mindset rooted in existentialism, which has gained a global following and rapidly spread among the masses, occasionally finds himself driven to loneliness within society. However, this loneliness does not connote despair, and the idea of resurrection is constantly kept alive. In the poem "Living Like Nothing," the idea of loneliness points to the solitude of a community devoid of a sense of belonging [1]. Unable to unite in the sensitivity shared by those whom cultural codes and religious consciousness cannot bring to common ground, the poet's subject is rendered nonexistent by the majority. His call to return to his true self, which he never loses hope, proves fruitless, and he begs his lover for rescue.

A mathematical model will be proposed through the analysis of this literary poem. Then, the mathematical model will be extended using fractional derivative operators, and its analysis will be performed [2-3]. In the analysis, the existence and uniqueness of the solution to the proposed mathematical model will first be examined using fixed-point theorems. Subsequently, the model will be solved numerically [4], and a detailed analysis will be conducted with simulations.

References

- [1] E. Bayazıt, (2017), *Şiirler*, İstanbul: İz Yayıncılık.
- [2] M. Caputo, 1967. Linear models of dissipation whose Q is almost frequency independent—II. *Geophysical journal international*, 13(5), 529-539.
- [3] M. Caputo, M. Fabrizio, 2015. A new definition of fractional derivative without singular kernel. *Progress in fractional differentiation & applications*, 1(2), 73-85.
- [4] A. Atangana, K. M. Owolabi, 2018. New numerical approach for fractional differential equations. *Mathematical Modelling of Natural Phenomena*, 13(1), 3.

Antiapoptotic Effects of Bergenin Against Lead Acetate-Induced Hepatotoxicity

M.S. Karagac¹, E.N. Yesilkent², H. Ceylan³ and Y. Demir⁴

¹Ataturk University, Faculty of Science, Erzurum, Türkiye, ORCID: 0000-0002-8064-1195

²Ataturk University, Faculty of Science, Erzurum, Türkiye, ORCID: 0000-0001-9468-2679

³Ataturk University, Faculty of Science, Erzurum, Türkiye, ORCID: 0000-0003-3781-4406

⁴Ardahan University, Nihat Delibalta Göle Vocational School, Ardahan, Türkiye, ORCID: 0000-0003-3216-1098

ABSTRACT

Lead acetate (PbAc), commonly referred to as “sugar of lead,” is a widely encountered environmental toxicant [1]. Although its use in cosmetics, hair dyes, and pesticides has been prohibited, it is still applied in certain laboratory and industrial processes. Prolonged PbAc exposure is known to cause severe organ damage, particularly hepatotoxicity, by activating apoptosis in liver tissue. Therefore, evaluating natural compounds with potential antiapoptotic activity is of considerable importance. Bergenin, a natural phenolic compound, has been reported to possess cytoprotective and antiapoptotic effects; however, its role in PbAc-induced hepatotoxicity has not been fully elucidated. In this study, the potential protective effect of bergenin against PbAc-induced hepatotoxicity was examined at the molecular level via apoptosis-related pathways. Sprague Dawley rats were divided into six groups (n = 8): control, bergenin (80 mg/kg), PbAc (25 mg/kg), bergenin (40 mg/kg) + PbAc, bergenin (80 mg/kg) + PbAc, and sham. Following the treatment period, animals were sacrificed, and liver tissues were collected for total RNA isolation and cDNA synthesis [2]. The expression levels of proapoptotic genes (Bax, Caspase-3, Caspase-9) and the antiapoptotic gene (Bcl-2) were analyzed using quantitative PCR (qPCR). Preliminary findings revealed that PbAc administration markedly increased the expression of proapoptotic genes while reducing Bcl-2 expression. In contrast, bergenin treatment partially counteracted these changes by downregulating Bax, Caspase-3, and Caspase-9 while upregulating Bcl-2. These results indicate that bergenin may exert a protective role against PbAc-induced hepatotoxicity through modulation of apoptosis-related gene expression.

References

- [1] Akaras, N., Kucukler, S., Gur, C., Ileriturk, M., & Kandemir, F. M. (2024). Sinapic acid protects against lead acetate-induced lung toxicity by reducing oxidative stress, apoptosis, inflammation, and endoplasmic reticulum stress damage. *Environmental toxicology*, 39(7), 3820–3832.
- [2] Barai, P., Raval, N., Acharya, S., Borisa, A., Bhatt, H., & Acharya, N. (2019). Neuroprotective effects of bergenin in Alzheimer’s disease: Investigation through molecular docking, in vitro and in vivo studies. *Behavioural Brain Research*, 356, 18-40.

Protective Effect of Bergenin Against Lead Acetate-Induced Testicular Oxidative Stress and Inflammation

E.N. Yesilkent¹, M.S. Karagac², H. Ceylan² and Y. Demir²

¹Ataturk University, Faculty of Science, Erzurum, Türkiye, ORCID: 0000-0002-8064-1195

²Ataturk University, Faculty of Science, Erzurum, Türkiye, ORCID: 0000-0001-9468-2679

³Ataturk University, Faculty of Science, Erzurum, Türkiye, ORCID: 0000-0003-3781-4406

⁴Ardahan University, Nihat Delibalta Göle Vocational School, Ardahan, Türkiye, ORCID: 0000-0003-3216-1098

ABSTRACT

Lead acetate (PbAc) is a widely distributed environmental heavy metal that bioaccumulates and exerts systemic toxicity. [1]. Prolonged exposure adversely affects the male reproductive system, provoking oxidative stress, hormonal imbalance, and cellular injury in testicular tissue. [2]. This study evaluated the protective potential of bergenin (Bg), an isocoumarin with antioxidant, anti-inflammatory, and anti-apoptotic properties, against PbAc-induced testicular damage. A total of 48 male Sprague Dawley rats were used in this study and divided into 6 groups (n=8). The groups were determined as control, PbAc(25 mg/kg), bergenin (80 mg/kg), PbAc (25 mg/kg)+ bergenin (40 mg/kg), PbAc + bergenin (80 mg/kg) and sham. At the end of the treatment, total RNA was isolated from testicular tissues and cDNA synthesis was performed, and the expression of genes associated with oxidative stress and inflammation were analyzed by qPCR. Following treatment, total RNA was isolated from testicular tissue, cDNA was synthesized, and qPCR was performed to quantify genes associated with oxidative stress (Sod, Cat, GPx) and inflammation (NF-κB, COX-2). PbAc exposure significantly downregulated Sod, Cat, and GPx transcripts while upregulating NF-κB and COX-2. Bergenin administration partially reversed these alterations, increasing antioxidant gene expression and suppressing inflammatory markers. These findings indicate that Bergenin can be considered a protective agent against PbAc-induced testicular toxicity, potentially supporting male reproductive health by mitigating oxidative stress and inflammation.

References

1. Abdel-Daim, M. M., Alkahtani, S., Almeer, R., & Albasher, G. (2020). Alleviation of lead acetate-induced nephrotoxicity by *Moringa oleifera* extract in rats: highlighting the antioxidant, anti-inflammatory, and anti-apoptotic activities. *Environmental science and pollution research international*, 27(27), 33723–33731.
2. Pan, J., Liu, P., Yu, X., Zhang, Z., & Liu, J. (2024). The adverse role of endocrine disrupting chemicals in the reproductive system. *Frontiers in endocrinology*, 14, 1324993.

ID: P-109

Isolation and Molecular Characterization of an Azo Dye Degrading Pseudomonas BC1 Strain from Erzurum

Y. Gülşahin¹, E. Güllüce¹, Ş. Aksu², M. Karadayı³, M. Güllüce³

¹*Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116;*

²*Department of Molecular Biology and Genetics, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-0844-5130*

³*Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-2473-0409
ORCID: 0000-0002-5957-8259*

ABSTRACT

With the increase in industrial activities today, dye pollution particularly originating from the textile, dyeing, and paper industries has become a serious environmental issue. When these dye substances are discharged into natural water sources, they have detrimental effects on both ecosystem health and human health [1]. Malachite green, a synthetic dye, is widely used especially in the textile industry and poses significant risks to environmental and public health due to its toxic, mutagenic, and potentially carcinogenic effects. Traditional treatment methods for such toxic dyes are not only costly but can also harm the environment due to the secondary pollutants they may generate. In contrast, microbial remediation methods systems based on the ability of microorganisms (bacteria, yeast, fungi) to degrade dye substances offer environmentally sustainable, cost-effective, and efficient alternatives.

As part of the present study, water samples exposed to dye contamination were collected from Erzurum and its surrounding areas. These samples were incubated in selective culture media and screened for their tolerance to the dye and degradation capabilities. A dominant bacterial colony, designated as BC1, which demonstrated the ability to degrade malachite green, was isolated and subjected to preliminary identification through morphological and biochemical tests. Subsequently, for molecular-level characterization, the 16S rRNA gene region was amplified using the primer set 27F (5'-AGAGTTTGATCCTGGCTCAG-3') / 1492R (5'-TACGGYTACCTTGTTACGACTT-3'), and the resulting amplicons were analyzed via Sanger sequencing. The sequence was further analyzed by NCBI BLAST (Basic Local Alignment Search Tool) for molecular identification of the isolate. It was also submitted to GenBank® and the accession number was assigned as PV363586.1.

As a result of the study, it was demonstrated that a Pseudomonas strain isolated from the natural environment could effectively degrade malachite green dye, indicating its potential as a bioremediation agent. This strain may be utilized in advanced biotechnological applications, particularly in wastewater treatment, offering environmentally friendly and sustainable solutions.

References

- [1] Mehra, Sukanya, Mandeep Singh, and P. J. T. I. Chadha. "Adverse impact of textile dyes on the aquatic environment as well as on human beings." *Toxicol. Int* 28.2 (2021): 165

Identification of Potential Human Targets of Azorubine (E122, Carmosine) by in silico Target Fishing and Molecular Docking Approaches

Ş. Aksu¹, S. Doğan², Y. Gülşahin³, T.Y. Koç², M. Karadayı² and M. Güllüce²

¹Department of Molecular Biology and Genetics, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-0844-5130

² Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0003-0499-2169; ORCID: 0000-0002-7786-5462; ORCID: 0000-0002-2473-0409; ORCID: 0000-0002-5957-8259

³ Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116

ABSTRACT

Azorubine is a well-known food colorant. Despite having a widespread use, it may have several toxic properties [1]. Although toxicity tests determine hazardous potential, the complexity of targets that can be changed, such as enzymes and sensitive proteins that can be inhibited by molecules, and the interactions that occur between a large number of molecules during experimental applications are limitations of toxicity tests [2]. On the other hand, in silico computational methods have become a procedure that has recently increased as powerful application tools that reduce target limitations. This method, defined as target fishing, aims to predict possible biological targets by taking into account the chemical structures of molecules. In this study, different online applications (SwissTargetPrediction, SEA, Phrammapper, LigAdvisor and Targetnet) were used to determine proteins that may interact with Azorubine using the target fishing method. In order to present the expected interactions of the 22 target proteins determined, the Molecular Docking process was performed with the Schrödinger program. With this process, ligand models were performed and the biological activities of these proteins in accordance with the literature were defined. An infrastructure was created for planning subsequent experimental studies by specifying the functions of the proteins and associated diseases.

References

- [1] Raposa, B., Pónusz, R., Gerencsér, G., Budán, F., Gyöngyi, Z., Tibold, A., Hengyi, D., Kiss, I., Koller, A., Varjas, T. J. P. I., 2016. Food additives: Sodium benzoate, potassium sorbate, azorubine, and tartrazine modify the expression of NFκB, GADD45α, and MAPK8 genes. *Physiology International (Acta Physiologica Hungarica)* 103, 334-343.
- [2] Jayapaul, A., Sakthivel, R., Lin, Y. C., Dhawan, U., Liu, X., Wen, H. W., Chung, R. J., 2024. A disposable tartrazine sensor fabricated with a synchronously activated nanocomposite comprising gadolinium molybdate nanoflowers anchored on functionalized carbon nanofibers. *New Journal of Chemistry* 48, 2660-2672.

ID: P-111

Determination of Some Transmembrane Proteins in the Digestive Tract of the Van Fish (*Alburnus tarichi* Güldenstädt, 1814) During Reproductive Migration

B. Ergöz Azizoğlu¹, E. Örgü², E. Kaval Oğuz³ and A. R. Oğuz²

¹ Yüksekova Vocational School Crop and Animal Production Dairy and Livestock Breeding Program, Hakkari University, 30000, Hakkari/Türkiye ORCID: 0000-0002-7002-3801

² Department of Biology, Science Faculty, Van Yüzüncü Yıl University, Van, Turkey ORCID: 0000-0002-5246-5438, ORCID: 0000-0001-6431-0508

³ Department of Science Education, Van Yüzüncü Yıl University, Van, Turkey ORCID: 0000-0003-0196-2693

ABSTRACT

Lake Van is the world's largest soda lake. Its high pH, salinity, and alkalinity significantly limit life. Therefore, only one vertebrate species, the Van fish (*Alburnus tarichi* Güldenstädt, 1814), lives in the lake. Although attempts to introduce other fish species to the lake environment have not been successful, the Van fish has adapted to the lake environment through its developed cellular and molecular mechanisms. Each year, the fish migrate to freshwater for spawning between April and July, varying according to seasonal patterns. During this migration, it is exposed to lake water, freshwater, and aquatic environments with varying physicochemical properties where these two environments mix.

In fish, digestive tract cells, one of the most active organs involved in osmoregulation, are functional in ion exchange. The number, size, and location of these cells vary depending on fish species and their habitat. In this study, changes in transmembrane proteins found in chloride cell membranes in two different fish environments were examined immunohistochemically.

Transmembrane proteins were observed in the esophagus, stomach-like structure, anterior intestine, and posterior intestine, which are parts of the digestive tract during the spawning migration of Van fish. Their presence was detected in fish in both lake and stream environments. Differences in the density of these cells were determined between these parts and the environment. Proteins such as Na,K,2Cl (NKCC), localized chloride channel, and cystic fibrous transmembrane conductance regulator (CFTR) were observed throughout the tract in both environments, with differences in their density and localization. Na⁺ K⁺ ATPase proteins were not observed in the esophagus in both environments, but were detected in other parts.

Acknowledgement: This study was supported by Van Yüzüncü Yıl University Scientific Research Projects Coordination Unit with project number FBA-2022-9864.

References

- [1] Bancroft, J.,D. Gamble M., 2002. 'Theory and practice of histological techniques'. Edinburg London New York Oxford Philadelphia St Louis Sydney Toronto. Fifth edition (2002).
- [2] Fuentes, J., Soengas, J. L., Rey, P. and Rebolledo, E. 1997. 'Progressive transfer to seawater enhances intestinal and branchial Na⁺-K⁺-ATPase activity in nonanadromous rainbow trout'. *Aquaculture International* 5 (1997) 217-227.
- [3] Lee, T. H., et al. 2003 "Ambient salinity modulates the expression of sodium pumps in branchial mitochondria-rich cells of Mozambique tilapia, *Oreochromis mossambicus*." *Zoological science* 20.1 (2003) 29-37.
- [4] Sardella, B. A., et al. 2004. "Physiological, biochemical and morphological indicators of osmoregulatory stress in California Mozambique tilapia (*Oreochromis mossambicus* × *O. urolepis hornorum*) exposed to hypersaline water." *Journal of Experimental Biology* 207.8 (2004) 1399-1413.

Extending the Shelf Life of Cimin Grapes with Reducing Atmosphere Packaging Method

Reyhan Özkan¹, Esranur Ceylan², Rümeyza Alkoyun³

¹*Şehremini Anatolian High School, Istanbul, Türkiye, ORCID: 0009-0007-5872-4430*

²*Erzincan Binali Yıldırım University, Erzincan, Türkiye*

³*Erzurum Technical University, Erzurum, Türkiye*

ABSTRACT

Cimin grapes (*Vitis vinifera*), registered in 2001 as Türkiye's first geographically indicated grape, have a short shelf life due to postharvest respiration and microbial growth. Although Modified Atmosphere Packaging (MAP) is widely used for grapes, it has not been tested on Cimin grapes. In this study, Reducing Atmosphere Packaging (RAP) was applied for the first time using hydrogen gas in conjunction with MAP methods to control redox conditions and maintain quality. Grapes were stored for seven weeks under four atmospheric conditions, and Brix, pH, color, and texture analyses were conducted weekly. RAP demonstrated significant advantages over open-air storage, particularly in terms of texture and sugar retention. Microbiological and residue tests conducted after eight weeks confirmed that RAP leaves no residue and suppresses yeast and mold. Overall, RAP outperforms MAP, demonstrating that it is a new and commercially promising method for extending the shelf life of Cimin grapes.

References

1. D. Alwazeer, Delbeau C., Divies C. (2003). Use of redox potential modification by gas improves microbial quality, color retention, and ascorbic acid stability of pasteurized orange juice. *International Journal of Food Microbiology*, 2741, 1–9.
2. D. Alwazeer (2018). A New Technique for Preserving the Color of Dried Foods: Reducing Atmospheric Drying. *Journal of the Institute of Science and Technology*, 8(4), 125–131. <https://doi.org/10.21597/jist.418232>
3. A. P. Ekinçi (2008). In Vitro Investigation of the Antioxidant Properties of Extracts from Different Tissues of Erzincan Grape. Karadeniz Technical University, Institute of Science, Trabzon.

ID: P-113

Endophytic Bacteria Obtained from *Viscum album* L. Collected from Bolu province

Zeynep OZAYDINLIK¹, Selin DOGAN², Yusuf GULSAHIN¹, Mehmet KARADAYI², Medine GULLUCE², Taha Yasin KOC², Hatice OGUTCU³

¹Ataturk University Graduate School of Natural and Applied Sciences, Erzurum, Turkey, ORCID:

²Ataturk University Faculty of Science, Erzurum, Turkey, ORCID: 0009-0001-8238-6036, ORCID: 0000-0003-0499-2169, ORCID: 0000-0002-3770-2116, ORCID: 0000-0002-2473-0409, ORCID: 0000-0002-5957-8259
ORCID: 0000-0002-7786-5462

³Kırşehir Ahi Evran University Faculty of Agriculture, Kırşehir, ORCID: 0000-0001-7100-9318

ABSTRACT

Mistletoe (*Viscum album* L.), which attracts attention with its semi-parasitic life style, is an evergreen and woody plant that maintains its photosynthetic ability while meeting its water and mineral needs from the trees it chooses as hosts. It is known that in traditional medicine, *Viscum album* is used to treat arthrosis, atherosclerosis, diabetes, cardiovascular disorders, bone and joint diseases, headaches, immune and nervous system disorders. Endophytic bacteria are found in the flowers, leaves, roots, seeds and stems of plants. Endophytic bacteria support host plant defense and growth by producing vital compounds. Therefore, their potential for both biocontrol and growth promotion increases the importance of these bacteria. In our current study, endophytic bacteria were obtained from the *Viscum album* plant collected from Bolu province. Asymptomatic mature plant, free of disease or damage, was collected along with its leaves and lateral branches and brought to the laboratory. Surface sterilization was first performed in the laboratory. Four types of media were used to isolate endophytic bacteria. A total of 122 bacterial isolates were obtained from the isolation study. When the bacterial isolates obtained after biochemical tests and conventional identification were examined, it was noted that *Bacillus*, *Pseudomonas*, *Enterobacter* and *Arthrobacter* genera were present intensively.

Acknowledgement: This work was supported by the Atatürk University Scientific Research Projects Coordination Unit (BAP) (Project ID: FHD-2025-15855).

References

- [1] P.A. Thomas, M. Dering, M.J. Giertych, G. Iszkuło, D. Tomaszewski, J. Briggs, 2023. Biological flora of Britain and Ireland: *Viscum album*: No. 303. Journal of Ecology, 111(3) (2023) 701-739.
- [2] S.L. Adzhiakhmetovaa, N.M. Chervonnaya, D.I. Pozdnyakov, O.I. Popova, E.T. Oganisyan, 2024. Component composition and features of biological activity of *Viscum album* (Viscaceae). Doklady Biological Sciences, 518(2024) 116-132.
- [3] W. Wu, W. Chen, S. Liu, J. Wu, Y. Zhu, L. Qin, B. Zhu, 2021. Beneficial relationships between endophytic bacteria and medicinal plants. Frontiers in Plant Science, 12(2021) 1-13.
- [4] M. Numan, M. Shah, S. Asaf, N. Ur Rehman, A. Al-Harrasi, 2022. Bioactive Compounds from endophytic bacteria *Bacillus subtilis* strain ep1 with their antibacterial activities. Metabolites, 12(12) (1228) (2022) 1-10.
- [5] Md.A. Ali, T.A.K.P. Chong, E. Ibrahim, J.W.H. Yong, M. Rizwan, 2024. A review on mechanisms and prospects of endophytic bacteria in biocontrol of plant pathogenic fungi and their plant growth-promoting activities. Heliyon, 10(11) (2024) 1-16.

ID: P-114

Optimization of Indole-3-Acetic Acid Production Capacity of *Enterobacter* sp. Bacteria Isolated from Various Extreme Areas

Burak Alaylar ¹, Akın Akıncıoğlu², Mehmet Karadayı ³, Medine Güllüce ⁴, Yüksel Dil ⁵, Yusuf Gülşahin ⁶

¹ Department of Molecular Biology and Genetic, Faculty of Arts and Sciences, Agri Ibrahim Cecen University, Agri, Türkiye, balaylar@agri.edu.tr Orcid ID: 0000-0001-6737-3440

² Central Research and Application Laboratory, Agri Ibrahim Cecen University, Agri, Türkiye, akinakincioglu@gmail.com Orcid ID: 0000-0002-6473-6338

³ Department of Biology, Faculty of Sciences, Ataturk University, Erzurum, Türkiye, mkaradayi@atauni.edu.tr Orcid ID: 0000-0002-2473-0409

⁴ Department of Biology, Faculty of Sciences, Ataturk University, Erzurum, Türkiye, gullucem@atauni.edu.tr Orcid ID: 0000-0002-5957-8259

⁵ Institute of Natural and Applied Sciences, Ataturk University, Erzurum, Türkiye, yuxel61@hotmail.com Orcid ID: 0000-0002-2238-061X

⁶ Institute of Natural and Applied Sciences, Ataturk University, Erzurum, Türkiye, yusufgulsahinn@gmail.com Orcid ID: 0000-0002-3770-2116

ABSTRACT

Indole-3-acetic acid (IAA) is the most common and naturally occurring plant hormone of the auxin class (1). Some microorganisms have the ability to synthesize IAA, and among them, IAA produced particularly by plant growth-promoting bacteria is considered a critical factor for plant development (2). In this study, 11 *Enterobacter* spp. strains isolated from the rhizospheric and endophytic regions of *Origanum vulgare* L. ssp. *vulgare* grown in various extreme areas of Erzurum province were evaluated. The strains were cultured in LB broth supplemented with 0.1% L-tryptophan, and their IAA production was analyzed. Based on the measurements, two strains showing the highest activity, designated as BY-4 and BY-7, were selected. The IAA production potential of these strains was characterized and optimized under different physiological conditions. During the optimization process, environmental factors such as carbon sources, pH, and temperature were tested. Initially, each parameter was evaluated individually while keeping others constant; subsequently, different combinations were tested to determine the conditions providing the highest activity. The results showed the highest IAA production was observed at 30 °C, pH 6.5, and when sucrose was used as the carbon source. In ongoing studies, it is aimed to isolate IAA at high purity from bacterial cultures grown under optimized conditions. For this purpose, IAA purification is planned using silica gel column chromatography or ion exchange chromatography methods.

Acknowledgement: This work was supported by Scientific Research Projects Coordination Unit (BAP) of Agri Ibrahim Cecen University (FEF.24.010)

References

- [3] Duca, D. R., & Glick, B. R. (2020, September 2). Indole-3-acetic acid biosynthesis and its regulation in plant-associated bacteria. *Applied Microbiology and Biotechnology*, s. 8607–8619.
- [4] Feng, Y., Tian, B., Xiong, J., Lin, G., Cheng, L., Zhang, T., . . . Li, X. (2024). Exploring IAA biosynthesis and plant growth promotion mechanism for tomato root endophytes with incomplete IAA synthesis pathways. *Chemical and Biological Technologies in Agriculture*, 11(1), 187.

ID: P-115

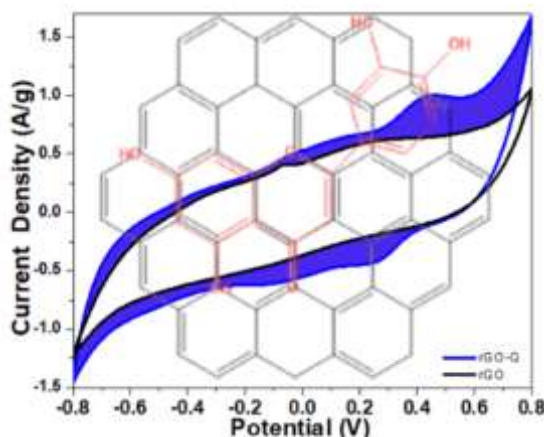
π - π Stacked Quercetin/Graphene Electrodes for High-Performance Supercapacitors

E. CEYRAN^{1,2}

¹ Central Research and Application Laboratory, Agri Ibrahim Cecen University, Agri, Turkey, ORCID: 0000-0002-9823-6649

² Art and Science Faculty, Department of Chemistry, Agri Ibrahim Çeçen University, Agri, Turkey

ABSTRACT



The integration of biomolecules with carbon-based electrodes offers a sustainable strategy for high-performance energy storage [1]. Quercetin (2-(3,4-dihydroxyphenyl)-3,5,7-trihydroxy-4H-chromen-4-one), a natural flavonoid with strong redox activity [2], was immobilized on graphene via π - π stacking to fabricate supercapacitor electrodes. The synergy between quercetin's redox functionality and graphene's electrical double-layer capacitance (EDLC) produced electrodes with enhanced EDLC and pseudocapacitive contributions.

Electrochemical characterizations including cyclic voltammetry (CV), galvanostatic charge-discharge (GCD), and electrochemical impedance spectroscopy (EIS) confirmed superior performance of the quercetin-modified electrodes. CV curves showed stronger redox currents, while GCD tests yielded specific capacitance values above 100 Fg⁻¹, outperforming bare graphene. EIS revealed lower charge-transfer resistance and improved ion transport. Long-term cycling (10,000 cycles) demonstrated remarkable stability with nearly 100% capacitance retention.

In conclusion, natural flavonoids such as quercetin hold great promise for the development of graphene-based supercapacitors.

Acknowledgement: This work was supported by Agri Ibrahim Çeçen University Central Research and Application Laboratory.

References

- [1] Yang, Y., Ma, W., Li, Z., Zhang, Z., & Hu, Z. 2022. Graphene non-covalently functionalized with Gallic acid (Ga) as high-performance electrode material for supercapacitors. *J. of Sc. Adv. Mat. and Dev.*, 7(1), 100386.
- [2] Zare, H. R., Namazian, M., & Nasirizadeh, N. 2005. Electrochemical behavior of quercetin: Experimental and theoretical studies. *J. of Elec. Chem.*, 584(2), 77-83.

ID: P-116

Natural Carbonic Anhydrase Inhibitors: hCA-I and hCA-II Inhibition by *Xanthium strumarium* Leaf and Fruit Extracts

S. Selimefendigil¹, Z.N. Saglam², I.C. Celik³, Y. Demir⁴, F. Oztokce⁵, and T. Aydin⁶

¹Ağrı İbrahim Çeçen University, Faculty of Pharmacy, Ağrı, Türkiye, ORCID: 0009-0006-7796-7422

²Ağrı İbrahim Çeçen University, Faculty of Pharmacy, Ağrı, Türkiye, ORCID: 0009-0002-6330-7918

³Ağrı İbrahim Çeçen University, Institute of Graduate Education, Ağrı, Türkiye, ORCID: 0009-0005-8148-1217

⁴Ardahan University, Nihat Delibalta Göle Vocational School, Ardahan, Türkiye, ORCID: 0000-0003-3216-1098

⁵Van Yüzüncü Yıl University, Faculty of Science, Van, Türkiye, ORCID: 0000-0002-3119-8561

⁶Ağrı İbrahim Çeçen University, Faculty of Pharmacy, Ağrı, Türkiye, ORCID: 0000-0002-7653-6480

ABSTRACT

Xanthium strumarium L., traditionally used for rhinitis, sinusitis, and headaches, is associated with relief of mucosal inflammation and secretion (1, 2). These effects may be mechanistically linked to inhibition of human Carbonic Anhydrase I (hCA-I) and II (hCA-II), which regulate pH and fluid balance in nasal tissues.

Dried leaves and fruits of *X. strumarium* (20 g) were macerated with 200 mL of solvent at room temperature for 24 h, and the process was repeated five times. The combined filtrates were concentrated under reduced pressure, and extraction yields were calculated. Leaf and fruit extracts were obtained using seven solvents (n-hexane, dichloromethane, ethyl acetate, acetone, dichloromethane: methanol 50:50, ethanol, and methanol), and their inhibitory effects on hCA-I and hCA-II were evaluated by the Verpoorte spectrophotometric method (PNA substrate, 348 nm), with IC₅₀ values calculated for each extract.

The IC₅₀ values of leaf extracts from *X. strumarium* against hCA-I were found in the range of 5.6–14.1 µg/mL, while those against hCA-II were in the range of 4.2–12.8 µg/mL. Likewise, IC₅₀ values for fruit extracts ranged from 6.8 to 12.6 µg/mL for hCA-II and from 4.1 to 11.4 µg/mL for hCA-I. These findings imply that leaf and fruit extracts have the potential to function as natural enzyme inhibitors since they both show notable inhibitory effects on human carbonic anhydrase isoenzymes.

Acknowledgement: This work was supported by Scientific and Technological Research Council of Türkiye (TÜBİTAK, 1919b012418566)

References

- [1] Fan, W., Fan, L., Peng, C., Zhang, Q., Wang, L., Li, L., Wang, J., Zhang, D., Peng, W., & Wu, C. (2019). Traditional Uses, Botany, Phytochemistry, Pharmacology, Pharmacokinetics and Toxicology of *Xanthium strumarium* L.: A Review. *Molecules*, 24(2), 359
- [2] Chinese Pharmacopoeia Commission. (1963). *Pharmacopoeia of the People's Republic of China*.

ID: P-117

Calcium–Alginate Beads of Tarragon (*Artemisia dracunculus*) Aqueous Extract: Formulation, Characterization, and Herniarin Quantification

O. Kral¹ and T. Aydin²

¹Ağrı İbrahim Çeçen University, Faculty of Pharmacy, Ağrı, Türkiye, ORCID: 0000-0003-1420-8462

²Ağrı İbrahim Çeçen University, Faculty of Pharmacy, Ağrı, Türkiye, ORCID: 0000-0002-7653-6480

ABSTRACT

Tarragon (*Artemisia dracunculus* L.) is a culinary and medicinal herb, with anti-inflammatory activity linked to coumarins such as herniarin (1). To improve stability and release, calcium–alginate beads were developed using ionotropic gelation with sodium alginate (1.0–2.0%) and CaCl₂ (0.75–2.5%). The aqueous extract (decoction, lyophilized; 5 mg/mL) was encapsulated in nine formulations (F1–F9), and herniarin content was quantified by HPLC (2).

Formulations were inspected immediately and after 24 h. Bead size increased with higher alginate (F7–F9), while low CaCl₂ produced amorphous beads with tailing (F1, F4), and higher CaCl₂ yielded rounder, uniform beads (3).



Figure 1. Images of extract-containing beads immediately after preparation

After drying, the bead diameters of formulations F6, F8 and F9, which were more rounded and uniform, were found to be 1.21, 1.18 and 1.25 mm, respectively. Herniarin, confirmed by HPLC as a major coumarin in tarragon extract, was effectively preserved after alginate bead encapsulation. This is the first report on alginate bead encapsulation of tarragon extract.

References

- [1] A.Q. Syamand, H.A. Farhang, H.Q. Miran, R.A.T. Sherzad, M.F. Aryan, H.H. Sahar, H.S. Tablo, N.S. Mohammed, 2025. Bioactivities, medicinal properties, and advanced extraction techniques of Tarragon (*Artemisia dracunculus*): a comprehensive review. *Journal of Herbal Medicine*, 50, 2025, 100989.
- [2] R. Stojanovic, A. Belscak-Cvitanovic, V. Manojlovic, D. Komes, N. Nedovic, B. Bugarski. Encapsulation of thyme (*Thymus serpyllum* L.) aqueous extract in calcium alginate beads. *Journal of the Science of Food and Agriculture*, 2011, 92(3), 685–696.
- [3] C. LarosaM. Salerno, J.S. de Lima, R. Merijs Meri, M.F. da Silva, L.B. de Carvalho, A. Converti, A. Characterisation of bare and tannase-loaded calcium alginate beads by microscopic, thermogravimetric, FTIR and XRD analyses. *International Journal of Biological Macromolecules*, 2018, 115, 900–906.

Awareness and Knowledge of Dermocosmetic Products: Evidence from Patients and Relatives Visiting Community Pharmacies

D. Ozmen Ozgun¹, E. Kadanalı² and Beyza Nur Mızrak³

¹ Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Agri Ibrahim Cecen University, Agri, Türkiye, ORCID: (0000-0002-8574-9672)

² Department of Economics, Faculty of Economics and Administrative Sciences, Agri Ibrahim Cecen University, Agri, Türkiye, ORCID: (0000-0001-6899-4935)

³ Faculty of Pharmacy, Agri Ibrahim Cecen University, Agri, Türkiye

ABSTRACT

This study aimed to evaluate the awareness and knowledge levels of patients and/or their relatives who applied to community pharmacies in Ağrı regarding dermocosmetic products. Considering the increasing global interest in dermocosmetics and the risk of misinformation, the research intended to provide data supporting public health and consumer behavior in this field. A cross-sectional survey was conducted with 384 participants, determined by proportional sampling. Data were collected through a structured questionnaire consisting of three parts: socio-demographic characteristics, knowledge level about dermocosmetics, and awareness factors. Factor analyses, reliability tests (Cronbach's Alpha), correlation, regression, t-test, and ANOVA were applied to assess the relationships between knowledge and awareness levels as well as socio-demographic variables. The majority of participants were female (67.2%) and in the 18–22 age group (59.6%). In the study, it was determined that the knowledge scale regarding dermocosmetic products consisted of four sub-dimensions: "product knowledge and accessibility," "personal care and health concerns," "brand preference," and "organic/sustainable product perception." Similarly, the awareness scale for dermocosmetic products was found to comprise four factors: "promotion and discount," "trust in pharmacies and accessibility," "product accessibility and expert advice," and "product innovation and efficiency." Within the knowledge scale, the highest mean score was observed in the "product knowledge and accessibility" factor, while the lowest mean score was in the "organic/sustainable product perception" factor. On the awareness scale, the highest mean score belonged to the "trust in pharmacies and accessibility" factor, whereas the lowest mean score was associated with "product innovation and efficiency."

According to the regression model, participants' awareness of dermocosmetic products explained approximately 55% of their knowledge level ($R^2 = 0.548$, $p < 0.001$). The study demonstrates that increased awareness significantly enhances knowledge about dermocosmetic products. While trust in pharmacies and expert guidance are strong drivers of awareness, limited perceptions of organic/sustainable products and innovative formulations highlight the need for targeted educational interventions. Developing informative materials in pharmacies, organizing community-based training, and integrating dermocosmetic education into pharmacy curricula are recommended to strengthen public awareness and safe use of dermocosmetics.

Keywords: Dermocosmetics, awareness, knowledge, pharmacy, consumer behavior

Acknowledgement: This work was supported by TÜBİTAK 2209-A with project number 1919B012314816.

References

- [1] Kayapınar C, 2019. Mersin Genelinde Bulunan Eczanelerde Dermokozmetik Uygulamalarının İncelenmesi. Yüksek Lisans Tezi. Mersin Üniversitesi, Sağlık Bilimleri Enstitüsü, Mersin.
- [2] Milam, E. C., and Rieder, E. A., 2016. An Approach to Cosmeceuticals. Journal of drugs in dermatology: JDD, 15(4), 452-456.
- [3] Sencan , N. ,Duman, G, Koparan, M., 2008. Serbest Eczacılar ve Kozmetikler: Türkiyedeki Durum. Ankara Eczacılık Fakültesi Dergisi, 37(4), 269-284.
- [4] DRENO, B., ARAVİİSKAİA, E., BERARDESCA, E., BİEBER, T., HAWK, J., SANCHEZ-VİERA, M., & WOLKENSTEİN, P. (2014). The science of dermocosmetics and its role in dermatology. Journal of the European Academy of Dermatology and Venereology, 28(11), 1409-1417.

ID: P-119

A Linear-Time Approach to Single-Node Dominator Detection in SESE Graphs

Davorka R. Jandrić¹

¹*Faculty of Mechanical Engineering, Belgrade, Serbia, ORCID: <https://orcid.org/0000-0002-1802-5594>*

ABSTRACT

We introduce a new algorithm for determining dominators in Single-Entry Single-Exit (SESE) directed graphs, designed to compute dominator information for one designated node rather than for the entire graph. Unlike classical methods, which evaluate dominators globally, our approach isolates the computation to a single target node and achieves linear-time complexity. This focused perspective provides clear benefits in cases where localized dominator data is sufficient, reducing unnecessary computation. Theoretical analysis is presented to establish correctness, efficiency, and guaranteed termination. Furthermore, experimental evaluation demonstrates that the method outperforms general-purpose dominator algorithms in both speed and practical usability.

Acknowledgement: This work was supported in part by the Serbian Ministry of Science, Technological Development, and Innovations, according to Contract 451-03-137/2025-03/200105 dated on February 4, 2025.

References

- [1] D.Jandrić, 2025. A NEW APPROACH TO FINDING DOMINATORS IN STRUCTURED CONTROL FLOW GRAPHS, ACCHE2025., Proceedings of the ACCHE 2025 Conference, pp. 82-90, https://acche.rs/ACCHE_2025/radovi/electrical/11.pdf.

ID: P-120

Investigation of Limit of Functions on Topological Spaces via Ideals

U. Kaya¹ and E. Işıklı²

¹*Bitlis Eren University, Bitlis, Türkiye, ORCID: 0000-0003-1278-997X*

²*Bitlis Eren University, Bitlis, Türkiye, ORCID: 0000-0002-4350-2858*

ABSTRACT

In this study, it is studied to explain all known limit concepts with a single concept. This concept is called the ideal limit. To introduce this concept, ideals and topologies are used in the given definition. It is shown that almost all known limit concepts in mathematics can be explained by changing the domain-codomain of functions or sequences, the topologies on these domain and codomain, the limit points, the local bases at the limit point, and the ideal on domain. After introducing this concept, it is given fundamental theorems about the ideal limit concept. These theorems are about the uniqueness of the limit, decomposition and algebraic operations on the limit (linearity of the limit, limit of multiplication, limit of quotient). Then, it is studied on the universality of the ideal limit in this study. Finally, it is given various examples for the ideal limit.

Acknowledgement: This study is Elanur Işıklı's master's thesis. The advisor is Ufuk Kaya.

References

- [1] H. Fast, "Sur la convergence statistique," *Colloquium Math.*, 2(3–4) (1951) 241–244.
- [2] P. Kostyrko, T. Salat, W. Wilczyński, 2000. I-convergence, *Real Anal. Exchange*, 26(2) (2000) 669–685.
- [3] F. Ilijas, 2000. Analytic quotients: theory of liftings for quotients over analytic ideals on the integers, *Amer. Math. Soc.*, 702 (2000).
- [4] H. Bauer, 2001. *Measure and integration theory*, De Gruyter, Berlin.
- [5] L. Narici, E. Beckenstein, 2011. *Topological vector spaces*, 2nd ed., CRC Press.

ID: P-121

Error Estimation of Gaussian Quadrature Formulae for Some Modifications of Jacobi Weights

A.V. Pejcev¹, D.R. Jandrlic², R. Orive, M.M. Spalevic and S.M. Spalevic²

¹*University of Belgrade, Serbia*

ABSTRACT

For analytic functions in a neighborhood of the real interval $[-1,1]$, we study the remainder terms of Gauss quadrature rules with respect to some modifications of Jacobi weight functions, namely

$$w_1 = \frac{(1-x)^\alpha(1+x)^\beta}{v-x}, \quad w_2 = v-x(1-x)^\alpha(1+x)^\beta$$

where $\alpha, \beta > -1$ and $v \in \mathbb{R}, |v| > 1$. Quadrature formulas concerned with this kind of weight functions have been considered recently by D. Lj Djukic et al.

Acknowledgement: This work was supported in part by the Serbian Ministry of Science, Technological Development, and Innovations, according to Contract 451-03-137/2025-03/200105 dated on February 4, 2025.

References

[1] D.Lj. Djukic, R. M. Mutavdzic, L. Reichel, M.M. Spalevic, Internality of averaged Gauss quadrature rules for certain modifications of Jacobi measures, Appl. Comput. Math. 22 (2023), 426--442.

ID: P-122

Temperley-Lieb Algebra from Potts Model to Knots

A. Şahin¹ and A. Çakmak²

¹Agri Ibrahim Cecen University, Ağrı, Turkey, ORCID: <https://orcid.org/0000-0002-9446-7431>

²Agri Ibrahim Cecen University, Ağrı, Turkey, ORCID: <https://orcid.org/0000-0002-2783-9311>

ABSTRACT

There is a strong relationship between the Potts model concept of statistical mechanics and the knot (link) concept of topology. This relationship contributes to the inseparable bond that exists between physics and mathematics. This connection is provided via the Temperley-Lieb algebra. It has been shown through studies on this subject how the Temperley-Lieb algebra can be used diagrammatically as a geometric simplification for knot theory. The relevance of the Potts model in statistical mechanics is investigated by transforming it into a knot polynomial state model in Kauffman square brackets. Temperley-Lieb operator algebra is used to obtain the dichromatic polynomial for the planar graphs underlying the knots (links). To illustrate what is being discussed here, these calculations are investigated on two models of knot known as the Zengi knots.

Acknowledgement: This work was supported by Scientific Research Projects Coordination Unit of Agri Ibrahim Cecen University under project number FEF.24.001.

References

- [1] C.C. Adams, 1994. The Knot Book. W. H. Freeman and Company, New York.
- [2] V.F.R. Jones, 1989. On knot invariants related to some statistical mechanical models, Pacific J. Math. 137 (1989) 311-334.
- [3] L.H. Kauffman, 2009. Remarks on Khovanov homology and the Potts model, Geom. Topol. 3, (2009) 237-262.
- [4] T. Kassenova, P. Tsyba, O. Razina, 2024. Investigation of partition function transformation for the Potts model into a dichromatic knot polynomial 7_4 , Symmetry 16 (2024) 842.
- [5] A.Ç. Kuru, 2008. Orta çağ Anadolu Türk mimarisinde düğüm motifi ve ikonografisi, Erdem 51 (2008) 23-52.
- [6] M. Stosic, 2005. Categorification of the dichromatic polynomial for graphs, J. Knot Theory Its Ramif. 17 (2005) 31-45.
- [7] A. Şahin, 2021. Dichromatic polynomial for graph of a $(2,n)$ -torus knot, Applied Mathematics and Nonlinear Sciences, 6(1) (2021) 397-402.

Automatic Detection of Clinical Signs of Foot and Mouth Disease in Cattle with YOLO Based Image Processing

B. Koçak¹, A. Özmen²

¹*Department of Computer Technology, Vocational School, Agri Ibrahim Cecen University, Agri, Turkey, ORCID: 0000-0002-1706-0283*

²*Department of Electronics and Automation, Vocational School, Agri Ibrahim Cecen University, Agri, Turkey, ORCID: 0000-0002-3631-4883*

ABSTRACT

Foot-and-Mouth Disease (FMD) is a viral infection of two-hoofed animals that is highly contagious and causes serious economic losses [1]. FMD, which is among the notifiable diseases by the World Organisation for Animal Health (WOAH), causes a decrease in milk and meat yield and restrictions in international livestock trade [2]. Early diagnosis of the disease is critical for controlling outbreaks and reducing economic losses [3]. However, since current diagnostic methods are based on clinical observation and laboratory tests, the possibility of a rapid and low-cost diagnosis under field conditions remains limited. The aim of this study is to automatically detect clinical signs (sores on the mouth and tongue, excessive salivation, udder and hoof lesions) in cattle infected with foot-and-mouth disease using computer vision based methods. Within the scope of the study, approximately 1500 high-resolution images were collected, the symptoms were labelled and the object detection model was trained using the YOLO algorithm. The performance of the model was evaluated using accuracy, recall, F1 score and mAP (Mean Average Precision). Experimental results show that the model achieves 91% accuracy, 88% precision and 90% mAP. The findings show that the YOLO-based object detection method is able to distinguish the clinical signs of foot-and-mouth disease with high success. This approach offers a practical, low-cost and feasible diagnostic alternative that can support veterinarians in the field as an early warning system.

Keywords: Foot-and-mouth disease, image processing, YOLO, object detection, veterinary diagnostic systems

References

- [1] R. N. Shebiah and S. Arivazhagan, "Deep Learning Based Image Analysis for Classification of Foot and Mouth Disease in Cattle," Proc. 5th Int. Conf. Inven. Res. Comput. Appl. ICIRCA 2023, no. Icirca, pp. 701–705, 2023, doi: 10.1109/ICIRCA57980.2023.10220765.
- [2] N. N. K. Krisnawijaya, C. Catal, B. Tekinerdogan, R. van der Tol, H. Hogeveen, and Y. Herdiyeni, "A machine learning approach to identifying foot and mouth disease incidence in Dairy Farms with suboptimal veterinary infrastructure," Smart Agric. Technol., vol. 12, no. July, p. 101261, 2025, doi: 10.1016/j.atech.2025.101261.
- [3] M. Rony, D. Barai, Riad, and M. Z. Hasan, "Automated Foot and Mouth Disease Classification Using Transfer Learning-Based Deep Convolutional Neural Network," 2021 12th Int. Conf. Comput. Commun. Netw. Technol. ICCCNT 2021, pp. 1–6, 2021, doi: 10.1109/ICCCNT51525.2021.9579954.

ID: P-124

An Extended Complex Valued Banach Space

Faisal Mahammad Alkassasbeh

*Department of Mathematics & Statistics, Faculty of Science,
Mutah University, Alkarak JORDAN
kassasbeh13@yahoo.com*

ABSTRACT

The abstract is a succinct summary of introducing the concept of an extended complex valued Banach space with examples. Some results are discussed and explained. Also, some theorems and corollaries with proposition are obtained.

Acknowledgement: This work was supported by Mutah University.

References

- [1] Rao, K., Swamy, P., & Prasad, J. (2013). A common fixed point theorem in b-metric spaces. *Bulletin of Mathematics and Statistics Research*, 1(1-3).
- [2] Mitrovic, Z., Işık, H., & Radenovic, S. (2020). *The new results in extended \$ b \$-metric spaces and applications*. *International Journal of Nonlinear Analysis and Applications*, 11(1), 473-482.
- [3] Mohammed, S. S., & Ullah, N. (2021). *Fixed point results in extended \$ b \$-metric spaces and related applications*. *Annals of Mathematics and Computer Science*, 1.
- [4] N. Ullah, M.S. Shagari, and A. Azam, *Fixed Point Theorems in Extended b-Metric Spaces*, *Moroccan Journal of Pure and Applied Analysis*, 5(2) (2019), 140-163.

Computational Algorithm to Solution of Linear Quadratic Optimal Control Problem in Oscillating Systems with Liquid Dampers

Aliev F.A.¹, Hajiyeva N.S.¹

¹*Institute of Applied Mathematics of Baku State University, Baku, Azerbaijan*
e-mail: f_aliev@yahoo.com, nazile.m@mail.ru

ABSTRACT

In the paper, the Cauchy problem for the fractional order linear differential equations with constant coefficients is considered. Firstly, the given equation is reduced to the normal system, where only two elements in the vector of the initial condition are known. Then the quadratic functional is introduced for defining the optimal program trajectory and optimal control. The extended functional is constructed and some transformations in this functional have been done (integration by parts, definition of fractional order derivative in Riemann-Liouville sense, left and right rectangular method) for receiving Euler-Lagrange equations with boundary conditions. Then we introduce the general solution of Euler-Lagrange equations as Mittag-Leffler series. Using Mittag-Leffler function, we construct its fundamental solution matrix for the general case. Using this solution, initial condition and boundary condition with Lagrange multipliers we find the optimal program trajectory and optimal control.

Keywords: linear quadratic optimal control problem, fractional order linear differential equations, Mittag-Leffler function, Euler-Lagrange equations.

References

- [1] Aliev F.A., Aliev N.A., Rasulzade A.F., Hajiyeva N.S., (2023), Solution of the optimal program trajectory and control of the discretized equation of motion of sucker-rod pumping unit in a Newtonian fluid, TWMS J. App. and Eng. Math., 13(4), pp.1369-1382.
- [2] Aliev F.A., Aliev N.A., Rasulzade A.F., Hajiyeva N.S., Alieva I.V., (2024), Development of discrete asymptotic algorithm for the optimal trajectory and control in oscillatory systems with liquid damper, SOCAR Proceedings, (2), pp.122-127.
- [3] Aliev F.A., Aliyev N.A, Hajiyeva N.S., Mahmudov N.I., (2021), Some mathematical problems and their solutions for the oscillating systems with liquid dampers: A review, Applied and Computational Mathematics, 20(3), pp.339-365.
- [4] Miller K.S., Ross B., (1993), An Introduction to the Fractional Calculus and Fractional Differential Equations, New York: Wiley, 336p.
- [5] Samko S., Marichev O., Kilbas A., (1987), Fractional Integrals and Derivatives and Some of Their Applications, Science and Technica, Minsk.

Vectorial Inverse Nodal Analysis for Singular Diffusion Equations

Abdullah ERGÜN¹

¹*Sivas Vocational School of Techncl Sciences, Sivas Cumhuriyet University, 58140, Sivas, Turkey*

ABSTRACT

We examine a vector-valued Diffusion problem given by the differential equation

$$-y'' + [2\lambda p(x) + q(x)]y = \lambda^2 y \quad (1)$$

with boundary conditions

$$\begin{aligned} Ay(0) + I_d y'(0) &= \theta \\ By(\pi) + I_d y'(\pi) &= \theta \end{aligned} \quad (2)$$

and jump conditions

$$y(a+0) = \alpha y(a-0), \quad y'(a+0) = \alpha^{-1} y'(a-0) \quad (3)$$

where $p(x) = [p_{ij}(x)]_{i,j=1}^d$ and $q(x) = [q_{ij}(x)]_{i,j=1}^d$ denotes a continuous symmetric matrix-valued function on the interval $[0, \pi]$ and $\alpha > 0, \alpha \neq 1$ and $a \in (0, \pi)$. An eigenfunction $y(x)$ is referred to as being of type (DP) if all isolated zeros in its components coincide with nodal points of the function itself. We demonstrate that in the two-dimensional case $d = 2$, the existence of infinitely many (DP)-type eigenfunctions is both necessary and sufficient for the simultaneous diagonalizability of $(p(x), q(x), A, B, \alpha)$. Consequently, if all but finitely many eigenfunctions possess the (DP) property, then the original data $(p(x), q(x), A, B, \alpha)$ can be uniquely recovered. These findings extend a result previously established by Shen and Shieh under Dirichlet boundary conditions. The core argument elies on a specific asymptotic analysis of the eigenvalues, which may hold independent mathematical significance.

ID: P-127

Effects of Triacntanol on Apoplastic Antioxidant System in Wheat Seedlings Under Raxil Fungicide

D. Tiryaki¹, B. Tosun², G. Karadayi², I. Colak², and M. Gulluce¹

¹*Ataturk University, Biology, Erzurum, Turkiye,*

²*Ataturk University, Molecular Biology and Genetics, Erzurum, Turkiye,*

ABSTRACT

Triacntanol (TRIA), a natural plant growth regulator, is widely used in large areas, covering millions of hectares of land, to increase agricultural productivity. In our study, to investigate the effects of TRIA on the resistance of Raxil fungicide to the harmful effects, bread wheat (*Triticum aestivum* L. Ayyıldız) seeds were planted in petri dishes containing Raxil (15, 30, 60 g/L). After germination, TRIA (10, 20 and 40 µM) was sprayed on the leaves on the 7th day, and the plants were harvested on the 10th day. Antioxidant enzyme activities such as catalase (CAT), peroxidase (POX), and superoxide dismutase (SOD), as well as lipid peroxidation (LPO) level and H₂O₂ amount, were determined in the harvested plant samples. When the results were evaluated, TRIA administration generally increased enzyme activities, while Raxil administration generally decreased them. When TRIA and Raxil were administered together, activity varied depending on the dose. Raxil increased MDA content, while TRIA administration decreased it. A general decrease in H₂O₂ content was observed.

In conclusion, while Raxil and similar fungicides are indispensable tools for disease control in modern agriculture, their uncontrolled and widespread use poses various risks. So, our study have attempted to minimize the risks posed by Raxil

ID: P-128

Effects of Triacntanol on Antioxidant System in Wheat Seedlings Under Raxil Fungicide

D. Tiryaki¹, B. Tosun², G. Karadayi², I. Colak², and M. Gulluce¹

¹*Ataturk University, Biology, Erzurum, Turkiye,*

²*Ataturk University, Molecular Biology and Genetics, Erzurum, Turkiye,*

ABSTRACT

Triacntanol (TRIA), a natural plant growth regulator, is widely used in large areas, covering millions of hectares of land, to increase agricultural productivity. In our study, to investigate the effects of TRIA on the resistance of Raxil fungicide to the harmful effects, bread wheat (*Triticum aestivum* L. Ayyıldız) seeds were planted in petri dishes containing Raxil (15, 30, 60 g/L). After germination, TRIA (10, 20 and 40 µM) was sprayed on the leaves on the 7th day, and the plants were harvested on the 10th day. Antioxidant enzyme activities such as catalase (CAT), peroxidase (POX), and superoxide dismutase (SOD), as well as lipid peroxidation (LPO) level and H₂O₂ amount, were determined in the harvested plant samples. When the results were evaluated, TRIA administration generally increased enzyme activities, while Raxil administration generally decreased them. When TRIA and Raxil were administered together, activity varied depending on the dose. Raxil increased MDA content, while TRIA administration decreased it. A general decrease in H₂O₂ content was observed.

In conclusion, while Raxil and similar fungicides are indispensable tools for disease control in modern agriculture, their uncontrolled and widespread use poses various risks. So, our study have attempted to minimize the risks posed by Raxil

ID: P-129

Evaluation of the Potential Use of *Chenopodium album* Essential Oils in Dermocosmetic Formulations

S. Ozdoğan¹, K. Aslan², I. Gulcin,³

^{1,2}Ataturk University, Erzurum, Türkiye, ORCID¹: 0009-0001-9062-230X ORCID²: 0000-0001-8388-5470

³Agri İbrahim CeCen University, Agri, Türkiye, ORCID³: 0000-0001-5993-1668

ABSTRACT

Chenopodium album, commonly known as lamb's quarters, is a plant with diverse biological activities and traditional uses in skin treatments. In this study, essential oils were extracted via steam distillation, chosen for preserving thermolabile compounds and ensuring compatibility with dermocosmetic formulations [1]. The oils were evaluated for antioxidant, antimicrobial, and enzyme inhibitory activities. Antioxidant capacity was assessed using 1,1-diphenyl-2-picrylhydrazyl (DPPH) and 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) radical scavenging assays, as well as Ferric Reducing Antioxidant Power (FRAP), Fe³⁺ reduction, and Cupric Reducing Antioxidant Capacity (CUPRAC) methods. Antimicrobial activity was tested against Gram-positive (*Staphylococcus aureus*, *Micrococcus luteus*) and Gram-negative (*Escherichia coli*, *Klebsiella pneumoniae*) skin-associated bacteria via the disk diffusion method. Chemical composition was analyzed by GC-MS/MS, and structure–function relationships of active compounds were examined. Tyrosinase inhibition and enzyme kinetics were investigated. To the best of our knowledge, no previous studies have reported tyrosinase inhibition by *C. album* essential oils, and our results indicate that these oils possess significant antioxidant, antimicrobial, and tyrosinase inhibitory activities, supporting their potential for dermocosmetic applications.

Acknowledgement: This work was supported by TÜBİTAK 2209-A (1919B012420688)

References

- [1] S. Showkat, T. S. Kumar, 2024. Exploring the anticandidal potential: Evaluating leaf extract efficacy and GC–MS metabolite profiling of *Chenopodium album* var. *album* L., South African Journal of Botany 173 (2024) 347–354.

ID: P-130

Proteomic Discovery of Antimicrobial Peptides from *Galleria mellonella* Larvae: Novel Biotechnological Strategies for Combating Multidrug Resistance and Enhancing Food Preservation

Ülkü Zeynep Üreyen ESERTAŞ¹, Ersin KARATAŞ² and Oktay YILDIZ^{3,4}

¹Ağrı İbrahim Çeçen University, Faculty of Medicine, Department of Medical Microbiology Ağrı, TURKEY ORCID: 0000-0001-9897-5313

²Ağrı İbrahim Çeçen University, Patnos Vocational School, Ağrı, TURKEY ORCID: 0000-0001-6848-7618

³Karadeniz Technical University Faculty of Pharmacy Department of Biochemistry Trabzon, TURKEY ORCID: 0000-0003-0436-682X

⁴Gumushane University Rectorate Gümüşhane, TURKEY

ABSTRACT

The long-term and widespread use of antibiotics has accelerated the emergence of resistant pathogens, posing a serious global health threat. In this context, antimicrobial peptides (AMPs), which are crucial components of innate immune defense, are considered promising candidates both as therapeutic agents and natural biopreservatives [1]. In this study, *Galleria mellonella* larvae are employed as a model organism to investigate novel antimicrobial peptides active against multidrug-resistant microorganisms including *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Acinetobacter haemolyticus*, and *Candida albicans*. The project involves immunization of larvae, extraction of hemolymph, separation of peptides through HPLC and LC-MS, and evaluation of their antimicrobial activities using standard in vitro assays. Furthermore, the potential of these peptides as food preservatives will be assessed by testing their activity against foodborne pathogens such as *Bacillus cereus* and *Salmonella typhimurium* in meat samples through microbiological, sensory, and chemical analyses. The successful completion of this study will provide the first proteomics-based identification of antimicrobial peptides from *G. mellonella* targeting multidrug-resistant pathogens, offering natural alternatives to synthetic preservatives in food safety applications. The findings are expected to contribute significantly to the development of high value-added biotechnological products and to open new research directions for combating antimicrobial resistance while enhancing food preservation strategies.

References

- [1] Brogden, N. K., & Brogden, K. A. (2011). Will new generations of modified antimicrobial peptides improve their potential as pharmaceuticals? *International Journal of Antimicrobial Agents*, 38(3), 217–225.
- [2] Carmona-Ribeiro, A. M., & de Melo Carrasco, L. D. (2014). Novel formulations for antimicrobial peptides. *International Journal of Molecular Sciences*, 15(10), 18040–18083.

Acknowledgements

This study was supported by TÜB TAK-B DEB-2218 (Project Code: 123C106).
www.icanas.agri.edu.tr

ID: P-131

Investigation of Potential Biomarkers in Multiple Myeloma through mRNA Expression Analysis

M.Kızılkaya¹, E. Balkan², A. Kara³, F. Erdem³

¹ Department of Medical Biology, Ağrı, Türkiye, ORCID: 0000-0001-7674-4223

² Department of Medical Biology, Erzurum, Türkiye, ORCID: 0000-0002-7065-8161

³ Department of Internal Medicine ORCID: 0000-0002-5229-7139

³ Department of Internal Medicine ORCID: 0000-0002-0377-7291

ABSTRACT

Introduction

Multiple myeloma is a heterogeneous hematologic malignancy characterized by the malignant proliferation of plasma cells. In recent years, alterations in mRNA levels have been considered important in the pathogenesis of myeloma (1,2). The aim of this preliminary study was to identify candidate genes with biomarker potential among selected mRNA transcripts in patients with multiple myeloma.

Materials and Methods

The study included 20 patients with multiple myeloma and 20 healthy controls. The expression levels of GAPDH, MTOR, PDCD1, CD274, STAT3, IL6, IFN, H3F3A, SIRT7, and YY1 genes were measured by RT-qPCR and analyzed using the $\Delta\Delta C_t$ method ($p < 0.05$).

Results

Distinct upward and downward expression trends were observed among the analyzed genes. The most upregulated genes were IL6 (FC \approx 8.9), IFN (FC \approx 8.2), and PDCD1 (FC \approx 7.3). The most downregulated genes were YY1 (FC \approx 0.12), H3F3A (FC \approx 0.13), and SIRT7 (FC \approx 0.14). Although these changes did not reach statistical significance, they represent biologically noteworthy tendencies.

Discussion

Preliminary findings suggest increased expression of inflammatory and immune regulatory genes (IL6, IFN, PDCD1) and downregulation of epigenetic/metabolic regulatory genes (YY1, H3F3A, SIRT7) in multiple myeloma patients. These results indicate that multiple myeloma may be reshaped through both immune activation and epigenetic control mechanisms (3). However, due to the limited sample size and variability, statistical significance was not achieved. Validation in larger cohorts will be required to better establish the biomarker potential of these genes.

References

- [1] Palumbo, A., & Anderson, K. (2011). Medical progress multiple myeloma. *New England Journal of Medicine*, 364(11), 1046-1060
- [2] Rajkumar, S. V. (2020). Multiple myeloma: 2020 update on diagnosis, risk-stratification and management. *American journal of hematology*, 95(5), 548-567.
- [3] Mikhael, J. (2020). Treatment options for triple-class refractory multiple myeloma. *Clinical Lymphoma Myeloma and Leukemia*, 20(1), 1-7.

ID: P-132

Design, Synthesis and Evaluation of Rasagiline and Phenethylamine Based Novel Urea Derivatives as Antioxidant Agents and Cholinesterases Inhibitors

P. Kalın¹, Y. Akbaba² and M. E. Arslan³

¹Erzurum Technical University, Faculty of Science, Department of Basic Science, Erzurum, Türkiye, 0009-0008-1096-0300

²Erzurum Technical University, Faculty of Science, Department of Basic Science, Erzurum, Türkiye, 0000-0002-7770-0473

³Erzurum Technical University, Faculty of Science, Department of Molecular Biology and Genetics, Erzurum, Türkiye, 0000-0002-1600-2305

ABSTRACT

Urea and its derivatives are central to drug development and medicinal chemistry due to their ability to form multiple stable hydrogen bonds with protein and receptor targets. Cholinesterases are enzymes widely distributed in cholinergic and non-cholinergic tissues in body fluids and plasma. Cholinesterases in living organisms are divided into two classes, Acetylcholinesterase (AChE: E.C.3.1.1.7) and Butyrylcholinesterase (BChE: E.C.3.1.1.8), based on their substrate specificity and sensitivity to inhibitors [1].

In this study's scope, eight new potentially active urea derivatives based on rasagiline and phenethylamine were synthesized and characterized. The inhibitory effects of the synthesized molecules on AChE and BChE enzyme activities were studied under in vitro conditions, and IC₅₀ values were calculated. IC₅₀ values were determined to be in the 59.243 to 77.016 nM range for AChE and in the 2.423 to 45.304 nM range for BChE. Additionally, antioxidant capacities of urea derivatives were determined. In this context, the antioxidant properties of the molecules were investigated by performing Fe³⁺-Fe²⁺ reducing capacity, Cu²⁺-Cu⁺ reducing capacity, FRAP reducing capacity, 1,1-Diphenyl 2-picryl hydrazyl (DPPH) free radical scavenging activity, and 2,2-Azino-bis (3-ethylbenzo-thiazoline-6-sulfonic acid) (ABTS) radical scavenging activity experiments.

Acknowledgement: This study was supported by TÜBİTAK-BİDEB-2218 (Project Code: 122C049).

References

[1] R. Sağlamtaş and İ. Gülçin, 2025. Investigation of the Effect of Gingerol on α -Glycosidase Cholinesterases and Monoamine Oxidase Enzymes: Antioxidant Activity and In Silico Study, *Chemistryselect*, 10(9) (2025).

Dual Inhibition Effect of Acetylcholinesterase and Butyrylcholinesterase by Sulfonamide Substituted Urea Derivates: In Vitro Activity and Antioxidant Properties

¹Neslihan Aydemir, ²Nihal Gökalp ³Akın Akıncioğlu, ²Süleyman Gök, ⁴Hülya Akıncioğlu

¹Ağrı İbrahim Çeçen University, Graduate Education Institute, Department of Chemistry, Ağrı, Türkiye, 0009-0000-3185-7515

²Atatürk University, Erzurum, Türkiye, 0000-0003-1280-3954

³Ağrı İbrahim Çeçen University, Central Research and Application Laboratory, Ağrı, Türkiye, 0000-0002-6473-6338

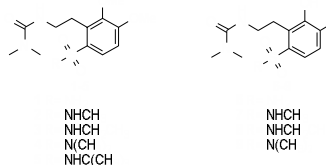
⁴Ağrı İbrahim Çeçen University, Department of Chemistry, Faculty of Arts and Sciences

Ağrı, Türkiye, 0000-0001-5453-0953

aydemir52@gmail.com

ABSTRACT

Alzheimer's disease, which has been increasingly observed recently, is a neurodegenerative disorder predominantly presenting in patients over the age of 65. [1] The primary etiology is attributed to a decline in acetylcholine (ACh) neurotransmitter levels within the brain, coupled with their diminished capacity to perform their original functions. Acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) are enzymes expressed in brain tissues, contributing to the regulation of ACh and BCh activities within the central nervous system. Cholinesterase inhibitors are employed in the therapeutic management of Alzheimer's and Parkinson's diseases. [2] Antioxidants are the human body's most important weapon for eliminating oxidative stress that can be caused by free radicals [3]. Antioxidants repair biological molecular damage by collecting and stabilizing free radicals, stopping chemical reactions that produce free radicals with a chain-breaking effect, reducing the rate of reactions with a suppressive effect, and restorative effect. [4] In this context, the inhibitory effects of Sulfonamide substituted urea derivatives were evaluated *in vitro*. The results demonstrated that the synthesized compounds exhibited inhibitory effects at the micromolar (μM) level on the enzymes AChE, BChE. Moreover, Sulfonamide substituted urea derivatives were observed to possess antioxidant properties that approach the efficacy of standard references.



Keywords: Anticholinergic Properties, Carbonic Anhydrase, Antioxidant, Sulfonamide Derivatives

References

- [1] Kucukoglu, K., Gul, H. I., Taslimi, P., Gulcin, I., Supuran, C. T., 2019. Investigation of inhibitory properties of some hydrazone compounds on hCA I, hCA II and AChE enzymes, *Bioorg. Chem.* 86, 316–321.
- [2] Tekeli, T., Lolak, N., Tekeli, Y., Bozgeyik, E., Anakok, D. A., Çete, S., Akocak, S., 2024. Bis-ureido-substituted benzenesulfonamides: Evaluation of their antibacterial, anticholinesterase, and cytotoxicity properties, *Chem. Select* 9(23), e202400485.
- [3] Karabulut, H., Gulay, M. S., 2016. Antioxidants, *Vet. J. Mehmet Akif Ersoy Univ.* 1(1), 65–76.
- [4] Kasapcopur Ozel, G. S., Birdane, Y. O., 2014. Antioxidants.

ID: P-134

Investigation of the Antioxidant Capacity of *Arum Maculatum* L. Collected from the Erzurum-Hinis Region

Z. Bingöl¹

¹*Tokat Gaziosmanpaşa University, Vocational School of Health Services, Department of Medical Services and Techniques, Tokat, Türkiye, ORCID: 0000-0003-3373-779X*

ABSTRACT

Arum Maculatum L. is a perennial plant, commonly known by various local names, and is widely distributed from Europe to Anatolia [1]. The plant is consumed as a vegetable in various cultures, and in the Southeastern region of Turkey, its leaves are used to prepare a traditional dish known as "tırşik soup." Besides its traditional use as an anti-rheumatic, anti-hemorrhoidal, analgesic, and antidiabetic agent, the plant is also used for treating burns, wounds, gastrointestinal disorders, and the common cold [1-2].

Interest in antioxidants arises from their protective roles in the body, their ability to prevent oxidative deterioration in food and pharmaceutical products, and their benefits against pathological processes induced by oxidative stress. Determining the antioxidant properties of plants and plant-derived compounds requires the use of appropriate methods to investigate the mechanisms of antioxidant activity and the kinetics of the reactions in which these compounds are involved [3]. This study was designed to evaluate the antioxidant activity of the ethanol extract of *Arum maculatum* L. leaves using various radical scavenging (DPPH•, ABTS•⁺) and reducing power (CUPRAC, Fe³⁺ reduction, FRAP) assays. The findings reveal that the extract possesses a considerable reducing power (Fe³⁺-Fe²⁺ → λ₇₀₀: 0.77 ± 0.05 µg/mL, CUPRAC → λ₄₅₀: 1.13 ± 0.02 µg/mL, FRAP → λ₅₉₃: 1.21 ± 0.08 µg/mL) and radical scavenging capacity (DPPH• → IC₅₀: 49.50 µg/mL, ABTS• → IC₅₀: 22.35 µg/mL). When compared with standard antioxidants, its comparable activity highlights the potential of *Arum maculatum* as a strong natural antioxidant source.

References

- [1] B. Ergene, M. Karaaslan, 2023. Food, medicine or a poisonous plant: *Arum maculatum* L., J. Res. Pharm., 27(2) (2023).
- [2] F. Ceylan, S.A. Sahingoz, 2022. Using ethnobotanical plants in food preparation: Cuckoo pint (*Arum maculatum* L.), Int. J. Gastronomy Food Sci., 29 (2022) 100529.
- [3] İ. Gulcin, 2025. Antioxidants: a comprehensive review, Arch. Toxicol., (2025) 1–105.

ID: P-135

Carbon Supported Silver-Nickel Nanocomposites and Catalytic Applications

Gökçe Turan¹, Melike SEVİM^{1,2}

¹*Department of Chemistry, Faculty of Science, Atatürk University, Erzurum, Türkiye*

²*Nanoscience and Nanoengineering Department, Atatürk University, Erzurum, Türkiye ORCID: 0000-0002-9410-0234*

ABSTRACT

In this study, we synthesized carbon supported Silver-Nickel nanocomposites and characterized advanced analytical technique which are Transmission Electron Microscopy(TEM), X-Ray Photoelectron Spectroscopy(XPS) and Inductively coupled plasma mass spectrometry (ICP-MS). After detailed characterization we performed hydrogen generation of catalyst with different parameters (catalyst amount, ammonia-borane amount, temperature and recyclability). At the end of the study we obtain that the catalyst has 41.1 min⁻¹ TOF value. The catalyst showed good stability and high hydrogen production performance after 5 cycle.

Keywords: hydrogen economy, catalyts, ammonia-borane.

Matrices Corresponding to (2,n) Torus Knot

Melike Aydın¹, Ceren Sultan Elmalı²

¹Erzurum Technical University, Erzurum, Türkiye,

²Erzurum Technical University, Erzurum, Türkiye, ORCID:0000-0002-2553-4733

ABSTRACT

A graph $G(V, E)$ consists of a finite set of vertices $V(G)$ and a set of edges $E(G)$ consisting of distinct, unordered pairs of vertices. We usually take $V(G)$ to be $\{1, 2, \dots, n\}$ and $E(G)$ to be $\{e_1, e_2, \dots, e_m\}$. It is known that matrices are mapping to graphs by various methods such as neighborhood, directional neighborhood, degree, distance and Laplacian. In mathematics, a knot is an embedding of the circle (S^1) into three-dimensional Euclidean space, \mathbb{R}^3 (also known as E^3). Besides it is known that graphs are corresponding to knots by Tait method. In this study, it is aimed to combine these two factors. That is, the matrices corresponding to the graph obtained from the knot are found. In addition, which is the inverse of this process, firstly, the graph corresponding to the matrix, secondly the knot corresponding to this graph are also obtained. In particular, the neighborhood and directional neighborhood matrices corresponding to (2,n)torus knots are formulated. Furthermore, it is adapted to the problems we may encounter in our daily life.

References

- [1] Wilson, R. J. 2022. Graf Teorisine Giriş. Palme yayınevi, 184, Ankara.
- [2] Bapat, R. B. 2002. Graphs and Matrices. Hindustan Book Agency, 171, New Series (Delhi)
- [3] Murasugi, K. 1996. Knot Theory and Its Applications. Birkhauser Boston, 341, New York.
- [4] Aldous J. M. Wilson R. J. (2004), Graphs and Applications London/UK, Springer .
- [5] Diestel, R. (2000). Graph theory. (Elektronic edition). New york/ USA: Springer-Verlag.

ID: P-137

Some Notes on the Metric ($E^4 = I$) – Manifolds

Sibel TURANLI¹, Elanur KÜÇÜK²

¹*Erzurum Technical University, Erzurum, Türkiye, ORCID: 0000-0001-6747-6757*

²*Erzurum Technical University, Erzurum, Türkiye,*

ABSTRACT

A metric ($E^4 = I$) –manifold is a n –dimensional pseudo-Riemannian manifold M_n which consists of a $(1, 1)$ tensor field E and a pseudo-Riemannian metric g satisfying $E^4 = I$, $g(EX, Y) = -g(X, EY)$. In this study, definitions of first type and second type special connections on the metric ($E^4 = I$) –manifolds are given under some conditions. Moreover, some properties of these connections are presented.

References

- [1] R.S. Mishra, 1976. Structures in electromagnetic field. Tensor N.S. 30 (1976) 145–156.
- [2] S. Turanli and A. Gezer, 2022. On Codazzi Couplings on the Metric ($E^4 = I$)– Manifolds. Symmetry, 14(7) (2022) 1346.
- [3] A. Salimov, 2014. On anti-Hermitian metric connections. Comptes Rendus Mathematique, 352(9) (2014) 731-735.

ID: P-138

Certain Formulas Associated with Some Quadruple Hypergeometric Functions

Ayed Al e'damat¹

¹Department of Mathematics College of Science, AL - Hussein Bin Talal University
Ma'an, Jordan Email:ayed.h.aledamat@ahu.edu.jo
Jihad Younis Department of Mathematics, Aden University, Yemen
Email: jihadalsaqqaf@gmail.com

ABSTRACT

Recently, there has been an important increase in the study of recursion formulas for multivariate hypergeometric functions. In this paper, we present some recursion formulas involving quadruple hypergeometric functions introduced by Younis and Bin-Saad.

Key words and phrases: Recursion formula, quadruple hypergeometric functions.

AMS Subject Classification: 15A15; 33C65.

References

- [1] P. Agarwal, J. Choi and J. Shilpi, Extended hypergeometric functions of two and three variables, Commun. Korean Math. Soc., 30 (2015), 403-414.
- [2] P. Agarwal, J. A. Younis and T. Kim, Certain generating functions for the quadruple hypergeometric series K10, Notes on Number Theory and Discrete Mathematics, 25 (2019), 16-23.
- [3] W. W. Bell, Special Functions for Scientists and Engineers, Oxford University press, London, 1968.
- [4] [4] J. Choi, A. Hasanov and M. Turaev, Certain integral representations of Euler type for the Exton function X2, J. Korean Soc. Math. Edu., Ser. B, Pure Appl. Math., 17 (2010), 347-354.

ID: P-139

Interpolation Formulas for α -Harmonic Functions on the Unit Circle

D.Lj. Djukić¹ and R.M. Mutavdžić Djukić²

¹*Department of Mathematics, University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia,
ORCID: 0000-0002-7748-4379*

²*Department of Mathematics, University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia,
ORCID: 0000-0002-7126-9897*

ABSTRACT

The α -harmonic functions are solutions of a weighted Laplace equation; in the special case $\alpha=0$ they are just the harmonic functions. It is known that an α -harmonic function u on the unit disc D is uniquely determined by its values on the boundary ∂D . In fact, $u(z)$ can be given as a contour integral over ∂D with a modified Poisson kernel. When this integral is difficult to evaluate, approximating $u(z)$ with an interpolatory formula, as a weighted sum of values of u at n nodes on ∂D , can be an attractive alternative. Our objective is to develop the interpolatory formulas of this kind whose degree of exactness is highest possible. We will also prove their convergence as n approaches infinity and discuss the locations of their nodes.

Acknowledgement: This work was supported in part by the Serbian Ministry of Science, Technological Development and Innovations, according to Contract 451-03-137/2025-03/200105 dated on February 4, 2025.

References

- [1] D.Lj. Djukić, N.M. Mutavdžić, R.M. Mutavdžić Djukić, 2024. Interpolation formulas for 1-harmonic functions on the unit circle, *Filomat*, 38(3) (2024) 1135-1142.

ID: P-140

New Inequalities via the ψ – Fractional Integral Operator Involving Functions with Bounded Ratios

M. Aydın¹ and M. Gürbüz²

¹*Ağrı Ekincik Middle School / Hamur, Ağrı, Türkiye, ORCID: 0009-0008-0045-8106*
²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye Country, ORCID: 0000-0002-7092-4298*

ABSTRACT

In this study, we derived various integral inequalities by employing the ψ -fractional integral operator for functions with bounded ratios. To achieve these results in our study, we utilized the relevant constant from the fractional integral operator, along with the inequalities such as Minkowski inequality, Young inequality, etc. The results obtained in our study provide a more general expression than many of the results available in the literature.

References

- [1] J.N. Valdés, (2020). Generalized fractional Hilfer integral and derivative. *Contr. Math.* 2, 55-60.
- [2] B. Meftah, A. Lakhdari, W. Saleh, A. Kiliçman, (2023). Some new fractal Milne-type integral inequalities via generalized convexity with applications. *Fractal and Fractional*, 7(2), 166.
- [3] J.E. Nápoles-Valdés, B. Bayraktar, (2025). Some Remarks on Caputo-Weighted Integrals and Applications. In *The Fundamentals of Fractional Calculus* (pp. 228-252). Apple Academic Press.
- [4] A.A. Abubaker, K.B. Matarneh, S. Al-Shaikh, M.F. Khan, (2025). Some new applications of the fractional integral and four-parameter Mittag Leffler function. *PLoS ONE* 20(2): e0317776. <https://doi.org/10.1371/journal.pone.0317776>

ID: P-141

Integral Inequalities Derived by Means of Fractional Integral Operators for Bounded Functions

D. Karakurt¹ and M. Gürbüz²

¹Mustafa Özkaya Middle School / Nizip, Gaziantep, Türkiye, ORCID: 0009-0004-8662-2085

²Ağrı İbrahim Çeçen University, Ağrı, Türkiye Country, ORCID: 0000-0002-7092-4298

ABSTRACT

In this study, new integral inequalities for bounded functions were established by employing a generalized fractional integral operator. In this process, inequalities such as the Cauchy-Schwarz inequality were utilized. Furthermore, some special cases of the obtained results were also examined.

References

- [1] S. Wu, M. Samraiz, A. Mehmood, F. Jarad, S. Naheed, (2023). Some symmetric properties and applications of weighted fractional integral operator. *Fractals*, 31(10), 2340011.
- [2] G. Rahman, M. Samraiz, K. Shah, T. Abdeljawad, Y. Elmasry, (2025). Advancements in integral inequalities of Ostrowski type via modified Atangana-Baleanu fractional integral operator. *Heliyon*, 11(1).
- [3] B. Meftah, A. Lakhdari, W. Saleh, A. Kiliçman, (2023). Some new fractal Milne-type integral inequalities via generalized convexity with applications. *Fractal and Fractional*, 7(2), 166.
- [4] J.E. Nápoles-Valdés, B. Bayraktar, (2025). Some Remarks on Caputo-Weighted Integrals and Applications. In *The Fundamentals of Fractional Calculus* (pp. 228-252). Apple Academic Press.
- [5] A.A. Abubaker, K.B. Matarneh, S. Al-Shaikh, M.F. Khan, (2025). Some new applications of the fractional integral and four-parameter Mittag Leffler function. *PLoS ONE* 20(2): e0317776. <https://doi.org/10.1371/journal.pone.0317776>

ID: P-142

Some Integral Inequalities Established by Means of a Fractional Integral Operator for Convex Functions

R. Nacitavham¹ and M. Gürbüz²

¹*Hamur Multi-Program Anatolian High School / Hamur, Ağrı, Türkiye, ORCID: 0009-0007-8208-9801*

²*Ağrı İbrahim Çeçen University, Ağrı, Türkiye Country, ORCID: 0000-0002-7092-4298*

ABSTRACT

In this study, we obtained some integral inequalities by taking into account a fractional integral operator for convex functions. To obtain these results in our study, we used Hölder inequality, power mean inequality etc. The results obtained in our study provide a more general expression than many of the results available in the literature.

References

- [1] A.K. Yadav, R.M. Pandey, V.N. Mishra, R. Agarwal, R. (2025). Some Integral Inequalities Involving a Fractional Integral Operator with Extended Hypergeometric Function. *Dolomites Research Notes on Approximation*, 18(DRNA Volume 18.1), 17-26.
- [2] B. Meftah, A. Lakhdari, W. Saleh, A. Kiliçman, (2023). Some new fractal Milne-type integral inequalities via generalized convexity with applications. *Fractal and Fractional*, 7(2), 166.
- [3] J.E. Nápoles-Valdés, B. Bayraktar, (2025). Some Remarks on Caputo-Weighted Integrals and Applications. In *The Fundamentals of Fractional Calculus* (pp. 228-252). Apple Academic Press.
- [4] A.A. Abubaker, K.B. Matarneh, S. Al-Shaikh, M.F. Khan, (2025). Some new applications of the fractional integral and four-parameter Mittag Leffler function. *PLoS ONE* 20(2): e0317776. <https://doi.org/10.1371/journal.pone.0317776>

Integral inequalities for Non-Newtonian Preinvex Functions

A. Ekinçi¹, A. O. Akdemir² and M. E. Özdemir³

¹Bandırma Onyedi Eylül University, Bandırma Vocational School, Bandırma, Turkey

²Department of Mathematics, Faculty of Arts and Sciences, Agri İbrahim Çeçen University, Agri, Turkey.

³Department of Mathematics Education, Bursa Uludağ University, Bursa, Turkey.

ABSTRACT

In this study, non-Newtonian preinvex functions and their fundamental properties are examined. Utilizing the framework of Non-Newtonian calculus, novel integral inequalities are derived for this class of functions. Furthermore, by analyzing certain special cases of these inequalities, new results are established for various types of preinvex functions.

References

- [1] rossman, M., & Katz, R. (1972). Non-Newtonian calculus. Lee Press.
- [2] Bashirov, A. E., Kurpinar, E., & Ozyapici, A. (2008). Multiplicative calculus and its applications. *Journal of Mathematical Analysis and Applications*, 337(1), 36-48.
- [3] U. Kadak ve Y. Gürefe, "A Generalization on Weighted Means and Convex Functions with respect to the Non-Newtonian Calculus", *International Journal of Analysis*, c. 2016, ss. 1-9, Kas. 2016, doi: 10.1155/2016/5416751.
- [4] E. Ünlüyol, Y. Erdaş, S. Salaş, Hermite-Hadamard-Fejer Inequality and Some New Inequality via *- Calculus, *Sigma J Eng & Nat Sci* 10 (3), 2019, 287-299.
- [5] Ünlüyol, Erdal, Salas, Seren and Iscan, Imdat. "A new view of some operators and their properties in terms of the Non-Newtonian Calculus" *Topological Algebra and its Applications*, vol. 5, no. 1, 2017, pp. 49-54.
- [6] Boruah, K.; Hazarika, B. G-calculus. *TWMS J. Appl. Eng. Math.* 2018,8, 94—105
- [7] Başar, F., & Hazarika, B. (2025). *Non-Newtonian Sequence Spaces with Applications* (1st ed.). Chapman and Hall/CRC. <https://doi.org/10.1201/9781003600640>.
- [8] S. R. Mohan and S. K. Neogy, On invex sets and preinvex functions, *J. Math. Anal. Appl.* 189 (1995), 901-908.
- [9] T. Antczak, Mean Value in Invexity and Analysis, *Nonlinear Analysis*, 60 (2005), 1471-1484.

ID: P-144

High-Accuracy Tuberculosis Diagnosis with Vision Transformer and Explainable AI Techniques

Erdal BAŞARAN¹, Ömer OKUCU²

¹*Agri Ibrahim Cecen University, Vocational School, Department of Computer Technology, Agri, TÜRKİYE, ORCID: 0000-0001-8569-2998*

²*Agri Ibrahim Cecen University, Vocational School, Department of Computer Technology, Agri, TÜRKİYE, ORCID: 0000-0003-1633-450X*

ABSTRACT

Tuberculosis is an infectious disease caused by the Mycobacterium tuberculosis bacterium, which affects the human lungs and can also affect other parts of the body. According to 2022 data from the World Health Organization, it is the second most common disease worldwide after the coronavirus, with approximately 7.5 million people diagnosed with the disease that same year. The World Health Organization has approved computerized diagnostic systems for diagnostic criteria, taking into account developments in artificial intelligence for the detection of this disease. In this study, tuberculosis was detected using chest X-ray images and the Pyramid Vision Transformer algorithm, a deep learning algorithm, for early diagnosis. Furthermore, the GradCAM explainable artificial intelligence algorithm was used to visualize which areas of the X-ray images contributed most to the classification, providing insight for clinicians. Experimental studies were conducted using 3,008 chest X-ray images collected from local hospitals in Pakistan for tuberculosis detection. To ensure the reliability of the model, a 5-fold cross-validation test was also performed. At the end of the experimental study, the proposed model achieved an accuracy rate of 99.88% for the diagnosis of tuberculosis. In conclusion, the proposed model in this study has shown promising results for the early diagnosis of tuberculosis.

Keywords: Tuberculosis, Pyramid Vision Transformer, Medical Imaging, Computer-Aided Diagnosis, Grad-CAM

ID: P-145

Microstructural Evolution of Al-Si Alloys Produced by Powder Metallurgy: The Role of Silicon Content and Sintering Temperature

Mustafa VAROL¹, Said ERAY² and Mehmet KARAKAN³

¹*Ağrı İbrahim Çeçen University, Patnos Vocational School, Department of Property Protection and Security Ağrı, TURKEY ORCID: 0000-0002-9541-7815*

²*Sivas Science and Technology University, Faculty of Engineering and Natural Sciences, Department of Metallurgical and Materials Engineering, Sivas, TURKEY ORCID: 0000-0001-7310-9726*

³*Atatürk University, Faculty of Engineering, Department of Mechanical Engineering, Erzurum, TURKEY ORCID: 0000-0002-6491-4667*

ABSTRACT

Al–Si alloys are widely used in automotive and aerospace applications because of their low density, good wear resistance, and thermal properties. Conventional casting methods often lead to coarse primary Si particles above the eutectic point (12.6 wt.% Si), which impair mechanical performance [1]. In this study, Al–Si alloys with 5 wt.% and 20 wt.% Si were produced via powder metallurgy (PM) to examine microstructural evolution and minimize these adverse effects.

The compacts were sintered at two different temperatures, 550 °C and 610 °C, under controlled conditions. Scanning Electron Microscopy (SEM) analyses revealed that, unlike in conventional casting processes, no primary Si particles were observed in the alloys containing 20 wt.% Si, demonstrating the effectiveness of the PM route in suppressing undesired coarse phases [2]. Furthermore, it was found that at 610 °C, partial melting of Si occurred, which facilitated its diffusion into the Al matrix. This led to a more homogeneous microstructure with improved particle bonding and reduced porosity compared to samples sintered at 550 °C. The resulting microstructural refinement is expected to translate into superior mechanical performance [3,4].

The findings highlight powder metallurgy as a viable alternative to casting for Al–Si alloys, particularly at high Si contents. By suppressing primary Si formation and improving Si–Al interaction at higher sintering temperatures, this method enables stronger and more reliable alloys.

References

- [1] Kaufman, J. G., & Rooy, E. L. (2004). Aluminum Alloy Castings: Properties, Processes, and Applications. ASM International.
- [2] Mondolfo, L. F. (2013). Aluminum Alloys: Structure and Properties. Elsevier.
- [3] Zhao, Y., Wang, H., Li, J., & Zhang, H. (2018). Microstructural refinement and mechanical properties of powder metallurgy Al–Si alloys. *Materials Science and Engineering: A*, 733, 154–162.
- [4] Zhang, Z., Chen, Y., & Li, X. (2021). Effect of silicon content and processing route on Al–Si alloys: A review. *Journal of Materials Research and Technology*, 12, 1131–1145.

ID: P-146

Properties of Conformable Fractional Lindley Probability Distribution

Ma'mon Abu Hammad¹, Jamil Shalby² and Azeza Al Abdallah³

M.Abuhammad@zuj.edu.jo¹, Jameelalsh1998@gmail.com² and

Azzezahalabdallah442@gmail.com³

ABSTRACT

In this paper, we are going to study the Lindley Probability Distribution and examine the entropy measures in fractional situations to present the conformable fractional Lindley probability distribution. To clarify its behavior and offer potential applications in dependability and risk analysis, the conformable fractional Lindley probability distribution CDF, survival function, and hazard function are constructed. Conformable fractional analogs of statistical measures, such as expected values, r^{th} moments, mean, variance, skewness, and kurtosis, can be used to comprehend the higher-order features and central tendencies of statistics more fully. Furthermore, important instruments for measuring uncertainty and randomness are presented, including conformable fractional analogs of well-known entropy measures like Tsallis, Renyi, and Shannon entropy.

Keywords: conformable fractional derivative, conformable fractional integral, entropy, probability distribution.

Inhibitory Effect of Tetrafluoronaphthalene-Triazole Derivatives on Acetylcholinesterase and Their Potential in Alzheimer's Disease Treatment

Neslihan BALCI¹, Musa ERDOĞAN², İlhami GÜLÇİN³

¹Gümüşhane University Şiran Dursun Keleş Health Services Vocational School, 29100-Gümüşhane, Türkiye, ORCID: 0000-0002-1798-5550

²Department of Food Engineering, Faculty of Engineering and Architecture, Kafkas University, Kars, Türkiye ORCID: 0000-0001-6097-2862

³Atatürk University, Faculty of Science, Department of Chemistry, 25240-Erzurum, Türkiye, ORCID:0000-0001-5993-1668

ABSTRACT

Alzheimer's disease involves ACh decline and elevated AChE activity, causing cognitive deficits. AChEIs prolong synaptic ACh, offering symptomatic relief.^{1,2}

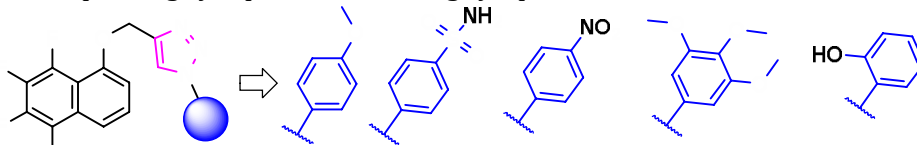


Figure 1. Tetrafluoronaphthalene-triazole hybrids

Compounds, including 1,2,3-triazole moiety (Figure 1) are stable pharmacophores, widely used in anti-Alzheimer, anticancer, antimicrobial, anti-inflammatory, and antidiabetic drugs. Recent data show strong AChE inhibition. Their stability and pharmacophoric traits support multi-target Alzheimer therapy.³ Fluorine-containing 1,2,3-triazole hybrids are increasingly valued in drug research for their enhanced metabolic and anticancer properties. This study evaluates triazole derivatives (**1–5**) via Ellman's method.⁴ IC₅₀ values: 6.13, 1.28, 5.05, 3.46, 5.17 nM. K_i values (Lineweaver–Burk): 4.57±0.83, 1.57±0.39, 2.94±1.22, 4.20±1.56, 7.70±3.35 nM.⁵ Results confirm triazole scaffolds as potent multi-target leads.

References

- [1] H. Akıncıoğlu, İ. Gülçin, 2020. Potent acetylcholinesterase inhibitors: Potential drugs for Alzheimer's disease. *Mini Reviews in Med. Chem.*, 20(8), 703-715.
- [2] N. Balci, K. Aslan, A. Erturk, İ. Gulcin, 2025. Evaluation of antioxidant and enzyme inhibition properties of Siran propolis: correlations with phenolic content determined by LC-MS/MS. *Food Science & Nutrition*, 13(7), 70654
- [3] A. Irajı, R. Hariri, M.H. Hashempur, M. Ghasemi, H. Pourtaher, M. Saeedi, T. Akbarzadeh, 2025. Design and synthesis of new 1,2,3-triazole-methoxyphenyl-1,3,4-oxadiazole derivatives: selective butyrylcholinesterase inhibitors against Alzheimer's disease. *BMC Chemistry*, 19(1), 97.
- [4] G. L. Ellman, K.D. Courtney, V. Andres Jr, R.M. Featherstone, 1961. A new and rapid colorimetric determination of acetylcholinesterase activity. *Biochem. Pharmacol*, 7(2), 88-95.
- [5] H. Lineweaver, D. Burk, 1934. The determination of enzyme dissociation constants. *J. Am. Chem. Soc.* 56(3), 658-666.

ID: P-148

Determination of the Antioxidant, Antidiabetic, Anticholinesterase, and Antidepressant Potentials of Seed Coat (Testa) and Kernel of Pistachio (*Pistacia vera* L.) Fruits

B. Demirci¹, M. Akyüz¹, A. Çakır¹

¹Kilis 7 Aralık University, Faculty of Science, Department of Chemistry, Kilis, Türkiye,
ORCID: 0000-0001-7971-8389 (M. Akyüz), 0000-0001-9379-6375 (B. Demirci),
0000-0003-1672-1438 (A. Çakır).

ABSTRACT

The fruits of the pistachio tree (*Pistacia vera* L.) are consumed raw, sun-dried, or roasted, and are widely used in the food industry, particularly in products such as baklava, confectionery, chocolate, and ice cream [1]. Decorticated seeds (kernels) are often preferred in the food industry due to their appealing appearance [2]. This study aimed to determine the changes in the biological activity of pistachio fruits when the seed coat (testa) is removed. For this purpose, ethanol, acetone, and hexane extracts were obtained from both the seed coat and the kernel parts of the fruit, and their antioxidant, antidiabetic, neuroprotective, antidepressant, and anti-Parkinson potentials were evaluated *in vitro*. The findings revealed that the extracts derived from the seed coat had higher phenolic content and exhibited stronger biological activity. Notably, the acetone extract of the seed coat, which had the highest phenolic content, demonstrated strong ABTS and DPPH radical scavenging activities, high reducing power, and potent antidiabetic potential, along with notable neuroprotective, antidepressant, and anti-Parkinson effects. Furthermore, the antidiabetic potential of the seed coat acetone extract was found to be higher than that of the reference drug, acarbose. Chromatographic and spectroscopic analyses of the acetone extract of the seed coat showed that it contain mainly phenolic compounds. In conclusion, the findings of this study also emphasize that the seed coat of pistachio fruits is the primary source of nutraceutical phenolic compounds with potential health benefits, suggesting that current practices of removing the seed coat during food processing should be reevaluated.

References

- [1] A. Çağlar, O. Tomar, H. Vatansever, E. Ekmekçi, 2017. Pistachio (*Pistacia vera* L.) and its effects on human health. *Akademik Gıda* 15 (4) (2017) 436-447.
- [2] A.S. Uzundumlu, V. Pınar, N. Ertek Tosun, H. Kumbasaroğlu, 2024. Global pistachio production forecasts for 2020–2025. *KSU Journal Agriculture and Nature* 27 (5) (2024) 1105-1115.

ID: P-149

***Bryoria capillaris*: Mineral Content and Antioxidant Activity of Ethanol Extract**

H. Demir¹, S.B. ÖZTÜRK SARIKAYA², A. ASLAN³

¹*Gumushane University, Graduate School of Natural and Applied Sciences, Department of Food Engineering, Gumushane, Türkiye*

²*Gumushane University, Faculty of Engineering and Natural Sciences, Department of Food Engineering, Gumushane, Türkiye, 0000-0002-7820-4260*

³*Van Yuzuncu Yıl University, Faculty of Pharmacy, Department Pharmacy Management, Van, Türkiye, 0000-0002-5122-6646*

ABSTRACT

Lichens have historically been used both in the treatment of diseases and as food due to their nutritional properties. One such species, *Bryoria capillaris*, is among the most common lichen species found particularly in the Northeastern Anatolia Region.

In the study, the antioxidant activity of the lichen was determined by preparing the ethanol extract (1mg/ml) and the mineral substance content was determined by burning 0.5 mg of the lichen after pre-treatment. The absorbance values of the plant extract (1mg/mL) at 20 µg/mL were found to be 0.466 ± 0.021 and 0.335 ± 0.013 for the reducing capacities for Fe^{3+} and Cu^{2+} , respectively. In addition, IC_{50} values for DPPH• and ABTS•⁺ (10–30 µg/mL) removal activities were calculated as 53.786 and 12.955, respectively. An activity as much as or similar to α -tocopherol was observed in all results except DPPH radical scavenging activity. Total phenolic and flavonoid contents (µg/mg) of the ethanol extracts (1 mg/mL) were found to be 71.190 ± 0.336 and 95.655 ± 0.318 , respectively. In the study, it was determined that *B. capillaris* had antioxidant activity and contained higher levels of nutritionally important macro minerals (S, P, Mg, Na, Ca, K) at ppm concentrations. Since studies on this species are limited, it is considered that this research will serve as a guide and make a valuable contribution to future studies in the fields of food and pharmacology.

Acknowledgement: This study is a part of H. DEMİR's MSc thesis (No: 777975) supervised by Prof. Dr. Sevim Beyza Öztürk Sarıkaya at Guumushane University

References

[1] Vinayaka, K. S., & Kekuda, T. P. (2024). Ethnic Knowledge on Medicinal and Nutritional Attributes of Lichens with Emphasis on the Western Ghats. *Ethnic Knowledge and Perspectives of Medicinal Plants*, 57-69.

ID: P-150

Trifluoromethyl-substituted PEPPSI-type Pd(II)NHC Complexes: Synthesis, Characterization, and Inhibition Properties against CARBONIC Anhydrase and Choline Esterases Enzymes

Burcu TEZCAN¹, Neslihan AYDEMİR² Yetkin GÖK³, Hülya AKINCIOĞLU², Aydın AKTAŞ⁴, Bilgehan GÜZEL¹ and İlhami GÜLÇİN⁵

¹ Department of Chemistry, Faculty of Arts and Science, Cukurova University, Adana, Türkiye

² Department of Chemistry, Graduate Education Institute, Ağrı İbrahim Çeçen University, Ağrı, Türkiye

³ Department of Chemistry, Faculty of Arts and Science, İnönü University, Malatya, Türkiye

⁴ Vocational School of Health Service, İnönü University, Malatya, Türkiye

⁵ Ağrı İbrahim Çeçen University, Ağrı, Türkiye

ABSTRACT

N-heterocyclic carbenes (NHCs) have received significant attention as ligands, particularly over the last three decades. They are among the most interesting ligands in organic, organometallic, and catalytic chemistry [1]. The biological activities of various metal complexes of these ligands were known. In 2006, Organ and colleagues synthesized a new stable palladium(II) complex containing an NHC and a 3-chloropyridine ligand [2]. These new complexes were termed PEPPSI (Pyridine Enhanced Precatalyst Preparation, Stabilization, and Initiation)-type complexes. Although initially used as catalysts [2], PEPPSI complexes have recently been identified as multitarget enzyme inhibitors [3].

In conclusion, herein, the PEPPSI-type Pd(II)NHC complexes with trifluoromethyl-containing NHC liganded were synthesized. All complexes were characterized using ¹H NMR, ¹³C NMR, and FTIR spectroscopic techniques. These complexes exhibited active inhibitory properties against carbonicanhydrase I(hCAI), carbonicanhydrase II(hCAII), acetylcholinesterase (AChE), and butyrylcholinesterase (BChE).

References

- [1] S. Díez-González, S. P. Nolan, 2007. Stereoelectronic parameters associated with *N*-heterocyclic carbene (NHC) ligands: A quest for understanding. *Coordination chemistry reviews*, 251(5-6), (2007) 874-883.
- [2] C.J. O'Brien, E.A.B. Kantchev, C. Valente, N. Hadei, G.A. Chass, A. Lough, A.C. Hopkinson, M.G. Organ, 2006. Easily prepared air- and moisture-stable Pd-NHC (NHC = *N*-heterocyclic carbene) complexes: a reliable, user-friendly, highly active palladium precatalyst for the Suzuki-Miyaura reaction, *Chem. Eur. J.*, 12 (2006) 4743-4748
- [3] Aktaş, A., Kaya, G., Taslimi, P., İzmirli, M., Taskin-Tok, T., Karabiyik, H., Y. Gök, Gülçin, İ. 2026. Design and evaluation of ester-containing PEPPSI Type Pd (II) NHC complexes as multitarget enzyme inhibitors. *Journal of Molecular Structure*, 1350 (2025) 143950.

ID: P-151

Improved Fractional Hermite-Hadamard-Jensen-Mercer Type Inequalities Utilizing Constants λ and μ

Ç. Yıldız¹, M.K. Polat² and F. Polat³

¹Atatürk University, K.K. Education Faculty, Department of Mathematics, Erzurum, Türkiye,
ORCID: 0000-0002-8302-343X

²Atatürk University, K.K. Education Faculty, Department of Mathematics, Erzurum, Türkiye,
ORCID: 0009-0007-9688-4080

³Atatürk University, K.K. Education Faculty, Department of Mathematics, Erzurum, Türkiye,
ORCID: 0000-0001-9760-721X

ABSTRACT

The topic of convex functions has attracted significant interest in recent decades, with the basic concept being expanded and generalized in several directions. A primary motivation for concentrating on the subject is the Hermite-Hadamard and Mercer inequalities. Moreover, fractional calculus serves as an effective instrument for analyzing both natural events and everyday scenarios. The Riemann-Liouville integral is the most commonly used fractional integral operator. Riemann-Liouville fractional integrals are an extended type of integral calculus utilized to determine derivatives of functions of non-integer orders. In this context, novel Mercer-type integral inequalities have been derived by an appropriate generalization in the paper utilizing the Riemann-Liouville fractional operator. Various results have been obtained for specified values of λ and μ .

References

- [1] A.M. Mercer, 2003. A variant of Jensen's inequality, *J. Ineq. Pure and Math.*, 73(4) (2003).
- [2] Z. Pavić, 2019. The Jensen-Mercer inequality with infinite convex combinations, *Math. Sci. Appl. E Notes*, 7 (2019) 19–27.
- [3] Z. Çiftçi, M. Coşkun, Ç. Yıldız, L.-I. Cotirla, D. Breaz, 2024. On new generalized Hermite-Hadamard-Mercer-type inequalities for Raina functions, *Fractal Fract.*, 8 (2024) 472.
- [4] M.Z. Sarıkaya, E. Set, H. Yıldız, N. Başak, 2013. Hermite-Hadamard's inequalities for fractional integrals and related fractional inequalities, *Mth. Comput. Model.*, 57 (2013) 2403–2407.
- [5] S. Faisal, M.A. Khan, S. Iqbal, 2022. Generalized Hermite-Hadamard-Mercer type inequalities via majorization, *Filomat*, 36 (2022) 469–483.

ID: P-152

Advances on Minkowski Inequalities through Fractional Operators with Analytic Kernels

Abdüllatif YALÇIN¹, Erdal GÜL² and Ahmet Ocak AKDEMİR³

^{1,2} *Yıldız Technical University, Faculty of Arts and Science*

Department of Mathematics, Istanbul, Turkey

³ *Ağrı İbrahim Çeçen University, Faculty of Science and Letters, Department of Mathematics, Ağrı, Turkey*

*Corresponding author: abdullatif.yalcin@std.yildiz.edu.tr

ABSTRACT

Recent developments in fractional calculus have introduced numerous formulations, which can generally be classified into a few broad families of operators. By replacing the classical power kernel in the Riemann–Liouville framework with more general analytic kernels, one obtains a wide range of extended fractional integral models. Current research has placed particular emphasis on Minkowski-type fractional inequalities and related integral inequalities for various classes of functions. In this work, we establish general theorems that encompass an entire class of fractional operators, thereby eliminating the need to verify such inequalities separately for each individual model. To highlight the strength and versatility of our results, we also provide several illustrative examples. Furthermore, our framework naturally extends to the study of fractional integrals and derivatives defined with respect to functions.

Keywords: Fractional integrals; Minkowski inequality; Integral inequalities; General analytic kernels.

References

- [1] Kilbas, A.A., Srivastava, H.M., & Trujillo, J.J. (2006). Theory and Applications of Fractional Differential Equations. North-Holland Mathematics Studies, vol. 207. Elsevier.
- [2] Baleanu, D., & Fernandez, A. (2019). On fractional operators and their classifications. Mathematics, 7, 830.
- [3] Dahmani, Z. (2010). On Minkowski and Hermite–Hadamard integral inequalities via fractional integration. Annals of Functional Analysis, 1, 51–58.

ID: P-153

New Fractional Integral Inequalities for s -Convex and P -Function via Modified Atangana–Baleanu Operators

Bariş ÇELİK¹

¹*Department of Mathematics, Faculty of Science, Marmara University, İstanbul, Türkiye*
ORCID: 0000-0001-5372-7543

ABSTRACT

Fractional calculus has recently emerged as a powerful tool in the development of integral inequalities, providing significant generalizations of classical results. Among fractional operators, the modified Atangana–Baleanu (MAB) fractional integral operator has gained particular importance due to its non-singular kernel and capability to model complex real-world problems. In this work, I establish several new fractional integral inequalities involving two distinct classes of functions: s -convex functions and P -function. By employing a fundamental identity associated with the modified Atangana–Baleanu (MAB) operators together with in the literature well-known Hölder’s, Young’s, and power-mean inequalities, I derive novel results that extend and unify some existing inequalities. These findings not only generalize earlier results in the literature but also provide fresh insights into the interaction between fractional operators and different convexity structures. The results are expected to stimulate further research on the applications of fractional integral operators to more general classes of convex functions.

References

- [1] G. Rahman, M. Samraiz, K. Shah, T. Abdeljawad, Y. Elmasry, Advancements in integral inequalities of Ostrowski type via modified Atangana-Baleanu fractional integral operator, *Heliyon*, 11(1) (2025), e41525, 1–13.
- [2] W-H. Huang, M. Samraiz, A. Mehmood, D. Baleanu, G. Rahman, S. Naheed, Modified Atangana-Baleanu fractional operators involving generalized Mittag-Leffler function, *Alex. Eng. J.* 75 (2023), 639–648, <https://doi.org/10.1016/j.aej.2023.05.037>.
- [3] H. Hudzik, L. Maligranda, Some remarks on s -convex functions, *Aequationes Math.* 48 (1994), 100-111.
- [4] S.S. Dragomir, J. Pecaric and L.E. Person, Some inequalities of Hadamard Type, *Soochow J. Math.* 21(3) (1995), 335-341.

Balancing-like Polynomials

T.A. Beyza¹, Ö. Engin²

¹Marmara University, Istanbul, Türkiye, ORCID: 0009-0005-7985-8951

²Marmara University, Istanbul, Türkiye, ORCID: 0000-0002-4188-7248

ABSTRACT

In this work, we first focus on k -balancing numbers, regarded as a generalization of classical balancing numbers. Subsequently, we investigate balancing polynomials, which arise as a natural extension of k -balancing numbers. Furthermore, we study k -balancing-like polynomials, derived from the notion of k -balancing-like numbers. A variety of structural properties of these polynomial families are established; for instance, we provide matrix representations of the polynomials and derive well-known identities such as those of Catalan and Cassini. In addition, we introduce and analyze the derivatives of these polynomials.

References

- [1] A. Behera, G.K. Panda, 1999. On the square roots of triangular numbers , The Fibonacci Quarterly., 37(2) (1999) 98–105.
- [2] A. Patra, G.K. Panda, 2024. Random balancing-like sequences, Arabian Journal of Mathematics. 13 (2024) 633–649.
- [3] M. Uysal, E. Özkan, A.G Shannon, 2023. On dual bicomplex balancing and Lucas-balancing numbers, Journal of Science and Arts. 23(4) (2023) 925–938.

ID: P-155

A New Parametrization of an Oval of Constant Width in R^2

Kamal Al-Banawi¹

¹*Mutah University, Al-Karak, Jordan , ORCID: (0009-0001-8673-1036)*

ABSTRACT

Throughout this work, we introduce a new parametrization of an oval of constant width in R^2 in terms of another curve that is parallel to the oval and is also related to its support function. We use Fourier series to expand the support function, and then to build an analytic differentiable form for the parallel curve. This leads to extracting new results regarding the speed, curvature, length, vertices and evolute of an oval of constant width in R^2 .

Acknowledgement: This work was supported by Mutah University.

References

- [1] K.Al-Banawi. Geometry of Ovals in R^2 in Terms of the Support Function, Journal of applied Sciences, , 8 (2)(2008), 383-386.
- [2] K.Al-Banawi and R.Al-Btoush. Some Geometric and Analytic Properties of Closed Convex Curves in R^2 , Dirasat Pure Sciences, , 38 (2)(2011), 81-84.
- [3] K.Al-Banawi and O.Jaradat. A Model of the Width of an Oval via Differential Equations, World Applied Sciences Journal, , 23 (12)(2013), 97-102.
- [4] A.Al-rabtah and K.Al-Banawi. Vertices of Ovals with Constant Width Relative to Particular Circles . Mathematics, 11(19):4179 (2023). Available from: <https://www.mdpi.com/2227-7390/11/19/4179>.
- [5] Manfredo P.Do Carmo. Differential Geometry of Curves and Surfaces, Second Edition. Dover Publications, 2016.
- [6] H.G.Eggleston. Convexity. Cambridge Tracts in Mathematics, 47, Cambridge University Press, 1958.
- [7] J.P.Fillmore. Symmetries of Surfaces of Constant Width. J.Differential Geometry, 3 (1969), 103-110.
- [8] T.Fu and Y.Zhou. A Novel Analysis of the Smooth Curves with Constant Width Based on a Time Delay System. Mathematics, 9:1131 (2021).
- [9] Chuan-Chih Hsiung. A First Course in Differential Geometry. International Press of Boston, 2013.
- [10] A.P.Mellish. Notes on Differential Geometry. Ann. Math., 32 (1931), 181- 190.
- [11] L.Paciotti. Curves of Constant Width and their Shadows. Whitman Sr. Proj., 20 (2010).
- [12] S.A.Robertson. Smooth Curves of Constant Width and Transnormality, Bull. L.M.S., 16 (1984), 264–274.
- [13] D.J.Struik. Lectures on Classical Differential Geometry. Addison-Wesley, New York, 2003.
- [14] S.Tanno. C^∞ -Approximation of Continuous Ovals of Constant Width, J. Math. Soc . Jpn, 28 (1976), 384-395.
- [15] B.Wegner. Analytic Approximation of Continuous Ovals of Constant Width, J. Math. Soc . Jpn, 29 (1977), 537-540. 9
- [16] I.M.Yaglom and M.G.Boltyanskii. Convex Figures, translated by P.J.Kelly and L.F.Walton. Holt, Rinchart and Winston, New York, 1961.

ID: P-156

Modeling Road Accident Severity in Amman Using Random Parameters Ordered Probit and Integrated Survey–GIS Analysis

Mahmoud M.S. Albattah¹ and Sarah Altarabsheh²

¹*Civil Engineering Dept., School of Engineering, The University of Jordan, Amman, Jordan*

²*The University of Jordan, Amman, Jordan*

Corresponding author: albattah@ju.edu.jo

ABSTRACT

Traffic crashes represent one of the most pressing global safety and public health challenges, particularly in rapidly developing regions. Jordan, facing accelerated population growth and urban expansion, suffers from high crash frequencies and severities. This study examines the determinants of accident severity in Amman through the integration of crash data, spatial hotspot analysis, and stakeholder surveys. A Random Parameters Ordered Probit (RPOP) model was employed to account for unobserved heterogeneity in the relationship between severity outcomes and explanatory variables. Factors examined include season, day of the week, crash time, crash type, driver demographics (age, gender), driver error and carelessness, roadway and environmental conditions (lighting, weather, speed limits), and vehicle type. Hazardous locations, identified from Traffic Department reports and confirmed using GIS-based hotspot mapping, were further investigated through field observations to document contextual risk contributors. To complement the model, structured questionnaires were distributed to both drivers and traffic police. The driver survey covered demographics, knowledge of traffic laws, self-reported behaviors, and perceptions of contributing factors, while the police survey provided expert insights on causal mechanisms and factors intensifying crash severity. Results consistently highlight the role of driver non-compliance, adverse weather, aging drivers, pedestrian involvement, and deficient vehicle conditions in elevating crash severity. Based on these findings, the study proposes a mix of short-term interventions (e.g., targeted enforcement, awareness campaigns) and long-term strategies (e.g., roadway design upgrades, vehicle inspection systems, and intelligent transportation solutions) to improve road safety and reduce the burden of crashes in Amman.

Keywords

Traffic safety; Accident severity; Random Parameters Ordered Probit (RPOP); Road crash modeling; GIS hotspot analysis; Driver behavior; Jordan.

ID: P-157

New Perspective of Hermite–Hadamard and Related Inequalities in G-Calculus

Abdelghani Lakhdari¹, Fahd Jarad², Badreddine Meftah³ and Hüseyin Budak⁴

^{1,4}*Department of Mathematics, Faculty of Science and Arts, Kocaeli University, Umuttepe Campus, Kocaeli 41001, Türkiye*

²*Department of Mathematics, Faculty of Arts and Sciences, Cankaya University, Ankara, Turkey*

³*Department of Mathematics, 8 May 1945 University, Guelma, Algeria*

ABSTRACT

This paper explores the extension of classical integral inequalities to the framework of G-calculus, a non-Newtonian system where operations are defined using multiplicative analogues of differentiation and integration. We begin by reviewing fundamental concepts and quadrature rules in this new setting, including midpoint, trapezoidal, and Simpson-type formulas. A suitable notion of convexity is introduced, allowing us to derive multiplicative versions of Hermite--Hadamard-type inequalities as well as midpoint- and trapezoid-type bounds. The theoretical results are supported by a set of illustrative applications, demonstrating the potential of multiplicative calculus in extending classical mathematical analysis. This work can serve as an excellent reference that opens the door for future researchers to explore and expand the rich potential of this emerging calculus framework.

References

- [1] K. Boruah and B. Hazarika, Application of geometric calculus in numerical analysis and difference sequence spaces, *J. Math. Anal. Appl.* 449 (2017), no.~2, 1265--1285.
- [2] K. Boruah and B. Hazarika, G-calculus, *TWMS J. Appl. Eng. Math.* 8 (2018), no.~1, 94--105.
- [3] A. F. Cakmak and F. Basar, On line and double integrals in the non-Newtonian sense. In *Proceedings of the AIP Conference Proceedings*; American Institute of Physics: New York, NY, USA, 2014; Volume 1611, pp. 415--423.
- [4] S. G. Georgiev and K. Zennir, *Multiplicative differential calculus. Vol. I*, Chapman & Hall/CRC, Boca Raton, FL, 2022.
- [5] M. Grossman and R. Katz, *Non-Newtonian Calculus*, Lee Press, Pigeon Cove, MA, 1972.
- [6] D. Stanley, A multiplicative calculus, *Primus IX* (4) (1999) 310--326.

ID: P-158

Microstructural and Mechanical Properties of Equiatomic Al–Ti–Cr Alloys Produced by Mechanical Alloying

A. KOŞATEPE¹

¹*Ağrı İbrahim Çeçen University Patnos Vocational School, Ağrı, Türkiye, ORCID: (0000-0002-7767-4981)*

ABSTRACT

In this study, an equiatomic Al–Ti–Cr ternary alloy system was produced by mechanical alloying (MA). High-purity Al, Ti, and Cr elemental powders were prepared and milled in a stainless-steel vial with 3 mm and 5 mm zirconia balls at a ball-to-powder ratio of 10:1 under an inert argon atmosphere. Milling times of 5, 10, 20, and 40 h were selected to systematically investigate the effect of milling duration on microstructure and phase evolution.

After mechanical alloying, the powders were compacted under vacuum and sintered. The samples were characterized by X-ray diffraction (XRD) to determine phase transformations and lattice parameters, and by scanning electron microscopy with energy-dispersive spectroscopy (SEM/EDS) to examine grain size, morphology, and elemental distribution. Density measurements were carried out using the Archimedes principle, and Vickers microhardness tests were performed to evaluate mechanical properties.

With increasing milling time, the grain size decreased to the nanocrystalline scale, amorphous phase formation was initiated, and a homogeneous elemental distribution in the solid solution was achieved. Hardness values, particularly after 20 h of milling and beyond, were found to be significantly higher than those of conventionally cast alloys. These results demonstrate the feasibility of producing Al–Ti–Cr ternary alloy-like systems via mechanical alloying and their potential for tailored development.

Acknowledgement: Mechanical alloying, Al–Ti–Cr alloy, density, hardness.

References

- [1] Patel, A. K., et al. (2025). Synthesis of a vanadium-substituted Fe–Ti-based ternary alloy via mechanical alloying. *Metals*, 15(7), 723. Zhang, L., et al. (2023). Mechanically alloyed AlCrFeNiTi high-entropy alloys. *Mater. Sci. Eng. A*, 866, 144693. <https://doi.org/10.1016/j.msea.2023.144693>
- [2] Liu, K., et al. (2025). Microstructure and properties of AlCu_xCrTiV high-entropy alloys. *J. Bio- Tribo-Corros.*, 11(1), 12. <https://doi.org/10.1007/s40735-025-00999-6>
- [3] Suryanarayana, C. (2025). Mechanical alloying: Past, present, and future. *Adv. Eng. Mater.*, 27(3), 2401625. <https://doi.org/10.1002/adem.202401625>
- [4] Zhang, L., et al. (2023). Mechanically alloyed AlCrFeNiTi high-entropy alloys. *Mater. Sci. Eng. A*, 866, 144693. <https://doi.org/10.1016/j.msea.2023.144693>

ID: P-159

Physical Risk Factors in Photovoltaic Energy Production Sites: An Analysis of Dust and Noise Exposure

S. Albayrak¹

¹*Ağrı İbrahim Çeçen University, Vocational High School, Department of Property Protection and Security, 04200, Ağrı, Türkiye, ORCID: 0000-0002-0953-571X*

ABSTRACT

This study aims to determine the dust and noise exposure levels of employees working in a solar power plant (SPP) operating in Turkey. Among the physical risk factors arising during activities such as panel installation, maintenance, and cleaning in SPPs, noise and dust are particularly prominent. In the research, task-based noise and personal dust measurement devices were used to identify exposure levels on-site, and the findings were compared with national and international standards. The measurement results showed that noise exposure ($Leq,8h=101.8$ dBA; $LC_{peak}=139.7$ dBC) exceeded the limit values set by regulations and may lead to serious health problems such as hearing loss and accident risk. Dust exposure, on the other hand, remained below the limit values at 4.4 mg/m³ (TWA), although it was observed to increase under dry and windy conditions. Based on the findings, engineering controls, acoustic insulation, and the use of high-level personal protective equipment were recommended for noise, while humidification practices and the use of appropriate respiratory protective equipment were suggested for dust. In conclusion, the study emphasized that occupational hygiene practices in the renewable energy sector should place greater focus on physical risks and that regular periodic measurements are essential for effectively managing existing risks.

Scale Development for Determining the Competencies of Occupational Safety Experts: Validity and Reliability Assessment

F. KOÇAK¹ and P. BAYKAN²

¹ *Department of Forestry, Vocational School, Atatürk University, Erzurum, Türkiye: ORCID: 0000-0001-7569-982X*

² *Occupational Health and Safety Department, Vocational School, Ağrı İbrahim Çeçen University, Ağrı, Türkiye: ORCID: 0000-0001-5279-3872*

ABSTRACT

The concept that determines the effectiveness of occupational safety experts in the field is competence. Competence is not limited to technical knowledge and skills, but also includes behavioral and cognitive dimensions such as decision-making, communication, strategic thinking, mastery of regulations, and developing a safety culture. This study aims to develop a valid and reliable scale for measuring the competence of occupational safety experts (OSE) in occupational health and safety (OHS) service areas.

The study has a methodological design focused on the scale development process. The study was conducted with 447 occupational safety experts working in Turkey. First, a literature review was conducted to examine existing theoretical and empirical studies on the subject, and then the opinions of academics and occupational safety professionals in the field were sought to ensure content validity. Subsequently, a pilot application was conducted for the preliminary testing of the scale, and item analysis, validity, and reliability studies were performed based on the data obtained. Exploratory and confirmatory factor analysis was applied to reveal the factor structure and measurement power of the scale.

The study group consisted of a total of 447 occupational safety experts (OSE) representing different ages, genders, education levels, and hazard classes in which they worked. First, normality tests were performed to determine the suitability of the scale items' distributions for parametric analyses. Subsequently, exploratory factor analysis (EFA) was applied to reveal the scale structure; in this context, Kaiser-Meyer-Olkin (KMO) and Bartlett sphericity tests were performed, and the data were found to be suitable for factor analysis. As a result of exploratory factor analysis (EFA), the items were grouped under six sub-dimensions: personal performance, incident management, strategy, occupational health and safety legislation knowledge, positive safety culture development, and risk management. Confirmatory factor analysis (CFA) was used to examine model fit indices, which were found to be satisfactory ($\chi^2/df=2.097$, RMSEA=.07, GFI=.93, AGFI=.95, NFI=.93, IFI=.91, CFI=.91, SRMR=.06) were found to be within acceptable limits. Finally, Cronbach's Alpha coefficients were calculated to determine the reliability of the scale. Cronbach's Alpha coefficients ranged from $\alpha=0.761-0.906$ for the subscales and $\alpha=0.956$ for the entire scale. Analyses conducted on 447 occupational safety experts working across Turkey revealed that the scale consists of six dimensions. These dimensions are: personal performance,

incident management, strategy, knowledge of occupational health and safety legislation, development of a positive safety culture, and risk management. The findings reveal that the scale is a valid and reliable tool for measuring the competencies of occupational safety experts. In this respect, the scale provides an important contribution to both research and practice for academics, practitioners, and policymakers working in the field of occupational health and safety.

Acknowledgement: This study is derived from the thesis titled "İŞ GÜVENLİĞİ UZMANLARI İÇİN İŞ SAĞLIĞI VE GÜVENLİĞİ HİZMET ALANLARI YETKİNLİK BELİRLEME ÖLÇEĞİ GELİŞTİRİLMESİ: GEÇERLİLİK VE GÜVENİLİRLİK SONUÇLARI" by Filiz Koçak, a student in the Occupational Health and Safety Department at Ağrı İbrahim Çeçen University.

ID: P-161

Racing Against Time: The Relationship Between the 112 Command and Control Center and Response Times in Ordu Province

Sinem GÜNAY¹

¹*Ordu 112 Ambulance Command and Control Center, Ordu, Türkiye*

ABSTRACT

Time is one of the most critical factors in emergency medical services (EMS). This study investigates the relationship between the operational efficiency of the 112 Command and Control Center in Ordu Province and ambulance response times to incident locations. A retrospective analysis was conducted using 10,000 EMS cases recorded in 2023. Key variables analyzed include the time from call receipt to dispatch decision, ambulance mobilization time, and total response time to the scene.

Results show that in urban areas, the average response time was approximately 8 minutes, while in rural areas it extended to 17 minutes. One of the most significant findings was that maintaining the dispatch decision time under 1 minute significantly shortened the overall response time. The data also revealed that delays in early triage and inappropriate team selection increased total intervention time and affected clinical outcomes in critical cases such as trauma, myocardial infarction, and stroke.

This study highlights the importance of rapid and accurate decision-making in EMS dispatch centers. Improving internal algorithms, enhancing dispatcher training, and integrating physician oversight in complex case triage are recommended to optimize performance. Ultimately, the study emphasizes that effective time management in emergency response is not just a matter of efficiency, but a key factor in saving lives.

References

- [1] T. H. Blackwell, J. S. Kaufman, Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. *Academic Emergency Medicine*, 9(4) (2002), 288–295.
- [2] E. B. Lerner, R. M. Moscatti, The golden hour: Scientific fact or medical "urban legend"? *Academic Emergency Medicine*, 8(7) (2001), 758–760.

ID: P-162

AI-Driven Cherenkov and Scintillation Discrimination for Next-Generation Neutrino Experiments

Tugce Aysegul^{1,2} Merve Tas³, Dilara Kizilkaya⁴, M. Anil Yagiz⁵, Mustafa Kandemir⁶ and Emrah Tiras^{7,8}

¹Graduate School of Natural and Applied Sciences, Erciyes University, Kayseri, Türkiye, 38030

²Department of Physics, Sakarya University, Sakarya, Türkiye, 54055, ORCID: (0009-0003-8329-5923)

³Artificial Intelligence and Big Data Application and Research Center, Erciyes University, Kayseri, Türkiye, 38030, ORCID: (0000-0003-4877-3347)

⁴Department of Computer Science, University of Iowa, Iowa City, Iowa, USA, 52241, ORCID: (0009-0002-6321-7197)

⁵Department of Engineering and Natural Sciences, Kırıkkale University, Kırıkkale, 71450, Türkiye, ORCID: (0009-0006-3061-7580)

⁶Department of Physics, Recep Tayyip Erdogan University, Rize, 53100, Türkiye, ORCID: (0000-0002-3642-9699)

⁷Department of Physics, Erciyes University, Kayseri, Türkiye, 38030

⁸Department of Physics and Astronomy, University of Iowa, Iowa City, Iowa, USA, 52241, ORCID: (0000-0002-5628-7464)

ABSTRACT

In recent years, separating scintillation and Cherenkov photons in water-based liquid scintillators (WbLS) has become a key challenge for next-generation neutrino detectors [1]. Traditional separation techniques, such as timing cuts, provide limited sensitivity and may lead to data loss [2]. This study proposes a machine-learning-based framework for photon separation using simulated data generated from a Geant4-based [3] WbLS detector model. The simulation employed directional and isotropic beam interactions to evaluate the robustness and generalization of the models under different optical conditions. Over twenty machine learning classifiers were trained and compared using more than one million photon events [4]. Among these, XGBoost, LightGBM, CatBoost, Gradient Boosting, and Random Forest achieved the highest accuracy. After hyperparameter optimization, these models were combined into an ensemble structure, improving performance. The ensemble reached 96% accuracy for directional beam interactions and 94% for isotropic data, significantly outperforming classical timing-cut methods (approximately 90%). These results demonstrate that machine learning-based photon discrimination can substantially enhance event reconstruction, background suppression, and particle identification in hybrid scintillator-Cherenkov detectors, paving the way for next-generation neutrino experiments.

Acknowledgment: This work was supported by Erciyes University Scientific Research Projects Coordination Unit and the Turkish Academy of Sciences (TÜBA GEBİP Program).

References

[1] J Caravaca et al. "Experiment to demonstrate separation of Cherenkov and scintillation signals". In: Physical Review C 95.5 (2017), p. 055801.

[2] T. Kaptanoglu et al. "Cherenkov and scintillation separation in water-based liquid scintillator using an LAPPDTM". In: The European Physical Journal C 82.2 (2022), pp. 1–12.

[3] Sea Agostinelli et al. "GEANT4—a simulation toolkit". In: Nuclear instruments and methods in physics research section A: Accelerators, Spectrometers, Detectors and Associated Equipment 506.3 (2003), pp. 250–303.

[4] Emrah Tiras et al. "Comprehensive Machine Learning Model Comparison for Cherenkov and Scintillation Light Separation due to Particle Interactions". In: arXiv preprint arXiv:2406.09191 (2024).

ID: P-163

Oxidative Stress and Adhesion Alterations Induced by Short-Term Microplastic Exposure in Human Breast Cells

Ş. ELMAS¹, B. BAKAN^{1*}

¹Atatürk University, Faculty of Science, Department of Molecular Biology and Genetics, 25240, Erzurum, Turkey, ORCID: 0000-0002-3553-7495; ORCID: 0000-0002-4400-677

ABSTRACT

Microplastics (MPs) are becoming a serious public health concern by rapidly accumulating in the environment and biological systems. Polyethylene terephthalate (PET) is a widely used microplastic in many products that acts as an endocrine-disrupting chemical (EDCs) [1]. In the scope of the study, toxicological investigation of PET MPs was performed by *in vitro* water-soluble tetrazolium salt (WST-1) assay, reactive oxygen species (ROS) formation and cell adhesion assays at a wide range of concentrations (6.25µg/mL to 500µg/mL) after 24h exposure in healthy mammary epithelial cell line (MCF-10A) and human breast cancer cell line (MCF-7) as a model system. According to results, while a dose-dependent decrease in cell viability was observed in the MCF-10A cell line, a significant increase in cell proliferation was detected in the MCF-7 cancer cell line. In the MCF-10A cell line, a significant increase in ROS levels was observed after 24h incubation, indicating the oxidative stress formation and disruption of redox homeostasis. In contrast, ROS levels decreased in the MCF-7 cancer cell line, indicating a potential antioxidant defense of cancer cells. Regarding cell adhesion assay, MCF-10A cells treated with PET MPs exhibited reduced adherence and progressively became non-adherent in a dose- and time-dependent manner, whereas the control group maintained stable adherent characteristics. In contrast, PET MP exposure led to increased adhesion in MCF-7 cells compared to the control group, which demonstrate a cell line-specific differential response. These results raise concerns about the potential health impacts of PET MPs, which are widely present in consumer products, and shows that even short-term exposure contributes to adverse human health effects.

Acknowledgement: This study was supported by Atatürk University, Scientific Research Project (FYL-2024-14539).

References

[1] Bossio, S., Ruffolo, S. A., Lofaro, D., Perri, A., & La Russa, M. F. (2025). Endocrine Toxicity of Micro- and Nanoplastics, and Advances in Detection Techniques for Human Tissues: A Comprehensive Review. *Endocrines*, 6(2), 23.

ID: P-164

Integral Inequalities for n-Fractional Polynomial Convex Functions via AB-Fractional Integral Operators

Ali Karaođlan¹, Erhan Set²

¹*Department of Mathematics Faculty of Science and Arts, Ordu, Türkiye, ORCID: 000-0002-8725-4716*

²*Department of Mathematics Faculty of Science and Arts, Ordu, Türkiye, ORCID: 0000-0003-1364-5396*

ABSTRACT

In recent years, many new equations involving fractional integral operators have been obtained, and numerous inequalities have been proven using these equations. In this paper, we obtained some integral inequalities via Atangana-Baleanu fractional integral operators for n-fractional polynomial convex functions using the identity by proved Set et al.. Some of the inequalities proved are reduced to existing inequalities in the literature for some special values of the parameters. And also, the inequalities obtained produce new results for some special values of the parameters.

References

- [5] A. Atangana, D. Baleanu, (2016). New fractional derivatices with non-local and non-singular kernel, Theory and Application to Heat Transfer Model, Thermal Science, 20 (2) 763-769
- [6] E. Set, A. O. Akdemir, M.E. Özdemir, A. Karaođlan, M.A. Dokuyucu, (2023). New integral inequalities for Atangana-Baleanu fractional integral operators and various comparisons via simulations, Filomat, 37 (7) (2023) 2251-2267.
- [7] İ. İřcan, (2023). Construction of a new class of functions with their some properties and certain inegulities: n-fractional polynomial convex functions, Miskolc Mathematical Notes, 24 (3) (2023) 1389-1404.

ID: P-165

Novel Corrosion Resistant and Tamper Evident Viscoelastic Polymers, Based on Hybrid Cyclic Phosphazene Materials

Khalid A. Ibrahim

Chemical Engineering Department, Al-Hussein Bin Talal University, Maan, Jordan
0503004@ahu.edu.jo

ABSTRACT

Three novel materials have been developed based on hexachlorocyclotriphosphazene and octachlorocyclotetraphosphazene. The core phosphazene ring is substituted with varying ratios of fluorinated side groups and with 4-hydroxybenzaldehyde to allow a Schiff base reaction with diaminodiphenylmethane (DDM) to form a cyclomatrix or cycloliner polymer compound. These compounds give excellent water repellence combined with good adhesion and viscoelasticity. In addition, the new materials undergo a surface reaction on exposure to atmosphere such that subsequent disturbance of the surface causes virgin material to become exposed giving clear evidence of such disturbance.

Keywords: phosphazene ring; Schiff base reaction; viscoelasticity; cross-linking

References

- [1] Allcock, H. R. (2004). Phosphorus, Sulfur Silicon Relat. Elem. 179: 661.
- [2] Tonei, D. M.; Bertani, R.; De Jaeger, R.; Gleria, M., In *Applicative Aspects of Cyclophosphazenes*, ed.; Gleria, M.; De Jaeger, R., Nova Science Publishers, Inc: New York, 2004; p. 1-30.
- [3] Liu, R; Wang, X, *Polymer Degradation and Stability*, 94, (2009), 617-624.
- [4] Gibson, R.F. *Principles of Composite Material Mechanics*, McGraw-Hill, Singapore, Chap. 1, p.1-33, 1994.
- [5] Bauer, R.S.; Corley, S. in *Reference Book for Composites Technology*, Lee, S.M. (Ed.), Technomic Publishing Co., Lancaster, p. 17-47, 1989.

ID: P-166

Arrhythmia Detection from ECG Signals Using Gradient Boosting Algorithms

Gaffari ÇELİK¹, Erdal BAŞARAN²

¹Agri Ibrahim Cecen University, Vocational School, Department of Computer Technology, Agri, TÜRKİYE, ORCID: 0000-0001-5658-9529

²Agri Ibrahim Cecen University, Vocational School, Department of Computer Technology, Agri, TÜRKİYE, ORCID: 0000-0001-8569-2998

ABSTRACT

In this study, various machine learning methods were compared for the detection of cardiac arrhythmias using a dataset containing features extracted from two-channel (lead II and lead V5) electrocardiogram (ECG) signals. The dataset includes five different classes: N (Normal beat), S (Supraventricular ectopic beat), V (Ventricular ectopic beat), F (Fusion beat), and Q (Unknown beat). Each record contains 34 features, with 17 features extracted from each channel. The main objective of this study is to accurately classify heartbeats and identify arrhythmia types using these extracted features. Eight different machine learning algorithms were applied in the experimental study, including Support Vector Machine (SVM), Decision Tree, Random Forest, K-Nearest Neighbors (KNN), Logistic Regression, Bagging, CatBoost, and XGBoost. According to the obtained results, SVM (Accuracy: 93.85%) and Logistic Regression (Accuracy: 93.59%) showed the lowest performance, while CatBoost (Accuracy: 99.01%) and XGBoost (Accuracy: 99.17%) achieved the best classification performance. The results indicate that gradient boosting algorithms (CatBoost and XGBoost) are highly effective in detecting arrhythmias from complex ECG signals. These models demonstrated superior performance in terms of accuracy and generalization compared to traditional machine learning techniques.

Keywords: Electrocardiogram (ECG), Arrhythmia Detection, Machine Learning, Gradient Boosting, CatBoost, XGBoost

References

- [1] S. Sakib, "ECG Arrhythmia Classification Dataset," kaggle. [Online]. Available: <https://shorturl.at/yI6Hc>
- [2] A. Shah, D. Singh, H. G. Mohamed, S. Bharany, A. U. Rehman, and S. Hussien, "Electrocardiogram analysis for cardiac arrhythmia classification and prediction through self attention based auto encoder," *Sci. Rep.*, vol. 15, no. 1, p. 9230, Mar. 2025, doi: 10.1038/s41598-025-93906-5.
- [3] Y. Ansari, O. Mourad, K. Qaraqe, and E. Serpedin, "Deep learning for ECG Arrhythmia detection and classification: an overview of progress for period 2017–2023," *Front. Physiol.*, vol. 14, Sep. 2023, doi: 10.3389/fphys.2023.1246746.

Are Rumination and Self-Compassion Associated with Sleep Disturbance in Older Adults?

M. Cengiz¹, B. D. Gökmen², V. Gökmen³

¹Department of Public Health Nursing, Ataturk University Faculty of Nursing, m.cengiz@atauni.edu.tr Erzurum, Turkey, <https://orcid.org/0000-0002-2066-3464>

²Department of Nursing, Ağrı İbrahim Çeçen University Faculty of Health Sciences, burcudmr04@gmail.com Ağrı, Turkey, <https://orcid.org/0000-0003-2058-8924>

³Department of Nursing, Ağrı İbrahim Çeçen University Faculty of Health Sciences, volkangokmen82@gmail.com, Ağrı, Turkey, <https://orcid.org/0000-0001-6490-8913>

ABSTRACT

Purpose: This study was conducted to examine the relationships between ruminative thinking, self-compassion, and sleep disturbance among older adults.

Method: A descriptive, cross-sectional study was conducted with 356 older adults who presented to the internal medicine outpatient clinic of a training and research hospital in eastern Türkiye between June 17 and 28, 2024. The study sample included all patients who agreed to participate and met the inclusion criteria. Ethics committee approval and informed consent were obtained for the study. Data were collected using a sociodemographic questionnaire, the Ruminative Thought Style Questionnaire, the Self-Compassion Scale–Short Form, and the DSM-5 Level 2 (PROMIS) Sleep Disturbance Adult Short Form. The obtained data were analyzed in the SPSS package program with the significance level accepted as $p < 0.05$.

Findings: Most of the older adults participating in the study were married, had chronic diseases, and used medication long-term. There was a weak negative relationship between sleep disturbance and self-compassion scores ($r = -0.381$, $p < 0.001$) and between self-compassion scores and ruminative thinking scores ($r = -0.367$, $p < 0.001$), whereas a weak positive relationship was observed between sleep disturbance and ruminative thinking scores ($r = 0.307$, $p < 0.001$).

Conclusion: Most older adults in our sample had mild or no sleep disturbance. More severe sleep disturbance was associated with lower self-compassion and greater tendency toward ruminative thinking. Higher self-compassion was also associated with less ruminative thinking. Interventions to reduce sleep disturbances and increase self-compassion are recommended for older adults.

Keywords: awareness, cognition, older, rumination, self-compassion, sleep,

References

- [1] Yaşlı Nüfus İstatistikleri Bülteni (2023), 27.10.2024 tarihinde https://www.aile.gov.tr/media/89041/yašli_nüfus_istatistik_bulteni.pdf adresinden ulaşılmıştır.
- [2] Demir Gökmen, B., Kanbay, Y., Fırat, M., Akçam, A., Öztürk, Ş. (2020). Yaşlıya yönelik tutumlar ve etkileyen etmenlerin incelenmesi, Türkiye Klinikleri Sağlık Bilimleri Dergisi ,5,(2),253-263, Doi: 10.5336/healthsci.2019-71324
- [3] Ayyıldız, Y. (2023). Bakım kurumunda yaşayan yaşlılarda ruminatif düşünme, suçluluk ve depresyon arasındaki ilişkinin incelenmesi. International Social Sciences Studies Journal, 9,118,9633-9639. Doi: <http://dx.doi.org/10.29228/sssj.734.58>
- [4] Sansone, R. A., ve Sansone, L. A. (2012). Rumination: Relationships with physical health. Innovations In Clinical Neuroscience, 9(2), 29-34.
- [5] Papageorgio, C. Ve Wells, A. (2004). Depressive Rumination Nature, Theory and Treatment. Nature, Functions and Beliefs About Depressive Rumination (s. 4-17). West Sussex: John Wiley and sons Ltd.

ID: P-168

Effects of N-Acetyl-L-Cysteine (NAC) Application on the Expression Levels of Stress-Related Genes in *Lactuca sativa* under Copper (Cu) Stress

N.S. Araz¹, G. Agar², E. Yildirim³, B. Tosun¹, M. Yuçe³, E.B. Yılmaz¹ and G. Karadayi¹

¹Ataturk University, Dept of Molecular Biology and Genetics, Erzurum, Turkiye

²Ataturk University, Dept of Biology, Erzurum, Turkiye

³Ataturk University, Dept of Horticulture, Erzurum, Turkiye

Heavy metal stress, particularly copper (Cu) toxicity, is an important environmental factor that negatively affects plant growth and productivity. Therefore, this study aimed to determine at the molecular level the effects of N-Acetyl-L-Cysteine (NAC), which has stress-reducing and antioxidant-enhancing properties, on the expression levels of stress-related genes in *Lactuca sativa* (lettuce) plants exposed to Cu stress. In this context, plants were treated with 0, 125, 250, 500 µM NAC, 28 mM Cu alone and Cu+NAC doses. The expression levels of *AKT1*, *SOD*, *CAT*, *TIP1-2*, and *PIP-1* genes in the leaf tissues of treated plants were analyzed by RT-PCR, and the obtained data were evaluated using the $2^{-\Delta\Delta CT}$ method. Analysis results showed that the *PIP-1* gene reached its highest expression level under the 28 mM Cu + 250 µM NAC treatment. The expression levels of *AKT1* and *TIP1* genes increased proportionally with the NAC concentration in Cu and NAC combined treatments. Particularly, the increase of the *AKT1* gene, which is a stress-responsive gene, in proportion to NAC indicates a response to Cu stress. The *CAT* gene was expressed at its highest level only under the Cu treatment. Moreover, the findings indicate that different NAC concentrations exert gene-specific regulatory effects. Overall, our findings demonstrate that NAC modulates the transcriptional response of *Lactuca sativa* against Cu stress, leading to changes in the expression levels of essential stress-responsive genes. These results provide new insights into the molecular-level tolerance mechanisms of plants against heavy metal stress and suggest that NAC is a promising compound for mitigating Cu-induced toxicity in plants.

References

- [1] Sakamoto, M., et al. (2024). N-acetylcysteine mitigates oxidative stress induced by copper in lettuce. *Plants*, 14(9), 2112.
- [2] Du, Y.Y., et al. (2008). Comprehensive functional analysis of the catalase gene family in plants. *Journal of Integrative Plant Biology*, 50(10), 1247–1259.
- [3] Chen, G., et al. (2022). Physiological and molecular mechanisms of plant responses to copper stress. *International Journal of Molecular Sciences*, 23(21), 12950.

ID: POSTER-1

Anticancer Effects of Chalcone–Valproic Acid Combination in Lung Cancer Cells

E.M. Serbetci¹, A. Sagnak¹, S. Karabag¹, D. Coskun² and F. Ari¹

¹Bursa Uludag University, Department of Biology, Bursa, Turkiye 0009-0004-1561-9065, 0009-0004-0929-5236, 0009-0008-2263-4545, 0000-0002-6729-7908

²Firat University, Department of Organic Chemistry Bursa, Turkiye, 0000-0001-7141-6909

ABSTRACT

Lung cancer remains a significant global health concern due to its high morbidity and mortality rates [1]. The toxicity and adverse effects associated with current chemotherapeutic agents highlight the need for safer therapeutic alternatives [2]. Chalcones, a class of flavonoid derivatives, have demonstrated notable anticancer potential, while the histone deacetylase (HDAC) inhibitor valproic acid (VPA) exhibits antiproliferative and pro-apoptotic effects [3]. In this study, the effects of synthesized chalcone complexes in combination with VPA were investigated in A549 and H1299 lung cancer cell lines. Cell viability was assessed using the Sulforhodamine B (SRB) assay, and cell death was analyzed via Annexin V/Hoechst/Propidium iodide staining. The results demonstrated that the combination treatment induced higher cytotoxicity and more pronounced apoptosis compared to single-agent treatments. These findings suggest that the chalcone-VPA combination may represent a promising anticancer strategy for lung cancer.

Acknowledgement: This work was supported by TÜBİTAK under project number 1919B012415219

References

- [1] V. M. Merabishvili, A. I. Arseniev, S. A. Tarkov, A. A. Barchuk, A. M. Shcherbakov, E. V. Demin, E. N. Merabishvili, 2018. Lung cancer morbidity and mortality, *Siberian Journal of Oncology*, 17(6) (2018) 15–26.
- [2] I. P. Oscorbin, M. A. Smertina, K. A. Pronyaeva, M. E. Voskoboev, U. A. Boyarskikh, A. A. Kechin, I. A. Demidova, M. L. Filipenko, 2022. Multiplex Droplet Digital PCR assay for detection of MET and HER2 genes amplification in non-small cell lung cancer, *Cancers*, 14(6) (2022) 1458.
- [3] T. Göcen, 2022. HDAC inhibitörü 2-(N-(2-hidroksifenil)-2-propilpentanamid)' in kuantum kimyasal hesaplamalar ile moleküler yapı, spektroskopik (IR, NMR, UV-Vis) incelemeleri ve lineer olmayan optik (NLO) analizi, *AKÜ FEMÜBİD*, 22(1) (2022) 011101.

Chromosomal Asymmetry Patterns in Rodent Species

Y. B. Gülçin¹ and T. Yağcı Gurbanov²

¹ Bilecik Şeyh Edebali University, Department of Molecular Biology, Institute of Graduate Education, Bilecik, Türkiye, ORCID: 0009-0000-3232-3830

² Bilecik Şeyh Edebali University, Department of Molecular Biology and Genetics, Bilecik, Türkiye, ORCID: 0000-0003-1705-5107

ABSTRACT

In this study, chromosomal morphometry and asymmetry values were calculated from metaphase spreads of *Mus musculus* and *Rattus rattus* prepared under identical conditions using computer-assisted measurements. According to the A1–A2 (intra- and interchromosomal asymmetry) framework, *M. musculus*, which possesses a completely acrocentric karyotype, exhibited high A1 values and a broad range of chromosome sizes (A1 = 1.000, A2 = 0.270, CVCL = 26.99, LC/SC = 2.585, CI \approx 0), consistent with previous reports (Ayarza et al., 2022). *R. rattus*, on the other hand, displayed a more symmetric karyotype enriched with bi-armed (meta/submetacentric) chromosomes (A1 = 0.609, A2 = 0.245, CVCL = 24.46, LC/SC = 2.335, CI \approx 0.22). These patterns indicate that rodent karyotype evolution follows a predictable trajectory from highly asymmetric, acrocentric-dominated structures toward more symmetric, bi-armed architectures, and that this transition is largely driven by chromosomal rearrangements such as Robertsonian fusions and pericentric inversions (Aplin et al., 2011). In conclusion, standardized chromosomal morphometrics sensitively reveal subtle interspecific differences and provide a powerful and scalable framework for comparative cytogenetic and karyotype evolution studies.

References

- [1] E. Ayarza, G. Cavada, T. Arévalo, A. Molina, S. Berríos, 2022. Quantitative analysis of Robertsonian chromosomes inherited by descendants from multiple Rb heterozygotes of *Mus m. domesticus*, *Front. Cell Dev. Biol.*, 10 (2022) 1050556.
- [2] K. P. Aplin, H. Suzuki, A. A. Chinen, R. T. Chesser, J. ten Have, S. C. Donnellan, J. Austin, A. Frost, J.-P. Gonzalez, V. Herbreteau, *et al.*, 2011. Multiple Geographic Origins of Commensalism and Complex Dispersal History of Black Rats, *PLoS ONE*, 6(11) (2011) e26357.

Diagnostic Value of EBV-Derived miRNAs in Lymphoma

M.Kizilkaya¹, E. Balkan², A. Kara³, F. Erdem³

¹ Department of Medical Biology, Ağrı, Türkiye, ORCID: 0000-0001-7674-4223

² Department of Medical Biology, Erzurum, Türkiye, ORCID: 0000-0002-7065-8161

³ Department of Internal Medicine ORCID: 0000-0002-5229-7139

³ Department of Internal Medicine ORCID: 0000-0002-0377-7291

ABSTRACT

Epstein-Barr virus (EBV) microRNAs (the BHRF1 and BART families) are critical regulators involved in immune response suppression and lymphomagenesis (1,2). In this study, the diagnostic value of selected EBV-derived miRNAs in lymphoma was investigated (3). Specifically, we aimed to evaluate the expression levels of four EBV-miRNAs (BHRF1-2-5p, BHRF1-3, BART1-3p, BART2-5p) in lymphoma cases and to determine their potential as diagnostic biomarkers.

miRNA expression profiles were analyzed by RT-qPCR in a total of 40 lymphoma cases and an appropriate control group. Δ Ct values were calculated, and groups were compared using Welch's t-test. False discovery rate (FDR; Benjamini-Hochberg) correction was applied for multiple comparisons. Diagnostic accuracy was assessed through ROC analysis, and independent predictors were examined using multivariable logistic regression.

All four EBV-miRNAs were found to be significantly upregulated in the lymphoma group compared to controls (fold change 2.5–3.7; all $q < 0.05$). The most pronounced increase was observed for BART1-3p (3.7-fold, $q = 0.004$). ROC analysis demonstrated high AUC values, providing clinically meaningful sensitivity and specificity. When all four miRNAs were evaluated together in a multivariable model, diagnostic performance was superior compared to univariable models.

EBV-derived miRNAs are markedly upregulated in lymphoma and exhibit strong diagnostic accuracy. These findings suggest that EBV-miRNAs may serve as promising biomarkers in the diagnosis of lymphoma and could contribute to the development of future targeted therapeutic approaches.

Acknowledgement: This work was supported by Scientific Research Projects Coordination Unit or Supporting Institution.

References

- [1] Fachko, D. N., Goff, B., Chen, Y., & Skalsky, R. L. (2024). Functional Targets for Epstein-Barr Virus BART MicroRNAs in B Cell Lymphomas. *Cancers*, 16(20), 3537. <https://doi.org/10.3390/cancers16203537>.
- [2] Navari M, Etebari M, Ibrahim M, Leoncini L, Piccaluga PP. Pathobiologic Roles of Epstein-Barr Virus-Encoded MicroRNAs in Human Lymphomas. *Int J Mol Sci*. 2018 Apr 12;19(4):1168. doi: 10.3390/ijms19041168.
- [3] Ji, H., Yang, T., Li, C., Zhu, Y., Zheng, Z., Zhang, J., ... & Xue, F. (2023). EBV-encoded miRNAs BHRF1-1 and BART2-5p aggravate post-transplant lymphoproliferative disorder via LZTS2-PI3K-AKT axis. *Biochemical pharmacology*, 214, 115676. <https://doi.org/10.1016/j.bcp.2023.115676>.

Food Safety Assessment of Phthalates in Food Packaging Materials Using Target Fishing and Molecular Docking Approaches

D. Tiryaki¹, S. Doğan¹, T.Y. Koç¹, Y. Gülşahin² and M. Karadayı¹

¹ *Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-7452-9236; ORCID: 0000-0003-0499-2169; ORCID: 0000-0002-7786-5462; ORCID: 0000-0002-2473-0409*

² *Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116*

ABSTRACT

Phthalates are among the most commonly used plasticizers in food packaging materials to provide flexibility and durability to polymer products. However, the migration of these compounds from packaging materials into food and their potential effects on human health have become a major concern in terms of public health and food safety [1, 2]. In this study, an *in silico* strategy combining target fishing and molecular docking approaches was employed to investigate the potential biological effects of three widely used phthalates in food packaging. The chemical structures of the phthalates were retrieved from the PubChem database, and their potential human protein targets were predicted using the TargetNet database [3, 4]. The predicted targets were found to be associated with liver metabolism, endocrine regulation, and reproductive health. Subsequently, molecular docking analyses were performed with critical targets, including members of the PPAR family and the estrogen receptor, revealing stable interactions and high binding scores. These results suggest that some phthalates, commonly used as plasticizers in food packaging, may play a significant role in endocrine disruption and metabolic disorders. The findings emphasize the necessity of closely monitoring the migration of phthalates from packaging into food and demonstrate that computational toxicology approaches can serve as a rapid, cost-effective tool for preliminary risk assessment of food contact materials.

References

- [1] C. V. Miranda, M. R. Gama, & T. M. Pizzolato, 2025. Analytical methodologies for the determination of phthalates in environmental matrices. *Trends in Environmental Analytical Chemistry*, 45 (2025). e00248.
- [2] D. Capela, K. Poissenot, C. Dombret, M. Keller, I. Franceschini, & S. Mhaouty-Kodja, 2019. Effects of combined exposure of adult male mice to di-(2-ethylexyl) phthalate and nonylphenol on behavioral and neuroendocrine responses. *Chemosphere*, 221 (2019) 573-582.
- [3] M. Schneider, J. L. Pons, G. Labesse, & W. Bourguet, 2019. In silico predictions of endocrine disruptors properties. *Endocrinology*, 160(11) (2019) 2709-2716.
- [4] N. Hamid, M. Junaid, R. P. P. Manzoor, Jia, & D. S. Pei, 2020. Prioritizing phthalate esters (PAEs) using experimental in vitro/vivo toxicity assays and computational in silico approaches. *Journal of hazardous materials*, 398, (2020) 122851.

The Nanoemulsion-Based Patch Formulations Containing *Heracleum persicum* Extract for the Treatment of Recurrent Aphthous Stomatitis: Preparation and *in Vitro* Characterization

I. Yazan¹, Y.F. Kilinboz², A. B. Ugur Kaplan³ and M. Cetin⁴

¹Atatürk University, Erzurum, Türkiye, ORCID: 0009-0000-5331-5266

²Ondokuz Mayıs University, Samsun, Türkiye, ORCID: 0000-0002-9646-4197

³Atatürk University, Erzurum, Türkiye, ORCID: 0000-0003-2222-8789

⁴Atatürk University, Erzurum, Türkiye, ORCID: 0000-0003-4009-2432

ABSTRACT

Recurrent aphthous stomatitis (RAS) is a painful condition characterized by one or more recurring oval or round ulcers surrounded by erythema. These ulcers are commonly seen on the buccal mucosa, lips, palate, and sides of the tongue. Because the etiology of RAS is not yet fully understood, treatment is aimed solely at relieving symptoms such as inflammation and pain [1]. *Heracleum persicum*, a plant belonging to the Apiaceae family, has biological properties such as analgesic, anti-inflammatory, antimicrobial [2]. Mucoadhesive patches are the preferred in RAS treatment because they allow the active substance to remain at the site of action for a longer time and offer advantages such as protecting the injured area by acting as a barrier against external factors, ease of application localized effect [3]. Nanoemulsion (NE) is a kinetically stable colloidal dispersion with a general droplet size range of 20–200 nm [4]. The aim of this study was to prepare NE-based patches (NE-P) for RAS treatment using different polymers (chitosan+sodium alginate, or NaCMC+PVP K30) and *H. persicum* methanol extract-containing NE formulation (Hp-ME-NE). In *in vitro* characterization studies, the droplet size and zeta potential values of the NE formulations were found to be <160 nm and about -35 mV, respectively. The NE formulations showed acceptable size distribution (polydispersity index-PDI<0.3). The surface pH values of all prepared NE-P formulations were in the range of 6.71±0.03-7.15±0.03 and were found suitable for mucosal application. The % swelling ratios of the NE-P formulations varied depending on the polymer composition. NE-P formulations prepared with chitosan+sodium alginate showed swelling rates of approximately 106% (for blank-NE-P) and 97% (for Hp-ME-NE-P) at 5 min, after which the patches lost their shape. However, the NE-P formulations with NaCMC+PVP K30 demonstrated prolonged structural integrity and exhibited swelling ratios ranging from 254% to 426% at 15 min. The presence of Hp-ME-NE led to slight decreases in the elasticity and tensile strength of the formulation with NaCMC+PVP K30. In conclusion, NE and NE-P formulations were successfully prepared and characterized *in vitro*.

Acknowledgement: This study was supported by TUBITAK (2209-A Research Projects Support Program for University Students; Project No: 1919B012309898).

References

- [1] J.R. Beguerie, M. Sabas, 2015. Recurrent aphthous stomatitis: An update on etiopathogenia and treatment. *Journal of the Dermatology Nurses' Association*, 7 (1) 8–12.
- [2] S.G. Bashlouei, E. Karimi, M. Zareian, E. Oskoueian, M. Shakeri, 2022. *Heracleum persicum* essential oil nanoemulsion: a nanocarrier system for the delivery of promising anticancer and antioxidant bioactive agents. *Antioxidants (Basel)*, 2022, 11 831.
- [3] L. Bonetti, A. Caprioglio, N. Bono, G. Candiani, L. Altomare, 2023. Mucoadhesive chitosan-methylcellulose oral patches for the treatment of local mouth bacterial infections. *Biomaterials Science*, 11 2699-2710.
- [4] A.B. Ugur Kaplan, M. Cetin, D. Orgul, A. Taghizadehghalehjoughi, A. Hacimuftuoglu, S. Hekimoglu, 2019. Formulation and *in vitro* evaluation of topical nanoemulsion and nanoemulsion-based gels containing daidzein. *Journal of Drug Delivery Science and Technology*, 52 189-203.

ID: POSTER-6

Investigation of the Antimicrobial, Antibiotic Resistance and Technological Properties of *Limosilactobacillus fermentum* Isolated from Kars Kashar Cheese

Selin Doğan¹, Taha Yasin Koç¹, Zeynep Özyaydınlık², Mehmet Karadayı¹, Medine Güllüce¹

¹ Atatürk University Faculty of Science, Erzurum, Turkey, ORCID: 0000-0003-0499-2169, ORCID: 0000-0002-7786-5462, ORCID: 0000-0002-2473-0409, ORCID: 0000-0002-5957-8259

² Atatürk University Graduate School of Natural and Applied Sciences, Erzurum, Turkey, ORCID: 0009-0001-8238-6036

ABSTRACT

In this study, lactic acid bacteria were isolated from traditionally produced Kashar cheese obtained from the central district of Kars using MRS agar medium [1]. The antimicrobial activities of the isolates were evaluated by agar spot and well diffusion methods, and the strain showing the highest inhibitory effect against nine selected pathogens was identified using 16S rRNA gene sequencing [2]. Molecular characterization revealed that the isolate belonged to the species *Limosilactobacillus fermentum*. The technological properties of the selected isolate, including acid production capacity, proteolytic activity, and growth ability at different temperatures (4 °C, 15 °C, 45 °C), salt concentrations (2%, 4%, 6.5%), and pH values (3.9 and 9.6), were investigated. In addition, antibiotic susceptibility profiles were determined using vancomycin (30 µg), kanamycin (30 µg), penicillin (10 µg), erythromycin (15 µg), ampicillin (10 µg), clindamycin (30 µg), gentamicin (10 µg), and streptomycin (10 µg) discs [1, 3]. To clarify the source of the antimicrobial activity, the cell-free supernatant of the isolate was subjected to pH neutralization, H₂O₂ elimination, and proteinase K treatment. The results indicated the production of bacteriocin-like substances. These findings suggest that *L. fermentum* possesses strong antimicrobial activity, resilience, and promising technological features, highlighting its potential for application in functional food development and probiotic culture production.

References

- [1] H. Özlü, 2015. Bacteriocin production ability of lactic acid bacteria isolated from some cheeses, PhD Thesis, Atatürk University, Institute of Health Sciences, (2015) Erzurum.
- [2] C. Işık, 2018. Investigation of changes in the expression profiles of bacteriocin genes of multibacteriocinogenic *Lactobacillus plantarum* S54 due to environmental conditions and pathogens. Doctoral Thesis, Atatürk University, Institute of Science, (2018) Erzurum.
- [3] T. Yuliana, A.R. Pratiwi, S. Zahratunnisa, T. Rialita, Y. Cahyana, P.W. Harlina, H. Marta, 2023. Purification and Partial Characterization of a Bacteriocin Produced by *Lactobacillus pentosus* 124-2 Isolated from Dadih. *Appl. Sci.*, 13 (2023) 4277.

ID: POSTER-7

An Alternative Approach to Antibiotic Resistance: Molecular Docking Analysis of TEM-1 β -Lactamase Enzyme with Clavulanic Acid and Quercetin

Y. Gülşahin¹, E. Güllüce¹, Ş. Aksu², B. Tosun¹ and M. Karadayı³

¹*Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116; ORCID: 0000-0003-2290-3799; ORCID: 0009-0009-5635-766X*

²*Department of Molecular Biology and Genetics, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-0844-5130*

³*Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-2473-0409*

ABSTRACT

Although antibiotics have revolutionized the treatment of bacterial infections, increasing antibiotic resistance remains a serious global health concern. One of the most prevalent resistance mechanisms is the bacterial production of β -lactamase enzymes that hydrolyze β -lactam antibiotics. TEM-1 β -lactamase, frequently found in *Escherichia coli* and other Gram-negative bacteria, plays a major role in resistance to widely used antibiotics [1]. Clavulanic acid is a clinically utilized β -lactamase inhibitor; however, resistance to such inhibitors has also emerged. Therefore, identifying alternative inhibitors, especially natural compounds with bioactive properties, has gained increasing attention. Quercetin, a flavonoid found in many fruits and vegetables, is known for its broad biological activity and has been investigated as a potential enzyme inhibitor. For this purpose, the molecular structures of Clavulanic acid and the natural flavonoid Quercetin were obtained from the PubChem database. Structural optimization of each ligand was performed using UCSF Chimera 1.17.3 software, and ligand preparations were completed with AutoDockTools 1.5.7. The target protein, TEM-1 β -lactamase (PDB: 1BTL), associated with antibiotic resistance, was retrieved from the RCSB Protein Data Bank and prepared using AutoDockTools. Molecular docking studies were conducted using AutoDock Vina, and the resulting data were visualized with BIOVIA Discovery Studio software. Molecular docking analyses demonstrated significant binding affinities of both Clavulanic acid and Quercetin towards the TEM-1 β -lactamase enzyme. Quercetin exhibited a binding energy of -8.3 kcal/mol, whereas the reference inhibitor Clavulanic acid showed a binding energy of -5.6 kcal/mol. These results indicate that Quercetin may bind more stably and strongly to the active site of TEM-1 β -lactamase. Furthermore, ligand-protein interaction analysis revealed that Quercetin forms strong interactions with critical amino acid residues via hydrogen bonds and hydrophobic interactions. The findings suggest that Quercetin is a potential inhibitor of TEM-1 β -lactamase and highlight the importance of natural compounds in combating antibiotic resistance.

References

- [1] K. Bush, 2018. Past and present perspectives on β -lactamases. *Antimicrobial agents and chemotherapy*, 62(10), 10-1128.

ID: POSTER-8

Evaluation of 3-Hydroxyflavone-Based Sulfonate Esters as Acetylcholinesterase, Carbonic Anhydrase and α -Glycosidase Inhibitors

Murat Guney¹, Ahmet Gokhan Aggul², Adem Erturk³, İlhami Gulcin⁴

¹Agri Ibrahim Cecen University, Agri, Türkiye, 0000-0003-4451-6538

²Agri Ibrahim Cecen University, Agri, Türkiye, 0000-0003-0377-0388

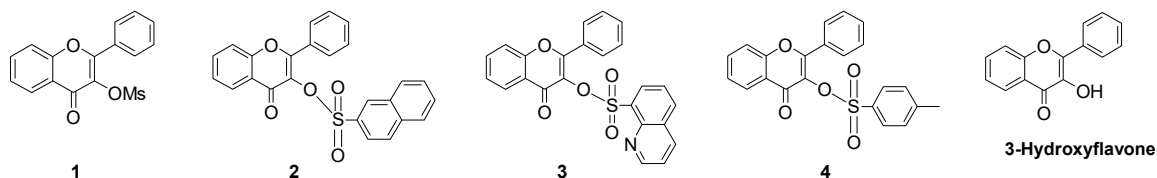
³Ataturk University, Erzurum, Turkey, 0000-0002-1750-1966

⁴Agri Ibrahim Cecen University, Agri, Türkiye,, 0000-0001-5993-1668

ABSTRACT

Flavonoids, a significant family of phenolic compounds, have important functions in the pharmaceutical, food, and cosmetic industries. 3-Hydroxyflavanone which is backbone of flavanols possesses important biological properties such as cytotoxicity, antiviral, anticancer, anti-inflammatory, anticholinesterase, and antioxidant. [1],[2]

This study was designed to investigate the synthesis of 3-hydroxyflavone sulfonate esters **1-4** and their inhibitory effects against AChE, AG, and CA I and II enzymes. Compounds **1-4** exhibited nanomolar inhibitory activity against all these enzymes (with K_i values ranging from 1.92 to 4.16 nM for AChE, 32.40 to 55.49 nM for AG, 9.45 to 65.53 nM for hCA I, and 76.62 to 163.33 nM for hCA II). Especially quinoline sulfonyl derivative **3** was shown to have a higher potential as an inhibitor of these enzymes. [2]



Acknowledgement: This work was supported by Agri Ibrahim Cecen University (Scientific Research Project Number: ECZF.21.004)

References

- [1] A. Chakali, K. Sujatha, K. P. Pasala, 2024. An Overview of Pharmacological Activities and Beneficial Effects of 3-Hydroxyflavone, *Macromol. Symp.* 2024, 413, 2300078 (1-7)
- [2] M. Guney, A. G. Aggul, A. Erturk, I. Gulcin, 2023. In Vitro and in Silico Studies of 3-Hydroxyflavone-Based Sulfonate Esters: Potent Acetylcholinesterase, Carbonic Anhydrase and α -Glycosidase Inhibitors, *ChemistrySelect* 2023, 8, e202303054 (1-12).

Effect of Astaxanthin on Gene Expression in Lettuce Plants Against Nickel Stress

B. Tosun¹, E. Yildirim³, G. Agar², I. Colak¹, M. Yuce³ and G. Karadayi¹

¹ Ataturk University, Dept of Molecular Biology and Genetics, Erzurum, Turkiye

² Ataturk University, Dept of Biology, Erzurum, Turkiye

³Ataturk University, Dept of Horticulture, Erzurum, Turkiye

ABSTRACT

Nickel(Ni) is one of the major causes of increasing heavy metal pollution in agricultural soils. Although it is required in trace amounts for plants, excessive concentrations lead to an increase in reactive oxygen species, resulting in genetic and epigenetic alterations, protein damage, and metabolic imbalances. One of the protective mechanisms plants employ against such stresses is the carotenoid **Astaxanthin (AX)**. This carotenoid is produced by various microorganisms and marine animals such as bacteria, yeast, fungi, microalgae, shrimp, and lobsters, and it is lipid-soluble. Astaxanthin, a powerful biological antioxidant, has been shown to confer tolerance to plants against various abiotic stresses. In our study, the effects of astaxanthin application on **Lettuce (Lactuca sativa)** under Ni stress were investigated by examining the expression changes of the **ABC3, HIPP28, MTPT, and MTPT3** genes. The experiment was conducted with eight groups (Control, 50 µM AST, 100 µM AST, 200 µM AST, Ni, Ni+50 µM AST, Ni+100 µM AST, and Ni+200 µM AST) and three replications. RNA samples obtained from plants were subjected to qRT-PCR analysis, and gene expression levels were comparatively evaluated using the GENEGLOBE program. When comparing the expression profiles of the examined genes across different groups, **ABC3** was found to be distinctly induced. In the control group, all genes exhibited basal expression levels, which was confirmed by the stable expression of **ACTB**, verifying the reliability of the measurements. The most remarkable change among the experimental groups was observed in lettuce plants exposed solely to nickel, where **ABC3** reached its highest expression level with approximately a 12-fold increase. This suggests that under such conditions, the plant may activate metabolite and hormone transport, detoxification processes, or defense responses. The **HIPP28** gene showed the highest expression in the group treated with 100 µM AST, while the **MTPT** gene was most expressed in the group exposed only to nickel. In contrast, no significant fluctuation was recorded for the **MTPT3** gene.

References

- [1] V. Pishchik, G. Mirskaya, E. Chizhevskaya, V. Chebotar, D. Chakrabarty, 2021. Nickel stress-tolerance in plant-bacterial associations, *PeerJ*, 9 (2021): e12230.
- [2] Si, P., & Zhu, C. (2022). Biological and neurological activities of astaxanthin (Review). *Molecular Medicine Reports*, 26(4), 300.
- [3] Ozavize, S. F., Qiu, C.-W., & Wu, F. (2024). *Astaxanthin induces plant tolerance against cadmium by reducing cadmium uptake and enhancing carotenoid metabolism for antioxidant defense in wheat (Triticum aestivum L.)*. *Plant Physiology and Biochemistry*, 210, 108622.

ID: POSTER-10

***In silico* Target Prediction and Molecular Docking Analysis of Food Colorant E102 (Tartrazine) on Human Proteins**

Ş. Aksu¹, Y. Gülşahin², S. Doğan³, T.Y. Koç³, B. Tosun², G. Karadayı⁴, M. Karadayı³ and M. Güllüce³

¹Department of Molecular Biology and Genetics, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-0844-5130

²Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116; ORCID: 0009-0009-5635-766X

³Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0003-0499-2169; ORCID: 0000-0002-7786-5462; ORCID: 0000-0002-2473-0409

³Department of Molecular Biology and Genetic, Faculty of Science, Atatürk University, Erzurum, Türkiye 0000-0003-2044-9609

ABSTRACT

Food additives are widely used to extend shelf life, enhance visual appeal, and influence consumer preferences. Among them, E102 (tartrazine), a synthetic azo dye, is commonly applied as a colorant in beverages, confectionery, and processed foods [1]. However, debates persist regarding its potential to cause allergic reactions, behavioral disorders, and metabolic effects. Thus, understanding the biological impact of food additives is crucial for public health. In recent years, research on the interactions of food dyes with human protein targets has rapidly increased. In this context, target fishing studies, followed by molecular docking, provides a robust approach [2]. This study investigates potential human protein targets of tartrazine and its interactions using *in silico* docking methods.

The structure of tartrazine (CID: 164825) was retrieved from PubChem. Target fishing with SwissTargetPrediction identified Beta-lactamase (1A8T), Glycogen synthase kinase-3 beta (1PYX), Carbonic anhydrase 4 (5KU6), and Aldo-keto reductase family 1 member C1 (1MRQ) as the most reliable targets. Ligand minimization was performed using LigPrep in Schrödinger Maestro, while receptor structures were obtained from the RCSB Protein Data Bank and prepared with the Protein Preparation tool. Docking and visualization were carried out in Schrödinger Maestro (v13.9.138).

Docking results showed strong binding affinities: tartrazine–Beta-lactamase (-10.145 kcal/mol), tartrazine–Glycogen synthase kinase-3 beta (-9.803 kcal/mol), tartrazine–Carbonic anhydrase 4 (-9.281 kcal/mol), and tartrazine–Aldo-keto reductase family 1 member C1 (-8.508 kcal/mol). These findings suggest tartrazine may provide valuable insights into potential protein targets for use safety research.

References

- [1] P. Amchova, F. Siska, J. Ruda-Kucerova 2024. Safety of tartrazine in the food industry and potential protective factors. *Heliyon* 10.18 (2024).
- [2] K.Y. Ji, C. Liu, Z.Q. Liu, Y.F. Deng, T.J. Hou, D.S. Cao 2023. Comprehensive assessment of nine target prediction web services: which should we choose for target fishing? *Briefings in Bioinformatics* 24.2 (2023): bbad014.

ID: POSTER-11

Artificial Intelligence in Community Pharmacy Practice: A Review on OTC Counseling and Patient-Centered Services

D. Ozmen Ozgun¹, K. Ozgun²

¹ *Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Agri Ibrahim Cecen University, Agri, Türkiye, ORCID: (0000-0002-8574-9672)*

² *Dilan Eczanesi, Diyaradin/Agri, Türkiye*

ABSTRACT

Aim: This review aims to examine the current and emerging applications of artificial intelligence (AI) in community pharmacy practice, with a focus on its role in supporting over-the-counter (OTC) counseling and enhancing patient safety.

Methods: A narrative review of studies published between 2018 and 2025 was conducted using PubMed, Scopus, and Google Scholar databases. Keywords included artificial intelligence, community pharmacy, OTC medicines, clinical decision support, patient safety. Selected articles, systematic reviews, and conference reports were analyzed to identify AI applications relevant to community pharmacy settings.

Results: The literature demonstrates that AI-based tools, such as mobile health applications, natural language processing systems, and pharmacy-specific decision support software, have been increasingly explored in community pharmacy practice. These systems provide functions such as real-time drug interaction checking, personalized OTC product selection, and automated patient education. While AI improves efficiency, accuracy, and patient trust in pharmacists' recommendations, challenges remain regarding data privacy, integration with existing pharmacy systems, and the need for pharmacist training.

Conclusion: AI applications in community pharmacies offer significant opportunities to enhance OTC counseling, optimize self-care practices, and strengthen the pharmacist's role as a trusted healthcare advisor. However, the adoption of AI requires addressing technological, ethical, and professional challenges. Further large-scale, real-world studies are needed to evaluate the effectiveness of AI integration in community pharmacy practice.

Keywords: Artificial intelligence, community pharmacy, over-the-counter medicines, pharmaceutical care.

References

- [1] Cornelison, B., Axon, D. R., Abbott, B., Bishop, C., Jebara, C., Kumar, A., & Root, K. A. , 2025. Accuracy and Safety of ChatGPT-3.5 in Assessing Over-the-Counter Medication Use During Pregnancy: A Descriptive Comparative Study. *Pharmacy*, 13(4), 104.
- [2] Kiyomiya, K., Aomori, T., & Ohtani, H., 2025. Medication counseling for OTC drugs using customized ChatGPT-4: Comparison with ChatGPT-3.5 and ChatGPT-4o. *Digital Health*, 11, 20552076251323810.
- [3] Jairoun, A. A., Al-Hemyari, S. S., Jaber, A. A. S., Shahwan, M., El-Dahiyat, F., Karuniawati, H., ... & Alorfi, N. M., 2022. Over-the-counter counseling in community pharmacies and job satisfaction among pharmacy professionals: A reflection of current scenario and possible solutions. *Pharmacy Practice*, 20(1), 2633.
- [4] Falahati, S., Alizadeh, M., Ghazipour, F., Safahi, Z., Khaledian, N., & Salmanpour, M. R., 2025. An AI-powered Public Health Automated Kiosk System for Personalized Care: An Experimental Pilot Study. *arXiv preprint arXiv:2504.13880*.
- [5] Gustafson, K. A., Rowe, C., Gavaza, P., Bernknopf, A., Nogid, A., Hoffman, A., ... & Southwood, R., 2025. Pharmacists' perceptions of artificial intelligence: A national survey. *Journal of the American Pharmacists Association*, 65(1), 102306.

ID: POSTER-12

Meshoma in a Case Evaluated with a Preliminary Diagnosis of Incisional Hernia

M. Baran Yerlikaya¹

¹Department of General Surgery, Faculty of Medicine , Ağrı İbrahim Çeçen University, Ağrı, Türkiye
ORCID:0000 0002 92918448

ABSTRACT

Prosthetic mesh materials are frequently used in abdominal wall repairs due to their ability to reduce recurrence. However, a rare but significant complication associated with mesh implantation is the development of *meshoma*, a localized foreign body granulomatous reaction. These lesions may clinically and radiologically mimic neoplastic or cystic masses, making diagnosis challenging.

A 65-year-old female patient with a history of mesh-reinforced incisional hernia repair presented with abdominal swelling and discomfort. Computed tomography revealed an intra-abdominal cystic mass consistent with a possible recurrent hernia. During surgical exploration, a cystic-appearing lesion was identified surrounding the previously placed mesh. Excision of the mass and the mesh was performed. Histopathological examination confirmed the diagnosis of meshoma. The postoperative course was uneventful.

Meshoma is an uncommon late complication following mesh-based hernia repair. Its imaging findings may mimic malignancy or cystic lesions. Definitive diagnosis requires surgical exploration and histopathological confirmation. In patients with prior abdominal wall surgery presenting with intra-abdominal masses, meshoma should be considered in the differential diagnosis.

Keywords: Meshoma, incisional hernia, foreign body reaction, abdominal wall, case report

ID: POSTER-13

Removal of Toxic Ni(II) by Activated Olive Stone: Optization of Analytical Parameters by Response Surface Methodology

ABBAS Moussa¹, AKSIL Tounsia ¹, TRARI Mohamed ²

¹ *Laboratory of Applied Chemistry and Materials (LabCAM), University of M'hamed Bougara, Avenue de l'indépendance Boumerdes, 35000. Algeria, ABBAS, 0000-0002-0420-2414, AKSIL, 0000-0001-8578-4323.*

² *Laboratory of Storage and Valorization of Renewable Energies, Faculty of Chemistry, (USTHB), BP 32-16111 El-Alia, Bab Ezzouar, Algeria, 0000-0002-5988-7692*

ABSTRACT

The increase in population led a negative impact on the water quality despite the strong policies implemented on wastewater treatment because the problem remains pressing. However, it is imperative to secure the environment of aquatic and human life. In this study, Olive Stones (OS) was chosen as the precursor to be converted to OSAC, by H₃PO₄ chemical activation. Plackett-Burman design allows to identify significant factors while a Box- Behnken design was considered to optimize three important parameters namely the initial Nickel concentration (Co: 10-50 mg/L), pH (2-5), and dose (0.4-4.0 g) on the removal of Nickel onto OSAC. The experimental data obtained were analyzed by analysis of variance (ANOVA) and fitted to a second-order polynomial equation using multiple regression analysis. Numerical optimization applying desirability function was used to identify the optimum conditions for maximum removal of Nickel. The optimum conditions were found to be (Co: 30 mg/L, initial solution pH: 3.5, and adsorbent dose: 0.55 g at temperature of 25 °C with a determination coefficient R² of 93.38%. Various isotherm models such as Langmuir, Freundlich, Temkin and Elovich [1] were used to fit the experimental data; the results indicate that the Langmuir model provides the best correlation with the maximum adsorption capacity was found to be 71.42 mg/g at 298 K. Kinetic studies [2] showed that the adsorption follows a pseudo-second order with the chemisorptions' process .

Acknowledgement: The authors gratefully acknowledge support from the University M'hamed Bougara of Boumerdes (UMBB), Laboratory of Applied Chemistry and Materials (LabCAM),

References

- [1] Moussa Abbas, Experimental investigation of Titanium Dioxide as an adsorbent to remove Congo red from aqueous solution- Equilibrium and Kinetics modeling. *Journal of Water and Reuse Desalination* Vol. 10, Issue 3 (2020) 251-266.
- [2] Moussa Abbas, Removal of Methylene Blue (MB) pollutant from the textile industry by adsorption onto zeolite Kinetic and thermodynamic study. *Journal of Engineered Fibers and Fabrics* Vol.17, (2022) 1-11.

ID: POSTER-14

Lutexin as a Potential Inhibitor for H1N1 Subtype of Influenza A Virus

Ş. Aksu¹, Y. Gülşahin², E. Güllüce² and M. Karadayı³

¹Department of Molecular Biology and Genetics, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-0844-5130

² Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116; ORCID: 0000-0003-2290-3799

³ Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-2473-0409

ABSTRACT

Lutexin is a derivative of luteolin, a natural flavonoid with therapeutic properties against many different viral infections. However, its effects against the H1N1 subtype of influenza A virus, the causative agent of Swine Flu, which first caused a large-scale pandemic in 2009 and has recently been recognized as a potential pandemic agent, are not yet fully known. Therefore, this study was conducted to determine the protective and therapeutic properties of Lutexin against Swine Flu using a molecular docking approach. For this purpose, the molecular structure of Lutexin was obtained from the PubChem chemical database (CID: 5281675). Structural minimization of the ligand was performed using UCSF Chimera 1.17.3, and ligand preparation was completed with MGLTools 1.5.7. The H1N1 subtype receptor of influenza A virus (PDB ID: 8VQQ) was obtained from the RCSB Protein Data Bank and prepared using MGLTools. The grid center was placed at -33, -49, -21 (XYZ coordinates), and the grid size was set to 20 Å × 20 Å × 20 Å. Docking simulations were performed with AutoDock Vina, and visualizations were performed using BIOVIA Discovery Studio. Docking results showed that Lutexin has a high binding affinity to the target protein, with a binding score of -6.6 kcal/mol. These findings demonstrate Lutexin's protective and therapeutic potential against the Swine Flu pandemic. Therefore, they are important for the development of new biotechnological products to protect against the disease.

References

- [1] J. Wang, X. Zeng, J. Gou, X. Zhu, D. Yin, L. Yin, ... & X. Pan, 2024. Antiviral activity of luteolin against porcine epidemic diarrhea virus in silico and in vitro. *BMC Veterinary Research*, 20(1), 288.
- [2] S. S.Chandanwale, M. Singh, A. Raj, C. Gore, N. Gupta, 2025. Swine Flu Progressive Pulmonary Fibrosis– Clinical Manifestation and Morphology of Explanted Lungs. *Indian Journal of Transplantation*, 19(2), 243-246.

ID: POSTER-15

Azomethine Compounds and Metal Complexes as Carbonic Anhydrase Inhibitors

F. Topal¹, S. Tuna Yıldırım², C. Türkeş³, M. Topal⁴ and Ş. Beydemir⁵

¹Gumushane University, Gumushane Vocational School, Department of Chemistry and Chemical Technologies, Gumushane, Türkiye, 0000-0002-2443-2372

²Erzincan Binali Yıldırım University, Faculty of Pharmacy, Department of Analytical Chemistry, Erzincan, Türkiye, 0000-0001-5564-9630

³Erzincan Binali Yıldırım University, Faculty of Pharmacy, Department of Biochemistry, Erzincan, Türkiye, 0000-0002-2932-2789

⁴Gumushane University, Gumushane Health Services Vocational School, Department of Medical Services and Techniques, Gumushane, Türkiye, 0000-0002-2107-8603

⁵Anadolu University, Faculty of Pharmacy, Department of Biochemistry, Eskişehir, Türkiye, 0000-0003-3667-6902

ABSTRACT

In this study, N₂O₂ type Schiff base ligand, (E)-6-[[[(2-hydroxy-4-nitrophenyl) imino]methyl]-3-ethoxyphenol, was synthesized from the reaction of a salicylaldehyde derivative and 2-amino-5-nitrophenol and then metal complexes were prepared from the reaction of this ligand with Co(II), Ni(II), Cu(II), Zn(II) and Cd(II) acetates. Structural characterizations of the synthesized compounds were carried out using some spectroscopic techniques. Carbonic anhydrase (CA) is an enzyme that plays an important role in the maintenance of acid-base balance and pH regulation in many tissues including the central nervous system [1]. In the study, the metal complex with the most effective IC₅₀ value for hCA I enzyme under *in vitro* conditions was [Zn(L)₂]; 57.35±1.08 nM, while for hCA II enzyme, [Cu(L)₂]; 314.00±9.04 nM exhibited effective inhibition. For both enzymes, these enzymes showed non-competitive inhibition. In conclusion, this study aims to shed light on the design and synthesis of new drug models by synthesizing compounds with high inhibitory potential, increased drug activity and reduced side effects.

Acknowledgement: This study was supported by Gumushane University Scientific Research Projects Coordination Unit (Project Code: 24. F5115.01.01).

References

- [1] F. Topal, K. Aksu, I. Gülçin, F. Tümer, S. Goksu. 2021. Inhibition profiles of some symmetric sulfamides derived from phenethylamines on human carbonic anhydrase I, and II isoenzymes. *Chem. Biodiversity*, 18(10) (2021) e2100422.

ID: POSTER-16

Cholinesterase Inhibition by Imine-Containing Compounds and their Metal Complexes

M. Topal¹, S. Tuna Yıldırım², C. Türkeş³, F. Topal⁴ and Ş. Beydemir⁵

¹Gumushane University, Gumushane Health Services Vocational School, Department of Medical Services and Techniques, Gumushane, Türkiye, 0000-0002-2107-8603

²Erzincan Binali Yıldırım University, Faculty of Pharmacy, Department of Analytical Chemistry, Erzincan, Türkiye, 0000-0001-5564-9630

³Erzincan Binali Yıldırım University, Faculty of Pharmacy, Department of Biochemistry, Erzincan, Türkiye, 0000-0002-2932-2789

⁴Gumushane University, Gumushane Vocational School, Department of Chemistry and Chemical Technologies, Gumushane, Türkiye, 0000-0002-2443-2372

⁵Anadolu University, Faculty of Pharmacy, Department of Biochemistry, Eskişehir, Türkiye, 0000-0003-3667-6902

ABSTRACT

Excessive production of free radicals can lead to various diseases, including cancer, cardiovascular disorders, and neurodegenerative conditions. There is considerable evidence that they contribute to Alzheimer's disease, Parkinson's disease, craniocerebral palsy, chronic kidney disease, and cancer. Numerous studies are currently underway on the use of Schiff bases in the treatment of Alzheimer's disease. The potential of these compounds as drugs has attracted considerable interest in medicinal chemistry [1]. In this study, an imine-containing ligand was synthesized from the reaction of an aromatic aldehyde with 2-amino-4-methylphenol, and metal complexes were prepared from their reactions with metal acetates. The inhibitory effects of these compounds on AChE and BChE enzymes were investigated for their biological activities. Among the synthesized metal complexes, the lowest IC₅₀ value was for AChE [Cu(L)₂] (26.44±1.77 nM; R²:0.9808), while the highest IC₅₀ value for BChE was [Cd(L)₂] (106.50±1.70 R²:0.9983). These results indicate that copper and cadmium complexes in particular may be promising candidates for cholinesterase inhibitors that can be used in the treatment of Alzheimer's disease.

Acknowledgement: This study was supported by Gumushane University Scientific Research Projects Coordination Unit (Project Code: 24.B0225.01.01).

References

- [1] Ü. Yaşar, Y. Demir, İ. Gönül, M.S. Özasan, G.G. Çelik, C. Türkeş, Ş. Beydemir. 2025. Novel schiff base sulfonate derivatives as carbonic anhydrase and acetylcholinesterase inhibitors: synthesis, biological activity, and molecular docking insights. *Chem.Biodiversity.*, 22(5) (2025) e202402893.

ID: POSTER-17

Determination of PGPR Properties of Bacteria Isolated from Agricultural Fields in Aşkale, Erzurum

M. Güllüce¹, M. Karadayı¹, Y. Gülşahin², Ş. Aksu³, E. Güllüce² and N. S. Araz²

¹*Department of Biology, Faculty of Science, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-5957-8259; ORCID: 0000-0002-2473-0409*

²*Institute of Natural and Applied Sciences, Atatürk University, Erzurum, Türkiye, ORCID: 0000-0002-3770-2116; ORCID: 0000-0003-2290-3799; ORCID: 0009-0001-6279-1720*

³*Department of Molecular Biology and Genetics, Kafkas University, Kars, Türkiye, ORCID: 0000-0002-0844-5130*

ABSTRACT

Plant growth-promoting rhizobacteria (PGPR) represent an important alternative as biofertilizers and biocontrol agents in sustainable agriculture. These bacteria enhance soil fertility and reduce the need for chemical fertilizers through various mechanisms that promote plant growth, such as phosphate solubilization, nitrogen fixation, phytohormone, and siderophore production. Microorganisms isolated from extreme or natural habitats hold great potential for the discovery of novel PGPR strains [1]. In this context, the microbial diversity of aquatic ecosystems is particularly noteworthy. This study aimed to evaluate the PGPR traits of bacteria isolated from sediment samples collected from Aşkale, screening for four key properties: phosphate solubilization, nitrogen fixation, indole-3-acetic acid (IAA) production, and siderophore production. For this purpose, sediment samples were aseptically collected from Aşkale located in Erzurum province. Serial dilution and culturing on Nutrient Agar (NA) at 28°C in laboratory conditions yielded a total of 257 pure bacterial isolates. The plant growth-promoting properties of these isolates were assessed using four assays: phosphate solubilization on Pikovskaya agar, nitrogen fixation in nitrogen-free selective media, IAA production detected by Salkowski reagent, and siderophore production tested on Chrome Azurol S (CAS) agar. Isolates that tested positive in each assay were recorded, and those exhibiting all four traits were given special consideration. As a result, out of 152 tested isolates, 10 strains were found to possess all four PGPR traits (phosphate solubilization, nitrogen fixation, IAA, and siderophore production). The isolates demonstrating the highest biological activity were identified as Y7, Y25, Y32, Y45, Y108, Y112, Y123, Y129, Y143, and Y151. These strains stand out as promising biofertilizer candidates. Further molecular and physiological analyses are planned to support the potential application of these bacteria, derived from natural soil environments, in sustainable agricultural practices.

References

[1] J. K. Vessey, 2003. Plant growth promoting rhizobacteria as biofertilizers. *Plant and soil*, 255(2), 571-586.

ID: POSTER-18

Caracterization Studies on Adsorption of Iodine Using Carbon Deriveted from the Crown of Oak

AKSIL Tounsia^{1,2}, ABBAS Moussa¹, TRARI Mohamed³

¹ *Laboratory of Applied Chemistry and Materials (LabCAM), University of M'hamed Bougara, Avenue de l'indépendance Boumerdes, 35000. Algeria, ABBAS, 0000-0002-0420-2414*

² *Laboratory of Soft Technologies and Biodiversity (LTDVPMB/FS), University M'hamed Bougara 3500 Boumerdès Algeria, , 0000-0001-8578-4323.*

³ *Labotory of Storage and Valorization of Renewable Energies, Faculty of Chemistry, (USTHB), BP 32-16111 El-Alia, Bab Ezzouar, Algeria, 0000-0002-5988-7692*

ABSTRACT

Adsorptive removal of iodine from aqueous waste streams is an efficient way of minimizing the environmental footprints associated with radioactive species. The current study aims to develop a new adsorbent material using oak wreath and explore its effectiveness in removing iodine ions through a series of batch experiments [1]. The ACOW was characterized by Point of Zero Charge (pHpzc) and FTIR spectroscopy analysis. The impact of initial iodine concentration (20 to 100 mg/L), Temperature (25 to 55 oC), pH (2 to 14), adsorbent dosage (2 to 10 g/L), agitation speed (100 to 900 rpm), particle size (100 to 2000 µm) and contact time (0 to 30 min) on the Iodine adsorption from its water solution was examined. The adsorptions kinetic were found to follow a pseudo-second order kinetic model confirming by ($R^2 = 0.999$) and the strong agreement between the calculated $q_{e,cal}$ and the experimental q_{exp} values demonstrate the applicability of the pseudo-second-order model to explain and interpret experimental data. In general, the results obtained indicate that the activated carbon produced from the crown of oak can be used as an alternative adsorbent at low economic cost for the treatment of effluents containing iodine in the environment.

Keywords: Iodine, Crown of oak, removal, Ftir, Adsorption

Acknowledgement: The authors gratefully acknowledge support from the University M'hamed Bougara of Boumerdes (UMBB), Laboratory of Applied Chemistry and Materials (LabCAM), Faculty of Sciences and Laboratory of Storage and Valorization of Renewable Energies, Faculty of Chemistry (USTHB) Algeria. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors).

References

[1] WWAP (United Nations World Water Assessment Programme) The United Nations World Water Development Report 2017: Wastewater: The Untapped Resource. Paris: UNESCO.

Phytochemical Composition, Antidiabetic–Antioxidant Potential, and Docking Analysis of *Arum rupicola* subsp. *Rupicola*

Hatice KIZILTAŞ¹, Ronay ERBUDAK² and İlhami GÜLÇİN³

¹Van Yüzüncü Yıl University, Van, Türkiye, 0000-0002-0833-3358

²Bigadiç Süt Üreticileri Birliği, Bigadiç/Balıkesir, Türkiye, 0000-0002-2112-522X

³Rectorate of Agri Ibrahim Cecen University, 04100-Agri, Türkiye, 0000-0001-5993-1668

ABSTRACT

Arum rupicola subsp. *rupicola* (Araceae) is a perennial geophyte traditionally consumed as food and used in ethnomedicine in Anatolia and surrounding regions. The methanolic extract is rich in phenolics, with fumaric acid as the most abundant compound, followed by scutellarin and diosmin [1]. Consistent with its folkloric use against diabetes, antidiabetic effects were confirmed through α -glucosidase inhibition [2]. Extracts obtained by solvent partitioning also exhibited antimicrobial and antioxidant activities against *Staphylococcus aureus*, *Bacillus subtilis*, and *Escherichia coli* [1]. Taxonomic and ecological surveys indicated that *A. rupicola* is widely distributed in Türkiye, the Middle East, and Central Asia, represented by two varieties (*rupicola* and *virescens*) [3]. Ethnobotanically, the plant is consumed as “kahri” in Türkiye and “kardeh soup” in Iran [4].

This study aims to investigate the antidiabetic properties and antioxidant activities of the ethanolic extract obtained from the aerial parts of *Arum rupicola*. For this purpose, α -glucosidase inhibitory activity was assessed, and molecular docking analyses supported the potential binding affinity of fumaric acid to the α -glucosidase enzyme; in addition, ferric ion (Fe³⁺) reducing power, DPPH[·], and ABTS⁺ radical scavenging activities were evaluated. The total phenolic content was determined as 84.10 mg GAE, and the total flavonoid content as 13.18 mg QE equivalents. These findings scientifically validate the traditional use of *A. rupicola* subsp. *rupicola* and highlight its potential as a promising source for future phytopharmacological applications.

References

- [1] Kıvanç, M.R. (2022). BEÜ J. Sci., 11(2), 574–585. doi:10.17798/bitlisfen.1061984
- [2] Özok, N., & Güneş, İ. (2019). BEÜ J. Sci., 8(3), 866–874.
- [3] Demiray, H., Demirci, B., & Yıldırım, H. (2024). Med., 14(1), 97–102. doi:10.31020/mutftd.1370658
- [4] Tofighi, Z., Shahpar, Y., Taheri, A., Tavakoli, S., Asatouri, R., et al. (2021). J. Med. Plants, 20(79), 14–23. doi:10.52547/jmp.20.79.14

Immobilization, Characterization, and Enhanced Stability of Carbonic Anhydrase Enzyme on Iron Oxide Magnetic Nanoparticles

¹Muhammet FIRAT, ^{2*}Şükrü BEYDEMİR, ³Mesut IŞIK, ⁴Alev AKPINAR BORAZAN

¹ Department of Chemistry, Faculty of Arts and Science, Cukurova University, Adana, Türkiye

² Department of Chemistry, Graduate Education Institute, Ağrı İbrahim Çeçen University, Ağrı, Türkiye

³ Department of Chemistry, Faculty of Arts and Science, İnönü University, Malatya, Türkiye

⁴ Vocational School of Health Service, İnönü University, Malatya, Türkiye

⁵ Ağrı İbrahim Çeçen University, Ağrı, Türkiye

ABSTRACT

The use of enzymes as biocatalysts in in vitro systems has greatly expanded their potential and applications across various biotechnological fields, including the pharmaceutical and food industries. However, the industrial application of free enzymes in soluble form is often limited due to challenges such as their inability to be easily recovered and reused. To enhance the economic feasibility and broaden the application potential of enzymes, enzyme immobilization has become one of the most widely adopted strategies [1]. One of the main advantages of immobilization is the expected improvement in the storage and operational stability of the enzyme molecules. Although carbonic anhydrase (CA) is commercially available, its direct use in free form is not recommended because of its high cost and the difficulty of recovering and reusing it from the reaction medium [2]. In this study, bovine carbonic anhydrase (BCA) enzyme was purified with a yield of 83.42% using the Sepharose 4B-L-tyrosine sulfanilamide affinity chromatography method. Subsequently, the support material was synthesized for immobilization. In the synthesis of the support material ($\text{Fe}_3\text{O}_4\text{-NH}_2$), magnetic nanoparticles (MNP) were functionalized with an amino group (NH_2) using 3-aminopropyl triethoxysilane (APTES). The support materials were characterized by FT-IR, SEM-EDX, and VSM before and after immobilization. The kinetic parameters of free BCA, K_m and V_{max} , were 4.888 mM and 3.081 EU mL⁻¹, respectively, while the K_m and V_{max} values for the enzyme bound to the support material were determined to be 9.369 mM and 1.810 EU mL⁻¹, respectively. To determine operational stability, immobilized enzymes retained 73% of their activity after 20 reuses.

Acknowledgement: This work was supported by TUBİTAK (124Z108).

References

- [1] P. C. Sahoo, Y. N. Jang, ve S. W. Lee, "Immobilization of carbonic anhydrase and an artificial Zn(II) complex on a magnetic support for biomimetic carbon dioxide sequestration", *J Mol Catal B Enzym*, c. 82, ss. 37–45, 2012.
- [2] M. Vinoba, M. Bhagiyalakshmi, S. K. Jeong, S. C. Nam, ve Y. Yoon, "Carbonic anhydrase immobilized on encapsulated magnetic nanoparticles for CO₂ sequestration", *Chem - A Eur J*, c. 18, sayı 38, ss. 12028–12034, 2012.

ID: POSTER-21

Isolation and Molecular Characterization of Potential Zinc-Solubilizing Bacteria from Agricultural Areas in Ağrı Province

Lalizer Kızıldağ Kaya ¹, Kubilay Seven ¹, Aysin Demir ¹, Yüksel Dil ², [Burak Alaylar](mailto:BurakAlaylar@agri.edu.tr) ¹

¹ Department of Molecular Biology and Genetic, Faculty of Arts and Sciences, Agri Ibrahim Cecen University, Agri, Türkiye, balaylar@agri.edu.tr
Orcid ID: 0000-0001-6737-3440

² Institute of Natural and Applied Sciences, Ataturk University, Erzurum, Türkiye, yuxel61@hotmail.com
Orcid ID: 0000-0002-2238-061X

ABSTRACT

Zinc (Zn) is an essential micronutrient in plants that plays a crucial role in numerous biological processes, and its deficiency results in various metabolic disorders. In the present study, rhizospheric soil and plant root samples were aseptically collected from different agricultural regions of Ağrı Province, Türkiye, at depths of up to 15 cm for the isolation of potential zinc-solubilizing bacteria. The samples were suspended in sterile physiological saline, and serial dilutions were prepared. The resulting dilutions were spread onto Nutrient Agar (NA) plates. Colonies exhibiting distinct morphological characteristics were selected and re-streaked on NA to obtain pure cultures. After incubation, a total of 49 pure bacterial isolates were obtained and preserved at –86 °C for subsequent analyses. To evaluate the plant growth-promoting (PGP) traits of the bacterial isolates—such as nitrogen fixation, phosphate solubilization, and zinc solubilization—the isolates were screened, and those exhibiting the highest activity levels were selected for molecular identification. Based on DNA extraction, PCR amplification, gel electrophoresis, and sequencing analyses, ten bacterial strains belonging to the genera *Acinetobacter*, *Bacillus*, *Pantoea*, and *Pseudomonas* were identified and subsequently deposited in the NCBI GenBank® database.

Acknowledgement: This work was supported by The Scientific and Technological Research Council of Türkiye (TUBİTAK) 2209-A project.

Effects of Triacantanol on Apoplastic Antioxidant System in Wheat Seedlings Under Raxil Fungicide

D. Tiryaki¹, B. Tosun², G. Karadayi², I. Colak², and M. Gulluce¹

¹*Ataturk University, Biology, Erzurum, Turkiye,*

²*Ataturk University, Molecular Biology and Genetics, Erzurum, Turkiye,*

ABSTRACT

Triacantanol (TRIA), a natural plant growth regulator, is widely used in large areas, covering millions of hectares of land, to increase agricultural productivity. In our study, to investigate the effects of TRIA on the resistance of Raxil fungicide to the harmful effects, bread wheat (*Triticum aestivum* L. Ayyıldız) seeds were planted in petri dishes containing Raxil (15, 30, 60 g/L). After germination, TRIA (10, 20 and 40 μ M) was sprayed on the leaves on the 7th day, and the plants were harvested on the 10th day. Antioxidant enzyme activities such as catalase (CAT), peroxidase (POX), and superoxide dismutase (SOD), as well as lipid peroxidation (LPO) level and H₂O₂ amount, were determined in the harvested plant samples. When the results were evaluated, TRIA administration generally increased enzyme activities, while Raxil administration generally decreased them. When TRIA and Raxil were administered together, activity varied depending on the dose. Raxil increased MDA content, while TRIA administration decreased it. A general decrease in H₂O₂ content was observed.

In conclusion, while Raxil and similar fungicides are indispensable tools for disease control in modern agriculture, their uncontrolled and widespread use poses various risks. So, our study has attempted to minimize the risks posed by Raxil .