KİMYAGERLER DERNEĞİ

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AKSARAY ÜNİVERSİTESİ 2006

İhsan Doğramacı Bilkent Üniversitesi Bilkent 1984

ATÜ

unam excellence in science and technology

5EBAT

EURASIA BIOCHEMICAL APPROACHES & TECHNOLOGIES CONGRESS

2-5 NOVEMBER 2023 ANTALYA

ABSTRACT BOOK

Dear Participants and Colloquies,

We are honored and pleased to announce the organization of the **5th Eurasia Biochemical Approaches & Technologies (EBAT) Congress** on behalf of the Organizing Committee and the Turkish Chemists Society. This congress is a collaborative effort involving İnönü University, Aksaray University, Bilkent University, and Adana Alparslan Türkeş Science and Technology University.

The primary objective of the 5th EBAT Congress is to bring together academic and industrial researchers from around the world who share an interest in various disciplines related to biochemistry. This year, our congress will focus on key topics such as "Biomaterials, Enzyme Technologies, Nanotechnologies, Biosensors, Protein Purification Technologies, and Bioengineering." Additionally, fundamental research contributions are also welcome.

Overall, the 5th EBAT Congress will provide a dynamic exchange opportunity for ideas and experiences between scientists taking the needs and expectations of the industry into consideration. A panel of worldwide known key speakers will take part, providing an exciting atmosphere to discover the advancement in biochemical technologies.

This year, we had participants from Algeria, Denmark, Egypt, England, France, Germany, Iran, Italy, Malaysia, Spain, Sweden, Pakistan, and Türkiye.

Ten invited speakers and more than two hundred fifty researchers have contributed with their presentations, discussions and active participations about every part of the conference. Part of the abstract submissions of our convention participants will be provided with the opportunity to present a full text article in the special issue of Molecular Catalysis.

On behalf of the organizing committee, we would like to thank you all for joining us and contributing to the success of the EBAT 2023.

We also greatly acknowledge also our distinguished companies starting with our Main Sponsor **MedSan Tek , Dr. Zeydanlı, Metrohm, Ant Teknik, Altium, NEST, Anton Paar,** and our supporters, **Hakan Medikal, Atabay, Chromascience, Life-Biotek, Ekspo-Farma, İnterlab, TUBİTAK and İnönü University.**

Apart from these, we especially thank to Organizing Committee who have spent their energy for the success of this meeting. We want to thank Amara Luxury Resort (Göynük, Kemer, Antalya/Turkey) for their excellent services.

Best wishes
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Prof. Mehmet ODABAŞI (Vice Chairman)
Prof. Prof. Gözde BAYDEMİR PEŞİNT (Vice Chairman)
Assoc.Prof. Fatih İNCİ (Vice Chairman)

November 2023

5EBAT
EURASIA BIOCHEMICAL APPROACHES& TECHNOLOGIES CONGRESS
2-5 NOVEMBER 2023 ANTALYA

5th EBAT Congress was supported by TUBITAK with 2223-B Support Program for Scientific Activities

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5th EURASIA BIOCHEMICAL APPROACHES & TECHNOLOGIES CONGRESS SCIENTIFIC PROGRAMME

November 02, 2023 Thursday		
13:00-17:00	**Registration**	***Registration Desk***
17:00-17:30	**Convention II**	
	Opening Ceremony	
Session 1 – Chair: Prof. İsmet Yılmaz		***Convention II***
17:30-18:05	**Invited Speaker (IS1) : Prof. Arzum Erdem Gürsan**	
	Electrochemical Nucleic Acids Biosensors with The Recent Applications	
18:05-18:20	**Oral Presentation (OP1): Özgecan Erdem**	
	Determination of Multiple Bacteria on Plasmonic Surfaces	
18:20-18:35	**Oral Presentation (OP2) : Okan Zenger**	
	Designing of L-Proline Specific Nanoparticles	
19:00	**Dinner**	

November 03, 2023 Friday

Session 2 – Chair: Prof. Ahmet Çolak	*Convention II*
09:00-09:35	**Invited Speaker (IS2) : Prof. Roberto Fernandez-Lafuente**
	Enzyme Co-Immobilization: Advantages, Necessity, Problems and Solutions
09:35-09:50	**Oral Presentation (OP3) : Mohd Shukuri Mohamad Ali**
	Molecular Expression and Immobilization of Hormone-Sensitive Lipase Like Esterase from *Glaciozyma antarctica*
09:50-10:05	**Oral Presentation (OP4): Sevgi Balcıoğlu**
	Immobilization of α-amylase onto Electrospun PCL/CHI Nanofibers
10:05-10:20	**Oral Presentation (OP5): Kübra Aslan**
	Microbial Phenazines as Potential Enzyme Inhibitors for Metabolic Diseases: Fermentative Production, Kinetic and Docking Studies
10:20-10:35	**Oral Presentation (OP6): Roukia Benyammi**
	Biochemical Profile of *In Vitro* Regenerated and *In Vivo* Grown *Lavandula stoechas* Plants
10:35-10:55	**Coffee Break**
Session 3 – Chair: Dr. Nihal Engin Vrana	***Convention II***
10:55-11:30	**Invited Speaker (IS3) : Assoc. Prof. Ilaria Palchetti**
	Microfluidic Procedures for The Electrochemical Biosensing of Isothermally-Amplified DNA
11:30-11:45	**Oral Presentation (OP7): Dilek Çam Derin**
	Dot Blot Assay for Rapid Detection of SARS-CoV-2
11:45-12:00	**Oral Presentation (OP8) : Abeer Alesknd rany**
	FTIR and DSC Investigations of The Inclusion of L-T3 in SM Model Membranes
12:00-12:15	**Oral Presentation (OP9): Burhan Bora**
	In vitro Selection of DNA Aptamers Against Hazelnut Allergen Protein Cor a 11
12:15-12:30	**Company: MSc. Elif Nihan Çetin (MedSanTek)**
	New Generation Solutions at Western Blot

12:30-13:00	**Workshop: New Generation Solutions at Western Blot (MedSanTek)**	
13:00-14:00	**Lunch**	
Session 4 – Chair: Assoc. Prof. Ilaria Palchetti		***Convention II***
14:00-14:35	**Invited Speaker (IS4) : Assist. Prof. Esra Akbay**	
	Development of Immunogenic Autochthonous Mouse Lung Cancer Models to Study Immune Resistance in Lung Cancer	
14:35-14:50	**Oral Presentation (OP10) : Kerem Tok**	
	Exploring the Potentiality of Endogenous Bioactive Peptides from Barley (*Hordeum vulgare L.*) Sprouts and Their Beneficial Role on Diabetes and its Complications	
14:50-15:05	**Oral Presentation (OP11) : Neşe Başak Türkmen**	
	Effect of Beta-Glucan on Oxidative Stress, Inflammation, Hormonal and Histopathological Changes in Dehydroepiandrosterone-Induced Polycystic Ovary Syndrome	
15:05-15:20	**Oral Presentation (OP12) : Mariam Kavakci**	
	Thiol-Disulfide Homeostasis in Neuromuscular Diseases: A Preliminary Study	
15:20-15:45	**Coffee Break**	
Session 5 – Chair: Prof. Lokman Uzun		***Convention I***
15:45-16:20	**Invited Speaker (IS5) : Assist. Prof. Ezgi Karaca**	
	Artificial Intelligence Revolution in Structure-Based Drug Design	
16:20-16:35	**Oral Presentation (OP13) : Sidar Bereketoglu Nergis**	
	Evaluation of DNA Methylation Analyzes in the Context of Oocyte Reprogramming	

16:35-16:50	**Oral Presentation (OP14): Emrah Dikici**	
	Preparation of Dipeptide-Based Nanoparticles and Their Cellular Interactions	
16:50-17:05	**Oral Presentation (OP15): Canbolat Gürses**	
	The Effectiveness Investigation of Some Apricot Cultivars on Endoplasmic Reticulum Stress in Different Cancer Cells	
17:05-17:20	**Coffee Break**	
	Short Oral Presentation	**Short Oral Presentation**
	Chair 1: Prof. Hatice Kaplan Can Chair 2: Assoc. Prof. Ahu Arslan Yıldız	**Chair 1: Prof. Burak Derkuş Chair 2: Assist. Prof. Nur Mustafaoğlu**
	Convention II	***Convention I***
17:20-17:25	**Oral Presentation (OP35): Mohd Shukuri Mohamad Ali**	**Oral Presentation (OP53): Kazım Köse**
	Structural and functional determination of an Aquaporin from *Antarctic Pseudomonas sp.*	Multi-Adsorption with Eupergit CM
17:25-17:30	**Oral Presentation (OP36): Kübra Turan**	**Oral Presentation (OP54): Ömür Acet**
	Electrochemical Aptasensor for tThe Detection of Cardiac Troponin T: The Diagnosis of Acute Myocardial Infarction	IMAC Application of Extracellular Polymeric Substances Doped Composite Membranes for α-Amylase Separation and Kinetic Studies
17:30-17:35	**Oral Presentation (OP37): Yusuf Aslan**	**Oral Presentation (OP55): Aleyna İtmeç**
	Hybrid Biosensing Systems for Detecting Biomolecules and Alzheimer's Disease Biomarkers	Removal of Chromium From Wastewater Using Chromium Imprinted Polymer
17:35-17:40	**Oral Presentation (OP38): Hussain Kawsar Chowdhury**	**Oral Presentation (OP56): Ayşegül Akı**
	Towards A Cost-effective Point-of-care Capacitive System for Rapid Antibiotic Susceptibility Testing	Comparison of The Antifungal Effects of Cinnemaldehyde Microencapsulation with Different Polymers in Tomato Paste

17:40-17:45	**Oral Presentation (OP39): Didem Tuncay**	**Oral Presentation (OP57): Demet Kızıl**
	A Laccase-Based Amperometric Biosensor for The Determination of Total Phenolic Content	Struggle Meadow Moth via ACHE Inhibition with Some Plant Extracts
17:45-17:50	**Oral Presentation (OP40): İmren Özcan**	**Oral Presentation (OP58): Emre Ece**
	Development of Selective Electrodes for The Determination of Vitamin D in Physiological Fluids	Fabrication and Characterization of Cryogel Microneedles for Drug Delivery Applications
17:50-17:55	**Oral Presentation (OP41): Alper Baran Sözmen**	**Oral Presentation (OP59): Nedim Hacıosmanoğlu**
	Nanoparticle Property Tuning Methodologies for LSPR-based Biosensor Applications	Isolating Membrane Vesicles of Microbiota Pathogens with 3D printed Microfiltration Platforms for Non-invasive Disease Diagnostics
17:55-18:00	**Oral Presentation (OP42): Elif Burcu Aydın**	**Oral Presentation (OP60): Emine Büşra Kaplan**
	Magnetic Nanoparticle-Based Biosensor System for Monitoring of Active and Passive Smoking	Production of Eco-Friendly Biodegradable Food Packaging Based on Carboxymethyl Cellulose Containing Spirulina and Hyaluronic Acid
18:00-18:05	**Oral Presentation (OP43): Tuba Tarhan**	**Oral Presentation (OP61): Hilal Özçelik**
	Synthesis of Drug Loaded Magnetic Nanocomposite and Investigation of Cytotoxic Properties	Removal of Chromium From Wastewater Using Anyonic Nanopolymer
18:05-18:10	**Oral Presentation (OP44): Murat Güngen**	**Oral Presentation (OP62): Dilşad Taydaş**
	Electrical Impedance Based Detection of Positive and Negative LAMP Tests for Point-of-Care Testing	Synthesis of Janus Micromotors for Potential Biomedical Approaches

18:10-18:15	**Oral Presentation (OP45): Oğuzhan Durmaz**	**Oral Presentation (OP63): Kader Kelle**
	Cardiopulmonary Bypass and Hypothermia-Induced Alterations in Plasma Metabolome Profile in Adult Cardiac Surgery	Development of Antibacterial CMC (carboxymethyl cellulose) - SA (sodium alginate) Based Hydrogel Films as A Potential Candidate for Wound Dressing
18:15-18:20	**Oral Presentation (OP46): Rabia Cankul Kerek**	**Oral Presentation (OP64): Nermin Gündüz**
	Exploring New Drug Candidates for Antimicrobial Resistance in *Pseudomonas aeruginosa* Through Integration of Transcriptome Data and Genome-Scale Metabolic Model	Development of Ribociclib Loaded Polycaprolactone (PCL)/Chondroitin Sulfate (CS) Nanofiber as Transdermal Drug Delivery Systems
18:20-18:25	**Oral Presentation (OP47): İlke Karakaş**	**Oral Presentation (OP65): Florian Seier**
	Production of Microbial Pigment from Whey	*Liquid-Crystal-Tunable-Filter and Imaging-Based Localized Surface Plasmon Resonance Spectrometry Utilizing DNA-Based Recognition Elements*
18:25-18:30	**Oral Presentation (OP48): Eda Günay**	**Oral Presentation (OP66): Meryem Damla Özdemir Alkış**
	The Physiological and Biochemical Effects of Nitric Oxide and Brassinosteroid on Two Wheat Varieties Under Drought Stress	Development of A 3D Glioblastoma Cell Culture Model using pHEMA-Gelatin Cryogels for Improved Biological Understanding
18:30-18:35	**Oral Presentation (OP49): Arın Öztürmen**	**Oral Presentation (OP67): Betül Eken**
	Synthesis of Novel Phthalocyanines and Their Usage as a Catalyst in the Photooxidation of Benzyl Alcohol	Preparation and Characterization of Polycaprolacton (PCL)/Resistant Starch (RS) Nanofibers as Probiotic Carrier

18:35-18:40	**Oral Presentation (OP50): Ulviye Kilimci**	**Oral Presentation (OP68): Defne Çığ**
	Investigation of The Usage of The Lipase Attached Micromotors For Degradation of Oils as Water Contaminant	MicroRNA-Based Drug Repositioning Revealed Candidate Drugs for Abdominal Aortic Aneurysm
18:40-18:45	**Oral Presentation (OP51): Baha Öndeş**	**Oral Presentation (OP69): Mehmet Kuzucu**
	Development of The Tyrosinase Enzyme Modified Multisegmental Nanowire Biosensor for Determination of Bisphenol A	Synergistic Effects of *Cynara scolymus* Leaf Extract and Sorafenib on Polyamine Metabolism in HepG2 Hepatocellular Carcinoma Cells
18:45-18:50	**Oral Presentation (OP52): Burcu Eren Yüngeviş**	**Oral Presentation (OP70): Burcu Önal Acet**
	Preparation of L-Proline Imprinted Nanoparticle Based Surface Plasmon Resonance Sensors for L-Proline Detection	Preparation and Characterization of Dipeptide-Based Nanomaterials for Their Potential Cellular Interactions
18:50-20:00	**Poster Presentations (PP01-PP78 and OP35-OP104)**	***Convention II***
20:00	**Dinner**	

November 04, 2023 Saturday

Session 6 – Chair: Prof. Metin Sitti	*Convention II*
09:00-09:35	**Invited Speaker (IS6) : Prof. Hilmi Volkan Demir**
	Semiconductor Nanocrystal Optoelectronics with Colloidal Quantum Dots to Wells: Pushing The Limits, Breaking Records
09:35-09:50	**Oral Presentation (OP16) : Münevver Tuna Genç**
	Effective Hydrogen Evolution by Using Bio-templated Rare Earth Element Doped Photocatalysts
09:50-10:05	**Oral Presentation (OP17): Ebru Akdoğan**
	Enhancing The Natural Lifecycle of Bioplastics: Plasma Technology as An Eco-Friendly Solution
10:05-10:20	**Oral Presentation (OP18): Eylül Gülşen Yılmaz**
	Microfluidic Chip-Based Systems for Monitoring Cancer Therapy
10:20-10:35	**Oral Presentation (OP19): Seda Demirel Topel**
	Investigating Singlet Oxygen Generation in Titanium Dioxide Nanoparticles Decorated with 2,6-Diiodo-Boron-Dipyrromethene Molecules
10:35-10:55	**Coffee Break**
Session 7 – Chair: Prof. Arzum Erdem Gürsan	***Convention II***
10:55-11:30	**Invited Speaker (IS7) : Dr. Ecevit Yılmaz**
	Development of Commercial Resins for Food Purifications
11:30-11:45	**Oral Presentation (OP20) : Burhan Beycan**
	Revolutionizing Textile Properties: A Study on The Electrospinning of Biocompatible Polymer Blend onto Cotton Fabric
11:45-12:00	**Oral Presentation (OP21) : Pırıl Arısoy**
	Development of Angiotensin (II) Imprinted Nanoparticles
12:00-12:15	**Oral Presentation (OP22): Zaib un Nisa Mughal**
	Development of MIP Based Graphene Oxide Substrate for Detection of Melamine in Milk

12:15-12:30	**Oral Presentation (OP23): Pinar Cakir Hatir**	
	Molecularly Imprinted Polymer Nanoparticles from Renewable Recourses for Protein Recognition	
12:30-14:00	**Lunch**	
Session 8 – Chair: Prof. Roberto Fernandez Lafuente		***Convention II***
14:00-14:35	**Invited Speaker (IS8) : Prof. Metin Sitti**	
	Light-, Magnetically- and Acoustically-Driven Active Microparticles for Targeted on-Demand Drug Delivery	
14:35-14:50	**Oral Presentation (OP24): Andrea Csáki**	
	Plasmonic Nanosensors for Diagnostics	
14:50-15:05	**Oral Presentation (OP25): Ahu Arslan Yıldız**	
	Utilization of Magnetic Levitation Technology in Biosciences	
15:05-15:20	**Oral Presentation (OP26): Beyza Nur Küçük**	
	Smart Material-Integrated Nanoparticles for Capturing and Releasing Circulating Tumor Cells On-a-Chip	
15:20-15:35	**Oral Presentation (OP27): Burak Derkuş**	
	Impact of Distinct Bacterial Populations on Brain Organoid Phenotype	
15:35-16:00	**Coffee Break**	
	Short Oral Presentation	**Short Oral Presentation**
	Chair 1: Prof. Nalan Özdemir **Chair 2: Assoc. Prof. Kazım Köse**	**Chair 1: Prof. Şebnem Selen İşbilir** **Chair 2: Assoc. Prof. Dilek Alagöz**
	Convention II	***Convention I***
16:00-16:05	**Oral Presentation (OP71): Çağdaş Sunna**	**Oral Presentation (OP88): Melek Çöl Ayvaz**
	Label-Free Immunosensor Based on AuNPs-Fullerene Nanocomposites for Ovarian Cancer Antigen CA-125 Detection	Evaluation of the Cosmeceutical Potential of Essential Oils of Five Algerian Plants

16:05-16:10	**Oral Presentation (OP72): Ahmet Çetin**	**Oral Presentation (OP89): Semih Latif İpek**
	Catalyzing Neuroprotection: Iron Nanoparticles Modified with Deinoxanthin in A Parkinson's Disease Cellular Model	Investigating the Cytotoxic Effects of Astaxanthin Isolated from *Blakeslea trispora* on Glioblastoma Cells
16:10-16:15	**Oral Presentation (OP73): Okan Zenger**	**Oral Presentation (OP90): Ece Kaya**
	Development of a 3D Neuroblastoma Cell Culture Model Using pHEMA-Gelatin Cryogel Scaffolds	Valorization of Grape Juice Wastes to Produce Citric Acid by *Aspergillus niger*
16:15-16:20	**Oral Presentation (OP74): Gamze Dik**	**Oral Presentation (OP91): Okan Acar**
	Preparation of Peroxygenase-Loaded Sodium Alginate Beads by Electrospraying Method: Characterization and Effect on Catalytic Activity	Effect of Different Concentrations of Hydrogen Sulfide Treatment on Antioxidant Capacity in Barley Under Drought Stress
16:20-16:25	**Oral Presentation (OP75): Münevver Müge Çağal**	**Oral Presentation (OP92): Selahattin Karacan**
	Halopteris Scoparia: Biosynthesis of Silver Nanoparticles and Determination of Its Antibacterial Activity	Neuroprotective Potential of *Asparagus officinalis* L. Extracts on Rotenone-Induced Parkinson's Disease Model in SH-SY5Y Cells
16:25-16:30	**Oral Presentation (OP76): Aykut Özgür**	**Oral Presentation (OP93): İdris Ayhan**
	The Genes That Carry Key Mutations in Breast Cancer	Effects of Taurine on 2,3,7,8-Tetrachlorodibenzo-p-Dioxin-Induced Oxidative Stress in the Hearts of Rats

16:30-16:35	**Oral Presentation (OP77): Zeliha Esra Çakmak**	**Oral Presentation (OP94): Mehmet Sait Yılmaz**
	Production of Polymeric Nanofiber Membranes Containing Plant Extract and Investigation of Their Potential in Wound Healing	Investigation of Exosome and miRNA Content as A Potent Marker of Colon Cancer for Early Diagnosis
16:35-16:40	**Oral Presentation (OP78): Hacer Kurt**	**Oral Presentation (OP95): Müge Teker Yıldız**
	Investigation of Antibacterial Activities of Metal Nanoparticle-Loaded Copper Sulfides	Biochemical Responses of Two Bacteria Isolated from Çanakkale Coastal Zone on Barley Under Salt Stress
16:40-16:45	**Oral Presentation (OP79): Ayşe Demirbaş**	**Oral Presentation (OP96): Soumeya Krimat**
	Investigation of Antibacterial Activities of Copper Antimony Sulfides with Rod and Dot Structures	Chemical Composition, Antioxidant and Antimicrobial Properties of Essential Oil Extracted from *Satureja candidissima (Munby) Briq.*
16:45-16:50	**Oral Presentation (OP80): Büşra Bakar**	**Oral Presentation (OP97): Hatice Palüzar**
	Immobilization of Xylanase on Chitosan Nanoparticles: A Robust Nanobiocatalyst for Juice Clarification	Investigation of Inhibition Kinetics of Various Plant Extracts on Polyphenol Oxidase Enzyme from *Paulownia Tomentosa* and Binding Mechanism by Molecular Docking
16:50-16:55	**Oral Presentation (OP81):**	**Oral Presentation (OP98): Nihan Günay**
		Combined Neuroprotective Effects of L-DOPA and Deinoxanthin on Dopaminergic SH-SY5Y Cells Exposed to Rotenone: Implications for Parkinson's Disease
16:55-17:00	**Oral Presentation (OP82): Tuğçe Özcan**	**Oral Presentation (OP99): Ayten Burcu Efe**
	Antibacterial Effect of ZnPc/TiO_2 on *E. coli* and *S. aureus* Bacteria	Investigation of The Potential Contribution of Beta Carotene in the Treatment of Glioblastoma

17:00-17:05	**Oral Presentation (OP83): Begüm Başbuğ**	**Oral Presentation (OP100): Ali Kuruçay**
	Preparation and Characterization of Biocompatible Materials From Keratin-based Nanofibers by Electro-Spinning Method	Phenylboronic Acid Functional N-Heterocyclic Carbene Precursors: Synthesis, Characterization, DNA Binding, Anticancer Activities, Inhibitory Properties Against Acetylcholinesterase and Xanthine Oxidase
17:05-17:10	**Oral Presentation (OP84): Demet Erdonmez**	**Oral Presentation (OP101): Seda Ağçam**
	Effects of *Aronia melanocarpa* L. Fruit Extract on Oral Pathogen Biofilms such *S. mutans* and *E. faecalis*	The Investigation of Phenolic Components and Antioxidant Activities of Wild Olive Variety "Delice" in Winter and Summer Seasons
17:10-17:15	**Oral Presentation (OP85):**	**Oral Presentation (OP102):**
17:15-17:20	**Oral Presentation (OP86): Ecem Çiçek Kocabaş**	**Oral Presentation (OP103): Zehra Gül Morçimen**
	Development of pH-sensitive Bacterial Cellulose Nanofiber Wound Dressings for Wound Monitoring	Macrophage Polarization and Its Role in Apoptotic Neural Recovery
17:20-17:25	**Oral Presentation (OP87): Tuğba Aygün**	**Oral Presentation (OP104): Ünzile Keleştemur**
	Synthesis of Tyrosinase Immobilized Metal-Organic Frameworks (MOFs) For Use in The Removal Of Phenolic Compounds	Investigation of Cytotoxic/Apoptotic Effects Different Species of Apricot in Malatya
17:30-19:30	**Poster Presentations (PP01-PP78 and OP35-OP104)**	***Convention II***
19:30	**Dinner**	

November 05, 2023 Sunday

Session 9 – Chair: Dr. Ecevit Yılmaz	*Convention I*
09:00-09:35	**Invited Speaker (IS9) : Dr. Desiree Gül**
	Mechanisms of Toxicity at Nanomaterial-Biological Interfaces
09:35-09:50	**Oral Presentation (OP28): Ümit Hakan Yıldız**
	Study of Penetration Systematic of Cationic Conjugated Polymer Dots in Blood-Brain Barrier Model
09:50-10:05	**Oral Presentation (OP29): Hakan Erdoğan**
	Bio-inspired Nanoparticle Approach to Plasmonic Phototherapy Based Drug Release Application
10:05-10:20	**Oral Presentation (OP30): Sahar Porrang**
	Extraction of Highly Pure, Economically Viable, and Scalable Biogenic Mesoporous Silica Nanoparticles (MSNs) from Biosources: Ideal Nanocarriers for Drug Delivery Applications
10:20-10:35	**Company: Hülya Kayandan (Tolkim)**
	Effective Solutions for The Active First Aid Management of Chemical Accidents
10:35-10:55	**Coffee Break**
Session 10 – Chair: Dr. Desiree Gül	***Convention I***
10:55-11:30	**Invited Speaker (IS10) : Dr. Nihal Engin Vrana**
	The Use of Supramolecular Systems in Medical Applications and Their Risk Assessment Using Advanced Characterisation Tools
11:30-11:45	**Oral Presentation (OP31): Yeşeren Saylan**
	Designing Spatial Fingerprints of Exosomes on A Nanoparticles for Diagnosing Breast Cancer on An Optical Biosensor
11:45-12:00	**Oral Presentation (OP32): Elif Gündüz**
	The Advantages of The Aptamer Usage in Lateral Flow Assays for Viral Detection

12:00-12:15	**Oral Presentation (OP33): Merve Durmuş**
	Collagen-Cu(II) Hybrid Nanoflowers: Chip and Alternative Biomaterials for Epinephrine Detection
12:15-12:30	**Oral Presentation (OP34): Hichem Moulahoum**
	Surface Modification of Screen-Printed Electrodes (SPE) with An Ionic Liquid-Hydrogel Hybrid Material for Electrochemical Detection of Illicit Drugs
12:30-13:30	**Closing Session**
	Awards for Poster Presentation
	Closing Ceremony

Poster Presentation

PP01	
PP02	Batuhan Göç
	Boric Acid Loaded Carboxymethylcellulose/N-succinylchitosan Hydrogels as A Intracanal Medicament: Contact Angle on Dentine Surfaces and Boron Delivery in Physiological Media
PP03	
PP04	Hasret Tolga Şirin
	Protein Adsorption Behavior on Laser Patterned Titanium Surfaces
PP05	Gözde Aydoğdu Tığ
	Fabrication of A Flexible and Sustainable Hand-Made Electrochemical Sensing Platform
PP06	İhsan Alacabey
	Removal of Pharmaceutical Micropollutant Ciprofloxacin with Activated Carbon
PP07	Cenk Erdoğan
	Antifouling and Antıcorrosion Performances of ZnO, TiO_2 and SiO_2 Nanoparticles Containing Polypyrrole-Coated Steel Surfaces in The Marine Environment
PP08	Yomna Soliman
	Human Bone Marrow-Mesenchymal Stem Cells Differentiation into Brain-Like Endothelial Cells
PP09	Yeşim Erdoğan
	Efficient Differentiation of Mesenchymal Stem Cells into Endothelial Cells Induced by Endothelial Cells Conditioned Medium

PP10	**Nafisa Tanjia**
	The Influence of Cobalt Chloride on the Differentiation of Brain Microvascular Endothelial Cells from Induced Pluripotent Stem Cells
PP11	**Zeynep Doğan**
	Differentiation of Mesenchymal Stem Cells into Brain-Like Endothelial Cells
PP12	**Gülşah Sevimli**
	Mesenchymal Stem Cells' Neuronal Differentiation and Their Functional Assessment with Multielectrode Array
PP13	**Meryem Damla Özdemir Alkış**
	Cytotoxic Effect of β-Caryophyllene on Pancreatic Cancer Cells: An Investigation of Potential Therapeutic Applications
PP14	**Fatmanur Yazıcı**
	The Effect of Water Soluble Metallophthalocyanines on α-Glucosidase Activity
PP15	**Fatmanur Yazıcı**
	Interaction of Water Soluble Metallophthalocyanines with DNA and Their α-Glucosidase Inhibition Potentials
PP16	**Ömer İrfan Küfrevioğlu**
	Determination of The Inhibition Effects of Some Newly Synthesized Schiff Bases on Lipoxygenase Enzyme Activity Quinoa (*Chenopodium Quinoa Willd*.)
PP17	**Ömer İrfan Küfrevioğlu**
	Purification of Glutathione S-Transferase Enzyme From Human Erythrocytes, Investigation of The Effects of Some Carbazole Derivatives on Enzyme Activity
PP18	**Fevzi Topal**
	Assessment of Anticholinergic Properties of Some Schiff Base Metal Complexes
PP19	**Fevzi Topal**
	Synthesis and Antioxidant Capacity of Some Metal Complexes

PP20	**Tunca Karasu**
	Conjugated Conducting Polymer Based Impedimetric Human Chorionic Gonadotropin (hCG) Aptasensor
PP21	**Semih Latif İpek**
	L-Asparaginase: Production and Applications in Pharmaceuticals and The Food Industries
PP22	**Sedat Odabaş**
	Bioinks from Decellularized Tissues: Expertise of bteLAB
PP23	**Şükrü Kaan Konaklı**
	Decellularized Cabbage and The Material Characterization
PP24	**Gülderen Karakuş**
	Investigation of The Relationship between The Chemical Structures and The Cytotoxicity of Some Maleic Anhydride-Containing Copolymers as Polymeric Drug Carriers
PP25	**Kübra Işık**
	Partial Purification of Glutathione Reductase Enzyme from Gill Tissue of Bonito (*Sarda sarda*) Fish and Examination of Its Inhibition Kinetics
PP26	**Kübra Işık**
	Purification of Glutathione Reductase Enzyme from Whiting Fish Liver Tissue and Investigation of Metal Inhibition
PP27	**Barış Can Körükçü**
	Comparison of Pesticide Loads and Degradation Potentials of *Punica granatum L.* Samples Collected from Two Different Regions in The South Aegean
PP28	**Barış Can Körükçü**
	Determination of Pesticide Residue Levels in *Citrus limon* L. Samples by Tandem Mass Spectrometry Multiple Reaction Monitoring (MRM) Method
PP29	**Çağrı Tartan**
	Investigation of Hydrophobicity and Microbial Activity of Boron Containing Nano Coatings

PP30	**Nagihan Saglam Ertunga**
	Investigation of DNA Binding Properties and Antidiabetic Effect of A New Water-Soluble Nonperipheral Zn(II) Phthalocyanine Complex and *in silico* Computational Studies
PP31	**Burcu Akar**
	Cyclodextrin and Halloysite Based Nanosponges for Enhanced Drug Carrier
PP32	**Roukia Benyammi**
	Enhancing Micropropagation and Secondary Metabolite Production in *Lavandula dentata* for Therapeutic and Cosmetic Applications
PP33	**Gülin Baran**
	Glioblastoma-Blood-Brain-Barrier-On-A-Chip
PP34	**Maryam Atabay**
	Investigating Interactions between Exosome and Polymeric Matrix: An *in silico* Study
PP35	**İlyas Özçiçek**
	Design of Micro/Nano-Patterned and Conductive PCL/PLGA Scaffolds for the Oriented Growth of Motor Neurons
PP36	**İlyas Özçiçek**
	Synthesis and Characterization of Quercetin Modified Gold Nanoparticles
PP37	**Münevver Müge Çağal**
	Development of Liposomal Juglone Formulation and Determination of Its Antibacterial Activity
PP38	**Roberto Fernandez-Lafuente**
	Step by Step Coimmobilization of Lipases with Very Different Stability using Heterofunctional Octyl Agarose Beads: Reuse of The Most Stable Immobilized Lipase to Build A New Combilipase after The Least Stable Lipase Inactivation

PP39	**Roberto Fernandez-Lafuente**
	Use of Vinyl Sulfone Activated Supports for The Step by Step Coimmobilization of Enzymes Following Different Events: Reutilization of The Most Stable and Covalently Immobilized Enzyme to Build New Combienzymes
PP40	**Hasan Özdemir**
	Purification of Lactoperoxidase Enzyme from Different Sources by Hydroxamic Acid Based Affinity Chromatography
PP41	**Merrouche Rabiaa**
	A New Dithiolopyrrolone Antibiotic Derivative Induced by Adding Cystine to The Culture Medium of Saccharothrix Algeriensis NRRL B-24137
PP42	**Merrouche Rabiaa**
	Antibacterial Activity of MD14 Strain of Streptomyces Isolated from Algerian Soil
PP43	**Mehmet Hüseyin Alkan**
	Determination of The Antiaging and Antidiabetes Effects of *Astragalus leporinus Boiss. var. hirsutus (Post) Chamberlain, A. distinctissimus Eig and A. schizopterus Boiss*. Species, Three Endemic Species Growing in Anatolia
PP44	**Mehmet Hüseyin Alkan**
	Determination of Antiaging and Antidiabetes Effects of Four *Centaurea* L. Species from Anatolia
PP45	**Meryem Topal**
	Evaluation of Antioxidant Potential of Some Schiff Base Metal Complexes
PP46	**Meryem Topal**
	Some Metal Complexes Containing Schiff Base: Synthesis and Bioactivity Study
PP47	**Gamze Kara Mağden**
	Development of A Veterinary Health Product That Accelerates Wound Healıng From Acellular Tissue-Based Biomaterials
PP48	**Muhammet Aydın**
	A Simple and Rapid Impedimetric Biosensor Modified with Magnetic Iron Oxide Nanoparticles for The Detection of Cotinine

PP49	**Almaysh Haidar Rizqullah**
	Preparation and Characterization of Exosome Imprinted Cryogels
PP50	**Melike Yıldırım Akatın**
	α-Glucosidase Inhibition Potentials of Some New Pyrazoline Derivatives
PP51	**Fulya Yoldaş**
	Recombinant Production and Characterization of ADP-Ribosyltransferase Enzyme
PP52	**Soumeya Krımat**
	Chemical Analysis and Antioxidant Effect of Essential Oils Extracted from Two Algerian Teucrium Species: *T. flavum* and *T. polium*
PP53	**Aleyna Tecer**
	Investigation of Shielding Properties of Conductive Cotton Composite Fabric Materials Against Electromagnetic Waves
PP54	**Sude Yılmaz**
	Repurposing Biotech Waste: Production of Bioactive Peptides through Histone Protein Isolation from Discarded Cells
PP55	**Kerem Tok**
	Utilizing *Lepidium Sativum L.* Extract as Biopesticides Against Tetranychus Urticae Koch for Effective Management of Food Crops
PP56	**Hülya Yağar**
	The Cytotoxic Effect of Green Walnut Husks on Melanoma Cancer Cells
PP57	**Nurşah Hüma Tatoğlu**
	Purification and Inhibition of Acetylcholinesterase from *Halyomorpha halys (Stål) (Heteroptera: Pentatomidae)*
PP58	**Ecenaz Merve Namlı**
	Label-Free Identification of Oxidative Stress through Exosomes Isolated from Stem Cells
PP59	**Songül Bayrak**
	Synthesis and Characterization of Starch@Metal Oxide Bionanofilms for Immobilization of Lactoperoxidase

PP60	**Bilge Hilal Çadırcı**
	Determination of Siderophores in Brucellosis Agents
PP61	**İrem Kırış**
	Comparative Analysis of Lysis Buffers for Protein Extraction from Organ Chips
PP62	**Şebnem Selen İşbilir**
	An Investigation on Biological Activities of *Jerusalem artichoke* Leaf
PP63	**Merve Koç**
	Recombinant Thaumatin Production in Pichia Pastoris Using The GAP and AOX1 Promoters
PP64	**Ali Dişli**
	Synthesis and Antimicrobial Activities of New Donepezyl Derivative Thiotetrazole Compounds
PP65	**Nurdan Akdoğan**
	Synthesis, Characterization, and Anticancer Activities of New Phenothiazine Derivatives
PP66	**Nazlı Ece Varan**
	Immobilization of Protease from *Bacillus sp*. on Magnetic Multi-Walled Carbon Nanotubes
PP67	**Özlem Yalçın Çapan**
	Characterization and Biocompatibility of Plant oil-Based Polymer Nanocarriers for the Gene Delivery
PP68	**Ahu Arslan Yıldız**
	Use of Hydrocolloid Bioinks to Fabricate 3D Bioprinted Tumor Models
PP69	**Deniz Ekinci**
	Biological Evaluation of Plant-Derived Exosomes
PP70	**Elifsu Polatlı**
	A Microfluidic Platform for Studying Macrophage Polarization Under Mechanically Dynamic Conditions
PP71	**Kardelen Cemek**
	Preparation of Etoposide-Loaded Human Serum Albumin Nanoparticles and Controlled Release of Etoposide for Glioblastoma

PP72	**Betül Eken**
	Xylanase Immobilization and Characterization Used The Cross-Linking Method to BSA Nanoparticles with High Reliability for Application to Foods
PP73	**Büşra Bakar**
	Cellulase Immobilization onto Quantum Dots Prepared from Bitter Apricot *(Prunus Armeniaca L.*) Kernel: A Robust Biocatalyst for Fruit Juice Clarification
PP74	**Gamze Dik**
	Synthesis and Characterization of Chitosan Nanoparticles with Different Sizes and Charges By Ionic Gelation Method
PP75	**Sibel Selçuk Pekdemir**
	Immobilization of Xylanase on ZnO Nanoparticles Obtained by Green Synthesis From *Eupatorium Cannabinum* L. and Its Application in Enrichment of Fruit Juices
PP76	**Seda Ağçam**
	The Investigation of Phenolic Components and Antioxidant Activities of Wild Olive Variety
PP77	**Mustafa Akbulut**
	Investigation of Peroxidase Mimic Activity of Copper Phosphate Nanoflower
PP78	**Ece Kaya**
	Valorization of Grape Juice Wastes to Produce Citric Acid by *Aspergillus niger*
PP79	**Aylin Aytaç**
	A Study for The improvement of The corrosion and Biological Properties of Ti-6Al-4V Alloy for Biomedical Implants
PP80	**Ensar Erel**
	Investigation of Simultaneous Melatonin and Serotonin Selective Properties of Screen Printed Carbon Electrode Modified with Chlorogenic Acid-Based Polyurethane in Electrochemical Sensor Application
PP81	**Merve Gökşin Karaaslan Tunç**
	Synthesis of Gold Nanoparticles with UV light for Microfluidic Chip

INVITED SPEAKERS ABSTRACTS

Light-, Magnetically- and Acoustically-Driven Active Microparticles for Targeted on-Demand Drug Delivery

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Wireless medical microrobots have the potential to improve the healthcare radically, since they have the unique capability of accessing, operating and possibly staying inside hard and currently not possible to reach small spaces inside the human body non-invasively. In this direction, two alternative approaches are investigated to create micron-scale medical robots. As the first approach, external light, magnetic fields and ultrasonic waves are used to propel microrobots remotely. Carbon nitride-based light-driven microswimmers with intrinsic photocharging ability and biocompatible propulsion in biological and ionic media are reported. Also, two types of COF microparticles are proposed as new visible- and UV-light-powered microswimmers for targeted drug and other cargo delivery inside the human eye. They can also have responsive on-demand drug delivery function towards medical use. Next, using rotating external magnetic fields, magnetic Janus microparticles-based microrollers are used to move against the blood flow on the vessel walls. They can adhere to the specific cancer cells using their antibody coating and release drugs triggered by light. Moreover, using ultrasonic waves, microswimmers with integrated microbubbles are propelled on a surface by fluidic flows induced by the bubble oscillation. As the second approach, cell-driven biohybrid microswimmers are proposed towards targeted active drug delivery applications. Bacteria- and alga-driven microswimmers are steered using remote magnetic fields and local chemical, oxygen or pH gradients in a given physiological microenvironment inside the human body. In vitro active cargo delivery demonstrations of such microswimmers are reported.

Enzyme Co-Immobilization: Advantages, Necessity, Problems and Solutions

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The coimmobilization of enzymes is everyday most popular. This is related to the current interest for cascade reactions. The enzyme coimmobilization offers some kinetic advantages, mainly related to a significant increment of the initial reaction rates due to the production of the intermedia products in confined spaces, which makes that all the enzymes from the cascade can act on high, even saturating concentrations (in some instances), of their respective substrate from the beginning of the reaction. This reduces or eliminates the usual lag time observed in cascade reactions. In some instances, the existence of this lag time can make the process unsuitable, making coimmobilization fully necessary. However, enzymes coimmobilization has diverse drawbacks at different levels, being the possibility of using enzymes with very different stabilities the one where we will focus in this conference. Some solutions for preparing coimmobilized enzymes where the most stable immobilized enzyme can be reutilized for the preparation of a new combienzyme will be briefly presented, All the strategies will be coupled to the combined use of different immobilization protocols (being at least one reversible, to selectively release the inactivated less stable enzyme).

Electrochemical Nucleic Acids Biosensors with The Recent Applications

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Electrochemical biosensors present a great promise for sensitive and selective detection of many analytes including nucleic acids towards to the clinical, environmental, or forensic investigations. The electroactivity in nucleic acids focused many scientists in order to develop electrochemical methods for DNA analysis, including development of electrochemical DNA biosensors (genosensors). Electrochemical DNA biosensors have an inherent specificity of biorecognition reactions with the high sensitivity of physical transducers in order to analyze sequence-selective nucleic acid hybridization and the interaction of nucleic acids with drugs, proteins. Recent electrochemical nucleic acid biosensors have been overviewed herein, and discussed with their further applications.

Mechanisms of Toxicity at Nanomaterial-Biological Interfaces

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Nanomaterials are expected to revolutionize applications in many areas, including biomedicine. Though, potential undesired nanotoxicity remains a mechanistically poorly understood and still unresolved issue. Using selected model amorphous silica nanoparticles (aSiNPs), we used state-of-the-art cellular, biochemical, biophysical, and innovative real-time nanolive imaging technologies to dissect early mechanisms of nanotoxicity, also on a single cell level. Here, we discovered that certain NPs induce an early (>30min) but not ultra-fast apoptotic phenotype culminating in a secondary necrotic response (4hrs). Unexpectedly, we found that differences in NP toxicity did not correlate with the levels of produced reactive oxygen species (ROS). Nanotoxicity was reduced when proteins absorbed to NPs forming a biomolecule corona. Furthermore, our data suggest the anti-apoptotic protein Surviving as a critical cytoprotective resistor against silica-based nanotoxicity. Collectively, our study characterizes nanotoxicity as a two-phase early event, underlines the impact of the NPs' physico-chemical properties and protein adsorption, and described a methological platform for the thorough assessment of nanotoxicity in general.

Microfluidic procedures for the electrochemical biosensing of isothermally-amplified DNA

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Many bioanalytical techniques have been developed to detect target DNA fragments in biological and environmental samples, but most of them require significant amount of time, attention, and work from expert personnel to thoroughly follow the analysis and obtain reliable results.

In this work, a new microfluidic system was exploited to design an easily-produced chip-based architecture that implements all the steps required for a full DNA assay, requiring limited manual work and small sample volumes. Superparamagnetic microbeads functionalized with a DNA capture probe are used as the solid-phase of the assay. These microbeads are first injected into the microchannel of a flow-based chip, where a removable magnet is used to retain the beads in position. Then, a microfluidic flow, controlled by a peristaltic pump, will put them in contact with a signaling probe, used to generate a measurable electrochemical signal, and the sample containing the DNA target in analysis. Hybridization occurs, resulting in a sandwich-like conjugate coupled to an enzyme capable of converting a proper substrate into an electroactive moiety, thus providing electrochemical signal amplification.

Optimizations were introduced by identifying the most effective workflow, e.g., washing steps, incubation times, and the single flow rates of each step to increase efficiency and sensitivity. In this way, it was possible to considerably decrease the volume of reagents and the overall experimental runtime. The system proved to be efficient in the proof-of-concept analysis of short DNA strands, with detection limits in the picomolar range, using only a few microliters of the target DNA sample and presenting results in less than one hour. Implementation of isothermal amplification techniques inside the microfluidic chip to enhance the platform sensitivity is also expected. The platform achieved good limits of detections with synthetic genes and was able to detect down to ≥500-fold diluted amplification products of selected genes, thus enabling numerous end-point analyses with a single amplification reaction.

Semiconductor Nanocrystal Optoelectronics with Colloidal Quantum Dots to Wells: Pushing the Limits, Breaking Records

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Lighting and displays are integral parts of human activities and economic development. Semiconductor nanocrystals, now offering a market volume exceeding 1 Billion Euros annually, have attracted great interest in quality lighting and displays in the last decade. Such colloidal semiconductors enable enriched color conversion essential to superior lighting and displays. These colloids span different types and heterostructures of semiconductors, starting in the form of colloidal quantum dots and extending to the latest sub-family of nanocrystals, the colloidal quantum wells. In this talk, we will introduce semiconductor nanocrystal optoelectronics and present most recent examples of photonic structures and device architectures using the colloidal quantum dots and wells [1-6] for lighting and displays. Also, we will present a powerful, large-area, orientation-controlled self-assembly technique for orienting colloidal quantum wells either all face down or all edge up [7]. We will demonstrate three-dimensional constructs of their oriented self-assemblies with monolayer precision [8]. Among their extraordinary features important to applications in lighting and displays, we will show record high efficiency from their colloidal LEDs [9] and record gain coefficients from their colloidal laser media [10] using heterostructures [2-6] and/or oriented assemblies [7,8] of colloidal quantum wells. Given their current accelerating progress, these solution-processed quantum dots and wells hold great promise to challenge their epitaxial thin-film counterparts in semiconductor optoelectronics in the near future.

The Use of Supramolecular Systems in Medical Applications and Their Risk Assessment Using Advanced Characterisation Tools

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Supramolecular assemblies of biopolymers are a versatile method to develop dynamic, multifunctional structures particularly for medical applications. The first part of the talk will focus on the development of supramolecular antimicrobial, antiviral and anti-inflammatory systems and their modifications for different microenvironments using advanced in vitro models and machine learning methodologies (Horizon Europe NOVA project). The use of new biopolymers or novel formulations in a spatiotemporally controlled manner requires advanced testing and risk assessment methodologies. The automatization of the current tests and their improvement using electrochemical sensors and real-time image analysis will be described together with in-silico model supplementary systems for determination of long term effects. The incorporation of machine learning technologies during conception, design and development of polymer based medical device systems together with automated testing systems with in-depth, personalized information on toxicity and environmental impacts will facilitate the translation of biomaterial research and will enable the design of medical products that are in line with Safe and Sustainable by Design.

How AI Will Revolutionize Structure-Based Drug Design

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The understanding of protein interactions at the atomistic scale is crucial for studying cellular function. Experimental techniques like X-ray diffraction, NMR spectroscopy, and cryo-electron microscopy (cryo-EM) provide high-resolution structures of protein complexes. However, in cases where experimental approaches face limitations, modeling becomes valuable. In particular, homology modeling is employed when there is a resolved structure of an evolutionarily related complex, while docking is preferred in the absence of such a template. Various strategies, including coevolution integration and the use of available experimental data, have been implemented to enhance docking accuracy. For intricate cases involving intertwined complexes, fold-and-dock strategies are employed.

The CAPRI blind docking competition has been evaluating the state-of-the-art in assembly modeling since 2002. In 2014, CAPRI joined forces with CASP to assess the prediction of protein complexes on a larger scale. Several rounds of CASP-CAPRI experiments have been conducted, shedding light on the capabilities and limitations of assembly modeling approaches. A major limitation in protein complex modeling has been the absence of reliable templates for modeling the monomer structures of an assembly. This limitation has been alleviated to a large extent with the release of AlphaFold2 (AF2), an artificial intelligence (AI) tool that has made unprecedented progress in tertiary structure prediction. In CASP14, AF2 demonstrated high accuracy in modeling tertiary structure targets regardless of the prediction difficulty. Consequently, the release of AF2 Protein Structure Database in 2022, with over 214 million predicted protein structures covering nearly all UniProt sequences, has significantly impacted the field of structural biology.

Since the release of AF2, scientists have sought to incorporate this framework into their modeling pipelines. The simplest way to employ tertiary structure modeling methods to quaternary structure modeling was to join individual sequences of complex subunits into a longer, artificial sequence by means of adding an artificial glycine linker between monomers or introducing a sequence gap between multiple chains. These approaches showed improvement over classical docking methodologies. In 2021, DeepMind released AlphaFold-Multimer (AF2M, version 2.2), the multimeric version of AF2 specifically retrained on biological interfaces. AF2M outperformed previously outlined AF2-monomer modifications in the case of heteromers. Although DeepMind did not participate in CASP15, they did so indirectly since the vast majority of assembly groups adopted AF2M in their modeling pipelines.

During CASP14 and CASP15, I acted as the assessor in the biomolecular assembly prediction category. During my talk, I will present our CASP-based analysis to demonstrate the state of AI in protein complex modeling. I will also show how the community could push the boundaries of AI-based assembly modeling forward, together with how AI will revolutionize structure-based drug design.

Development of Commercial Resins for Food Purifications

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Polymeric separation materials for adsorption and chromatography are indispensable tools for a large variety of industries. In this presentation, we will present industrial applications of newly developed resins with applications in the food industry, such as detoxification of plant derived food side streams, off flavor reduction of plant protein solutions and removal of color compounds from plant extracts.

With new tools, the food industry, and also other industries, such as pharmaceutical and life science industries, will be able to bring forward improved new products, ingredients and raw materials that are more effective or more appealing in taste and appearance. At the same time, implementation of new technology has the potential to increase both profitability and sustainability.

Development of Immunogenic Autochthonous Mouse Lung Cancer Models to Study Immune Resistance in Lung Cancer

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Immune checkpoint blockade has revolutionized cancer treatment especially for non-small cell lung cancer. Biomarkers for therapeutic response to immune checkpoint blockade is unknown. Tumor intrinsic factors such as tumor mutational burden was associated with better responses to ICB in lung cancer. However not all tumors with high TMB respond well to ICB. Role of tumor mutational burden in shaping the tumor immunity and response to immune checkpoint blockade has not been mechanistically addressed in clinically relevant lung cancer models.

Because mouse models lack antigenic diversity, we induced mutations in lung cancer models by utilizing Polymerase epsilon catalytic subunit mutant mice (Pole P286R). This is an ultra-mutator variant of DNA polymerase-E (POLE) (P286R) detected in human tumors and causes elevation of TMB. We crossed this allele into the well-characterized Kras G12D;p53 L/L alleles, the two most commonly mutated genes in NSCLC.

Addition of Pole significantly increased the TMB of the KP model. However, increasing TMB alone was not sufficient to induce immune responses with immune checkpoint blockade. This was in part due to mutational heterogeneity and in part due to tumor microenvironment as syngeneic models derived from these GEMMs were moderately sensitive to ICB. We also addressed the role of clonal heterogeneity in anti-tumor immunity using these models.

ORAL PRESENTATION ABSTRACTS

Determination of Multiple Bacteria on Plasmonic Surfaces

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Molecularly imprinted polymers (MIPs) are specialized materials known for their remarkable specificity towards particular molecules, making them suitable alternative for antibodies in a variety of biomolecule detection applications.[1] Fundamentally, molecular imprinting involves creating a matrix around the target molecules that results in the formation of three-dimensional cavities within the polymer. These cavities mimic shape, size, and physical and chemical properties of the template molecule, allowing for highly specific molecular recognition.[2] Bacterial infections have been recognized as a major contributor to illnesses over time and are linked to raised death rates. Bacteria, such as *Escherichia coli (E. coli)* and *Staphylococcus aureus (S. aureus),* are responsible for severe bacterial infections.[3] Polymers prepared by imprinting the entire bacterial cell or surface antigens are utilized in sensor studies.[4] In this study, a plasmonic platform for detecting multiple targets (*E. coli* and *S. aureus*) simultaneously was designed. After bacteria-imprinted nanoparticles were synthesized and characterized, a platform was prepared for the detection of the specified bacteria by modifying them with gold nanoparticles. Experiments were conducted to detect each bacterium within the bacterial concentration range of 10^7- 10^9 cfu/mL. Furthermore, selectivity investigations were carried out to assess the specificity of imprinted nanoparticles. According to the results obtained, *E. coli* and *S. aureus* can be detected in the specified concentration range with 95% and 99% accuracy, respectively.

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Designing of L-Proline Specific Nanoparticles

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Processes such as the detection and quantification of amino acids hold significant importance in biochemical analyses, particularly in the diagnosis of metabolic disorders. Among these amino acids, L-Proline has been identified as having significant relevance to various metabolic disorders in living organisms, particularly in human. Hyperprolinemia is a metabolic disorder that arises when the L-proline molecule is not effectively broken down due to deficiencies in proline oxidase or pyrroline-5 carboxylate dehydrogenase enzymes, resulting in an accumulation of L-Proline within the body. In individuals with Hyperprolinemia, there is a noticeable increase in L-Proline levels in both blood and urine, underlining the importance of accurately measuring and monitoring these levels in body fluids. To address the challenge of recognizing target molecules, such as proteins, peptides, amino acids, or ions, in complex environments with high selectivity, molecular imprinting emerges as a dependable technique that accomplishes this in a single step. In this study, molecularly imprinted nanoparticles that can selectively recognize the L-Proline molecule were synthesized. Hydroxyethyl methacrylate (HEMA) based nanoparticles were synthesized via emulsion polymerization technique and were characterized by scanning electron microscopy, zeta-sizer particle size analysis, surface area calculations, and swelling studies. Based on zeta-sizer analysis, the estimated diameters of Pro-MIP and NIP nanoparticles were determined to be approximately 27.51 nm and 20.66 nm, respectively. The adsorption of L-Proline onto nanoparticles from aqueous solutions was investigated in a batch system, and the maximum L-Proline adsorption capacity was determined to be 26.58 mg/g for Pro-MIP and 4.65 mg/g for NIP. The selectivity of L-Proline imprinted nanoparticles was successfully confirmed via Mass Spectroscopy, in the presence of competing molecules (L-Histidine and L- Phenylalanine). Finally, Pro-MIPs were subjected to repeated adsorption-desorption cycles and it was demonstrated that Pro-MIPs can be used up to 10 times without significant decrease in selective adsorption capacity.

Molecular Expression and Immobilization of Hormone-Sensitive Lipase like Esterase from *Glaciozyma antarctica*

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The HSL-like esterase, derived from *Glaciozyma antarctica*, shows remarkable adaptation to cold environments and holds significant interest for various biotechnological applications. The enzyme has the potential to catalyze the hydrolysis of ester bonds, which is valuable in industries such as food processing, biofuel production, and pharmaceutical manufacturing. The *Glaciozyma antarctica* HSL-like esterase (GlaEst) offer valuable insights into its biochemical properties, potential applications, and its ability to thrive in cold environments. In this study, the putative lipolytic enzyme was successfully cloned and expressed in *E. coli* expression system. However, the expressed GlaEst12 accumulated in the form of inclusion bodies. Subsequently, the crude refolded GlaEst12 was efficiently purified in a one-step purification process utilizing nickel sepharose affinity chromatography. The purified enzyme exhibited a single band on SDS-PAGE with a molecular weight of 63 kDa. GlaEst12 demonstrated broad temperature stability, ranging from 10 to 70 °C. To explore immobilization strategies, different supports were employed. The optimal enzyme immobilization was obtained 110 U/g after a 3-hour immobilization period. Consequently, this study successfully immobilized the lipase, which holds promise for triglyceride hydrolysis in biodiesel production and in the making of flavor esters.

Immobilization of A-amylase onto Electrospun PCL/CHI Nanofibers

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Improving enzyme resistance to environmental conditions and enhancing their catalytic properties hold significant industrial importance. Enzyme immobilization stands out as one of the most widely employed techniques for achieving these objectives.[1,2] In this study, we synthesized PCL/CHI nanofibers via electrospinning and successfully immobilized α-amylase enzymes. First, PCL/CHI nanofibers were cut into 0.5x0.5 cm^2 pieces, and amylase purified from *A. oryzae* was adjusted to 50 IU per 0.5x0.5 cm^2 nanofiber unit. These nanofibers were then surface-modified using a 0.5% glutaraldehyde solution. Afterward, the nanofibers were mixed with the enzyme solution for 24 hours at 4 ℃. Following the mixing period, the nanofibers were separated from the supernatant and washed with distilled water to remove unbound enzyme groups. The supernatant was retained for further analysis. The immobilization procedure was executed covalently, and the immobilization efficiency was determined. After immobilization, PCL/CHI nanofibers were characterized by FT-IR, SEM-EDX, and XRD. The optimum pH for the amylase immobilization was determined as 6 and the optimum temperature was determined as 50 ℃. In addition, the Ea value calculated using the Arrhenius equation was 5.14 KJ/mol. Km was found to be 0.37±0.11 mg/ml and Vmax value was determined as 6.23±0.87 µmol/min. The thermal stability studies were conducted at two different temperature values. At 50°C, the immobilized enzyme retained approximately more than 50% of its initial activity, whereas at 60°C, this ratio was approximately 20%. In addition, the resistance of the immobilized enzyme to environmental conditions was investigated by using some metal ions and organic solvents. The findings have confirmed that the immobilized enzyme has better resistance to environmental conditions compared to the free enzyme, and even improvements in catalytic activities in some conditions. In conclusion, we can say that this study presents a simple, economical and practical technique for the immobilization of industrial enzymes by electrospinning.

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Microbial Phenazines as Potential Enzyme Inhibitors for Metabolic Diseases: Fermentative Production, Kinetic and Docking Studies

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Phenazines are low molecular weight, heterocyclic compounds that serve as versatile and golden molecules in several industries regarding their broad-spectrum antimicrobial, antitumor, and antiparasitic activity as well as their biological origin, and suitability to a great deal of biotechnological applications [1,2]. The present study aimed to evaluate enzyme inhibition properties of microbial phenazines over enzymes associated with metabolic diseases. For this purpose, phenazine derivatives were produced in chemically defined media by *P. chlororaphis* subsp. *aureofaciens* on batch, submerged cultures and purified through solvent extraction followed by adsorption chromatography. Prior to the molecular docking procedure, three different phenazine derivatives were obtained and characterized by spectroscopic techniques including FT-IR, NMR, and UV-Vis. Then the molecular docking procedure was applied to the identified phenazine derivatives using AutoDock Vina 1.1.2. The best docking scores and binding interactions over acetylcholinesterase (AChE), α-glycosidase (AG), carbonic anhydrase I (hCA I) and II (hCA II), butyrylcholinesterase (BChE), and α-amylase (AA) are analyzed by BIOVIA Discovery Studio. As empirical studies, spectrophotometric methods investigated the inhibitory properties of commercially purchased AChE, BChE, AG, AA, and in-house purified (affinity chromatography) hCA I and II enzymes. The kinetic parameters of each enzyme in the presence of the inhibitors were defined and compared with clinically available inhibitors. In conclusion, the potential use of microbial phenazine derivatives in the treatment of Alzheimer's disease, diabetes, and glaucoma was evaluated. To the best of our knowledge, this is the first study conducted to investigate the anticholinergic, antidiabetic, and antiglaucoma effects of microbial phenazines.

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Biochemical Profile of *In Vitro* Regenerated and *In Vivo* Grown *Lavandula stoechas* Plants

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Lavandula stoechas L. (Lamiaceae) is an ornamental flowering plant from the *Lavandula* genus, commonly known as Lavender, originating from the Mediterranean Basin. Recently, *Lavandula stoechas* has received considerable interest in the fields of medicine and pharmacology. Several studies have reported that *Lavandula stoechas* is a valuable source of phenolic compounds, which can confer antioxidant, antibacterial, antidepressant, anti-inflammatory, and insecticidal effects. In this research, we compared the phytochemical profiles of *Lavandula stoechas* extracts obtained from *in vitro* cultures and extracts from *in vivo* plants. Our research focused on evaluating the impact of plant growth regulators (PGRs) on *Lavandula stoechas* shoot proliferation *in vitro* and assessing the antioxidant potential and total phenolic content of both types of extracts. Additionally, we performed chemical analysis of the phenolic compounds using HPLC-DAD. Optimal shoot proliferation and biomass accumulation were achieved using a combination of 0.5 mg/l 6-benzyladenine (BA) and 0.5 mg/l gibberellic acid (GA3). The hydroalcoholic extract derived from *in vitro* cultures exhibited a notably higher phenolic content (83.18 mg GAE/g DW extract) compared to extracts from wild plants (32.33 mg GAE/g DW extract). Moreover, the *in vitro* culture extract demonstrated superior antiradical effects against 2,2-diphenyl-1-picrylhydrazyl (DPPH) with an IC50 value of 51.38 ± 0.7 µg/ml and greater antioxidant capacity (757.26 mg GAE/g DW) according to the total antioxidant capacity (TAC) assay. Chemical profiling of both extracts revealed the presence of naringenin, acacetin, rhamnetin, luteolin 3'-7 diglucoside, and hesperetin.

Dot Blot Assay for Rapid Detection of SARS-CoV-2

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SARS-CoV-2 is a crucial causative agent of pandemic and early detection of it will always become significant. The most commonly used diagnostic method is molecular detection by Real-time reverse transcription polymerase chain reaction (rRT-PCR). In the meantime, antibody (Ab) detection developed after the viral infection in the patients is another common method. However, false negative results and advanced devices for analysis are the main disadvantages of rRT-PCR, while the late production of Abs about 7-10 days during the infection and cross reactivity of Abs are drawbacks of the second method. Therefore, rapid antigenic recognition of SARS-CoV-2 is still being developed by using aptamers, antibodies and viral surface proteins such as Spike (S) or nucleocapsid (N) protein. Dot blot assay is one of the rapid assays used in this purpose.[1,2] Thus, we designed the dot blot assay for the rapid detection of SARS-CoV-2 with naked eye, in this research. For that purpose, gold nanoparticles were conjugated with aptamer as a capture reagent and receptor binding domain of S protein (sRBD) was used as target using nitrocellulose membrane. Results showed that the recognition of SARS-CoV-2 as a synthetic target was accomplished on the membrane and it was decided to prepare the detection platform for the clinical samples using dot blot assay.

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FTIR and DSC investigations of the inclusion of L-T3 in SM model membranes

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In this study, Fourier Transform Infrared (FTIR) spectroscopy and Differential Scanning Calorimetry (DSC) techniques were applied to investigate the interactions of L-T3 with sphingomyelin (SM) multilamellar liposomes (MLVs) as a function of temperature and concentrations of L-T3 (1 mol% and 15 mol%).

L-T3 is a manufactured form of the thyroid hormone T3. It is most commonly used in the treatment of hypothyroidism and myxedema coma and can be used when there is impairment in the conversion of T4 to T3 in peripheral tissues.[1] Sphingomyelin (SM), a major component of the plasma membrane of cells, is found in high concentrations in nerve tissues and red blood cells. It has significant structural and functional roles in the cell and participates in many signaling pathways.[2]

The investigation of the C-H and PO^{-}_{2} antisymmetric double stretching modes in FTIR spectra and DSC studies reveal that the inclusion of L-T3 in SM liposomes changes the physical properties of model membranes by:

(i) broadening the transition profile slightly;

(ii) decreasing the main phase transition temperature (Tm) and enthalpy (ΔH), whilst increasing the width at half height (ΔT½);

(iii) ordering the system both in the gel phase and liquid crystalline phases;

(iv) increasing the dynamics of the acyl chains both in the gel and liquid crystalline phase;

(v) increasing the wave number values of PO^{-}_{2} stretching mode both in the gel and liquid crystalline phases, i.e. non-bonding with phosphate groups.

The findings obtained from this study are important in terms of explaining and interpreting the molecular mechanism of the effects of thyroid hormones on phospholipid membranes.

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In vitro Selection of DNA Aptamers Against Hazelnut Allergen Protein Cor a 11

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Food allergy is one of the emerging public health issues of 21st century[1]. Public authorities had announced regulations in order to protect allergic individuals. Relatedly, food companies request fast and reliable allergen tests aiming to ensure food products from any contamination by a specified food allergen. Currently available and the most popular commercial tests are antibody-based ELISA test kits. Considering broad range of allergens that can be found in food products, there is an urgent need to develop novel methods based-on ligands other than antibodies. Aptamers, single-stranded DNA or RNA molecules, are capable of selectively recognize and bind to their target with high affinity. Systematic Evolution of Ligands by Exponential Enrichment (SELEX) is an *in vitro* aptamer selection method[2]. As a result of flexibility, efficiency and ease of use, SELEX methodology resulted in selection of hundreds of aptamers in last 30 years. In this study, we aimed to select DNA aptamers against hazelnut allergen protein Cor a 11. Cor a 11 is one of the major allergen proteins that can be found in many food types, especially in bakery, chocolates, ice cream and confectionerry[3]. Considering the high incidence of hazelnut allergy in most of the countries, there is an urgent need for developing a novel ligand against hazelnut allergen protein Cor a 11. Before proceeding to aptamer selection with the well-established magnetic-SELEX methodology, we have done heterologous expression and IMAC-purification of Cor a 11 in *Escherichia coli* expression system. Soluble and active protein was purified from expression host with high yield and purity as it was approved by Bradford assay, SDS-PAGE and commercially available ELISA test. Soluble and highly purified recombinant allergen protein was used as a target during 11 rounds of *in vitro* aptamer selection. Peanut allergen protein Ara h 1, highly homologous to Cor a 11, was also expressed and purified in the same manner in order to be used as a counter-target during *in vitro* selection rounds. Increasing the *in vitro* aptamer selection pressure in the means of duration and number of wash steps, concentration of competing agents like bovine serum albumin and salmon sperm DNA, increasing the concentration of counter-agent Ara h 1 and decreasing the concentration of target protein Cor a 11, after 11 rounds of selection the SELEX process was ended. Enriched library of DNA aptamers was cloned to pJET2.1_Blunt vector and PCR products of the colony-PCR were delivered for Sanger DNA Analysis. Bioinformatic analysis revealed highly enriched Cor a 11 aptamers sub-grouped in 3 clusters. *In vitro* characterization of 3 different aptamer sequences, representing the most enriched sequence within each cluster, revealed highly selective aptamers with high affinity against Cor a 11.

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Exploring the Potentiality of Endogenous Bioactive Peptides from Barley (*Hordeum vulgare* L.) Sprouts and Their Beneficial Role on Diabetes and its Complications

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Bioactive peptides (BPs) are specified amino acid sequences originating endogenously or extracted from hidden regions of proteins. Also, they can be obtained by fermentation, recombinant production and synthesized chemically.[1] In addition, BPs play a critical role in many disorders and complications such as hypertension, infections, and age-related diseases, such as Alzheimer's disease, diabetes, neuropathy, nephropathy, retinopathy, cancer, etc.[2] Among these, diabetes and its complications seriously affect public health, and the efforts to heal this issue gained massive attention. Furthermore, the medical and pharmaceutical industries have made significant progress in developing beneficial treatments; however, the quest for "safe" alternatives using peptides and other molecules from natural products provides more promise in the therapeutical field.[3] Plant-based sources such as cereals proteins and peptides are of great importance due to the presence of inherently endogenous bioactivities peptides that can provide multiple health-promoting effects.[4]

Here, we aimed to purify and identify endogenous peptides from barley (*Hordeum Vulgare L.*) sprouts for the potential therapeutical effect against type 2 diabetes (T2D) and its complications. Barley seeds were germinated, and extracted peptides from sprouts were fractionated through ultrafiltration followed by RT-HPLC. All peptide fractions were tested for various biological activities, including α-glucosidase and DPP4 inhibitory activity, metal chelation, antioxidant, and antiglycation activities. The data demonstrated that fractions with molecular weight lower than 3 kDa show the highest activities, of which the RT-HPLC resulting in 11 fractions. Among these 2 active fractions (F10 and F11) demonstrate the highest potential as a treatment for T2D and its complications. Two distinct sequences EKHAAATASVNSLR and SQQENELTSLIVESNNRFNNASNT were identified by LC/Q-TOF-MS/MS. Natural bioactive peptides from easy to procure and cheap sources are promising molecules for therapeutic applications. Further *in-vivo* and clinical testing are necessary to validate the current findings.

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Effect of Beta-Glucan on Oxidative Stress, Inflammation, Hormonal and Histopathological Changes in Dehydroepiandrosterone-Induced Polycystic Ovary Syndrome

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PCOS (polycystic ovary syndrome), an endocrine disorder, is a common type of disease that occurs as a result of the rupture of the interaction between the hypothalamus and the pituitary-ovarian axis, triggers oxidative stress and is widely observed.[1] Beta-glucans (βTGs) are biologically-active polysaccharides from natural sources with bioactive properties. βTGs are known to have anti-tumor, anti-inflammatory, antimicrobial and immunomodulating activities. Although many biological activities of βTG have been proven, its mechanism in DHEA-induced PCOS has not been investigated so far. Our aim in this study was to investigate the protective effects of βTG treatment on PCOS and its capacity to reverse PCOS-induced changes. Pre-pubertal female Sprague-Dawley rats were randomly into four groups (n=8/group), control, PCOS, PCOS+βTG, and βTG groups. Biochemical parameters related to oxidative stress, antioxidant status, inflammation, cytokines, and hormone levels were determined in the blood and ovarian tissues. Histopathological and immunohistochemical analyses were also performed. βTG did not cause any change in body weight, ovarian weight, and uterus weight in rats. βTG normalized the deviations in the oestrus cycle caused by PCOS. It was observed that βTG had a positive effect on the reproductive system of women. βTG has the potential to mitigate the inflammatory response in PCOS rats by reducing the level of inflammatory cytokines. Oxidative stress was significantly reduced whereas, antioxidant enzyme activities were elevated in the βTG group. βTG prevented histopathological alterations. The results of this study showed that treatment with βTG protects against oxidative stress, inflammation, hormone imbalance, and histopathological damage in ovarian tissue caused by PCOS.

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Thiol-Disulphide Homeostasis in Neuromuscular Diseases: A Preliminary Study

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The importance of thiol-disulphide homeostasis has been implicated in several disease processes. Its role in neuromuscular diseases, however, remains largely elusive. This preliminary study investigated thiol-disulphide homeostasis in 29 patients with neuromuscular diseases and 18 healthy age-matched controls. Thiol-disulphide homeostasis, ischemia-modified albumin and total antioxidant status levels were measured by spectrophotometric method.[1,2] Native thiol and total antioxidant status tests, which reflect antioxidant levels in serum, were significantly decreased in patients with neuromuscular disorders ($p < 0.05$ for all tests).[3] In patients with neuromuscular disorders, disulphide, disulphide/native thiol percentage ratio and ischemia-modified albumin tests, which reflect the oxidation state, were significantly increased ($p < 0.05$ for all tests). Additionally, significant positive correlations were detected between tests showing antioxidant levels and significant negative correlations between antioxidant and oxidant tests ($p < 0.05$ for all tests). Statistical analyses were performed using the SPSS software version 20 (SPSS Inc. Chicago, IL, USA). In patients with neuromuscular disorders, the decrease in antioxidant levels and the increase in oxidant levels support each other. These findings indicate that thiol-disulphide levels may serve as a potential biomarker involved in the pathogenesis of neuromuscular diseases and may be a future target of therapeutic drug development studies.

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Evaluation of DNA Methylation Analyzes in the Context of Oocyte Reprogramming

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DNA methylation is one of the major epigenetic marks involved in gene regulation. It is involved in many vital cellular activities, from the establishment of pluripotency to the expression of tissue-specific genes that determine the fate of the cell during development.[1] Various methods are used to measure DNA methylation levels, which are also affected by environmental factors. These are assays such as pyrosequencing, meDIP, and ChIP, which are sensitive but multistep, expensive, and require high DNA concentrations.[2] Moreover, in the transition from unmethylated DNA to methylated DNA, there are intermediate methylation forms such as 5hmC, 5faC, 5caC, which have been discovered in recent years and have functions in different cell types.[3] This makes measuring DNA methylation levels more complex.

In this study, the determination of DNA methylation levels on the pluripotency marker genes, Nanog and Oct4, of the mouse embryonic stem cells, somatic cells and fibroblasts reprogrammed with oocytes will be discussed by comparing them with pyrosequencing and ChIP methods. As is known, these pluripotency markers are active in embryonic stem cells and their promoters are unmethylated (5C) or hydroxymethylated (5hmC).[3, 4] During development, as pluripotency genes are silenced and tissue-specific genes are activated as the epigenetic profile changes, the regulatory regions of Nanog and Oct4 genes are highly methylated (5mC) in somatic cells.[5] In this study, in which we examined the replication-independent removal of DNA methylation in the mentioned regions in somatic mouse cells incubated with oocyte extract for 6 hours, we found that the ChIP method is more selective than pyrosequencing, which requires bisulfite conversion, but it has high cost and difficulties in application.[6] Analysis of DNA methylation, which has a wide range of effects from obesity to neurodegenerative disorders, still has major handicaps, advantages and difficulties encountered will be evaluated in the context of oocyte reprogramming and will guide interested researchers.

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Preparation of Dipeptide-Based Nanoparticles and Their Cellular Interactions

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In order to overcome the drawbacks seen in traditional cancer treatments such as tumor invasion, tumor spread to surrounding tissues, and rapidly developing multidrug resistance, it is of great importance to develop carriers that will transport the therapeutic gene to the target tissue in gene therapy. Proteins/peptides, which stand out in nanomaterial production with advantages such as self-assembly, biocompatibility and biodegradability, are called "smart functional materials" due to their molecular recognition functions.

Here, it is aimed to create new biopolymeric nanomaterials based on dipeptides by self-assembly for the delivery of DNA and small interfering RNAs to cancer cells by gene therapy and to analyze their biocompatibility, interaction with proteins and nucleic acids and to analyze their possibilities of use.

Within the scope of this study, after nano-particles (NPs) based on FFA was synthesized and modified with Ca^{2+} ions, it was analyzed by SEM (scanning electron microscope), TEM (Transmission electron microscope), MS (mass spectrometry), DLS (Dynamic light scattering), Zeta potential measurement, Image J size assessment and FTIR (Fourier transform infrared) spectroscopy. Then it was continued with the cell toxicity, and cell internalization tests.

Some of the results obtained are given below: FFA-NPs gained a positive charge as a result of decorating with Ca^{2+} ions. A corona layer of HSA, IgG and DNA was formed on the surface of all NPs after interaction with these biological materials, and this structure changed in relation to the size and surface charge of the biological molecules forming the corona. After 24 and 72 h interactions of NPs with HeLa and HT29 cell lines, a slight decrease in cell viability was observed. Complex formation between NPs-siRNA was demonstrated by agarose gel electrophoresis. Up to 14% of NPs-siRNA complexes were found to internalize into HeLa and HT29 cell lines. The cytotoxic effects of siRNA complexes of NPs with and without Ca^{2+} ions were 15-28% and 19-36%, respectively. The dipeptide-based NPs used in this study are biocompatible and show promise for further studies in increasing the degree of internalization of siRNAs into cancer cells.

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The Effectiveness Investigation of Some Apricot Cultivars on Endoplasmic Reticulum Stress in Different Cancer Cells

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The most cultivated fruit in the Malatya area and a significant export good is the apricot, which has a high value in nutrients and functional food components.[1] Because apricot has an extremely short shelf life, it is sulphurized to prolong their freshness and maintain their color. Despite the benefits of sulfurization, there are worries that too much sulphur could be harmful to human health.

One of the biggest cytoplasmic organelles in eukaryotic cells is the endoplasmic reticulum. It performs important tasks such protein folding, lipid synthesis, detoxification, and calcium storage.[2] Proteins exit this organelle and correctly fold in the endoplasmic reticulum before travelling to their final location. Endoplasmic reticulum organelle is regarded to be at the center of many disorders, the occurrence of which is rising day by day, including diabetes, obesity, Alzheimer's disease, and cancer. All of these diseases are assumed to be linked to misfolded proteins.

The purpose of this research was to investigate *in vitro* the cytotoxic, morphological, and cell migration effects of *Prunus armeniaca* L. Cv. "Hacıhaliloğlu" and "Kabaaşı" apricot species on MCF-7 (human breast cancer) and HCT116 (human colon cancer) cell lines. Endoplasmic reticulum stress was induced using Thapsigargin. Depending on the results of MTT assay, the IC_{50} values of sun-dried Hacıhaliloğlu, sulphurized Hacıhaliloğlu, sun-dried Kabaaşı, and sulphurized Kabaaşı apricots were 60.16, 95.47, 56.32, and 108.99 mg/mL against MCF-7 cell line and 79.97, 110.11, 74.94, and 117.77 mg/mL against HCT116 cell line for 24 hours, respectively. Furthermore, sun-dried Kabaaşı extract, which was treated with Thapsigargin in the MCF-7 cell line, had the largest percentage of migrating cells (9.60%) compared to the control group. Aside from the control group, sun-dried Hacıhaliloğlu apricots that were treated with Thapsigargin had the highest rate of cell migration in the HCT116 cell line (41.54%). Moreover, examining ELISA data for MCF-7 cells reveals that the MCF-7 Control group had a higher average value for the ATF6 protein than all other groups. Interestingly, neither MCF-7 nor HCT116 cells contained CHOP protein. In addition, The HCT116 Control group has a significantly higher value than all other groups in terms of the XBP1 protein, which is implicated in a different route in endoplasmic reticulum stress ($p<0.05$).

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Effective Hydrogen Evolution by Using Bio-templated Rare Earth Element Doped Photocatalysts

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Photocatalytic water splitting reactions take place in the presence of photo/catalysts or co-catalysts because high positive Gibbs free energy is required. Silicon carbide (SiC) is considered as a promising catalyst that can be used as a visible-light-driven photocatalyst for water splitting because of its band gap and band gap position, reducibility property, high conductivity and appropriate conduction band potential.[1] In this study, SiC doped rare earth element ytterbium oxide (Yb_2O_3) nanofiber structure (Yb_2O_3/SiC) was prepared by using electrospinning method to increase the photocatalytic hydrogen evolution production capacity. Moreover, the addition of cellulose and chitosan to the reaction medium result in improved photocatalytic hydrogen evolution reaction performance. The photocatalytic hydrogen evolution reactions have been performed by using catalyst in the presence of EY dye (photosensitizer) and TEOA (electron donor) under solar light with cellulose and chitosan addition. Herein, cellulose and chitosan were used as a bio-template and assistant to increase dispersion, hydrophilicity, morphological transformation and adhesion to semiconductor with the help of functional groups.[2] The hydrogen production amount of bare SiC, bare Yb_2O_3, 5% Yb_2O_3/SiC composite have been measured as 391 µmol g^{-1}, 818 µmol g^{-1} and 1685 µmol g^{-1}, respectively. Furthermore, the hydrogen production amount of cellulose-5% Yb_2O_3/SiC and chitosan-5% Yb_2O_3/SiC composites were reached to 3346 µmol g^{-1}, 4084 µmol g^{-1}, respectively. These results have been showed that the EY sensitized rare earth element doped catalyst showed higher activity in the presence of cellulose and chitosan. The results can be attributed to the roles of cellulose and chitosan in the photocatalytic water splitting reaction as assistant and bio-templates functions.[3]

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Enhancing the Natural Lifecycle of Bioplastics: Plasma Technology as an Eco-Friendly Solution

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The quantity of plastics disposed in landfill is steadily rising each year, with a significant proportion remaining untouched and neither recycled nor incinerated. The detrimental impact of plastic waste on the environment is creating a need for the development and widespread use of biodegradable polymers with properties comparable to those of conventional synthetic polymers. While the widespread use of environmentally friendly biodegradable polymers is crucial in reducing plastic waste, it is not sufficient as the biodegradation of even a small amount of these polymers can take a considerable period to degrade, thereby hindering the prevention efforts of waste accumulation in the landfill. Here we report plasma surface treatment as a strategy for contributing to relieve the burden in waste management via accelerating the biodegradation rate of bioplastics by soil microbial community. For this purpose, the surface of polyhydroxyalkanoates have been modified using a low-pressure plasma system. Fourier transform infrared spectroscopy, scanning electron microscopy, atomic force microscopy, X-ray diffraction, and water contact angle measurements were employed to characterize the surface chemistry, crystallinity, morphology and hydrophilicity of the surfaces. Degradation rates of the samples were determined in a controlled soil environment and the microbial colonization and biofilm formation on the samples were characterized during the course of biodegradation. Our results showed that plasma treatment significantly accelerated the rate of biodegradation in natural environments.

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Microfluidic Chip-Based Systems for Monitoring Cancer Therapy

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A variety of fluid shear stresses (FSS) are present in tumor microenvironment; yet, in vitro three-dimensional (3D) models available today are not suitable for studying the dynamic effects of biophysical stimuli on cancer process and chemoresistance. A number of novel techniques have been developed in the last several decades in response to the urgent need for investigating biological significance of mechanical forces. Microfluidic system integration into cancer research is one of these strategies. The utilization of microfluidic chips has been gaining momentum due to their low cost, low material/reagent consumption, high-throughput, and ease-of-manipulation. Moreover, recent studies have clearly shown that tumor-derived extracellular vesicles (EVs) control the local and systemic environment to promote the growth and dissemination of cancer by means of the nano- and micron-sized vesicles they contain. Breast cancer cells (MCF-7) are used as a model cancer system in our study, and as such, they are grown in multiple adlayers such as silk fibroin (SF), matrigel, and collagen. As a result, SF-coated microfluidic systems enabled to replicate the conditions of a tumor microenvironment and showed a more dynamic state. Concurrently, conventional static culture of MCF-7 cells was also carried out as a control group to comprehend the influence of flow conditions. At the conclusion of the cell-culturing procedure, the effects of FSS on gene expression were investigated. Of particular, the highly expressed genes EpCAM and CK-18 in MCF-7 cells were studied. Furthermore, the research was carried out on cancer cells that have developed resistance to anti-cancer medications throughout FSS. Accordingly, in the circumstances of dynamic (microfluidic system) and static (tissue culture flask) culture conditions, the cells were treated with either doxorubicin or docetaxel (anti-cancer medications). After anti-cancer treatment has been decided upon, the levels of gene expression for Multi-Drug Resistance 1 (MDR-1) and Breast Cancer Resistance Protein (BCRP) were evaluated. The isolation and examination of EVs in both static and dynamic situations, with and without anti-cancer medication treatment, is necessary for the study's last phase, thereby, stating the utility of EVs as biomarkers for tracking the effectiveness of treatments in real time.

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5EBAT EURASIA BIOCHEMICAL APPROACHES& TECHNOLOGIES
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Investigating Singlet Oxygen Generation in Titanium Dioxide Nanoparticles Decorated with 2,6-Diiodo-Boron-Dipyrromethene Molecules

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Recent intensive research in photodynamic therapy (PDT) has focused on developing novel photosensitizers (PSs) and effective delivery methods. This involves combining dyes and nanostructures in a system to enhance PS selectivity and efficiency in the therapy.[1,2] In this context, 2,6-diiodo-borondipyrromethane (Bodipy) molecules as a photosensitizer were conjugated to TiO_2 nanoparticles via covalent bonds. The aim was to enhance the singlet oxygen ($^1O_2$) generation and water dispersibility of the 2,6-diI_2-Bodipy by integrating it with TiO_2, making it a viable PDT agent. Additionally, their photocatalytic behavior and the photophysical properties of the Bodipy-TiO_2 were studied systematically. It was found that Bod-TiO_2 nanoparticles generated $^1O_2$ with 56.9% efficiency in the presence of 1,3-Diphenylisobenzofuran, trap molecule, and exhibited an 83.8% photodegradation rate for methylene blue. Loading efficiency (LE%) and content (LC%) of Bodipy were 90.8% and 54.5%, respectively. These findings highlight Bod-TiO_2 NPs' potential for PDT applications due to their excellent dispersibility, moderate photocatalytic activity, and efficient singlet oxygen generation.

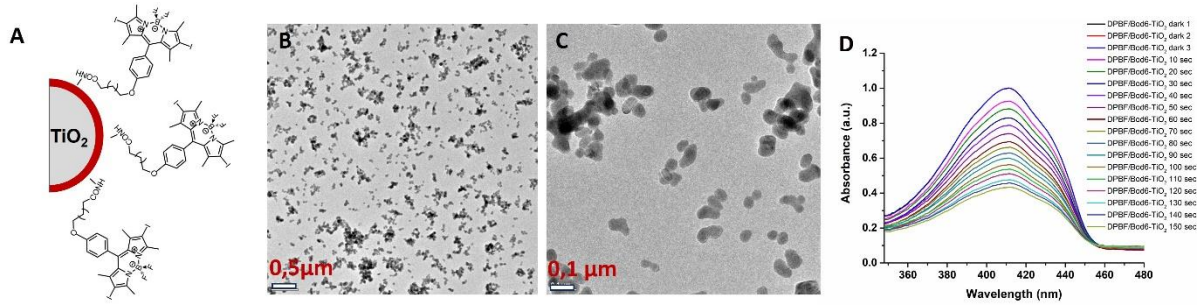

Figure 1. A schematic representation of Bodipy-TiO_2 nanoparticle (**A**), TEM images of the TiO_2 nanoparticles (**B,C**), decrease in the absorbance of DPBF molecule (**D**)

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Revolutionizing Textile Properties: A Study on the Electrospinning of Biocompatible Polymer Blend onto Cotton Fabric

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Electrospinning is a versatile and efficient technique for fabricating polymer nanofibers with various applications, from filtration to membrane technologies.[1,2] This study aims to investigate the electrospinning of blended gelatin and poly(2-ethyl-2 oxazoline) (P2Ox) or hydrolyzed P2Ox polymers to form a biocompatible and surface-chemically attractive functional nanofibrous coating. The optimal electrospinning parameters, such as the distance between the collector and the drum, applied electric potential, and polymer blending ratios, were determined to achieve a coated fabric with desirable properties for potential applications in the biomedical field, such as reusable mask material. For this purpose, the P2Ox polymer was first subjected to an acidic hydrolysis process to impart linear poly(ethylene imine) (L-PEI) units to its main polymer chain (P2Ox-co-PEI). Then, gelatin, a natural polymer, was combined with either P2Ox or P2Ox-co-PEI polymers to improve the resultant nanofibers' mechanical properties, biocompatibility, and/or antimicrobial activity. The electrospinning of these polymers in hybrid nanofiber morphology was conducted onto a marbleshah woven cotton to develop a composite material with those properties. The structural properties of the polymers selected for blending, the hydrophilicity, and the nanofibrous texture of the coat on the fabric surfaces were evidenced using ATR-FTIR, optical microscope, contact-angle measurements, and SEM techniques in detail. Additionally, the mechanical properties of the developed composites were assessed through tensile and air permeability tests. This study provides valuable insights into the electrospinning of gelatin and P2Ox polymers and their potential biomedical application, such as composite materials development that can interact with biomolecules.

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Development of Angiotensin (II) Imprinted Nanoparticles

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Angiotensin II (Ang II) is a peptide hormone that causes vasoconstriction and an increase in blood pressure. Due to its relationship with cardiovascular diseases, it is an important biomarker in blood serum.[1] In this study, Ang II imprinted nanoparticles were synthesized by miniemulsion polymerization reaction for the determination of Ang II from human serum. Hydroxyethyl methacrylate (HEMA) based Ang II imprinted (Ang II-MIP_{np}) and non-imprinted nanoparticles (NIP_{np}) were synthesized, characterized by Zeta Size analysis, Scanning Electron microscopy (SEM), Transmission Electron Microscopy (TEM) and FTIR-ATR spectrophotometer.[2,3] The average particle size of the NPs was recorded as 50 nm. The specific surface areas of Ang II-MIP_{np} and NIP_{np} were calculated. Ang II molecules were successfully removed from the Ang II-MIP_{np} with a 98% success rate using 0.5 M NaCl solution to obtain template-specific cavities. Then, the adsorption studies were achieved. The binding capacity was found as 4500 pg/g at 700 pg/mL Ang II concentration. The selectivity studies showed that Ang II-MIP_{np} can recognize Ang II molecules 2.76 times and 3.23 times selectivity than Ang I and Vsp respectively. Reusability studies shows that the synthesized nanomaterial is reusable.

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Development of MIP based Graphene oxide Substrate for Detection of Melamine in Milk

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Nowadays, milk has been one of the most important dietary products, which provides necessary nutrients for all age groups to maintain growth and health.[1]Melamine (1,3,5-triazine-2,4,6-triamine) is rich in nitrogen, an organic compound that is often illegally added to milk to boost protein levels.[2] Adulterated milk with melamine causes serious health issues in both infants and adults. It can be the cause of kidney stones, renal damage, bladder stones, and urinary tract problems.[3] Therefore, the development of sensitive method and analysis and detection of melamine in milk samples is of paramount importance.

In this research study, we present a novel and cost-effective surface enhanced raman scattering (SERS) substrate for detection melamine in milk sample. We developed the hybrid substrate by mini-emulsion polymerization based upon molecularly imprinted polymer nanobeads on the surface of functionalized graphene oxide (MIP nanobeads@fGO) to get the effective performance of SERS substrate. The synthesized substrate is thoroughly characterized by different characterization techniques including Fourier transform infrared (FTIR) spectroscopy, RAMAN, dynamic scattering light (DSL), and scanning electron microscopy (SEM). The performance of SERS substrate was also evaluted, it showed that MIP nanobeads@fGO has excellent performance towards the melamine with enhancement factor (EF) of 1.3 x 10^6. Quantitative analysis was also carried out and good relation was observed between the –log concentration of melamine (µM) and the Raman intensity (a.u.) in a broad linear range 7.9 E-5 µM to 7.9 E2 µM, with 1.2 µM (0.15ppm) and 3.6 µM (0.45 ppm) of limit of detection (LOD) and limit of quantification (LOQ), respectively. The dettection limit is lower than the safety limit of World Health Organization (WHO) and US Food and Drug Administration (USFDA), which suggests that the MIP nanobeads@fGO substrate is effectively applied to food safety measurement in milk samples.

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Molecularly Imprinted Polymer Nanoparticles from Renewable Recourses for Protein Recognition

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Molecularly imprinted polymers (MIPs) are artificial materials with the ability to recognize target molecules specifically and selectively.[1,2] In comparison to biomacromolecules, they are more readily available, less expensive, and considered an alternative to antibodies due to their higher chemical and physical stability. MIP-based biomimetic systems can be successfully used for sensing, catalysis, and separation applications due to the unique recognition properties. Currently, trustworthy, and reliable methods are used to imprint small molecules, however, imprinting macromolecules such as proteins, nucleic acids, cells, bacteria, and viruses still presents challenges.[3] The exciting concept of only imprinting a small piece of the protein, such as an epitope, as opposed to the entire protein, has so far been effective, offering lower costs and compatibility with many synthetic conditions.

In this study, novel molecularly imprinted polymer nanoparticles were created to recognize a particular peptide sequence using acrylated methyl ricinoleate, a functional monomer derived from plant oil.[4] By employing castor oil-based monomer, an environmentally friendly process was developed while also synthesizing a biocompatible and non-immunogenic natural biomaterial. MIP nanoparticles with an average particle size of 80 nm were successfully synthesized. Scanning electron microscope and Fourier-transform infrared spectroscopy were used to characterize nanoparticles.

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Plasmonic Nanosensors for Diagnostics

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Plasmonic nanostructures exhibit specific optical properties called localized surface plasmon resonances (LSPR). These resonances can be tuned by the chemical synthesis of these noble metal nanoparticles, because they depend on material size and the shape of the particles.[1] Especially microfluidic nanoparticle synthesis provides good sensor transducer particles with various shapes.[2] Resonances of the particles are strongly dependent on the refractive index of the nearest environment, which can be used for the realization of optical biosensor concepts. When biomolecules bind to recognition elements (captures) previously immobilized on their surface, it leads to a well measurable shift of the resonance band. This optical effect is utilized as sensor signal offering great potential for applications in diagnostic sensing. Different concepts of sensing, depending on transducer type and size, can be realized. In particular, the use of single nanoparticles, individual spots or plasmonic microarrays as transducers allows for flexible adaptation for adaptation to different future devices. This presentation will provide an overview of potential biosensing applications of nanoparticle-based LSPR sensing for various analytes. Proteineous disease biomarker, pathogens and antibiotic resistance genes can be detected with high precision, also in multiplexed approaches and using low-cost spectroscopic readout devices.[3,4,5,6,7]

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Utilization of Magnetic Levitation Technology in Biosciences

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Magnetic levitation (MagLev) is a new-generation methodology to achieve contactless magnetic manipulation of objects. Diamagnetic particles in paramagnetic medium can be manipulated by MagLev technique, which provides antigravity conditions. In MagLev system, both biological and non-biological entities are levitated and manipulated in a three-dimensional (3D) space.

Recently, magnetic levitation methodology has been utilized in several applications in bioscience, such as biosensors, diagnostics and tissue engineering. Density-based separation was carried out for varied materials such as metals, polymers, biological and non-biological samples by magnetic levitation principle. On the other hand, magnetic levitation-based approaches have also been used in tissue engineering applications; that 3D cellular microenvironment was mimicked, and 3D cellular structures were formed by guiding cells.

This contribution summarizes our efforts in designing new setups and their use for biosensor applications, as well as assembling cellular entities via MagLev for 3D cell culture and tissue engineering. With the developed technology and assays, employed models also provide us possibility to adapt several components into different platforms for further biosensor and tissue engineering applications.

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Smart Material-Integrated Nanoparticles for Capturing and Releasing Circulating Tumor Cells On-a-Chip

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In the ongoing battle against cancer, early diagnosis plays a crucial role in commencing and broadening potential treatment options. While traditional methods have been widely employed, recent breakthroughs in the field of medical science have introduced a revolutionary approach: the examination of circulating tumor cells (CTCs). These micron-sized entities, break away from primary tumors and navigate through the bloodstream, offering groundbreaking opportunities for early cancer detection and personalized treatment strategies. In contrast to conventional biopsy techniques that necessitate invasive procedures and expensive equipment, CTC analysis provides a non-invasive, real-time window into the intricate dynamics of cancer development. By capturing CTCs from a simple blood sample, medical professionals can extract comprehensive information concerning tumor diversity, genetic mutations, and resistance to therapy. This advancement marks the dawn of a new era in precision medicine. In our research, we are striving to create a special type of material that responds to temperature changes, which will be integrated into silica nanoparticles. These nanoparticles will then be immobilized on a microfluidic chip to efficiently capture CTCs and release them for further analysis. We have ingeniously designed the silica particles to mimic the shape of peanuts, inspired by nature, enhancing the biosensing microchips' surface area. To heat up these nanoparticles, we employ a substance known as polypyrrole (PPy), which is embedded within the peanut-shaped silica nanoparticles. Additionally, we incorporate a thermoresponsive polymer called poly(N-isopropyl acrylamide) (PNIPAM) on the surface of the nanoparticles and to specifically target CTCs, we utilize anti-EpCAM antibodies. After CTCs are captured on the nanoparticles, the temperature is increased up to LCST (lower critical solution temperature). Once polymer brushes shrink, CTCs are released from the nanoparticles and can be collected for further analysis.

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Impact of Distinct Bacterial Populations on Brain Organoid Phenotype

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Organoids are micro-anatomic organ-like structures obtained by the use of pluripotent stem cells. In this work, we aimed to investigate how distinct bacterial populations, that are pathogenic microbiota (PM) and non-pathogenic microbiota (NM), affect the phenotype of brain organoids (BOs). To investigate that, we established BOs and co-cultured them with PM and NM through a transwell system, a 0.45 µm membrane-separated two-compartment cell culture device. To assess the presence and structure of tissues containing neural stem cells and neurons, the Nestin and TUJ1 staining on BOs were conducted. Control BOs (Cntrl_BOs) displayed Nestin+ and TUJ1+ cells emerging the specific morphology of Nestin+ cell enriched ventricular zone as well as TUJ1+ cells enriched outermost layer, complying with the specific histology of BOs. BOs co-cultured with NM (NM_BOs) contained multiple ventricular regions with lateral arrangement similar to Cntrl_BOs, while outer region containing TUJ1+ neurons was observed to be broader. In contrast, in BOs co-cultured with PM (PM_BOs), the ventricles are not longitudinally laterally arranged like in Cntrl_BOs and NM_BOs, but rather arranged in a triangular or rectangular geometry. Additionally, the regions containing TUJ1+ neurons were shown to be damaged. ImageJ software was used to measure the amount of Nestin+ and TUJ1+ cells in each group. There was no significant difference ($p>0.05$) in the amount of Nestin+ cells among the three groups. However, the amount of TUJ1+ cells was found to be highest in NM_BOs and lowest in PM_BOs ($p<0.05$).

Study of Penetration Systematic of Cationic Conjugated Polymer Dots in Blood-Brain Barrier Model

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Recently, an easy-to-apply nanophase separation method has been proposed to prepare a single chain conjugated polymer dot (Pdot) with a diameter of 5 nm.[1] In this method, Pdots containing a conjugated polyelectrolyte single chain are formed with a rapid nanophase separation between water (poor solvent) and ethylene glycol (good solvent). It has been shown that Pdots obtained by this method have high absorbance coefficient, high quantum efficiency, brightness, photostability and colloidal stability. Remarkably, single-chain Pdots less than 10 nm in diameter can access crowded and hard-to-reach (restricted) intracellular spaces, providing a more efficient means to label these regions, while providing significant advantages in penetrating cellular compartments. However, despite the remarkable number and quality of systematic studies on the penetration of Pdot imaging agents into cells/tissues in the current literature, no study has been found on the penetration systematic and efficiency of cell/tissues with barrier properties. Substance transfer across the blood-brain barrier, which is the most important barrier in the organism, emerges as a critical problem for life sciences and molecular medicine applications. The demonstration that Pdots enriched with cationic elements penetrate the cell wall with high efficiency suggested that cationic Pdots have a potential in overcoming diffusion limitiations of the blood-brain barrier.

By this project, the potential of Pdots as a new generation imaging and therapeutic agent will be investigated by performing the synthesis of Pdot with a conjugated polyelectrolyte structure in the size of 5-20 nm with super penetration properties, and systematically characterizing the transfer properties of these elements through the blood-brain barrier in the artificial blood-brain barrier model.[2]

In the project proposal, conjugated polyelectrolytes to be synthesized by the copolymerization of two different hydrophobic/hydrophilic monomers will be converted into Pdots whose charge density changes systematically by using the nanophase separation method. Penetration behavior of Pdots with a hydrophobic core and a hydrophilic crown (corona) structure with 5-20 nm size changes in the artificial blood-brain barrier model created with bEnd.3 mouse brain endothelial cell line and SH-SY5Y human epithelial neuroblastoma cell line will be studied.

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Bio-inspired Nanoparticle Approach to Plasmonic Phototherapy Based Drug Release Application

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Drug release studies using bioinspired materials as carriers have attracted considerable attention in recent years. In particular, the design of these structures to respond based on light-substance interaction gains importance in terms of the safety and controllability of drug release. In this study, Fmoc-Phe-Phe-OH and polydopamine nanoparticles, which contribute to photothermal drug release with near-infrared radiation (NIR), are decorated and embedded with gold nanoparticles (AuNPs) to take advantage of their plasmonic properties. Thus, it can be increased in the presence of an 808 nm NIR laser an effective photothermal response has been obtained. With this approach, epirubicin (EPI)-loaded bioinspired NPs, AuNPs decorated and embedded EPI-loaded bioinspired NPs were prepared. The structural characterizations of these nanoparticles were determined through Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD). The release behavior of the particles could be controlled by examining the release studies based on ON/OFF approach in acidic (pH 5.0) and neutral (pH 7.4) mediums. The release behavior of particles in the presence and absence of laser irradiation was investigated in terms of cytotoxicity in healthy (mouse fibroblast, L929) and cancer (neuroblastoma, SH-SY5Y) cells. The effects of EPI-loaded particles prepared, and laser-controlled drug release genotoxicity were also investigated in SH-SY5Y cells. In the light of the results obtained, it can be said that the drug release differs in accordance with ON/OFF-based approach with laser irradiation. It is thought that the developed approach is remarkable and promising in terms of making advanced evaluations before clinical use.

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Extraction of Highly Pure, Economically Viable, and Scalable Biogenic Mesoporous Silica Nanoparticles (MSNs) From Biosources: Ideal Nanocarriers for Drug Delivery Applications

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The current clinical methods for cancer treatment are notorious for their numerous side effects, primarily due to their lack of specificity. In the realm of drug delivery, Mesoporous Silica Nanoparticles (MSNs) have emerged as promising nanocarriers due to their exceptional structural characteristics, encompassing a substantial surface area, high pore volume, stable mesoporous structure, adjustable pore diameter, tunable particle size, and facile internal and external surface functionalization. Owing to these advantageous structural and chemical properties, MSNs have found applications in various scientific domains, notably in drug delivery and cancer treatment.[1] However, one of the critical limitations hindering the utilization of nanoparticles like silica nanoparticles in cancer treatment has been the challenge of scalability. This issue can be effectively addressed by sourcing nanoparticles economically through a straightforward extraction method. In numerous studies, the synthesis of MSNs has relied on expensive and potentially toxic alkoxysilanes.[2] In contrast, this study presents a novel approach wherein highly pure and cost-effective MSNs are directly extracted from diverse silica-rich biosources, including Rice Husk (RH), Wheat Husk (WH), and Horsetail (HT) plants, employing a simple one-step method. These MSNs exhibit the potential for functionalization with various stimuli-responsive polymers and specific ligands, enabling them to surmount physical barriers and target cancerous sites for the treatment of various types of cancers. The conversion efficiency of these biosources into MSNs was quantified, and the resultant MSNs were comprehensively characterized through techniques such as FTIR, XRD, BET/BJH, Fe-SEM, and EDS. Moreover, the biocompatibility of MSNs was rigorously assessed and confirmed through MTT assays. The results unequivocally demonstrate that these biosources represent a robust choice for synthesizing MSNs, and their distinctive features make them exceptionally well-suited for drug delivery applications in the field of cancer treatment.

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Designing Spatial Fingerprints of Exosomes on a Nanoparticles for Diagnosing Breast Cancer on an Optical Biosensor

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This study projects to seamlessly integrate multiple disciplines (chemistry, engineering, medicine, biology, and materials science) on the same platform, for employing non-invasive exosome biomarkers in cancer early detection, and also, for examining the effect of exosomes on cancer microenvironment. In summary, it is aimed to design and optimize flow dynamic analysis of microfluidic chip. Then, efficiently isolate exosomes released from human breast cancer cells using the microfluidic chip that mimics cancer microenvironment. By molecular imprinting of the spatial structure of exosomes into nanoparticles, it is aimed to minimize the stability problems in immunological-based platforms and integrate them with optical biosensors that are ease-of-control, sensitive, and reproducible.

Hence, capturing biomarkers with small size, yet big players in cancer will revolutionize precision health; accelerate early diagnosis and intervention; provide a better understanding of the cancer microenvironment; increase the geography of care by minimizing health costs and global-inequalities. In addition, unlike current laboratory assays that are lengthy and low-sensitive, low-cost microfluidics and optical biosensors, which provide sensitive, label-free and selective detection in a wide range of concentrations, have short assay times, facile preparation and ease-of-use fashions for the determination of exosomes, will have huge potential.

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The Advantages of The Aptamer Usage in Lateral Flow Assays For Viral Detection

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Rapid and accurate detection of viral pathogens is crucial for effective disease management and epidemic control. The pandemic also has necessitated the development of scalable diagnostic methods for the detection of viruses. Aptamers, which are short, single-stranded nucleic acid molecules, enable the identification of viral biomarkers by exhibiting high affinity and specificity for their targets.[1] Easy modification processes enable custom-designed binding features, improving test performance. Their reduced size facilitates better penetration of complex biological samples while minimizing nonspecific binding.[2] In this study, it was aimed to optimize the aptamer usage for preparation of the point of care test for viral detection. For this purpose, gold nanoparticles (AuNPs) were synthesized and used as label. Aptamer was modified with –SH (thiol) bond before the conjugation of AuNPs and also modified with biotin for surface immobilization. Then, different concentrations of aptamer were adopted to conjugation for the same purpose. Results showed that using aptamers for labelling the AuNPs has more advantages compared to the antibody labelling in terms of the efficiancy, time, shelf life and stability for preparing the LFAs. In short, this work summarizes the distinct advantages offered by the use of aptamers in LFAs specifically designed for viral detection compared to antibody.

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Collagen-Cu(II) Hybrid Nanoflowers: Chip and Alternative Biomaterials for Epinephrine Detection

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Epinephrine (EP), which is considered one of the most important subgroups of neurotransmitters in the central nervous system, is used in the diagnosis of various diseases.[1] Various methods such as colorimetric, electrochemistry, electrophoresis, chemiluminescence, fluorimetry, chromatography have been used for the detection of EP.[2,4]

In this study, collagen-Cu (II) hybrid nanoflowers (C-hNF) were synthesized using collagen protein (CL) as organic part and Cu (II) as inorganic part and investigated the usability of it's for determination of epinephrine. Synthesized C-hNF was characterized via SEM, EDX, XRD, FTIR. It was observed that the morphologies of synthesized C-hNF at pH 6, 7, 8 and 9 have a flower-like structure. The laccase mimic activity of C-hNF was determined in buffer solution at different pH levels (pH 3-9). According to obtained results, highest laccase mimic activity of C-hNF was found as 0,076 EU/mg at pH 7. The colorimetric and spectrophotometric detection limit for EP were found to be 10 µg/ml and 0.5 µg/ml respectively. The reusability of synthesized CNFs in enzyme assay was also investigated and it was seen that they could be used 5 times for EP detection. In conclusion, synthesized C-hNF using collagen and Cu (II) ion has the potential to be used as a low-cost and alternative hybrid material for EP detection.

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Surface Modification of Screen-Printed Electrodes (SPE) with an Lonic Liquid-Hydrogel Hybrid Material for Electrochemical Detection of Illicit Drugs

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Substance abuse is a plague haunting modern society especially with the dangers related to driving under the influence. As such, like alcohol level testing using breathalyzers, substance abuse is in critical need of on-site detection. The use of portable biosensors as point-of-care (POC) tools became an important field of research. One of the most prominent biosensor formats are electrochemical sensors that have seen tremendous development in substance abuse detection.[1] However, there is still room for development and enhancement through the modification of the electrode surface or adaptation for non-invasive sample testing.[2,3] The current study proposes the enhancement of the electrochemical sensing ability towards illicit drugs (i.e., methamphetamine) over human saliva using a new hybrid material composed of hydrogel and ionic liquids (gelatin, PEG, and 1-butyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide). The synthesis steps characterization of the ionogel was performed using FTIR and SEM. The surface modification of the screen-printed electrode (SPE) was performed, and the electrochemical measurements were measured using cyclic voltammetry (CV) and differential pulse voltammetry (DPV). The biosensor demonstrated a detection range of 5.0-1000 ng/mL and a limit of detection (LOD) reaching 0.56 ng/mL and 0.72 ng/mL for buffer and spiked human saliva, respectfully. Other analytical parameters, such as the repeatability and reproducibility showed a coefficient of variance (CV%) reaching 6.92% and 2.53%, respectively. Additionally, the specificity of the biosensor was highly correlated to methamphetamine compared with other illicit drugs interferents. The current ionogel-based electrochemical immunosensor offers a promising and versatile tool for sensitive onsite detection of substance abuse.[4]

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Structural and Functional Determination of an Aquaporin from Antarctic Pseudomonas sp.

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Aquaporin is a water channel protein that facilitates the movement of water across the cell membrane. It is ubiquitous in nature, however the understanding on water transport mechanism particularly from low temperature microbes remain scarce. Aquaporin also has been recognized for its ability to be used as a water filtration but lacking the structural information regarding the aquaporin to be a potential protein for the industrial. Therefore, this research was conducted to express, purify and study the structural and functional adaptations of aquaporin Z family from *Pseudomonas* sp. AMS3 at various temperatures via computational and molecular approaches. In this study MD simulation of a predicted were embedded in a lipid bilayer and was performed at different temperatures for structural flexibility and stability analysis. The MD simulation results suggest that AqpZ model able to remain stable and flexible throughout the simulation. AqpZ was successfully subcloned and expressed optimally in *E.coli* as a recombinant protein. A mild detergent (3-((3-cholamidopropyl) dimethylammonio]-1- propanesulfonate) (CHAPS) was the suitable surfactant for the solubilization of the protein and purified via affinity chromatography. Liposome and proteoliposome were reconstituted to carry out the size determination using Dynamic Light Scattering (DLS). The information obtained from this psychrophilic aquaporin identified provides new insights into the structural adaptations of this protein at low temperatures and could be useful for low temperature applications in the future.

Electrochemical Aptasensor for the Detection of Cardiac Troponin T: the Diagnosis of Acute Myocardial Infarction

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Acute myocardial infarction (AMI) is the most prevalent condition that results in cardiac arrest and death worldwide. Over time, much more emphasis should be placed on detecting AMI biomarkers, focusing on designing a rapid, simple, and convenient detection method.[1] Cardiac biomarkers have been widely used for AMI diagnosis, including myoglobin, creatinine phosphokinase (CK), and cardiac troponins (cTns). Among these, the cTns are highly selective and accurate for monitoring heart muscle damage. In healthy individuals, the level of cTnT in the bloodstream is extremely low or undetectable, but when the heart muscle is damaged, cTnT is released, and its concentration in the blood increases. So far, most of the laboratory diagnostic methods for TnT assessment have been based on immunological assays.[2,3] In recent years, electrochemical biosensors for biomarker detection have been extensively used as alternative and highly selective platforms due to their remarkable properties, such as high sensitivity, fast response time, low cost, and instrumental simplicity.[4] Especially, using aptamer molecules as biorecognition elements in biosensor design significantly increases the effectiveness of the developed diagnostic platform.[5]

In this study, a novel sandwich-based and aptamer-based biosensor was developed for the selective and sensitive detection of cTnT, which is used as a golden biomarker for AMI. The modified electrode was prepared by electrodepositing AuNPs and ERGO on the SPE surface. Thiolated-Apt-1 was immobilized onto the SPE/ERGO/AuNPs utilizing Au-S chemistry. Then, cTnT, Apt-2 and Strep-ALP were successively incubated on the electrode surface. Optimization studies were investigated by cyclic voltammetry and electrochemical impedance spectroscopy. The prepared SPE/ERGO/AuNPs/Apt-1/cTnT/Apt-2/Strep-ALP aptasensor is highly efficient to determine cTnT with excellent repeatability, anti-interference ability and reproducibility.

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Hybrid Biosensing Systems for Detecting Biomolecules and Alzheimer's Disease Biomarkers

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Dementia—a cognitive skills-impairing illness, affects a substantial number of individuals worldwide. Alzheimer's Disease (AD) is the prevalent reason for dementia. Yet, current methods for detecting AD biomarkers suffer from cost-effectiveness and sensitivity issues. Therefore, it is crucial to develop affordable and highly sensitive point-of-care (POC) biosensors for this regard. In this study, fluorescently-labeled proteins are integrated over a plastic-templated plasmonic metasurface *via* three different surface modifications to obtain a hybrid biosensing system that enhances plasmonic sensitivity and improves the detection limit for the detection of AD biomarkers. The surface modifications on the metasurface are arranged as short-distance, medium-distance, and long-distance intervals for the optimization of separation distance between fluorescently-labeled proteins and the plasmonic metasurface. Furthermore, the spectral overlap between the excitation/emission spectrum of fluorescent proteins and the absorption spectrum of plasmonic metasurface is optimized on the medium-distance modification by exchanging the fluorescent targets over the protein. After evaluating the separation distance and the spectral overlap, the medium-distance modification functionalized with FITC shows the highest plasmonic resonance shift with ~4.4 times signal enhancement compared to the short-distance modification. The FITC-functionalized medium-distance modification is further combined with AD biomarker-specific antibodies for the detection of AD biomarkers in both PBS and serum medium. The developed hybrid sensor is investigated using a variety of characterization methods. Finally, the performance of the hybrid biosensor is also assessed using the gold-standard method (ELISA) from various aspects. Our study provides a new strategy for coupling fluorescent molecules with plasmonic structures and utilizes this strategy for the cost-effective and sensitive detection of AD biomarkers.

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Towards a Cost-effective Point-of-care Capacitive System for Rapid Antibiotic Susceptibility Testing

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The accelerated growth of antimicrobial resistance (AMR), bacterial AMR more particularly, has become a global public health issue as a consequence of the abuse or misuse of antibiotics. Some bacteria have evolved to such an extent that available antibiotics are now completely ineffective against them, compromising the established treatment procedures for the diseases caused by these bacteria. This challenge has become a colossal hurdle for effective disease control, and addressing this issue demands the utmost urgency now than ever before. Primarily, antibiotic susceptibility testing (AST) is performed using phenotype methods in clinical-grade laboratories, which is time-consuming, making it unsuitable for point-of-care (POC) implementation. Taking an electrochemical approach towards this has the potential to develop a low-cost, portable, and rapid diagnostic tool for AMR testing. Therefore, in this work, we study the effectiveness of a capacitance-based system for antibiotic susceptibility testing. We develop a portable POC microfluidic chip that uses the change in dielectric property of the insulating layer of the capacitive system due to applying antibiotics to the bacteria immobilized on the dielectric material.

A Laccase-Based Amperometric Biosensor for the Determination of Total Phenolic Content

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Biosensor design and fabrication for the rapid and sensitive detection of phenolic compounds remain crucial research areas for monitoring food quality and measuring the antioxidant levels in foods.[1] This study proposes a laccase-based amperometric biosensor constructed using the carbon paste electrode (CPE) to detect the total phenolic content in fermented grape beverage. The biosensor was prepared by dispersing a laccase solution (1.25 U/5 µL) into a composite matrix of multi-walled carbon nanotubes (MWCNTs), graphite powder, and mineral oil (10:60:30 w/w%).[2,3] Amperometric measurements were conducted at 35°C in a 50 mM phosphate buffer with a pH of 6.0. The Lac/MWCNTs/CPE biosensor showed a linear response to the gallic acid solution (GA) in the range of 5.0 to 100 µmol L^{-1} with the detection and quantification limits of 0.31 and 1.04 µmol L^{-1}, respectively. The biosensor demonstrated acceptable repeatability and reproducibility. The amperometric responses by Lac/MWCNTs/CPE biosensor were measured for the fermented grape beverage sample. The total phenolic content of samples was calculated by interpolating these responses into a calibration plot constructed with GA stock solutions in the concentration range of 5.0-100 µmol L^{-1}.[4] These results were compared with those obtained by Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS), achieving a recovery rate of 78.91%. This study demonstrates the potential of the proposed biosensor to detect the total phenolic content in beverages, and the findings offer promising prospects for future applications.

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Development of Selective Electrodes for the Determination of Vitamin D in Physiological Fluids

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Vitamins are very important protective and regulatory molecules for human health. They have very important functions especially in terms of energy metabolism and defense mechanism of the body.[1] Among these; There are some specific tasks such as repairing damaged tissues, carrying out physiological activities, maintaining hormonal balance.[2] In particular, vitamin D has a very important role in many processes such as the continuation of normal blood activities, the fulfilment of thyroid functions, the absorption of Ca and P, blood clotting and growth in children. At the same time, vitamin D deficiency causes disturbances in heart rhythm, immune system, muscular system and bone tissue. Therefore, it is very important to measure vitamin D quickly and selectively. The measurement of vitamin D is usually carried out by instrumented techniques such as HBLC and GC, which are very intensive sample preparation steps.[2] These techniques require very costly equipment and require specialized personnel. However, electrochemical measurement systems offer an important alternative for fast, accurate and sensitive vitamin D measurement. For this purpose, polyurethane composites containing mesoporous C were converted into potentiometric sensors to be used in vitamin D measurement. Firstly, mesoporous C structures were prepared from different pollen structures. The prepared C structures were characterized by techniques such as FTIR, XRD, SEM and BET and then converted into polyurethane composites at different ratios. Polyurethane composite structures were coated on electrode surfaces and converted into vitamin D selective sensors. The obtained sensors were tested for vitamin D in the presence of common interferants using CV and DPV techniques. The obtained sensors showed low detection limit and electrode stability for about 10 days. Compared to unmodified electrodes, sensivty, stability and precision values were quite good. In conclusion, C-based polyurethane composite sensors prepared for fast, easy and sensitive vitamin D measurement offer an important alternative in pharmaceutical and clinical applications.

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Nanoparticle Property Tuning Methodologies for LSPR-based Biosensor Applications

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Localized Surface Plasmon Resonance (LSPR) is a method which operates on the same principle as Surface Plasmon Resonance (SPR), unlike SPR it employs metal nanoparticles (NPs) rather than metal films, hence LSPR does not need complex hardware and provide quicker response time, however it generally offers a lower sensitivity. In LSPR, an absorbance peak (λ_{max}) is observed and the position and intensity are dependent on factors such as NP size, shape, composition, and orientation. Therefore, the effectiveness of LSPR-based sensor platforms hinges significantly on the specific characteristics of the employed NPs. Consequently, characteristics of LSPR-based sensors can be controlled in terms of sensitivity, specificity, and resolution by fine tuning the said characteristics of NPs.[1]

Herein, several methods for enhancing LSPR sensor sensitivity and utility were investigated. For this purpose, NPs with various sizes, morphologies, and compositions were synthesized. Syntheses were carried out via well-established,[2] modified,[3] and novel methods for tuning of NPs during the study. The synthesized NPs were characterized via SEM imaging, EDX analyses, UV-Vis spectrum and DLS measurements and optimization was done with reaction time, reactant concentration and ratios as parameters. Effectivity of the sensitivity enhancement was then tested via a model protein. Synthesized NPs were then immobilized onto solid surface for biosensor applications to increase sensitivity, reusability, stability and reduced background signals. Moreover, various tuning applications were carried out for several NPs such as in-situ size growth and coating for further tuning. Afterwards, biomolecule recognition was accomplished via the shift in λ_{max} measured. The most successful enhancement was achieved via core-shell NP utilization of gold core, silver shell particles. Core-shell ratio was also carried out and characterization was doneç Overall, tuning of NPs was carried out by various techniques and their effect on NPs and biosensor characteristics were thoroughly investigated. The completed work is a wide compilation of various NP synthesis and manipulation techniques and would be a promising background for further biosensor studies.

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Magnetic Nanoparticle-Based Biosensor System for Monitoring of Active and Passive Smoking

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Cotinine is a main metabolite of nicotine and an addictive agent in cigarette smoke. Smoking has several adverse health influences on both active and passive smokers. In addition, different studies illustrate that blood cotinine levels are associated with the risk of lung carcinoma incidence.[1,2]

A highly sensitive electrochemical biosensor for the determination of cotinine was reported. The novel immunosensor was fabricated on iron oxide nanoparticles, and anti-cotinine antibodies were utilized as biorecognition elements. The electrochemical behavior of the iron oxide nanoparticle-based biosensor was studied with electrochemical impedance spectroscopy and cyclic voltammetry. The morphology and composition of the fabricated biosensor were characterized by scanning electron microscopy. The electrochemical properties of the biosensor were changed accordingly after cotinine immobilization. The electrochemical impedance technique was utilized to quantify the cotinine concentration. The results displayed that the impedance gradually increased after more cotinine molecules were immobilized on the iron oxide nanoparticles. A low quantification limit (1.93 pg/mL) was obtained. This system illustrated high sensitivity, good selectivity, and long storage stability. This novel method is specific and fast, and it has the potential for real sample detection.

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Synthesis of Drug Loaded Magnetic Nanocomposite and Investigation of Cytotoxic Properties

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This aims of study to develop drug delivery systems providing an alternative solution to cancer chemotherapy. Firstly, carboxymethyl dextran which has magnetic properties (MD), was synthesized as stated in the literature.[1,3] Its structure was elucidated with various analytical devices. Then, loading studies were carried out on the nanocomposite with topotecan (TP) (in the range of 0.2-40 µM in phosphate buffer at pH 5) as an anticancer drug. The cytotoxic properties of MD, TP, drug loaded MD (MD-TP), and free TP were studied on human prostate cancer cell (Du145) and human healthy prostate cell (PNT1A) line. The synthesized MD and MD-TP nanocomposites were characterized by different analytical devices such as FTIR, XPS, UV-VIS, VSM, TEM, SEM and DLS. According to the FTIR results, the presence of peaks belonging to functional groups in the expected places indicates that MD was successfully synthesized and TP was successfully loaded on nanocomposite. According to TEM image, the MD particles showed a spherical structure, and also, the particle size was measured as 9 ± 1.8 nm. The SEM image of MD indicated that the nanoparticles were aggregated. Furthermore, after the loading TP, the brightly colored particles of TP were observed on some parts of the surface of MD. Moreover, DLS measurements of the nanoparticles were taken before and after loading the drug. Due to high agglomeration of the magnetic nanoparticle, it showed polydispersity. In addition, cytotoxicity effects of drug loaded nanocomposites on Du145 and PNT1A cell lines were investigated and the results were found to be statistically significant. The topotecan loaded MD-TP nanocomposite have shown cell viability to be reduced by up to 20 %. It has been shown that synthesized polymer coated superparamagnetic nanocomposites with these properties can be used in drug targeting studies.

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Electrical Impedance Based Detection of Positive and Negative LAMP Tests for Point-of-Care Testing

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SARS-CoV-2 pandemic (COVID-19) has shown how unprepared modern society is to emerging infectious diseases.[1] Despite the availability of advanced diagnostic capabilities, these have not been available to the masses due to infrastructural and economic confronts.[2] To tackle this problem, the concept of Point-of-Care (PoC) testing has been developed[3] and restructured as the REASSURED criteria, which were stated as ASSURED by the World Health Organization earlier, to help standardize the development of such systems.[4] Herein, our research aims to produce an electronic device that can gauge the result of loop-mediated isothermal amplification (LAMP)-based nucleic acid assays for REASSURED compliant diagnostic of infectious diseases. Our device, using a combination of analog and digital electronics, applies a time-varying electrical signal to the samples and measures any alterations in impedance across a resistive divider in response to the nature of the sample (varying nucleic acid concentration between positive and negative results). This method can be achieved using more inexpensive components compared to traditional optical items needed for existing methods such as RT-PCR. The device is also designed to be affordably produced using existing electrical mass-production techniques and off-the-shelf components. All that is needed for the device to function is a computer with a functioning USB drive.

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Cardiopulmonary Bypass and Hypothermia-Induced Alterations in Plasma Metabolome Profile in Adult Cardiac Surgery

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Cardiopulmonary bypass (CPB) is the temporary suspension of the heart and lungs to permit cardiac, vascular, or thoracic surgery in a safe, immobile, bloodless, and regulated environment. The goal of utilizing hypothermia is to provide some degree organ protection during CPB.[1] The significance of hypothermia is difficult to comprehend since its effects are mediated by various systemic and cellular pathways.[2] This study was comprised of 16 patients with (32-35°C) mild hypothermia (MIH) and 16 patients with (26-31°C) moderate hypothermia (MOH) following open heart surgery with CPB (n=32). Plasma samples were collected before surgery (T_0), at the lowest intraoperative body temperature (T_1), where after CPB was stopped and the patient reached normothermic (36.5°C) body (rectal) temperature (T_2). Metabolomic profiles of both groups (moderate and mild hypothermia) were performed using GC-MS and LC-qTOF-MS technologies. Metabolomic analysis showed different metabolites to be altered in both hypothermia groups ($p<0.05$). T_0 was set as the preoperative control point to determine individual differences within the groups. It was also determined that phenylalanine and D-glucose-6-phosphoric acid showed change of each group between sampling time points T_1 and T_2. Comparing the hypothermia groups independent of time points, Dehidroisoandrosterone Sulfate, Inosine, and N-Ethylglycine 2-Hydroxybuthyric acid metabolite levels increased in MIH, while L-valine, N,N-Dimethyl-Safingol, and N-octadecanoyl-sphinganine increased in the MOH group. It was determined that the phenylalanine, tyrosine, and tryptophan biosynthesis pathways caused differentiation between the MOH and MIH groups. Consequently, the metabolomic profile in both groups may have the potential for optimization of temperature strategies in CPB.

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Exploring New Drug Candidates for Antimicrobial Resistance in *Pseudomonas Aeruginosa* Through Integration of Transcriptome Data and Genome-Scale Metabolic Model

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Antimicrobial resistance (AMR) is an increasing threat according to World Health Organization. *Pseudomonas aeruginosa* is a Gram-negative and opportunistic organism that develops multidrug resistance in several ways, which requires a better understanding of the mechanisms and new and effective solutions to overcome them. The transcriptome, a complete set of RNA molecules, provides information about gene expression, regulation, and function, leading to the translation of this information for disease diagnosis, treatment, and drug development and discovery. Integration of transcriptome data and genome-scale metabolic model (GEM) of the organism is one of the useful strategies to identify and understand metabolic activities related to AMR. The discovery of reporter metabolites (RM) and their specific metabolic pathways may be a powerful method to study metabolic responses and cellular mechanisms of AMR under different conditions leading to potential therapeutic targets or biomarkers. In this study, comprehensive transcriptome data sets associated with 4 drugs (ciprofloxacin (CIP), tobramycin (TOB), ceftazidime (CAZ), and meropenem (MEM)) and a total of 144 drug-resistant/susceptible *P.aeruginosa* strains from a previous study[1] were integrated with the GEM of *P.aeruginosa*.[2] To integrate these two data, the COBRA toolbox on the MATLAB platform was used. A reporter score was assigned to each metabolite by the RM algorithm[3] based on its connectivity to differentially expressed genes, and the metabolites with the highest scores were identified as RM (p-value < 0.05). The sets of RM for each of the four drug resistance profiles were further analysed to identify significantly altered metabolic pathways (p-value < 0.05). It is found that CAZ and MEM effect biofilm formation pathways besides arginine and proline metabolism, glyoxylate and dicarboxylate metabolism in common, CAZ and TOB effect cell wall biosynthesis by D-Alanine metabolism and peptidoglycan biosynthesis as well as cell growth by Pantothenate and CoA biosynthesis and biofilm formation as well. CIP and TOB effect on sulphur metabolism and CAZ, CIP and MEM effect on translation on DNA by Aminoacyl-tRNA biosynthesis pathway, trigger bacterial chemotaxis and ABC transport system in common. The reporter metabolites and significant metabolic pathways identified here will contribute to the development of new therapeutic approaches against antimicrobial resistant *P. aeruginosa* infections.

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Production of Microbial Pigment from Whey

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Whey is one of the wastes released in cheese production and is considered an important environmental pollution due to its high organic load. The aim of this study is to produce color pigment with low cost and rich composition using bacteria isolated from whey.[1] In our study, bacteria were isolated from raw whey and their pigment production abilities were investigated in MSM Broth medium. By measuring the absorbance of the colors given by the pigments at different wavelengths for the isolates, the spectrum value of the pigment substance corresponding to µg/ml was obtained. The dried pigment materials were characterized by Fourier transform infrared spectroscopy (FTIR). As a result of the spectrum scanning, it was determined that all pigments gave their maximum absorbance values between 500 nm and 505 nm. It is known that quinone molecules have high absorbance points in the regions up to wavelengths of 280 nm and 550 nm. According to FTIR data, all extracted pigments showed characteristic absorption bands of carotenoids between 400 and 520 nm. The measured spectra correspond to the absorption of chromophore groups present in the chemical structures of carotenes. The bands in the range of 1,320^{-1},390cm^{-1} of the pigments indicate that the pigment contains pyrrole or indole in its structure. In FTIR spectroscopy of microbial pigments, moderate peaks at 1469 cm^{-1} and 1726 cm^{-1} are known as fingerprint regions for biocolorants. The peaks at 1460^{-1} and 1450 cm^{-1} regions indicate the presence of aliphatic groups, which are organic compounds containing a skeleton in the form of straight or branched chains, formed by covalent bonding of various atoms to each other, in the molecular structures of the pigment material.

As a result, the sustainable use of whey for the production of natural pigments can improve the bio-based economy of different industries and therefore the national economy.

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The Physiological and Biochemical Effects of Nitric Oxide and Brassinosteroid on Two Wheat Varieties Under Drought Stress

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Drought stress causes many physiological and biochemical changes that affect plant growth and development. Oxidative damage and the balance of antioxidant defense are two important factors that enable the plant to survive under drought stress. Brassinosteroids (BR) affect growth, photosynthesis, and redox balance at many stages of a plant's life cycle. Nitric oxide (NO) is an important signaling molecule that affects many biological processes in plants.[1] There is no data in the literature on the physiological and biochemical effects of combined and single treatment of BR and NO on wheat under drought stress. For this purpose, the effects of NO and BR treatments on two 21-day-old wheat varieties (*Triticum aestivum* cv. NKÜ Lider and cv. Kenanbey) during 7-day drought stress were investigated. In this study, NO (sodium nitroprusside, SNP) and BR (24-epibrassinolide, EBL) were applied foliar with single (200 µM SNP, 0,0250 mg/l^{-1} EBL, 0,0500 mg/l^{-1} EBL) and combination (200 µM SNP + 0,0250 mg/l^{-1} EBL, 200 µM SNP +0,0500 mg/l^{-1} EBL). Biomass, dry weight, total chlorophyll content (SPAD), relative water content (RWC), peroxidase activity (POX) and hydrogen peroxide amount (H_2O_2) were determined in the seedlings sampled after the treatment.

Our results showed that biomass, dry weight, SPAD and POX activity decreased with drought stress in the drought-resistant NKU Lider variety, whereas they increase with the single treatment of 0.0250 mg/l^{-1} EBL and the combination of 200 µM SNP +0.0500 mg/l^{-1} EBL. In addition, RWC increased with the 200 µM SNP and the combination of 200 µM SNP +0.0500 mg/l^{-1} EBL in drought resistant variety. In the drought-sensitive Kenanbey variety biomass, dry weight, SPAD, RWC and POX activity were decreased with drought stress. However, they increased with the single treatment of 200 µM SNP and the combination of 200 µM SNP +0.0500 mg/l^{-1} EBL. It has been understood that combined treatments are especially more effective than single treatments of NO and BR for these wheat varieties under drought stress.

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Synthesis of Novel Phthalocyanines and Their Usage as a Catalyst in the Photooxidation of Benzyl Alcohol

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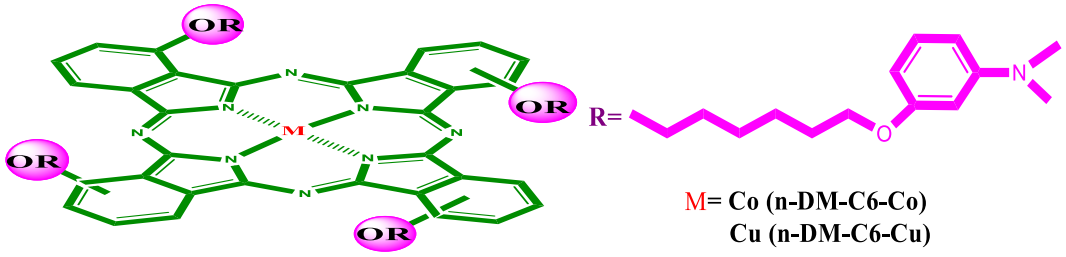
Phthalocyanines are macrocyclic compounds consisting of four iminoisoindole units with a central cavity large enough to bind many metal ions. They have 18-π electron system. Although they are similar to porphyrins, phthalocyanines differ from the porphyrin ring in that they contain benzo units and meso nitrogens.[1,2] Phthalocyanines which are heterocyclic compounds, have taken interest in applying as functional materials Phthalocyanines, which are in the class of technological products, have many applications such as being used as a catalyst today.[3] The main aim of this study was the developing of highly water-soluble non-peripherally tetra-({6-[3-(dimethylamino)phenoxy]hexyl}oxy) substituted cobalt(II), copper(II) phthalocyanines as catalysts. For this reason, we have designed and synthesized metallophthalocyanines, their water soluble derivatives bearing ({6-[3-(dimethylamino)phenoxy]hexyl}oxy) groups at non-peripheral position of phthalocyanine. Then, photocatalytic properties of water soluble phthalocyanines were examined in benzyl alcohol photoxidation reaction in biphasic system.



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Investigation of the Usage of the Lipase Attached Micromotors For Degradation of Oils As Water Contaminant

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Various lipids such as oil and grease are widely used in cosmetics, oil refineries, agriculture, pharmaceutical, automobile, pulp, tannery, and food industries. These industries release large amounts of lipids into wastewater, causing serious environmental damage and adverse effects on plants, animals, etc.[1] Wastewater treatment methods mainly include physicochemical and biological methods. Physicochemical methods such as chemical oxidation, distillation, membrane-based separation techniques, and adsorption are used in wastewater treatment. These strategies are intended for treatment purposes, but they are very expensive and can cause more pollution and damage. Enzymes are catalytic molecules that have a special place among biological methods and are efficient biocatalysts that can biodegrade substances, especially under mild conditions. The most widely used enzymes in wastewater treatment are hydrolases and oxidoreductases. Today, enzymes such as lipase, laccase, and peroxidase are used commercially.[2] Lipases are carboxylesterases that catalyze the hydrolysis of long-chain acylglycerols to glycerol, free fatty acids, and mono- and diacylglycerols.[3]

In this study, PPy-COOH/Ni micromotors were synthesized by the electrodeposition method and lipase enzyme was covalently bound to these micromotors. Lipase-bound micromotors were characterized by SEM, EDX, and FTIR techniques. The activity of free and immobilized lipase was investigated and its stability was evaluated. The thermal and storage stability of immobilized lipase was found to be higher than free lipase and could be used repeatedly. In addition, tributyrin was used as a substrate to investigate the oil removal potential of lipase-attached micromotors, and immobilized lipase was found to degrade tributyrin oil droplets by 90% after 90 min.

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Development of the Tyrosinase Enzyme Modified Multisegmental Nanowire Biosensor for Determination of Bisphenol A

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Tyrosinase (EC 1.14.18.1, monophenol monooxygenase or polyphenol oxidase) is a copper metalloenzyme. It is an enzyme widely found in plants, animals, and various microorganisms that removes phenolic compounds, and dyes, is used in bioremediation, and plays an important role in melanin formation. It belongs to the oxidoreductase class of enzymes, also called polyphenol oxidase, and contains two Cu atoms. [1,2,3] Bisphenol A [2,2-bis(4-hydroxyphenyl) propane, BPA] is one of the most important endocrine-disrupting chemicals. Bisphenol A can leach from polycarbonate plastics (PC) and epoxy resin products used to make water bottles, baby bottles, beverage bottles, and food storage containers and can interfere with the normal functioning of endocrine hormones, causing harmful effects on human health even at low doses.[4] The residual levels of BPA in PC baby bottles ranged from 1 to 599 ppm, with average levels from 9.9 to 177 ppm.[5] Therefore, BPA is a serious threat to health and its detection is important. In this work, a novel rGO/Au/PPy-COOH nanowire-modified amperometric biosensor was prepared for bisphenol A detection. The nanowire was synthesized by the electrochemical deposition method and then characterized. The prepared nanowires were immobilized with tyrosinase enzyme using EDC/NHS chemistry and modified with Nafion™ to protect the screen-printed electrode surface. All modification steps were characterized by cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). The developed tyrosinase enzyme-based biosensor has a linear range of 0.05-7.5 µM and a detection limit of 0.039 µM. The tyrosinase enzyme-based biosensor also demonstrated great reproducibility, selectivity, and stability.

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Preparation of L-Proline Imprinted Nanoparticle Based Surface Plasmon Resonance Sensors for L-Proline Detection

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L-Proline is an essential amino acid that the body can synthesize from other amino acids when necessary. It is also obtained from dietary sources, especially in protein-rich foods.[1]L-Proline is important for maintaining overall health and plays a role in various biological processes within the body.[2] Determining L-proline levels can be important in some medical diagnoses or nutritional assessments. L-Proline and its derivatives have the potential for use as drug delivery systems and have been investigated for their anti-inflammatory and anticancer properties.[3] Additionally, collagen synthesis depends on the availability of L-proline, and decreased L-proline levels have been associated with impaired wound healing, weakened immune function, and joint disorders.[4,5] In this study, L-Proline imprinted SPR sensors (Pro-Mip) were produced for selective detection of L-Proline in body fluids. PHEMA based Pro-Mip and non-imprinted (Nip) SPR sensors were synthesized and characterized via Zeta-sizer, SEM, AFM, FTIR and contact angle measurements. According to the size analysis results obtained from the Zeta-sizer, it has been observed that the sizes of Pro-MIP and NIP nanoparticles are approximately around 20 nm, and the size distribution is found to be homogeneous. Studies for real-time detection of L-Proline were performed using aqueous L-Proline solutions at different concentrations and the detection limit was obtained as 0.0005 mg/ml. SPR isotherm parameters were determined accordingly, and results showed that the Pro-Mip SPR sensors was well suits with the Langmuir isotherm model. The selectivity of the SPR sensor was tested using the competing molecules L-histidine and L-phenylalanine, and it was able to recognize L-proline at 5.5 and 3 times higher levels, respectively. Synthesized Pro-Mip SPR sensors were used repeatedly 5 times without any change in their L-Proline binding capacity. Obtained results showed that, the Pro-Mip SPR sensors are reusable and able to detect the L-Proline molecule selectively in both aqueous solutions and body fluids.

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Multi-Adsorption with Eupergit CM

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As a member of the carbamate family, carbaryl has been used extensively in the last century due to its broad spectrum in improving the quality of foods and fighting pests.[1,2] However, its uncontrolled and unconscious use could not prevent carbaryl from being a potential carcinogen, and especially by affecting acetylcholinesterase activity, it blocks the nervous system and caused neurological disorders to increase.[3] In addition, although there are studies to remove concerning environmental pollution due to its DNA-damage effects, the desired level of improvement has not been achieved yet.[4] To overcome the removal issues, adsorption is preferred as the best alternative. Especially adsorbents with a large negative charge such as eupergit are effective in removing polar molecules such as carbaryl. Therefore, in this study, the pores and abundant oxirane rings in the polymeric structure of eupergit were exploited. In particular, the fact that Eupergit is mechanically stable at almost all pH and is resistant to microbial degradation has been beneficial in increasing adsorption performance and repeated use.[5, 6] Although the SEM images taken give information about its morphology, the most suitable adsorption was obtained at neutral pH value. Adsorption, which decreases with time, can be interpreted as the best contact time is the first five minutes resulting in breaking of adsorbed molecules due to molecular friction over time. Since the increasing retention rate up to 10 ppm concentration is much enough with the individual yield of 63% carbaryl and 99% copper removal to get rid of environmental accumulation. Enhanced adsorption with increasing temperature can be attributed to the molecular kinetics of carbaryl adsorption. In addition, all conditions for dual removal performance were also applied with the presence of copper and the multi-removal performance of eupergit was in favor of copper. While the presence of iron, nickel and lead in the matrix interfere with carbaryl adsorption by approximately 8%, the decrease caused by this interaction increased up to 36% in copper case. However, while interference caused by tap water affects carbaryl (26%) more, it has almost no effect on copper (0.05%) adsorption. Experimental results show that carbaryl can be used as a waste-sweeper in multiple removals.

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IMAC Application of Extracellular Polymeric Substances Doped Composite Membranes for α-Amylase Separation and Kinetic Studies

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IMAC, a popular method of affinity chromatography, has been utilized effectively for the purification of α-amylase, which is an important enzyme industrially. For the polymerization, poly (2-hydroxyethyl methacrylate) (PHEMA) as monomer, glycidyl methacrylate (GMA) as co-monomer, *N,N'*-methylene-bis- acrylamide as crosslinker, extracellular polymeric materials (EPS) as metal binding agent, *N,N,N´,N´*-tetramethylethylenediamine (TEMED)/ammonium persulfate (APS) as activator/initiator and ethanol as porogen were used. After attachment of Cu^{2+} ions to extracellular polymeric substances (EPS), PHEMA based composite membranes including Cu^{2+}-EPS were synthesized in the petri dish by radical copolymerization method. Prepared Cu^{2+} attached EPS-mixed membranes were characterized by Scanning Electron Microscopy (SEM), swelling tests, surface area measurements. The influence of parameters such as pH, initial α-amylase concentration, temperature, and ionic strength in α-amylase adsorption from aqueous medium were also investigated. The highest adsorption capacity on Cu^{2+} attached-EPS doped polymer membranes (Cu^{2+}-EPS-PM) was determined as 54.2 mg/g polymer at pH 5.0 sodium acetate buffer at 25 °C in an initial α-amylase concentration of 2 mg/mL. Furthermore, it has been determined that the enzyme can be adsorbed and desorbed repeatedly on Cu^{2+}-EPS-PM. The effects of pH and temperature as well as storage and operational stability were investigated for the activity profiles of free and immobilized α-amylase. The results showed that immobilization had positive effects on activity.

Removal of Chromium from Wastewater Using Chromium Imprinted Polymer

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With the rapid advancement of technology, industrial processes and waste generation have increased; as a result it is leading to increased release of heavy metals into environment. This situation has caused the widespread presence of heavy metals in living ecosystems and the disruption of ecological balance. Therefore, in order to improve the quality of drinking water and prevent possible diseases, these metal ions that pollute the aquatic environment must be removed or their concentrations should be reduced to the levels determined by the World Health Organization (WHO).[1] The commonly treatment technologies for the removal of toxic heavy metals from industrial wastewater are oxidation-reduction, filtration, electrochemical treatment, evaporation, ion exchange, and reverse osmosis processes, considered as significant research topics due to their associated costs.[2] Molecularly Imprinted Polymers (MIPs) are effective molecular recognition materials used for separating and analyzing complex molecules from environmental samples. Molecularly imprinted polymers offer an effective solution for the removal of heavy metals from wastewater due to their high selectivity, specificity and low operating costs.

In this study, chromium (VI) ion was chosen as the template, poly HEMA-MAA as the monomers and EGDMA was used as cross linker. The removal of chromium (VI) from the polymer was studied with four different washing (1M HCl; 0.3M EDTA; 1M HCl:0.3 M EDTA; 0.1M HCl: 0.3 M EDTA). The determination of Cr (VI) ions in the washing step was spectrophotometrically carried out using the 1,5-diphenylcarbazide (DPC) method. The structural characterization of imprinted polymer was studied with Fourier Transform Infrared Spectroscopy (FT-IR) analysis and SEM images. The synthesized molecularly imprinted polymers offer an environmentally sustainable and economically viable option for heavy metal removal from marine wastewater due to their reusability and high selectivity.

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Comparison of the Antifungal Effects of Cinnemaldehyde Microencapsulation with Different Polymers in Tomato Paste

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Cinnamaldehyde is obtained from the cinnamon tree and is generally considered safe (GRAS).[1] This active ingredient is a natural compound isolated from the stem bark of Cinnamomum Cassia. It has been shown to have various effects such as antitumor, antifungal, cytotoxic and mutagenic.[2] Cinnamaldehyde was developed as a food-grade antimicrobial agent because it has been shown to be active against both gram-positive and gram-negative bacteria, including organisms of safety concern.[3] Due to these advantages, cinnamaldehyde has great potential to be used as a natural antifungal agent in the food industry. However, properties such as unpleasant odor, high volatility, easy water solubility, and extreme instability under ambient conditions (temperature, light, oxygen) limit their direct application in the food industry. Microencapsulation is an emerging technology that protects various food ingredients or functional ingredients against various processing conditions by encapsulating them in polymeric or non-polymeric materials and controlling their release under certain conditions.

The aim of this study is to use cinnamaldehyde as a food preservative by taking advantage of its antifungal properties without changing the parameters of the food such as taste and smell. Two different techniques were used as microencapsulation methods. Chitosan/gum arabic by complex coacervation method; chitosan/soy protein polymers were used. Alginate microbeads were obtained using the ionotropic gelation method. Antifungal studies of the microencapsulated cinnamaldehyde obtained against *Aspergillus flavus* isolated from Tomato Paste were carried out and their activities were compared. Isolated soy protein/chitosan complex coacervation was measured at 97.08 % encapsulation efficiency (EE) and 45.30 % loading capacity (LC), MIC (minimal inhibitory concentration) and MFC (minimal fungicidal concentration) were 187.5 ppm and 62.5 ppm, respectively.

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Struggle Meadow Moth via ACHE Inhibition with Some Plant Extracts

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This study aims to determine alternative plants to pesticides used to struggle Meadow Moth *Loxostege sticticalis (L. sticticalis*), which are common in Eurasia and detected in the Marmara, Aegean, and Black Sea regions of Turkey. For this purpose, the effects of various plants on ACHE inhibition were examined in the struggle against this pest. Acetylcholinesterase (ACHE) is an important neuronal enzyme that regulates neurotransmission by hydrolyzing the neurotransmitter acetylcholine (ACH), systematically referred to as acetylcholine acetylhydrolase [EC.3.1.1.7]. ACHE inhibition is a common mode of action of various insecticides such as carbamates and organophosphorus pesticides. Therefore, ACHE is the target of insecticides and pharmacological agents such as nerve agents. Insecticides with high toxic properties cause major health problems and create environmental problems by causing serious pollution all over the world.[1,2] Therefore, in this study, plant extracts that can be used instead of pesticides in the fight against pests and that can slow down or completely stop the activity of ACHE will be determined. The activity of *L. sticticalis* ACHE collected from agricultural areas in Bursa and its surroundings was determined by the Ellman method.[3] IC_{50} values were determined by examining the effects of specific inhibitors of ACHE, tacrine and edrophonium chloride, water extracts of cherry laurel (*Laurocerasus officinalis* L.) and plane tree (*Platanus orientalis* L.) leaves, and a commercially available insecticide on the activity of *L. sticticalis* ACHE. The IC_{50} values of tacrine and edrophonium chloride are 3.4±0.5 and 0.08±0.006 µM, respectively. The IC_{50} values of cherry laurel leaves, plane tree leaves, and insecticide were determined as 58.3±1.6, 75.2±1.8 µg dry matter/mL, and 35.4±2.1 µg cypermethrin eq./mL, respectively. The fact that cherry laurel and plane tree leaves water extracts are effective in inhibiting this enzyme shows that such pests can struggle with a nature-friendly extract even in regions where organic farming is practiced. By periodically applying these plant extracts to insect larvae in vivo, these extracts taken through both nutrition and respiration can cause ACH accumulation in nerve cells and therefore paralysis of nerve conduction, leading to the death of the pest. The solution to be proposed in the fight against this pest will prevent the loss of many agricultural products grown in Turkey and will make a great contribution to the country's economy.

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Fabrication and Characterization of Cryogel Microneedles for Drug Delivery Applications

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Microneedles consist of micron-sized arrays that are systematically arranged on a miniature patch. They have emerged as a significant technological tool that plays a plethora of roles in delivery and sensing systems.[1] Microneedle-based drug delivery is a novel technology in which drug compounds are delivered to bloodstream *via* micron-size needles.[2] Supermacroporous gels, a.k.a. cryogels, are unique scaffolds that can be prepared by polymerizing monomer solution under sub-zero temperatures. They are broadly employed in many applications, and they hold noteworthy potential biomaterials due to their inherent interconnected supermacroporous structures and easy formation of composite polymers compared to other porous polymer synthesis techniques.[3]

In this study, microneedle patch is fabricated using a number of materials (i.e., titanium, steel, silicon, and poly dimethyl siloxane (PDMS)) employing techniques, such as an electric discharge machine, dry/wet etching or a combination of photolithography and soft lithography techniques. The fabricated microneedle patch is characterized in terms of surface area measurements by chemical composition by Fourier transform infrared (FT-IR) spectroscopy, Brunauer–Emmett–Teller (BET) method, surface morphology by scanning electron microscope (SEM), 3D laser scanning microscope (Keyence VK-X100), and atomic force microscope (AFM), and mechanical strength analysis by dynamic mechanical analysis (DMA). After that, a cryogel microneedle patch is fabricated by free radical polymerization as a drug delivery system. Following the thawing process, cryogel microneedle patch is characterized using scanning electron microscopy, FT-IR spectroscopy, swelling test, gelation efficiency, BET analysis, and thermogravimetric analysis to define chemical and physical structure.

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Isolating Membrane Vesicles of Microbiota Pathogens with 3D Printed Microfiltration Platforms for Non-invasive Disease Diagnostics

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Bacterial Membrane vesicles (bMVs) are communication bubbles among microbes, which could carry many critical information on pathogenicity, drug resistance, and physiological state of donor cells.[1] Unique characteristics of MVs have garnered notable attention with the increased effort on characterization of MVs and revealing the critical information they carry among human body as that could be used for a new generation of diagnostic target for various diseases. MV research in clinic is limited with the laborious isolation of pure vesicles from patient samples since the overall procedure requires highly expensive equipment (ultracentrifuge, polymer-based column chromatography, etc.) and large volume of patient samples, which could only be obtained with invasive sampling techniques that disturbs the state of the patient. Earlier, our research group demonstrated a unique strategy to isolate mammalian extracellular vesicles from culture media by using a hybrid flow, PMMA microchip that utilizes dead-end and cross-flow processes in a unified microchip architecture, resulting in higher recovery efficiency and lower clogging with a low-cost and easy-to-use device.[2] In this work, it is aimed to create a new generation pathogenic bMV isolation strategy from non-invasive patient samples, and combining this modality with an isothermal nucleic acid test to achieve an all-in-one strategy to detect pathogens from bMVs. Overall, it is demonstrated that pathogenic bMVs could be isolated with a 3D printed microfluidic chip, and later, isothermal nucleic acid tests could be employed for detecting pathogens directly from patient samples that were collected non-invasively.

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Production Of Eco-Friendly Biodegradable Food Packaging Based On Carboxymethyl Cellulose Containing Spirulina and Hyaluronic Acid

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Todays, global plastic consumption represents the largest application of crude oil. Plastic consumption is naturally directly dependent on oil and carries significant risks both in terms of health and economy. Although these materials are gradually replaced by polymers such as polyethylene terephthalate (PET), polyvinylchloride (PVC), polyethylene (PE), polypropylene (PP), polystyrene (PS) and polyamide (PA), more cost-effective, environmentally friendly, biodegradable, low-toxicity food grades are used. Development of packaging materials is extremely essential. Carboxymethylcellulose (CMC), widely used in food packaging, is a hydrophilic, water-soluble cellulose derivative. The application range of CMC film in the field of packaging can be expanded through its modification with other bio or synthetic polymers.[1]

In this study, CMC-based food packaging products were easily prepared. During the preparation phase, hyaluronic acid (HA) and spirulina were added to the CMC structure. Within the scope of the study, firstly, 25 ml of 3% CMC solution was prepared with pure water. After the dissolution of CMC, 0.5-0.25-0.1% spiriluna and hyaluronic acid were added into the solution. After mixing this solution for 24 hours, it was poured into molds and allowed to dry as a film. The obtained films were cut from the control group, films containing HA and spiriluna content, and their % transmittance and UV spectra were taken. When the UV spectra were examined, the films containing HA gave a spectrum similar to the control group, while the characteristic peaks of the films containing spiriluna were clearly observed. In addition, an increase and decrease in peak intensity depending on the ratio of spiriluna content was clearly observed. In addition, based on their percentage permeability, it was decided that the most suitable materials were materials with 0.25% content, and structural and morphological properties were determined based on this ratio. Characterizations such as Fourier transform infrared spectrophotometer (FTIR), X-ray diffraction (XRD), scanning electron microscope (SEM), energy dispersion X-ray analysis (EDX) were used to determine these properties. The findings obtained from FTIR and EDX confirmed the findings of Spiriluna and Hyaluronic acid in products synthesized for food packaging purposes. As a result, biodegradable films with different CMC-based spirulina and hyaluronic acid have been successfully prepared, and their other parameters continue to be investigated for food package applications.

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Removal of Chromıum from Wastewater Usıng Anyonıc Nanopolymer

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In the 21st century, the advent of industrialization and advancements in technology has greatly facilitated human life. However, these rapid developments have also brought about industrial and harmful waste, leading to environmental pollution. One of the significant problems of our time is water pollution, which is a crucial component of environmental pollution.[1] The significance of water pollution arises from its adverse effects on the physical, chemical, and biological properties of water, its disruption of biological life, and its presence of microorganisms causing infectious diseases and chemical pollutants in contaminated water. Among these pollutants, heavy metals are of particular concern due to their toxic effects on humans and the environment. Furthermore, these non-biodegradable pollutants tend to accumulate in living tissues through food, making their removal crucial. General wastewater treatment methods are often not effective in removing heavy metals, so techniques like ion exchange, chemical precipitation, adsorption processes, coagulation, flotation, and membrane filtration technologies are commonly used.

Nanopolymers are polymers made on a nanoscale, and their unique physical and chemical properties make them suitable for various industrial applications. The general wastewater treatment methods mentioned above can be time-consuming, have low efficiency, and can be costly. Therefore, the removal of heavy metals from wastewater with next-generation nanopolymers offers several advantages, such as ease of application, low cost, and non-toxic properties.

In this study, the synthesis of next-generation non-toxic nanopolymers was carried out with the aim of removing chromium +6 heavy metal from wastewater in the Manisa region using anionic hydrogel. Anionic nanopolymers based on acrylamide, including acrylate and sodium styrene sulfonate as auxiliary monomers, were synthesized. The nanopolymers were prepared through free radical polymerization in a solution environment, using cross-linkers like poly(ethylene glycol) diacrylate. The structural characterization of the chemically cross-linked copolymers was conducted using Fourier Transform Infrared Spectroscopy (FT-IR) analysis. SEM images were taken to gain information about the surface porosity of the nanopolymer. Dynamic swelling tests were conducted at 25°C to investigate the swelling properties of the cross-linked copolymers. Parameters related to swelling kinetics and diffusion mechanisms were calculated using the obtained data.The removal of the cationic heavy metal chromium was achieved by adsorption using the anionic nanopolymer with parameters such as concentration, pH, and time. Successful results were obtained by adsorbing bisacrylamide anionic nanopolymer at a chromium concentration of 4 ppm in pH 7.4 phosphate buffer for 1 hour.The nanopolymer used in this study may be an efficient option for many institutions, particularly wastewater treatment facilities, due to its cost-effectiveness and reusability.

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Synthesis of Janus Micromotors for Potential Biomedical Approaches

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Janus particles, named after Janus—the Roman God known for his two faces, indicate a particular category of particles that have two or more distinct sections representing different composition and surface characteristics.[1] A key characteristic of Janus particles is their anisotropy, resulting from their structure being asymmetric, either chemically or morphologically.[2] Self-propelled micro- and nano-motors are motile objects that are engineered to move independently in a solution by transforming stimulus into mechanical action.[3] With its two-faced design, the Janus micro-motor utilizes the heterogeneity between its two hemispheres to generate self-propulsion. In this study, we have fabricated Janus micromotors, which suspend in a hydrogen peroxide solution (H_2O_2). SiO_2 microspheres were synthesized by modified Stöber method.[4] The catalytic material Platinum (Pt) was then deposited on monolayer of SiO_2 microspheres using atomic layer deposition. In the process of nonionic or neutral diffusiophoresis, a chemical gradient of neutral species such as H_2O_2 and O_2 was formed through an asymmetric catalytic reaction. Accordingly, this gradient propelled the Janus motors.[5] In Pt-SiO_2 Janus micromotor, owing to catalytic decomposition of H_2O_2 occurring on the Pt side, the Janus motor undergoes motion driven by the concentration gradient established, which is commonly referred to as diffusophoretic motion.[6] In the experiments, it was observed that the Pt-SiO_2 Janus micromotor moved in H_2O_2 solution without any external stimulus.

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Development of Antibacterial CMC (carboxymethyl cellulose) - SA (sodium alginate) Based Hydrogel Films as a Potential Candidate for Wound Dressing

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Wounds are a major health problem worldwide. In developing countries with poor hygienic conditions, wounds can lead to serious complications due to secondary microbial infections.[1] Therefore, appropriate wound dressing in combination with antibiotics is essential. However, due to overuse of antibiotics, microbial drug resistance has increased, resulting in great financial losses as well as decreased efficacy of treatment. Besides, most of the wound dressings available on the market lack of moisturising properties, so they adhere to the wound surface and may damage the newly formed epithelium, causing delayed wound healing. Hydrogels are suitable candidates for wound dressings due to their excellent water absorption and structural integrity.[2] Research on this subject is still ongoing.

Essential oils (EOs) have been widely used from the past to the present, in recent years, modern pharmacological studies have revealed their broad biological properties during the search for new drugs.[3] EOs possess a variety of active compounds that have aroused interest because of their remarkable biological potentials such as anti-inflammatory, antimicrobial, anti-allergic and regenerative properties.[3,4]

The scope of this study was to synthesis CMC (carboxymethyl cellulose) and SA (sodium alginate) based hydrogel films due to their biocompatible, water-soluble, high water holding capacity, biodegradability and environmental friendliness. And also, it was aimed to add antioxidant and antimicrobial properties to hybrid hydrogels loaded with plant extracts. For this purpose, the gel content and swelling properties of the CMC-SA hydrogel were studied. The synthesized hydrogel films were characterized by Fourier Transform Infrared Spectroscopy (FTIR) method. For adding antibacterial properties, *O. onites* and *O. vulgari*, which are EO varieties, were loaded into the hydrogel films and their antibacterial activity against some pan-resistant strains (*E.coli* and *Staphylococcus aureus*) were investigated by agar disc diffusion method. Furthermore, total phenol and flavonoid content as well as antioxidant activity of EO loaded hydrogel films were determined. The obtained results showed that the synthesized EO loaded hydrogels were superabsorbent materials and they had remarkable antibacterial properties. It was considered that the synthesized hydrogel films were potential candidates as a wound dressing.

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Development of Ribociclib Loaded Polycaprolactone (PCL)/Chondroitin Sulfate (CS) Nanofiber as Transdermal Drug Delivery Systems

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Breast cancer is the most common type of cancer worldwide and is responsible for the highest number of cancer-related deaths. Generally, tumors are treated through a process that typically begins with surgery and is followed by post-operative therapeutic interventions. Ribociclib, an oral chemotherapeutic agent used in the treatment of breast cancer, acts as a cyclin-dependent kinase (CDK) inhibitor. It exerts its therapeutic effects by blocking the CDK4 and CDK6 proteins in cells. In hormone-dependent breast cancers, CDK4 and CDK6 are overexpressed. Inhibiting this pathway with drugs like Ribociclib slows cancer growth by preventing cell division.[1]

Like many cancer drugs, high doses of Ribociclib can lead to increased plasma concentrations reaching toxic levels, resulting in significant side effects.[2] Various drug delivery systems have been developed to reduce side effects and increase half-life. In our study, a Polycaprolactone/Chondroitin Sulfate (PCL/CS) transdermal patch was developed using the electrospinning method for the efficient release of Ribociclib. Comprehensive characterizations of the patch were conducted using FTIR, TGA, DSC, and SEM analyses. Furthermore, the degree of swelling of the patches, determination of patch thickness, folding durability and weight homogeneity tests were carried out. Subsequently, Ribociclib was incorporated into the patch, and drug loading capacity and release studies were assessed using HPLC.

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Liquid-Crystal-Tunable-Filter and Imaging-Based Localized Surface Plasmon Resonance Spectrometry Utilizing DNA-Based Recognition Elements

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Over the past years, the need of new devices, capable of fast, affordable, sensitive and accurate devices for point-of-care diagnostic purposes are in high demand.[1] DNA-based localized surface plasmon resonance spectrometry, utilizes the wavelength shift in the absorbance caused by incident light exciting the free electrons of noble metal nanoparticles to collectively oscillate at a certain frequency in dependence of the binding and unbinding of molecules to the immobilized.[2] The required sensors can be produced in high quantities in cost effective ways. By using various binding properties of DNA molecules, a high accuracy can be achieved. In regards of the sensitivity, signal enhancing effects can be easily exploited to lower the limit of detection for various use cases if needed. By using microarrays, samples can be tested on a multitude of things simultaneously, allowing for an overall fast scanning and high throughput of samples. DNA itself is an interesting molecule, as it possesses the capability of interacting with many differently sized molecules, ranging from ions, proteins, genes up to whole cells. Due to the DNAs stability and the downgrade ability of the LSPR device, affordable point-of-care diagnosis can be achieved. Our approach for the LSPR spectrometry analysis of microarrays is an imaging-based systems utilizing a liquid-crystal-tunable-filter (LCTF), which obtains the gray values obtained from multiple images captured while the sample was excited with light of various specific wavelengths set by the LCTF. This allows to recreate an artificial spectrum by fitting the absorbance maximums of the peaks. This can be used to calculate the center of mass by calculating the second derivation of the curve, also known as centroid. By tracking the wavelength of the centroid over time including the changes caused by refractive index changes, indicating solution changes, binding, and unbinding events to the DNA.

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Development of a 3D Glioblastoma Cell Culture Model Using pHEMA-Gelatin Cryogels for Improved Biological Understanding

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Glioblastoma, the most prevalent and highly lethal form of brain tumor, poses significant therapeutic challenges due to its propensity for relapse and limited treatment options.[1,2] Understanding the complex biology of glioblastoma is imperative for devising innovative therapies. In this research, our objective was to create an innovative 3D culture model to enhance our insights into tumor biology. To achieve this objective, we successfully synthesized pHEMA-gelatin-based cryogels at distinct cryogelation temperatures, varying gelatin concentrations. We conducted comprehensive characterizations and in vitro cell studies of these cryogels. A neutral red cell viability assay was employed to assess cytotoxicity, with reassuring results indicating the non-cytotoxic nature of the cryogels for glioblastoma cells. Additionally, we examined morphological features, porosity, and swelling properties during characterization, confirming the suitability of these cryogels as scaffolds for our 3D cell culture model.

This novel 3D glioblastoma cell culture model offers potential to enhance our comprehension of glioblastoma biology and may serve as a valuable platform for future research and therapeutic development.

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Preparation and Characterization of Polycaprolacton (PCL)/Resistant Starch (RS) Nanofibers as Probiotic Carrier

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Resistant starch (RS) is a polymer that is extremely abundant in nature and can be easily obtained by simple technological processes in the food industry. RS's high concentration of amylose molecules gives it a highly organized and packaged structure that is physically resistant to enzymes. Since RS, a typical fiber, is not affected by human digestive enzymes, it reaches the colon with its macroscopic structure preserved.[1] Recently, there has been increasing interest in encapsulating and immobilizing probiotics to enhance their survival under harsh conditions and promote their high-viability distribution in the gastrointestinal tract. The electrospinning technique is used to produce submicron or nanoscale fibers. The produced nanofibers exhibit various structural and functional advantages such as controllable diameters, porous structure, high surface-to-volume ratio, and high encapsulation. For this reason, electrospinning is widely used in the encapsulation and immobilization of bioactive compounds.[2]

In this study, SEM, FTIR, and XRD characterization processes were performed for the shell material required for the encapsulation of probiotic bacteria using the electrospinning method. The shell material consists of resistant starch and PCL polymer mixtures. Resistant starch was electrospun by dissolving it in different concentrations of formic acid and mixing it with PCL solution in certain proportions. In the SEM images of the resulting fiber structures, variations in bead formation and fiber diameters were observed depending on the different concentrations of formic acid and the amount of resistant starch.

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MicroRNA-Based Drug Repositioning Revealed Candidate Drugs for Abdominal Aortic Aneurysm

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Abdominal aortic aneurysm (AAA) is a permanent and progressive enlargement of abdominal aorta. AAA progression is mostly asymptotic and may result in aortic rupture, which often leads to death. Reducing the mortality rate due to rupture can only be achieved through early diagnosis and effective treatments. MicroRNAs (miRNAs) play an important role in the development of AAA, however, expression profiles of only a few miRNAs show consistency in the presence of AAA. Therefore, identification of miRNAs as novel markers and drug targets could be an efficient strategy for AAA. In the current study, we identified reporter miRNAs around which the most significant transcriptional changes by integrating genome-wide expression data from large and small AAA patients with the transcriptional regulatory network containing experimentally validated miRNA-target gene interactions. A total of 166 and 150 reporter miRNAs were identified in large and small AAA, respectively. MiRNAs that were not previously reported to be associated with AAA, were selected for clinical investigation. Blood samples were collected from 30 previously diagnosed AAA patients and 15 healthy controls, and the expression levels of 22 selected miRNAs were determined by RT-PCR. A total of 9 miRNAs (7 up- and 2 down-regulated) were found to be significantly expressed in the presence of AAA. Drug repositioning analysis performed via 379 differentially expressed genes regulated by these 9 miRNAs revealed MAPKK, ERK/MAPK, MEK1/2, mTOR, and cholesteryl ester-transfer protein inhibitors, sigma-1 receptor and PPAR-γ agonists, and anti-diabetic drugs as candidate drugs for AAA therapy. Our findings provided invaluable information for the development of novel diagnostic markers and treatment strategies for AAA.

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Synergistic Effects of *Cynara scolymus* Leaf Extract and Sorafenib on Polyamine Metabolism in HepG2 Hepatocellular Carcinoma Cells

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Hepatocellular carcinoma (HCC) ranks as the second most common cause of cancer deaths worldwide, with its incidence on the rise. Approximately half of HCC patients undergo systemic treatments like sorafenib or lenvatinib initially, followed by regorafenib, cabozantinib, or ramucirumab. Concurrently, many patients consume widely popular herbal products, such as *Cynara scolymus* (artichoke) known for liver benefits due to its Cynarin content, without informing healthcare professionals, leading to potential interactions.[1] Polyamines, including spermine, spermidine, and putrescine, are vital for eukaryotic cell growth and differentiation. These low-molecular-weight polycations have multiple amino groups. While their concentrations are tightly regulated in normal cells, their metabolism is often disrupted in various cancers.[2]

In this study, the effects of combined treatment with Sorafenib (50 µM) and *Cynara scolymus* leaf aqueous extract (CLE) (10, 20, 40, 80 µg/ml) on a Hepatocellular cancer cell line, HepG2 cells, were examined in terms of changes in the amounts of certain polyamine compounds (Putrescine, Spermine, Spermidine) and Ornithine decarboxylase, the pivotal enzyme in this pathway. The quantities of Putrescine, Spermine, and Spermidine were determined by LC-MS/MS, while the quantity of Ornithine decarboxylase was determined using the ELISA method. Additionally, cell viability was monitored using the MTT method. The findings revealed that in cells treated with 80 µg/ml CLE + 50 µM Sorafenib, the amount of Ornithine decarboxylase increased by 42.2% compared to the control group and by 61.5% compared to cells treated only with Sorafenib. Furthermore, the amount of putrescine in the 80 µg/ml CLE + 50 µM Sorafenib treated cells (1.54 nmol.mg-1 protein) decreased by 65.2% compared to the cells treated only with Sorafenib; while the amount of Spermine (27.7 nmol.mg-1) increased by 53.1% and Spermidine (17.07 nmol.mg-1) increased by 36.3%. This suggests that cells treated with both sorafenib and CLE possess a more active polyamine metabolism and exhibit a higher proliferative capacity compared to cells treated solely with sorafenib.

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Preparation and Characterization of Dipeptide-Based Nanomaterials for Their Potential Cellular Interactions

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The potential of nanostructures in cancer drug delivery is enormous, and new applications in cancer drug delivery are constantly being explored. Peptide-based nanostructures are emerging as a new class of biomaterials due to their unique chemical, physical and biological properties, ease of synthesis and functionality, and natural biocompatibility. Self-assembled nanostructures among protein-based nanostructures are intensively investigated for a variety of biomedical applications. Such nanostructures are biodegradable, non-toxic, and have the ability to efficiently transport many drugs to cancer cells. Within the scope of this study, firstly, *N*-(florenilmetoksikarbonil)-L-lizin (Fmoc-Lys) nano-materials (NMs) were synthesized and then modified with Ca^{2+} ions. They were analysed by SEM (Scanning electron microscope), TEM (Transmission electron microscope), MS (mass spectrometry), DLS (Dynamic light scattering), Zeta potential measurement, Image J size assessment and FTIR (Fourier transform infrared) spectroscopy. Then, it was continued with the cell toxicity and cell internalization tests. Some of the obtained results can be given as follows: Corona formations of Fmoc-Lys NMs with HSA, IgG and DNA were examined. As a result of the experiments, it was revealed that the biological molecules that form corona vary according to their size and surface charge before forming corona. For cell experiments, after 24 and 72 h interactions of NMs with HeLa and HT29 cell lines, a slight decrease in cell viability was observed after the first 24 h incubation while a slight increase was observed after 72 h incubation. Up to nearly 14% of NM-siRNA complexes were found to internalize into HeLa and HT29 cell lines. The cytotoxic effects of siRNA complexes of NMs with and without Ca^{2+} ions were 15-28% and 19-36%, respectively. The dipeptide-based nanomaterials used in this study are biocompatible and show promise for further studies in increasing the degree of internalization of siRNAs into cancer cells.

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Label-Free Immunosensor Based on AuNPs-Fullerene Nanocomposites for Ovarian Cancer Antigen CA-125 Detection

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Ovarian cancer (OC) is one of the most common cancers among women and has a high mortality rate among cancers of the reproductive system. Unfortunately, due to the lack of adequate physical examination and specific symptoms, OC is often diagnosed in the late stages after metastasis. Therefore, it is vital to diagnose the cancer in the early stages to increase the survival rate and achieve cost- and time-effective treatment. Cancer antigen 125 (CA125) is the most widely used molecular marker for the diagnosis of OC and is often recognized as a "gold standard" onco-marker.[1] CA125 is a high-molecular-weight glycoprotein (>200 kDa) generated by normal cells in adult tissues derived from coelomic and Müllerian epithelia.[2] In healthy women, the serum CA125 level is usually below 35 $U \cdot mL^{-1}$ and is elevated in 50% of women with early-stage ovarian cancer and 90% of women with advanced ovarian cancer.[3]

In this study, a novel label-free electrochemical immunosensor was developed to detect CA125. For this purpose, AuNPs-Fullerene nanocomposites were prepared and immobilization of anti-CA125 into nanocomposites was carried out using EDC/NHS. To modify the SPE, anti-CA125 bound AuNPs-fullerene nanocomposite was first dropped onto the SPE surface and the surface was protected with Nafion. BSA was used to prevent non-specific interactions. To characterize the SPE, cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) were performed after all modification steps. The prepared immunosensor showed a wide working concentration range of 1-100 U and exhibited a detection limit of 0.26 $U \cdot mL^{-1}$. Finally, this immunosensor-based cancer diagnostic concept, which shows simple reproducibility, good selectivity, and improved stability, is considered to have the potential to be used in real cases.

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Catalyzing Neuroprotection: Iron Nanoparticles modified with Deinoxanthin in a Parkinson's Disease Cellular Model

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Parkinson's Disease (PD) is a neurodegenerative disorder primarily characterized by the disruption of movement, muscular rigidity alterations, and the presence of a lesion correlated with the decline in dopaminergic transmissions, evident symptoms such as bradykinesia.[1] Deinoxanthin (DX) stands out as a keto-carotenoid, extracted from the cell wall of Deinococcus radiodurans, and is renowned for its potent antioxidant properties.[2]

This study investigated the potential therapeutic effects of iron nanoparticles modified with DX (DX-FeNPs) on a PD model, which was induced using Rotenone in the dopaminergic cell line SH-SY5Y.[3] The surface impacts on cell viability for DX, FeNP, and DX-FeNP were initially assessed through the MTT assay. The ELISA method provided insights into the regulation of dopamine production by DX-FeNPs. Additionally, the capability of DX-FeNP to counteract the oxidative damage inflicted by rotenone was gauged using malondialdehyde (MDA), catalase (CAT), and superoxide dismutase (SOD) assays. Furthermore, mitochondrial oxygen consumption's evaluation entailed the study of nitric oxide (NO) concentrations using the ELISA method. Nanoparticles modified with Deinoxanthin (DX-FeNPs) underwent characterization processes evidenced by SEM, XRD, and FTIR recordings.

Remarkably, pronounced cell viability was recorded following a 24-hour treatment with 50 µg/ml DX-FeNPs. During this specific duration and concentration, the DX-FeNPs treated group exhibited the subsequent outcomes in comparison to the positive control: an elevation in dopamine concentrations, a decrement in MDA (8.59 nmol.mg-1 protein) and NO (1.957 µmol.g-1) levels, coupled with a surge in CAT (10.27%) and SOD (20.57%) levels. The accumulated data from these findings suggest a promising therapeutic potential of DX-FeNPs in mitigating the biochemical perturbations intrinsic to PD.

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Development of a 3D Neuroblastoma Cell Culture Model Using pHEMA Gelatin Cryogel Scaffolds

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Neuroblastomas are tumors originating from neural crest tissues within the autonomic nervous system and are commonly diagnosed in early childhood. They can manifest in various locations where sympathetic nerve tissues exist. Neuroblastoma displays diverse clinical behaviors; while approximately half of the cases are confined to the site of origin, the other half exhibit metastasis to nearby lymph nodes. Despite its prevalence, the precise etiology and underlying biology of neuroblastoma remain incompletely understood.[1,2] Consequently, there is a pressing need to delve into the mechanisms governing neuroblastoma to pave the way for novel therapeutic strategies. To gain deeper insights into the development of neuroblastoma and to identify potential avenues for new treatment modalities, this study aimed to establish a 3D neuroblastoma cell culture model utilizing cryogel scaffolds. The use of cryogels, known for their remarkable hydrophilicity, biocompatibility, and macroporous structure, has become increasingly popular due to their ability to closely mimic the extracellular matrix, thereby playing a pivotal role in facilitating cellular activities.[3] In the context of this research, we focused on the synthesis of cryogel membranes based on 2-hydroxyethyl methacrylate-gelatin (HEMA-Gel) loaded with L-Glutamine (L-Glu), referred to as HEMA-Gel/Glu, for the purpose of serving as a 3D cell culture scaffold for neuroblastoma. L-glutamine was used to improve cell adhesion and proliferation as it is an essential amino acid for complex carbohydrate metabolisms required for cell adhesion and proliferation. The synthesis of both HEMA-Gel and HEMA-Gel/Glu achieved impressive polymerization yields of 97% ± 0.34% and 96% ± 0.23%, respectively. The cryogel membranes were characterized through swelling tests, Brunauer–Emmett–Teller (BET) analysis, and scanning electron microscopy (SEM). The swelling ratios were determined to be 97.9% ± 2.87% for HEMA-Gel and 97.34% ± 4.23% for HEMA-Gel/Glu. Then, we assessed the compatibility of these cryogel membranes with neuroblastoma cell cultures. The assay involved subjecting neuroblastoma cells to these cryogels to determine their impact on cell viability and overall performance. According to the results, it was observed that cell viability increases when compared to the control group. In addition, it can be inferred that the material exhibits non-cytotoxic properties.

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Performing Peroxygenase encapsulation on Sodium-Alginate Nano Beads by Electrospraying Method; Characterization and Effect on Catalytic Activity

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Peroxygenases have attracted attention in recent years due to their ability to oxidize unactivated C-H bonds. Nonspecific peroxygenases (UPOs) catalyze oxidation and oxygenation reactions using only hydrogen peroxide as co-substrate.[1] Since UPOx has industrial and environmental applications, it is extremely important to develop different immobilization strategies to improve biocatalyst properties in different applications. This study was carried out with the encapsulation electrospraying method as an alternative to alginate nanocapsules obtained by standard methods. For the encapsulation process, alginate and enzyme solution were mixed in the same environment and enzyme immobilization was carried out in situ. The structural and morphological properties of the obtained alginate microcapsules (AlgMC), alginate-unspecific peroxygenase microcapsules (AlgMC@UPOx), and Unspecific peroxygenase were characterized by analyzes such as FTIR, XRD, SEM, EDX. In addition, a series of biochemical experiments were carried out. From the experiments carried out to obtained the optimum pH value, the optimum pH of free UPOx was determined as 4.5, while the optimum pH of AlgMC@UPOx was determined as 5.5. The findings obtained from the optimum temperature values show that the optimum temperature values are determined as 40℃ and 50℃ for UPOx and AlgMC@UPOx, respectively. To observed that the immobilization process makes the enzymes resistant to environmental conditions, its resistance to trypsin, a protease, was investigated and while a decrease in the activity of the free enzyme was observed, the activity of the immobilized enzyme, taking advantage of the hydrogel structure, did not decrease, but on the contrary, interestingly, an increase was observed. Additionally, when the effects of metal ions and organic solvents on both enzyme activities are examined, it is possible to say that there is an improvement in the activity of the immobilized enzyme compared to the free enzyme.

As a result, with this method, peroxygenase was successfully immobilized into sodium alginate beads and its catalytic activity was observed to improve.

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Halopteris Scoparia: Biosynthesis of Silver Nanoparticles and Determination of Its Antibacterial Activity

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Halopteris scoparia is an edible brown algae commonly found in European waters. This macroalgae can live in warm and cold environments and has many uses in various fields, such as food, medicine, and cosmetics. Due to its rich components, *Halopteris* species have antibacterial, antifungal, and antioxidant properties. These features make this algae an important species to be used in studies.[1] Biosynthesized silver nanoparticles (AgNPs) have become a very attractive field of study in recent years, mainly due to their antibacterial properties. They also play an important role as nanopesticides in the control of phytopathogens.[2] In this present work, AgNPs were synthesized from aqueous extracts of *Halopteris scoparia* since macroalgae are also known to reduce silver ions to obtain nanoparticles. Among these nanoparticles synthesized at different temperatures and pHs, the most optimal nanoparticle giving SPR peaks between 400-450 nm was determined by UV spectrophotometry and used in further experiments. The functional groups involved in the synthesis were characterized by FT-IR spectroscopy. For antibacterial activity tests, tomato pathogenic bacteria, gram-negative bacterial strain *Pectobacterium carotovorum subsp. carotovorum* and gram-positive strain *Clavibacter michiganensis subsp. michiganensis* were used. Using these bacterial strains, the Kirby-Bauer disk diffusion test and Minimum Inhibition Concentration (MIC) test were performed in accordance with The Clinical and Laboratory Standards Institute (CLSI) protocol. According to the results obtained, it was found that biosynthesized AgNPs obtained from *Halopteris scoparia* aqueous extracts have antibacterial activity against tested bacterial strains.

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The Genes That Carry Key Mutations in Breast Cancer

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Breast cancer is the most common type of cancer among women in the world.[1] Breast cancer is a complex disease that can be influenced by various genetic factors, including mutations. Mutations in certain genes can increase the risk of developing breast cancer.[2] This study aimed to determine mutation profiles in genes involved in the formation and development of breast cancer using computational techniques. Breast cancer-related mutation data in The Cancer Genome Atlas (TCGA) database were analyzed using Mutation Annotation Format (MAF) tools, one of the analysis packages developed with the R programming language. The main purpose of the analysis was to identify the genes with the highest mutation burden in the relevant data and to elucidate which of these genes tend to mutate together in patients, while which ones show contradictory mutation profiles. As a result of the analysis of existing data, it was revealed that *PIK3CA, AP3K1, KMT2C, GATA3,* and *CDH1* genes carry mutations that play significant roles in the pathogenesis of breast cancer. These results reveal that the genes with high mutation burden are potential biomarkers in the diagnosis and treatment of breast cancer.

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Production of Polymeric Nanofiber Membranes Containing Plant Extract and Investigation of Their Potential in Wound Healing

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The skin, consisting of three layers known as the epidermis, dermis, and subcutis (subcutaneous tissue), is the body's largest organ and functions as a barrier that protects the body from mechanical and chemical external influences. Damage occurring in one or more of these layers is referred to as a wound or injury. In particular, burn injuries can cause severe damage to the skin layers. Depending on wound type, there are various wound dressings being developed. Wound dressings represent an increasingly significant field within medical textiles. In recent years, a multitude of functional polymeric wound dressings, especially those containing various components, have been utilized to accelerate the wound healing process and promote optimal regeneration of skin tissue. These polymeric wound dressings typically include one or more components to expedite wound healing, including biologically sourced biomolecules and plant-derived extracts.

This study aims to develop an easily applicable and effective wound dressing by loading active components obtained through extraction from the *Echium italicum* plant (known as viper's bugloss) into biodegradable poly(lactic-co-glycolic acid) (PLGA) copolymers, known to be effective in the healing of burn wounds. Membranes with nanofiber structures were produced using PLGA solutions containing different amounts of EIE (weight percentages of 10, 12, 15, and 20%). ATR-FTIR analyses confirmed the presence of EIE on the surface of the nanofibers. However, the addition of EIE to the nanofiber mats resulted in decreases in both tensile strength and elongation values. Water contact angle measurements indicated an increase in membrane hydrophilicity due to the presence of diol groups in the extract. In vitro degradation tests conducted under physiological conditions revealed both weight loss and morphological degradation of the membranes after 60 days.

In vitro cytotoxicity tests conducted using the MEM extraction method found that the membranes were non-cytotoxic. Based on all the analyses conducted, it can be concluded that the membranes with a nanofiber structure developed in this study have the potential to be used as a wound dressing for the treatment of burn injuries.

Investigation of Antibacterial Activities of Metal Nanoparticle-Loaded Copper Sulfides

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Copper sulfide (CuS) is a p-type semiconductor material with a tunable band-gap, has aroused significant interest owing to its remarkable physical and chemical properties.[1] In this study, non-toxic CuS nanomaterials (NPs) were employed to assess their antibacterial efficacy against *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (*S. aureus*) infections.[2] CuS NPs doped with Manganese (Mn), Zinc (Zn), and Nickel (Ni) were efficiently synthesized using one-step hot injection method and uniformly dispersed in dimethyl sulfoxide (DMSO) to facilitate their application.[3] The principal objective of this study is to tackle microbial contamination and mitigate biofilm formation. The photothermal antibacterial and antibiofilm activity of CuS NPs and CuS/Mn, CuS/Zn and CuS/Ni nanocomposites were investigated against *E. coli* and *S. aureus* by studying the photothermal effect, bacterial growth curve, scanning electron microscopy (SEM) and crystal violet assay under near infrared (NIR) light irradiation. The study demonstrated that by harnessing the superior photothermal conversion efficiency of CuS/Ni nanocomposites compared to bare CuS NPs under NIR light irradiation, the bacterial cell membrane was effectively disrupted, leading to a remarkable 56% biofilm inhibition rate. This study represents the pioneering investigation into the antibacterial and antibiofilm activity of CuS/Ni nanocomposites utilizing a photothermal approach under NIR light irradiation. These findings underscore the potential of CuS/Ni nanocomposites in combating pathogenic bacteria and open avenues for further exploration of CuS-based antibacterial platforms.

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Investigation of Antibacterial Activities of Copper Antimony Sulfides with Rod and Dot Structures

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In the current century, studies on the use of nanomaterial-based structures as an alternative to antibiotics are increasing day by day, especially due to the low effectiveness of antibiotic therapy in the fight against bacteria and the confrontation with bacterial resistance. In recent years, research on low-toxicity, soil-abundant, environment-friendly and low cost materials has attracted a lot of attention from researchers due to increasing concerns about both energy and the environment.[1,2] Based on these properties, metal sulfides, which perfectly fulfill this role by imitating safe natural minerals in antibacterial studies using inorganic metal nanoparticles, seem to be a rising star in this field. In this study, Copper Antimony Sulfides ($CuSbS_2$) with rod and dot structures, which are low toxicity, soil-abundant, environmental-friendly, low cost and photothermal materials were investigated its antibacterial activity on *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (*S. aureus*) bacteria for the first time. $CuSbS_2$ with rod and dot structures were synthesized by hot-injection method. This $CuSbS_2$ structures were characterized by scanning electron microscopy (SEM), X-ray diffraction (XRD) and UV-Vis spectroscopy. The antibacterial activities of the prepared nanostructures were examined by optical density measurement (OD_{600nm}) and minimum inhibition concentration (MIC) methods. Finally, antibacterial mechanisms of nanostructures were investigated by using oxidative stress assay (GSH) technique. Since this work is aimed at using $CuSbS_2$-based nanostructures as an alternative to antibiotic drugs, it is predicted that its widespread effect will be high.

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Immobilization of Xylanase on Chitosan Nanoparticles: A robust Nanobiocatalyst for Juice Clarification

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Xylanase (Xyl, EC 3.2.1.8) is glycosyl hydrolases that catalyze the hydrolysis of β-1,4 glycosidic bonds between xylose units in xylan. Xyl has a wide range of uses, such as fruit juice clarification, enzymatic degradation of animal feed, production of xylooligosaccharides in the pharmaceutical industry and the paper industry. The poor thermal stability of the xylanase enzyme under industrial conditions, its high sensitivity to changing conditions and difficulties in recovery limit its commercial presence in the industry. In this context, the immobilization strategy ensures that the enzymes show increased stability against reaction conditions such as pH and temperature and are reusable.

In this study, chitosan nanoparticles (ChNPs) were synthesized using the ionotropic gelation method.[1] Structural and morphological characterization of the synthesized ChNPs and xylanase immobilized chitosan nanoparticles (Xyl@ChNPs) were carried out. Biochemical characterizations of Xyl and Xyl@ChNPs, such as optimum pH and temperature, kinetic parameters, thermal stability and reusability, were carried out. While the optimum pH values of Xyl and Xyl@ChNPs were determined as 5.0 and 8.0, respectively, their optimum temperatures were recorded as 70 °C. The decrease in the Km value after immobilization indicates that the enzyme has a high affinity for its substrate. Additionally, the effect of Xyl@ChNPs on the clarity of fruit juice was determined at 70 °C and pH 8.0.

The results obtained showed that Xyl@ChNPs will contribute to the development of clarification strategies in the fruit juice industry.

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Antibacterial Effect of ZnPc/TiO_2 on *E. coli* and *S. aureus* Bacteria

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Antibiotics, one of the greatest discoveries of the 20th century, have today led to bacterial resistance due to uncontrolled consumption.[1] As an alternative to this issue, nanomaterials have been the subject of extensive study in recent years.[2] In this study, we investigated the antibacterial effects of a structure formed by binding zinc phthalocyanine (ZnPc) to TiO_2-based nanomaterial on *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (*S. aureus*) bacteria. We generated a reproduction chart using the bacterial growth curve, which revealed a 100% perfect anti-growth and lethal effect on both types of bacteria. Morphological changes in the bacteria were observed through Scanning Electron Microscopy (SEM). ZnPc/TiO_2 exhibited significant antibacterial effects on both bacterial strains, suggesting its potential use as an alternative to antibiotics and encouraging further research in this field.

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Preparation and Characterization of Biocompatible Materials From Keratin-based Nanofibers by Electro-Spinning Method

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Electro-spinning is a process that enables the production of nanofibers, ranging in diameter from nanometers to micrometers, offering precise control over fiber dimensions, by applying a high electric field to a polymer solution.[1] Wool keratin is one of the most preferred environmentally available natural polymers humans utilize as the shielding material for covering their body by imitating the warm animal body.[2] Due to its versatile, attractive polypeptide chains, not only for apparel production, it has also been employed as a substrate in different application fields ranging from physicochemical industrial areas to biomedical purposes. Poly(ethylene imine) (PEI), chosen as additives in the electro-spinning technique, offer several advantages, including being highly effective in antibacterial applications due to their polycationic nature while their low cytotoxicity towards human cells, coupled with their ability to readily traverse cell membranes and enhance membrane permeability, make them a preferred choice for various biomedical applications. This work blended keratin particles with gelatin and PEI polymers to obtain a nano-fiber web coating onto the marbleshah woven cotton through an electro-spinning technique in different morphologies, such as hybrid, janus, and core-shell. To attain this objective, we utilized a chemical reduction process on the waste wool material to improve its permanent processability, such as ease of dissolution in different solvents and forming interaction with the functional groups. Subsequently, after identifying the appropriate solvent system for the keratin particles, we prepared its solutions incorporating PEI and gelatin polymers, rendering them suitable for the electrospinning process. We extensively characterized the structural properties of the selected polymers for blending, as well as the hydrophilicity and nanofibrous texture of the fabric coatings, employing a comprehensive array of techniques, including ATR-FTIR, optical microscopy, contact-angle measurements, and SEM. As a result, this study revealed the fabrication of biocompatible composite material from keratin-based nanofibrous coatings to be potentially used as a biomedical substrate, such as filters, biocompatible meshes, and surgical reusable mask material.

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Effects of *Aronia melanocarpa* L. Fruit Extract on Oral Pathogen Biofilms Such *S. mutans* and *E. faecalis*

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Individuals may employ a dental prosthetic known as a denture structure to mitigate potential oral complications arising from tooth loss. The maintenance of prostheses is a significant concern that necessitates careful attention while utilizing dentures. Utilizing a suitable maintenance product for the prosthesis and proper cleaning procedures can enhance both the comfort and functionality of the prosthesis.[1] The act of brushing dentures effectively removes debris and stains, although it does not possess the ability to thoroughly disinfect them. The process of disinfection holds significant importance in the maintenance of dentures. Acrylic dentures possess porosity, rendering them susceptible to harbouring pathogenic microorganisms. Biofilms are commonly observed in many bacterial populations that thrive on surfaces. Over the course of time, the microorganisms present in this biofilm have the ability to acquire resistance towards antimicrobial treatments.[2] The presence of biofilms on medical devices can give rise to significant risks to human health. Hence, it is imperative to formulate novel approaches to prevent and treat the aforementioned condition. The objective of this study was to assess the efficacy of *Aronia melanocarpa* L. berry extracts *in vitro* in inhibiting the growth of *S. mutans* and *E. faecalis* bacteria, as well as preventing biofilm formation. Previous studies have demonstrated that certain constituents of Aronia have the ability to impede the production of biofilms.[3] Importantly, these constituents do not exhibit any harmful effects on the organisms that were subjected to screening. The risk for resistance development in standard antimicrobial drugs may be minimized when utilizing this nontoxic inhibitory approach. The results of the study will be discussed in the presentation.

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Development of pH-Sensitive Bacterial Cellulose Nanofiber Wound Dressings for Wound Monitoring

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Bacterial cellulose nanofibers show high potential for wound dressings due to its three-dimensional network structure, high biocompatibility, high swelling capacity, hydrophilic nature and mechanical strength. Bacterial cellulose nanofibers are widely-used especially in biomedical application area due to their cost-effectiveness, simple production with high purity.[1,2] In this study, bacterial cellulose nanofibers-based smart wound dressings capable of wound monitoring were developed. Kombuchaderived bacterial cellulose nanofibers were produced and then modified with 3-MPS. Phenol red was methacrylated (PR-MA) and PR-MA was further characterized by FTIR and UV spectroscopy. PHsensitive smart wound dressings were fabricated via polymerization of PR-MA onto BC nanofibers. [3] The pH sensitive BC nanofibers were characterized with SEM and FTIR measurements. The color change response to different pH values (pH: 5.5-8.5) were taken via photographs. RGB values of the images were converted to Lab values and they were used in CİE76 color change formula to calculate DE values via custom made program. The swelling degree, water vapor transmission rate and water loss were also evaluated.

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Synthesis of Tyrosinase Immobilized Metal-Organic Frameworks (MOFs) for Use in The Removal of Phenolic Compounds

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Water pollution has been recognized as a universal environmental problem. Developed countries are making major investments in both cleaning polluted waters and protecting clean water resources. It causes various health problems such as cancer, allergies and skin diseases that may arise due to the intake and absorption of water contaminated with dyes into the human body. Therefore, it is important to remove toxic compounds from water.

Tyrosinase enzyme (1.14.18.1) has an important effect in the removal of phenolic compounds.[1] It is immobilized to various carriers in order to increase the stability and durability of the tyrosinase enzyme, to remove it from the desired reaction environment and to ensure its reusability. Metal-organic frameworks (MOFs) are recently promising carriers with high specific surface area, modifiability, large internal pore volumes and tunable pore sizes. In this study, UIO-66-NH_2 was synthesized by hydrothermal synthesis method, primarily to be used as a carrier matrix. Then, UIO-66-NH_2 was interacted with copper ions and used for tyrosinase enzyme immobilization. Materials with and without enzymes were characterized in detail structurally and morphologically. Additionally, the optimum parameters (pH, temperature), reusability and kinetic parameters of the immobilized enzyme were examined and compared with the free enzyme. The optimum pH and temperature of the free enzyme were found to be 7.0 and 40 °C, respectively, while the immobilized enzyme was 7.o and 45 °C. Moreover, even after 8 usage cycles, the immobilized enzyme retained 9% of its initial activity.

In conclusion, this study shows that immobilized tyrosinase is a promising bioreactor for the removal of phenolic compounds.

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Evaluation of the Cosmeceutical Potential of Essential Oils of Five Algerian Plants

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Many cosmetic brands are encouraged to offer more natural products to the market, such as plant extracts that can be used for their antiaging, antiwrinkle, and depigmentation properties and other cosmetic purposes. Essential oils (EO) as naturally have also great interest among the increasing demand for herbal cosmetics in the market. Skin aging factors can lead to an increase in matrix metalloproteinases (MMPs) expression in human skin. Collagenase and elastase are members of the MMPs family that degrade collagen network and breakdown elastin fibers, respectively. As a result, wrinkles appearance, loss of skin elasticity, and consequently skin aging occur. Therefore, medical and cosmetic preparations used to protect skin against aging are mainly composed of collagenase and elastase inhibitors.[1]

Essential oils from five species (*Artemisia campestris* L., *Artemisia herba-alba* Asso, *Juniperus phoenicea* L., *Mentha pulegium* L. and *Lavandula officinalis* Chaix) of Algerian flora were evaluated in terms of their use in cosmetic products against skin aging, by investigating their anti-inflammatory activity and sun protection factors (SPF), in addition to their inhibition potential on collagenase and elastase enzymes.

Inhibitions of the EO samples on the collagenase enzyme were calculated for concentrations of 0.1, 0.5 and 1 mg/mL, and the obtained values were compared with the value obtained for 1 µg/mL epigallocatechin gallate. The degrees of elastase inhibition are calculated only in the presence of 0.02 mg/mL EOs, while the result given for the ursolic acid tested for comparison purposes is for 0.01 mg/mL. While the most effective inhibition value was calculated for *J.phoenicea* in both enzyme cases, the highest anti-inflammatory activity calculated based on the effect of preventing denaturation of BSA by heat was calculated for 1 mg/ml of EO obtained from the *M. puligium* species with a value of 45%. The SPF value calculated according to the Mansur equation was recorded as 21.74 for the same amount of oil, again the highest value for the same type. In addition to the fact that it has been revealed that these herbal resources can be cosmeceutically valuable with the data obtained, attention is drawn to the potential value of the same herbal resources from the soil of our country.

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Investigating the Cytotoxic Effects of Astaxanthin Isolated from *Blakeslea trispora* on Glioblastoma Cells

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Cancer is one of the highly fatal disease group encompasses various types. Among the various types of cancer, glioblastoma, a subtype of brain cancer, stands out as one of the most aggressive and deadly forms. Current treatments for glioblastoma involve chemotherapeutic agents, which often bring severe side effects and cytotoxicity to normal human cells. To address these challenges, research has shifted towards identifying natural adjuvant agents that exert cytotoxic effects on cancer cells while sparing normal cells. These natural agents may also mitigate the cytotoxicity of chemotherapeutic agents on healthy cells. This study investigates the cytotoxic effect of astaxanthin, an FDA-approved terpene compound with hydroxyl and ketone groups, isolated from *Blakeslea trispora*, on glioblastoma U87 MG cells. Neutral red viability tests revealed that astaxanthin exhibited a cytotoxic effect on glioblastoma cells, as evidenced by reduced cell viability in U87 MG cell lines with increasing concentrations of astaxanthin. This research sheds light on the potential of astaxanthin as an adjuvant agent for glioblastoma treatment.

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Valorization of Grape Juice Wastes to Produce Citric Acid by *Aspergillus niger*

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Citric acid, which is used as an acid regulator, sweetener, and preservative in many industries, especially food, beverage, and pharmaceuticals, can be obtained by chemical means, but it is commercially produced by fermentation from microorganisms. Many types of microorganisms can be used for the production of citric acid however, *Aspergillus niger* species are the most preferred in industrial production. Citric acid is obtained in the Krebs cycle during aerobic respiration. For this reason, carbon sources with high sugar content are preferred in citric acid fermentation. Grape pomace, an important waste of wine and fruit juice factories is a valuable carbon source for fermentation due to its 50-80% sugar content. Therefore, dried and ground grape pomace was used as the substrate in this study. To obtain high yields of citric acid, fermentation parameters need to be optimized. However, since testing all parameters is a negative situation in terms of time and cost, the optimum conditions of the parameters are determined by some statistical methods. In this study, the optimum conditions of substrate concentration, initial pH, fermentation temperature, and time were investigated using the Response Surface Methodology Box-Behnken Design, and the minimum and maximum values were determined as 30-120 g/L, 2-8, 25-35^{o}C, 48-168 hours, respectively. The optimum conditions for substrate concentration, initial pH, fermentation temperature, and duration were determined as 120 g/L, 5, 30^{o}C, and 168 hours, respectively, and the citric acid concentration was found to be 7.57 g/L. Statistical analysis showed that the created model was significant and R^2 was found to be 0.936.

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Effect of Different Concentrations of Hydrogen Sulfide Treatment on Antioxidant Capacity in Barley Under Drought Stress

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Abiotic stress factors such as drought, salinity, high and low temperature significantly reduce growth and crop yield in barley. As a signal molecule, Hydrogen sulfide (H_2S) helps to plants protect from stress conditions.[1] Suitable concentrations of sodium hydrosulphite (NaHS) (H_2S donor) for barley (*Hordeum vulgare* L.) are unknown. In this study, foliar NaHS (0.1 mM NaHS, 0.3 mM NaHS, 0.5 mM NaHS) was applied to two 21-day-old barley (cv. Kalaycı-97, cv. Yaprak) varieties and exposed to drought stress. The effects of NaHS application under 10-day drought stress were determined as physiological (Biomass, RWC) and biochemical [hydrogen peroxide (H_2O_2), total chlorophyll content (SPAD) and activities of catalase (CAT), peroxidase (POX), ascorbate peroxidase (APX)]. According to our results, the biomass that decreased with drought increased to the control level in Kalaycı-97 with the application of 0.5 mM NaHS, while it limited the loss to 16.5% in Yaprak. Similarly, it was determined that RWC, which decreased by 36% under drought stress in Kalaycı-97, increased to 92% with the treatment of 0.5 mM NaHS. In the Yaprak variety, treatment of 0.5 mM NaHS preserved the RWC content under drought stress. In drought-sensitive Kalaycı-97, 0.5 mM NaHS treatment increased CAT and POX activities approximately 1.5 times but did not change APX activity. In the drought-resistant Yaprak variety, only APX activity increased 2-fold under drought stress with 0.5 mM NaHS application compared to the control. H_2O_2 data support these results. As a result, it was determined that the most effective concentration for drought-sensitive Kalaycı-97 under short-term drought was 0.5 mM NaHS.

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Neuroprotective Potential of *Asparagus officinalis* L. Extracts on Rotenone-Induced Parkinson's Disease Model in SH-SY5Y Cells

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Asparagus officinalis L., commonly known as asparagus, is a nutritious vegetable rich in various bioactive compounds. These include carotenoids, steroidal saponins, and flavonoids. Studies have shown that extracts from asparagus offer several health benefits, such as antioxidant properties, lipid-lowering effects, and glucose-reducing capabilities, and potential benefits for neurodegenerative diseases.[1] Parkinson's disease (PD) is a continuously advancing neurodegenerative disorder, primarily marked by three motor-related symptoms: rigidity, resting tremor, and bradykinesia. While current PD treatments, such as dopamine replacement medications and deep brain stimulation, address many motor symptoms effectively, they do not halt the progression of PD. As a result, there's a significant emphasis in PD research on devising adjuvant therapies that can modify disease prognosis and offer neuroprotection.[2]

In this research, the potential neuroprotective effects of methanol and water extracts from *A. officinalis* L. were explored on SH-SY5Y cells, which were modeled as a PD representation using rotenone. Using the ELISA technique, the impact of *A. officinalis* L. extracts on dopamine synthesis, specifically its inhibitory effects due to rotenone, was examined. Additionally, the potential of these extracts to alleviate oxidative damage induced by rotenone was assessed using malondialdehyde (MDA), catalase (CAT), and superoxide dismutase (SOD) assays. An evaluation of mitochondrial oxygen consumption was also conducted, gauging nitric oxide (NO) concentrations through the ELISA method.

The effects of both water and methanol extracts of *A. officinalis* L. on cell viability post-rotenone application were assessed using the MTT method after 24 and 48-hour incubation periods. Based on these findings, the highest cell viability was detected at a concentration of 200 µg/ml for the water extract (61.83%) at 24 hours and 25 µg/ml for the methanol extract (82.18%). While the water extract of *A. officinalis* showed no statistically significant changes in dopamine, MDA, CAT, SOD, and NO levels, cells treated with the methanol extract demonstrated the following outcomes compared to the positive control: increased dopamine levels, reduced MDA (7.48 nmol.mg-1 protein) and NO (1.79 µmol.g-1) concentrations, and enhanced CAT (25.44 U.mg-1 protein) and SOD (7.13 U.mg-1 protein) activities. This collective data indicates that the methanol extract of *A. officinalis* holds potential co-active therapeutic value in counteracting the biochemical disturbances associated with PD.

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Effects of Taurine on 2,3,7,8-Tetrachlorodibenzo-p-Dioxin-Induced Oxidative Stress in the Hearts of Rats

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The aim of this study was to investigate the potential preventive effects of taurine against organ damage induced by 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in rats. TCDD is an environmental toxin known for its high toxicity in both animal and human tissues. Taurine, an amino acid distributed in various organs, exhibits diverse physiological functions, including cellular protection due to its antioxidant and anti-inflammatory properties. In the context of this research, our primary aim was to explore the potential of taurine to mitigate oxidative stress and organ damage in rat heart tissues induced by TCDD exposure. To assess these potential effects, we measured the levels of thiobarbituric acid reactive substances (TBARS) and glutathione (GSH), as well as the activity of superoxide dismutase (SOD) and catalase (CAT). Adult male Wistar rats (weighing 250-300 g and aged 12-13 weeks, n = 32) were randomly assigned to one of four groups (n = 8/group): Control, TCDD, TAU, and TCDD+TAU. TCDD and taurine were administered via gavage at doses of 2 µg/kg/week and 200 mg/kg/day, respectively. The results demonstrated that TCDD induced oxidative stress in the heart tissues of rats, characterized by reduced GSH levels and decreased SOD activity, along with elevated TBARS levels. Notably, taurine treatment significantly ameliorated the levels of TBARS ($p<0.05$), while concomitantly increasing GSH levels and SOD activity ($p<0.05$) when administered alongside TCDD. The supplementation of taurine proved effective in mitigating the oxidative imbalance associated with TCDD-induced organ damage, thus offering a potentially novel strategy to mitigate TCDD toxicity.

Investigation of Exosome And miRNA Content as a Potent Marker of Colon Cancer for Early Diagnosis

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Colorectal cancer (CRC) ranks among the leading causes of cancer-related deaths worldwide. CRC is typically detected through the hidden blood test in feces and the imaging technique of flexible sigmoidoscopy. However, these methods have certain limitations due to the problems and side effects they pose to the patients. In addition, the sensitivity of the hidden blood test in feces is low, and retro sigmoidoscopy can be challenging for patients.[1] Exosomes, which can be obtained from various body fluids such as blood, urine, and cell/tissue lysates, play crucial roles in different biochemical processes, including intercellular communication, signal transmission, genetic material transfer, and regulation of the immune response.[2,3] The high expression of many miRNAs in cancer tissues makes them highly significant for diagnosis and determining the course of the disease.

This study aims to determine the expression levels of exosomal miRNAs from healthy and HT-29 colon colorectal carcinoma cells using qRT-PCR and propose an alternative, practical, and sensitive liquid biopsy technique for traditional colon cancer diagnosis. However, due to both the limited experimental data and the small number of patients, it has been concluded that further comprehensive research is needed for the potential use of miR-19a-3p, miR-21, and miR-1246 in colorectal cancer diagnosis.

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Biochemical Responses of Two Bacteria Isolated from Çanakkale Coastal Zone on Barley under Salt Stress

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Salt stress is one of the major abiotic stresses that threaten the environment by negatively affecting sustainable agricultural productivity all over the world. However, plant growth promoting rhizobacteria (PGPR) are a sustainable environmentally friendly product that is highly effective in increasing plant resistance to environmental stresses.[1] Within the scope of the study, the effects of *Micrococcus luteus* (ML) and *Bacillus nealsonii* (BN) isolated from the Çanakkale coastal region of Turkey and diagnosed with 16s rRNA inoculating on sea barley grass (*Hordeum marinum* subsp. *marinum*) and two cultivated barley varieties (*Hordeum vulgare* L. salt-tolerant cv. Ocak, salt-sensitive cv. İnce-04) under salt stress (0, 100, 300 mM NaCl). We focused on biochemical parameters (chlorophyll content, total protein content, hydrogen peroxide content (H_2O_2, spectrophotometric and histochemical staining), lipid peroxidation (TBARS), cell membrane permeability (ES)) and some antioxidant enzyme activities (peroxidase (POX), catalase (CAT)). Our results showed that chlorophyll content decreased, while TBARS, H_2O_2 content, and ES improved with increasing salt stress in İnce-04 variety. Besides *H. marinum* subsp. *marinum* was less affected by salt stress and were more tolerant salinity compared to other barley varieties. In addition, ML and BN inoculation eliminated negative impacts of salt stress with increased chlorophyll content, CAT, and POX activities in salt-sensitive İnce-04. As a result, it reduced the negative effects of salt stress by reducing the production of reactive oxygen species (ROS) after PGPR inoculation. These results also show that ML and BN inoculation into barley can be used as biofertilizer under salt stress conditions.

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Chemical Composition, Antioxidant and Antimicrobial Properties of Essential Oil Extracted From *Satureja candidissima* (Munby) Briq.

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The present research was conducted on the essential oil composition, antioxidant and antimicrobial activities of *Satureja candidissima* (Munby) Briq., an endemic medicinal plant from Algeria. Gas Chromatography (GC) and Gas Chromatography-Mass Spectrometry (GC/MS) analyses of the plant's essential oil resulted in the identification of 37 compounds. The principal constituents were pulegone (32.13%), menthone (23.80%) and neo-menthol (20.16%). Antimicrobial activity of the essential oil was evaluated using disk diffusion, and significant potential activity was observed against *Klebsiella pneumoniae*, *Escherichia coli* and *Aspergillus niger* with their respective zones of inhibition ranging from 25±1.52 to 47 ±3 mm. Furthermore, the results of antioxidant power determined by DPPH and TAC tests revealed that the essential oil possesses moderate activity. In conclusion, these findings suggest that the essential oil of *S. candidissima* could be considered as a potential source of natural antimicrobial for pharmaceuticals and food preservation.

Investigation of Inhibition Kinetics of Various Plant Extracts on Polyphenol Oxidase Enzyme from *Paulownia Tomentosa* and Binding Mechanism by Molecular Docking

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Browning in foods is undesirable as it causes deterioration of food quality and appearance. This browning process is an enzymatic event and occurs by the conversion of phenolic compounds to o-quinones by the enzyme polyphenol oxidase (PPO). Although synthetic inhibitors are widely used in the food industry today to prevent or slow this phenomenon, the development of natural inhibitors is extremely important. Our aim in this study is to find natural plant extracts that will inhibit the PPO enzyme. In the present study, we investigated the inhibitory effects of the herbal plant extracts of *Verbascum thapsus*, *Tanacetum vulgare*, *Solanum nigrum* and *Datura stramonium*, obtained from Kosovo on polyphenol oxidase (PPO) enzyme activity from *Paulownia tomentosa*. PPO enzyme from *Poulownia tomentosa* plant was purified by using triple phase purification method and 4-methyl catechol was used as a substrate to determine the inhibitory effect of the plant extracts on PPO enzyme activity. Among these plants, it was determined that *Tanacetum vulgare* extract showed the most effective inhibitory effect in the form of mixed inhibition with a K_i value of 0.2 mg/mL. In order to explain and support the binding mechanism of the best inhibitory extract, the phenolic content of *Tanacetum vulgare* extract was determined by LC-MS/MS and molecular docking study was performed for the phenolic compound it contains at the highest rate, and the binding mechanism of the inhibitor was explained.

Combined Neuroprotective Effects of L-DOPA and Deinoxanthin on Dopaminergic SH-SY5Y Cells Exposed to Rotenone: Implications for Parkinson's Disease

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L-DOPA, or levodopa, serves as an indirect dopamine agonist and is able to cross the blood-brain barrier, a capability not shared by dopamine itself. As a result, L-DOPA is instrumental in elevating dopamine levels in the brain and is employed in therapies for several neurodegenerative disorders, notably Parkinson's disease (PD).[1] Deinoxanthin, a distinct ketocarotenoid synthesized by *Deinococcus radiodurans*, demonstrates both antioxidant and under specific scenarios, pro-oxidative properties.[2] Its unmatched efficacy in scavenging reactive oxygen species grants it superior antioxidant attributes compared to other carotenoids, a property exclusive to *Deinococcus* spp. derivatives.

This study investigated the potential therapeutic effects of L-DOPA and deinoxanthin against rotenone-induced toxicity in dopaminergic SH-SY5Y cells. The synergistic effect was quantified using the Combination Index (CI) values, computed through the CompuSyn software. Dopamine concentrations within the cells were gauged using ELISA, while levels of SOD, CAT, and NO were ascertained via Assay Kits. Our findings highlight that while individual administrations of L-DOPA and deinoxanthin elevate dopamine levels in rotenone-challenged SH-SY5Y cells, their combined application magnifies this effect, further mitigating rotenone's deleterious impact. Evidently, deinoxanthin potently augments L-DOPA's neuroprotective efficacy when co-administered. Thus, the combined therapeutic approach of L-DOPA and deinoxanthin may herald a promising avenue for innovative treatments in Dopaminergic Parkinson's Disease.

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Investigation of the Potential Contribution of Beta Carotene in the Treatment of Glioblastoma

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Glioblastoma is a brain tumor that mostly affects adults. It is aggressive and frequently fatal. Standard treatment protocols typically involve a combination of radiation therapy, chemotherapy, and surgical resection. However, effectively managing glioblastoma poses significant challenges due to its complexity. The goal of surgical resection is to remove as much of the tumor as possible, but complete removal can be challenging due to the tumor's infiltrative nature. Additionally, it is challenging to completely remove all diseased tissue during surgery due to the rapid spread of tumor cells to different regions of the brain. To address these complexities, postoperative care often includes radiation and chemotherapy. These treatments target any tumor cells remaining after surgery and aiming to inhibit their growing and spread. However, due to the aggressiveness, propensity for treatment resistance of glioblastoma and the risk of recurrence remains significant despite these interventions. Therefore, complementary methods and supportive medications are often needed to manage glioblastoma effectively. The aim of this study was to examine the effects of beta-carotene, a carotenoid, both alone and in combination with the chemotherapeutic drugs which are frequently used in glioblastoma treatment regimens on glioblastoma U87-MG cells. The results indicated that beta-carotene was effective in killing glioblastoma cells. This finding underscores the potential significance of beta-carotene as a valuable component in glioblastoma therapy. Additionally, the observed synergistic effect of beta-carotene when used in combination with the conventional chemotherapeutic drug etoposide is promising for enhancing the prognosis of glioblastoma patients particularly in addressing the challenge of medication resistance.

Phenylboronic Acid Functional N-Heterocyclic Carbene Precursors: Synthesis, Characterization, DNA Binding, Anticancer Activities, Inhibitory Properties Against Acetylcholinesterase and Xanthine Oxidase

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N-heterocyclic carbenes (NHC) are heterocyclic compounds consisting of singlet carbenes and containing nitrogen atoms.[1] In this study, the synthesis, characterization, anticancer, genotoxicity, antibacterial and enzyme inhibition properties of benzimidazolium salts containing boronic acid functional group were investigated. Within the scope of the study, benzimidazolium salts (1a-1b) with meta-phenylboronic acid substitution were synthesized. The IC50 µg/mL values of the synthesized salts, MCF-7, 1a-1b salts on the Cell Line and cisplatin drug were found to be 32.27±4.24, 29.90±2.89 and 82.02±6.19, respectively. On the A549 Cell Line, the IC50 µg/mL values for 1a-1b salts and cisplatin were determined as 31.86±3.53, 29.24±2.86 and 91.31±3.65, respectively. For HCT116 Cell Line, IC50 µg/mL values of 1a-1b salts and cisplatin were found to be 30.42±4.52, 15.31±3.81 and 106.57±6.77, respectively.[2] In genotoxic studies, no effect was observed on the pBR322 plasmid despite increasing concentration. In the enzyme inhibition test, the IC50 µg/mL values for 1a-1b salts and allopurinol were found to be 0.811±0.033, 0.637±0.011 and 1.685±0.051, respectively, and it was determined that they may have a greater inhibitory effect on the xanthine oxidase enzyme than allopurinol. It showed more inhibition of the acetylcholinesterase enzyme than donepezil, and these values were found to be 0.862±0.033, 0.903±0.011 and 3.172±0.661 for the 1a-1b salts and donepezil, respectively. As a result, it has been determined that boronic acid functional NHC precursors are biologically active compounds and exhibit biological activity on cells, especially through enzyme inhibition.[3]

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The Investigation of Phenolic Components and Antioxidant Activities of Wild Olive Variety "Delice" in Winter and Summer Seasons

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The olive plant (Olea Europaea L.) is divided into two subspecies: Olea Europaea L. subs. Sativa (cultivated olive) and Olea Europaea L. subs. Oleaster (wild olive or "delice" in Turkish). In addition to many cultivated olive varieties in our country, there are also two wild olive varieties known as Ak Delice (White Delice) and Kara Delice (Black Delice). Ak Delice is recognized by its light-colored and large leaves, while Kara Delice is known for its small and dark-colored leaves. [1]

In this study, the Kara Delice leaves were collected from the Arsuz district of Hatay province in summer and winter seasons. Leaves were washed, dried and extraction was performed using a 80% methanol-water solution in an ultrasonic bath for 4 hours. The obtained extract was analyzed for both phenolic components and antioxidant activities through methods such as ABTS, Ellman,Total flavonoid content (TFC), FRAP (TE), and total phenolic content (TPC). Oleuropein, tyrosol, and hydroxytyrosol concentrations were determined by HPLC using a double-phase system with formic acid-water (5:95, v/v, A) and Acetonitrile (ACN)-Phase A (80):(20, v/v, B). In the summer season, the highest values for phenolic components were determined in June as 28.56 mg/g, 0.56 mg/g, and 1.17 mg/g, respectively for oleuropein, tyrosol, and 3-hydroxytyrosol. In case of the winter season, the highest values were observed in december with values of 41.43 mg/g, 0.62 mg/g, and 2.57 mg/g, respectively. When comparing the summer and winter seasons, it was determined that the highest results were obtained during the winter season.

When the results of antioxidant activities were compared, the highest values were given in Table 1.

Table 1. Values and months with the highest antioxidant activities

Antioxidant Activity	June-July-August	October-November- December
ABTS (mg/ml)	49.12 - 25.78 - 34.35	25.77- 24.63- 26.92
Elmann (mg/ml)	11.14 - 10.022 - 9.05	12.13- 15.12 - 9.13
FRAP(mg/ml	517.66- 302.39 - 280	439.35 - 406.28-472.42
TPC(mg/ml)	11.16-10.12-11.69	9.64-8.24-11.05
TFC(mg/ml)	244.36 - 116.64 - 286.96	116.6 - 87.96- 145.24

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Macrophage Polarization and Its Role in Apoptotic Neural Recovery

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Peripheral monocyte-derived macrophages have critical roles in regulating the immune response in neuroinflammatory and neurodegenerative diseases.[1] Damage to the central nervous system (CNS) does not heal completely like peripheral tissue damage. For this reason, it is thought that immune system cells may play different roles in the CNS. Tissue regeneration begins with macrophages removing dead tissues/apoptotic cells from the damaged area. In this study, in order to understand the role of macrophages on CNS tissue inflammation, the effect of apoptotic neurons and neutrophils on macrophage phenotype was examined in in vitro co-culture. Macrophages have been shown to elicit a response distinct from the typical M1/M2 phenotypes in the CNS when confronted with apoptotic cell stimuli.[2] It is suggested that this different phenotype (M1-2) is one of the factors in the transition from the M1 phenotype to M2 in the CNS and that induction of this transition phenotype may be an alternative strategy for accelerated regeneration of CNS injuries. The viability of apoptotic neurons grown with different macrophage phenotypes was also examined and it was shown that the M2 phenotype accelerates neuronal recovery.

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Cytotoxic and Apoptotic Effects of Different Apricot Species in Malatya

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Nutrition is undeniably important in the fight against cancer. A diet based especially on fruits and vegetables is the biggest ally of traditional treatment to eliminate cancer. At the same time, thanks to this type of nutrition, protection against many serious diseases, including cancer, can be provided. Since Malatya apricot has a rich content that can be considered the king of fruits, the investigation of its cytotoxic and apoptotic effects has been the subject of this study.

In this study, Hacıhaliloğlu, Hasanbey, Kabaaşı and Soğancı apricots, among different apricot varieties grown in Malatya, were collected as raw fruits between April and June and as ripe fruits between June and August. Some of the ripe fruits were dried under sunlight and these dried fruits were also used within the scope of the study. Methanol and acetone extracts were obtained by extracting raw, ripe and dried apricot fruits. The cytotoxic properties of these extracts were demonstrated by MTT test in MCF-7 and Caco-2 cells in cell culture. According to the results obtained from the MTT test, IC50 values were determined and Wound Healing test was performed on these two cell lines using these values. Especially to reveal the apoptotic properties of apricot extracts, cell images were obtained with a fluorescent microscope using the acridine orange (AO)/ethidium bromide (EB) staining method.

According to MTT test results performed on MCF-7 cell line for 24 and 48 hours application time, the lowest IC_{50} values were determined as 3.9 and 0.5 mg/mL in the acetone extracts of dried and raw Kabaaşı apricots, respectively. In the Caco-2 cell line, the lowest IC_{50} values for 24 and 48 hours application time were measured as 3.59 and 1.95 mg/mL in the acetone extracts of dried Kabaaşı apricots, respectively. In Wound Healing test, which was made by using the lowest IC_{50} values with apricot extracts, the opened slit in the control group of Caco-2 cells closed at the level of about 70%. In the Caco-2 cells treated with apricot, the opened slit was opened in the range of 10-30% at the end of 24 hours. In the MCF-7 cell line, while the level of the slit opening in the control group closed at approximately 80%, the slit opening in apricot-treated cells opened in the range of 0-12%. Also, cell death and apoptotic formation were seen morphologically in the images obtained from AO/EB staining method, which was performed to demonstrate the cytotoxic/apoptotic properties of the apricot extract.

As a result, the extracts of Malatya apricot were determined to have strong cytotoxic/apoptotic properties in Caco-2 and MCF-7 cells.

POSTER PRESENTATION ABSTRACTS

Boric Acid Loaded Carboxymethylcellulose/N-succinylchitosan Hydrogels as a Intracanal Medicament: Contact Angle on Dentine Surfaces and Boron Delivery in Physiological Media

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Chitosan and carboxymethyl cellulose (CMC) based hydrogels have attracted significant attention in the field of biomaterials due to their unique ability to be injected and their potential applications in endodontics. In endodontics, hydrogels are considered a base material that loads different antimicrobial agents. In this research, chitosan polymer underwent a modification process using succinic anhydride to produce *N*-succinyl chitosan (NSC). Subsequently, NSC was combined with CMC to form NSC-CMC hydrogels under conditions of pH=7.4 and room temperature. The study examined the gelation time and swelling capacity of the NSC-CMC hydrogels at room temperature. Boric acid was then introduced into these hydrogels at concentrations of 4%, 8%, and 12% (w/v). Four study groups consisted of NSC-CMC hydrogels without boric acid, with 4%, 8%, and 12% boric acid. The addition of boric acid was chosen for its non-toxic nature and its strong antibacterial properties, which make it highly effective in various biomedical applications. Following the incorporation of boric acid into the hydrogels, their release behavior in physiological media was assessed using inductively coupled plasma-mass spectroscopy (ICP-MS). After obtaining the clinical research ethics committee's approval (protocol number: 2022-306), to analyze the wettability of hydrogel, the contact angle measurements were performed. The roots of sixteen mandibular anterior teeth were split longitudinally into dentin slices and randomly divided into 4 according to the study groups (n=4). Wettability was evaluated with contact angle measurement. Contact angle values between hydrogels and dentin were affected by the chemical composition of the agent. The high contact angle of antibacterial hydrogels is inappropriate owing to limiting the penetration efficiently into dentin tubules or canal irregularities.

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Protein Adsorption Behavior on Laser Patterned Titanium Surfaces

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As the world's population ages, the use of bone implants is increasing. Metals are the preferred materials for such implants due to their mechanical strength and durability. Titanium has exceptional durability and corrosion resistance among these metals. However, a major challenge is to improve the osseointegration of titanium implants. Recent research has shown that surface topographical modifications, particularly laser periodic patterning, can considerably enhance osteointegration. This topic has become widely investigated. At the beginning of osseointegration, blood proteins are adsorbed onto the surface of the implant, resulting in the formation of a protein layer that is crucial for the integration of the implant since this layer facilitates cellular recognition. The study of surface-protein interactions is therefore essential for the investigation of protein adsorption.[1] In this study, the surface of titanium plates was modified using micro and femtosecond laser patterning to yield periodic patterns on the surfaces. The nano-morphology of micro and femtosecond laser machined titanium surfaces were imaged using scanning electron microscopy (SEM) and atomic force microscopy (AFM). The values for average roughness (Sa) in 2D and 3D, along with maximum height (Sz), maximum pit height (Sv), skewness (Ssk), and kurtosis (Sku), were calculated. Surface wettability was determined by contact angle measurements, and the elemental composition of the sample surfaces were analyzed by X-ray photoelectron spectroscopy XPS. Protein adsorption on the laser modified surfaces relative to the untreated surface was characterized by XPS using the % of N to Ti. The conformation of surface adsorbed proteins was determined using Fourier transform infrared spectroscopy equipped with an attenuated total reflection apparatus (FTIR-ATR).

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Fabrication of a Flexible and Sustainable Hand-made Electrochemical Sensing Platform

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Screen-printed electrodes (SPE) consist of working, reference, and counter electrodes.[1] They are preferred in industrial, clinical, and environmental applications for their advantages, such as ease of manufacture, rapid analysis, reliability, sensitivity, precision, low cost, reproducibility, customization, and high selectivity.[2-3] They are also environmentally friendly and can be miniaturized, making them suitable for mass production. The high cost of commercial SPEs makes it difficult for daily use in laboratories. Producing electrodes is very important, with higher flexibility and low-cost properties. Handmade flexible electrodes can be produced in any design and size with any material such as poly(ethylene terephthalate) (PET), poly(vinyl chloride) (PVC), etc. according to the purpose of the study.

Recently, portable flexible biosensors have gained considerable interest due to their various properties such as studying with low-volume samples, portability, and mass production. These sensors produced with economical and sustainable materials have exhibited high endurance for external conditions and low manufacturing costs.[4] The hand-made sensors have been also extensively used for rapid and affordable biomarker screening and monitoring in medicinal approaches.[5]

In this study, flexible and portable hand-made screen-printed electrodes were fabricated. Electrode design and the cutting process were realized using a Cameo 4 printer with the software. PET films from recycled beverage bottles were properly prepared and used as substrate. In SPE production, parameters such as PET film thickness, type of sanding paper, number of sanding processes, electrode design, and electrode length were optimized. The prepared flexible SPEs could have a significant potential to be used for the electrochemical detection of several biomolecules.

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Removal of Pharmaceutical Micropollutant Ciprofloxacin with Activated Carbon

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Antibiotics are among the most critical drug groups that contaminate the environment. Ciprofloxacin (CIP) is one of the most widely used fluoroquinolone antibiotics in the world[1]. In this study, the removal of ciprofloxacin antibiotic from aqueous solution was investigated using activated carbon through batch adsorption. pH, adsorbent dosage, contact time, and concentration effects were examined to find the optimum adsorption conditions. Langmuir, Freundlich, Dubinin-Radushkevich (D-R), and Temkin adsorption equations were applied. It was found to fit the Freundlich adsorption isotherm. The calculated E value in the Dubinin-Radushkevich (D-R) model was <8 kJmol-1, indicating that the adsorption process is physical. Thermodynamic parameters such as enthalpy (ΔH0), Gibbs' free energy (ΔG0), and entropy (ΔS0) were calculated. In the adsorption of ciprofloxacin with activated carbon, it was observed that the process is endothermic, physical, and spontaneous."

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Antifouling and Anticorrosion Performances Of ZnO, TiO_2 and SiO_2 Nanoparticles Containing Polypyrrole-Coated Steel Surfaces in the Marine Environment

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Sea water contains many organic molecules, microorganisms and macroorganisms, as well as many ions, especially 35% NaCl, that make it highly corrosive. For this reason, two basic processes occur on surfaces in contact with the sea, causing great economic losses and significant environmental pollution: biofouling and corrosion. Fouling is observed on all living and non-living surfaces in contact with the aquatic environments such as seas, oceans, lakes and streams. The sticky structure formed by bacteria serves as food for the larvae of crustaceans and provides a habitable environment for them. Not only does seawater contain many electrolytes as well as highly corrosive chloride ions, but the biofouling itself that forms on metal surfaces also contributes to corrosion. Anticorrosive (ANCO) and antifouling (ANFO) paints are used to get rid of this phenomenon, but these toxic paints cause great damage to the sea and marine life. People have started to produce polymeric coatings as an alternative to these paints. The most easily applicable of these coatings are conductive polymers.

In this study, 304 stainless steel coupons were coated with polypyrrole (PPy) containing ZnO, SiO_2 and TiO_2 nanoparticles (NP) and their ANFO and ANCO properties were investigated. The coatings were carried out electrochemically by cyclic voltammetry technique in presence oxalic acid electrolyte medium. The coatings were kept in the Mediterranean Sea in Hatay (Arsuz), Turkey for 6 days and then back to the laboratory in water to investigate its surface properties.

Fluorescence microscopy imaging using DAPI staining, SEM, EDX and AFM analysis and water contact angle values were applied to investigate for ANFO performance. Biofilm amount was determined spectrophotometrically by crystal violet staining. Anodic polarization curves and impedance analysis were applied to examine the ANCO properties for both coupons kept in the marine environment and coupons kept in seawater into the laboratory. Results showed that all NP containing PPy coatings have ANFO and ANCO properties, but the best protection was observed for the polypyrrole coating containing ZnO NP. Impedance analysis also indicated that ZnO NP containing PPy film showed the highest anticorrosive property.

Human Bone Marrow-Mesenchymal Stem Cells Differentiation into Brain-Like Endothelial Cells

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Human pluripotent stem cells (hPSCs) are routinely used to develop and nurture monolayers of brain microvascular endothelial cells (BMECs). hPSCs primarily develop into mesodermal lineage cells upon differentiation.[1] Accordingly, human bone marrow-derived mesenchymal stem cells (BM-MSCs) may provide an approach to develop fully functional human BMECs that may be used to build the blood-brain barrier (BBB) for scientific purposes. The research revealed that BM-MSCs may develop into various cell types, including endothelial cells (ECs).[2] However, there is currently no method for transforming BM-MSCs into endothelial cells with brain-like properties, preventing their broad adoption.

In order to differentiate brain-like endothelial cells (BLECs) from BM-MSCs, we created a novel technique motivated by embryologically developing processes and protocols for iPSCs-BMECs that had already been reported.[3] Utilizing three distinct differentiation media —Endopan, EGM-2, and IMDM—, we were able to design the differentiation process by optimizing the BM-MSC seeding densities and the differentiation medium's components. Then, we investigated the effects of retinoic acid (RA) addition at various doses to the differentiation medium on BLEC formation. In addition, to mimic the environment of embryological development, we looked at how the hypoxic environment was controlled during endothelial cell differentiation by chemical HIF-1α regulators, and we saw a significantly higher expression of brain endothelial cell markers. By using the IMDM medium and adding RA, it was possible to reduce the time it took for BM-MSCs to differentiate into BLECs from 14 to 9 days. Occludin, CD-31, ZO-1, and claudin-5 expressions in BLECs were increased by adding chemical HIF-1α regulators during the differentiation phase. The ability of the BLECs to form tubes when cultivated on Matrigel also allowed us to demonstrate their functioning.

In summary, we have presented a protocol for the differentiation of BM-MSCs into BLECs that can be used to build fully functional, physiologically relevant, human cell-based BBB models for the investigation of brain-related diseases and the evaluation of various novel drugs for the treatment of neurological disorders.

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Efficient Differentiation of Mesenchymal Stem Cells into Endothelial Cells Induced by Endothelial Cells Conditioned Medium

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Endothelial cells (ECs) compose the inner layer of blood vessels, playing a crucial role in meditating the exchange of molecules between the blood vessel and its surroundings. Despite their wide-ranging applications in both physiological and pathological research, a consensus remains elusive in the literature concerning the optimal culturing methods for ECs. Primary endothelial cells have a limited lifespan and present challenges in terms of acquisition, particularly when organ specific ECs are required for specialized studies, such as those involving the brain, heart, and lungs. In contrast, human induced pluripotent stem cells (hiPSCs), which hold the potential to differentiate into ECs, are inherently delicate to cultivate and can give rise to various complications including long and expensive differentiation protocols. Alongside iPSCs, mesenchymal stem cells (MSCs) also possess the capacity to differentiate into diverse cell types, including ECs, rendering them valuable candidates for research.[1] Due to their relatively straightforward maintenance and reduced sensitivity, MSCs may offer a more practical approach for obtaining ECs. Nevertheless, currently, there is a dearth of protocols with sufficiently high success rates for deriving ECs from MSCs. The objective of this study was to investigate the differentiation potential of MSCs sourced from bone marrow and umbilical cord into ECs by inducing them with EC conditioned medium. We employed human umbilical vein endothelial cells' (HUVEC) fresh or conditioned medium at varying concentrations to induce the differentiation of MSCs to ECs. The differentiation of ECs was assessed through immunostaining with endothelial markers, and the resultant data were subject to one-way ANOVA analysis. Our analysis revealed that the expression of fundamental endothelial markers increased in specific groups of MSCs induced with a noteworthy increase in the expression of key endothelial markers, ZO1, CD31 and occludin, within specific groups of MSCs with conditioned medium compared to the control group. These findings present a valuable method for enhancing the differentiation of MSCs into ECs, with potential applications in future studies, including those involving organ and brain modeling.

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The Influence of Cobalt Chloride on the Differentiation of Brain Microvascular Endothelial Cells from Induced Pluripotent Stem Cells

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The blood-brain barrier (BBB) is a semipermeable boundary formed by brain microvascular endothelial cells (BMECs) that shields the brain from harmful substances. While it safeguards the brain, it hinders drug delivery to the central nervous system (CNS), affecting drug efficacy in treating brain diseases. Developing an *in vitro* human BBB model with an optimal BBB phenotype and functionality has long been a challenging endeavor. Human stem cell approaches have helped create 3D *in vitro* models mimicking the *in vivo* environment. While efforts have been made to differentiate iPSCs into iBMECs, maintaining stable BMEC characteristics remains a challenge.[1,2] Recent research has shown that mimicking embryological developmental stages in a low-oxygen environment during differentiation enhances the barrier functionality of brain microvascular endothelial cells.[3,4] Cobalt chloride ($CoCl_2$), a hypoxic agent, has been found to increase barrier integrity and the expression of various tight junction proteins when applied at specific concentrations and durations during the differentiation of iPSCs into BMECs.[3] However, the detailed effects of $CoCl_2$ in this differentiation process have not been thoroughly studied. Therefore, the primary objective of our research is to investigate the impact of $CoCl_2$ on the differentiation of BMECs from iPSCs. To achieve this, we varied $CoCl_2$ concentrations and application times during differentiation, assessing BBB characteristics using transendothelial electrical resistance (TEER) measurements and immunostaining. Our findings show that just four days of $CoCl_2$ treatment enhances the expression of junction proteins like ZO-1, occludin, and vWF. Furthermore, different $CoCl_2$ treatment schemes consistently produced similar patterns in TEER value plots for biological replicates. However, under normoxic conditions, TEER plots exhibited fluctuations. By investigating the effects of $CoCl_2$ on iPSC differentiation into BMECs, our study provides valuable insights into enhancing the development of a reliable *in vitro* BBB model with improved functionality.

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Differentiation of Mesenchymal Stem Cells into Brain-Like Endothelial Cells

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Among stem cells, mesenchymal stem cells (MSCs) offer several advantages. They can be readily isolated from various tissues, pose no ethical concerns, and do not require demanding cell culture conditions, unlike human pluripotent stem cells (hPSCs)[1]. MSCs have demonstrated the potential to differentiate into endothelial cells[2], suggesting their suitability for differentiation into brain-like endothelial cells (BLECs) for blood-brain barrier research. While protocols for differentiating hPSCs into BLECs are available in the literature[3,4], to our knowledge, none exist for the differentiation of MSCs to BLECs.

In this study, we endeavored to develop a protocol for differentiating MSCs to BLECs by adapting the methodology used by Qian and colleagues[3] for hPSCs to bone marrow-derived MSCs. We systematically optimized this protocol by subjecting the cells to various conditions including different media composition, different concentrations of inducing agents, and different differentiation periods. We performed immunostaining using endothelial cell marker antibodies, such as vWF and ZO1, to determine the conditions that yield the highest endothelial lineage protein profile. Interestingly, we observed that longer culture periods in differentiation media did not enhance expression; consequently, we adopted a shorter differentiation period of 3 days.

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Mesenchymal Stem Cells' Neuronal Differentiation and Their Functional Assessment with Multielectrode Array

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Neurological disorders present significant research challenges owing to the intricate nature of the human brain and the limitations of conventional methods such as postmortem analysis and animal models. This necessitates the exploration of alternative approaches. Mesenchymal stem cells (MSCs) hold promise in neurological disorder research due to their multipotency and low immune response. They are valuable for differentiation into neurons, a process primarily achieved using small molecules and extracellular matrix components, with the manipulation of material properties enhancing efficiency. These attributes position MSCs as valuable tools for effective study and modeling of neurological disorders. Various methods, including the predominant use of small molecules like cytokines and chemokines, along with the emerging interest in employing extracellular matrix (ECM) components to activate mechanotransduction pathways, show promise in enhancing the efficiency of neuronal differentiation of MSCs through material property manipulation.

This study has developed an innovative differentiation protocol to generate neurons from human bone marrow-derived MSCs by optimizing culture conditions, and differentiation duration, and incorporating graphene-based nanoparticles. These enhancements have resulted in longer culture lifespans and improved functionality. We validated the neuronal differentiation through cellular morphology changes, examined through microscopic investigation, and confirmed protein expressions using immunostainings with well-known neuronal markers like MAP2 and Nestin. Most notably, we assessed the functionality of stem cell-derived neurons for several crucial reasons. To achieve this, we employed a custom-made Multielectrode Array (MEA) reading system while stimulating the neurons with varying concentrations of potassium chloride to observe their electrical signal coordination and changes. It was imperative to ensure that the differentiation protocol yielded cells capable of demonstrating distinctive neuronal properties, including the generation of action potentials and the formation of synaptic connections. The functional analysis, as indicated by the MEA spectra, provides valuable insights into disease modeling applications. Central nervous system (CNS) disorders exhibit unique neuronal conditions that must be accurately represented in our models.

Cytotoxic Effect of β-Caryophyllene on Pancreatic Cancer Cells: An Investigation of Potential Therapeutic Applications

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Pancreatic cancer stands as one of the most lethal forms of cancer with a dismal prognosis.[1] Current treatments, such as chemotherapy and surgery, aim to enhance patient quality of life and extend survival rates. Unfortunately, the majority of pancreatic tumors exhibit resistance to conventional therapies, and the disease often eludes early detection.[2] This necessitates the exploration of novel treatments, including more efficacious chemotherapy strategies. β-Caryophyllene, a natural compound, emerges as a promising candidate for pancreatic cancer treatment. This sesquiterpene is the principal component responsible for the pungency of black pepper and is found in substantial concentrations in the essential oils of various spices and food plants, including rosemary, cinnamon, and cloves.[3] Numerous studies in the literature extol the therapeutic potential of β-Caryophyllene for various diseases. Furthermore, it has been documented that β-Caryophyllene exhibits synergistic effects when combined with chemotherapeutic agents against cancer cells.[4] Given these insights, this study sought to explore the potential of β-Caryophyllene in pancreatic cancer treatment. The study's outcomes revealed that β-Caryophyllene exerts a cytotoxic impact on pancreatic cells. Additionally, it was observed that β-Caryophyllene enhances the efficacy of the chemotherapeutic drug etoposide against pancreatic cancer cells. These findings open up promising avenues for future research and the development of innovative therapies for pancreatic cancer utilizing β-Caryophyllene. Such therapies have the potential to significantly improve the outcomes for patients grappling with this aggressive malignancy.

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The effect of Water Soluble Metallophthalocyanines on α-Glucosidase Activity

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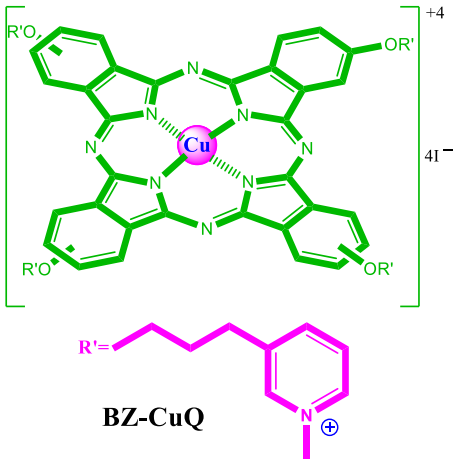
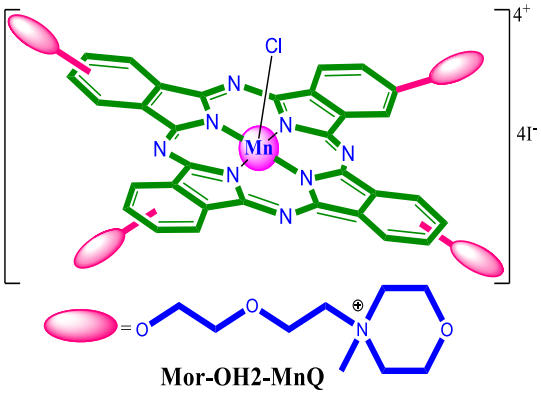
α-Glucosidase inhibitors can be used as antidiabetic agents. In this study, the effect of two water soluble metallophthalocyanines on the activity of α-glucosidase was investigated.

The results showed that both complexes inhibited α-glucosidase, but the most effective was Mor-OH2-MnQ (IC_{50}=12.96 µM) with the competitive inhibition type. The results support that these metallophthalocyanines may have antidiabetic potential.





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Interaction of Water Soluble Metallophthalocyanines with DNA and Their α-Glucosidase Inhibition Potentials

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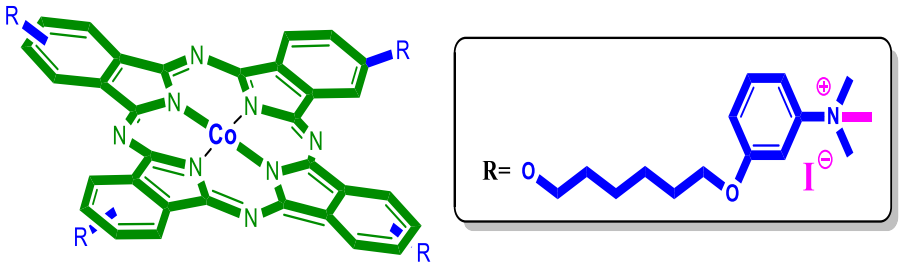
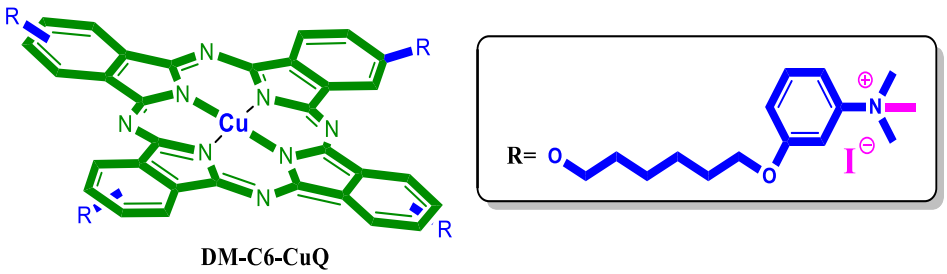
The numerous studies performed so far suggest that DNA and protein are most important targets for drugs so the interactions of small molecules with DNA and proteins are important research areas for the development of new therapeutic agents. In this study, the interactions with DNA and α-glucosidase inhibition activity of two water soluble metallophthalocyanines were studied.

The results showed that both metallophthalocyanines interacted with DNA and showed DNA cleavage activity. It was also seen that the complexes inhibited α-glucosidase. The inhibition type for the DM-C6-CuQ molecule (IC_{50}=0.22 µM) was determined as noncompetitive. The results support that these molecules may be suitable agents for the cleavage of DNA and have antidiabetic potential.



DM-C6-CoQ



DM-C6-CuQ

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Determination of the Inhibition Effects of Some Newly Synthesized Schiff Bases on Lipoxygenase Enzyme Activity Quinoa (*Chenopodium Quinoa Willd*.)

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In the animal and plant worlds, lipoxygenases (LOXs) are a class of non-heme, iron-containing enzymes that may stereo-specifically insert molecular oxygen into particular omega-6 polyunsaturated fatty acids (PUFAs). LOXs are categorized into 5-, 12-, and 15-LOX depending on where the carbon atom that bonds the molecular oxygen is located.[1,2] A double bond connecting carbon and nitrogen atoms defines the broad class of compounds known as schiff bases, and the compounds' versatility is produced by the numerous ways in which different alkyl or aryl substituents can be combined with them.[3] In this study, LOX enzyme was purified from Quinoa (*Chenopodium Quinoa Willd*.) using homogenate preparation, ammonium sulfate precipitation (20-40%), and Q-sepharose ion exchange chromatography method and determined the inhibition effects of newly synthesized Schiff bases on this enzyme activity. The ligand of (E)-2-(((2-hydroxyphenyl)imino)methyl)4-nitrophenol was synthesized. Subsequently, the complexes of this ligand were prepared with Ni(II), Co(II), and Cu(II). The ligand, Ni(II), Co(II), and Cu(II) complexes were tested at various concentrations, which showed reduced *in vitro* LOX activity. IC_{50} values were found to be 0.317, 0.257, 0.071 and 0.064 µM, respectively whereas K_i constants were 0.024 ± 0.003, 0.014 ± 0.002, 0.068 ± 0.014, and 0.091 ± 0.042 µM, respectively. Inhibition mechanisms of all compounds were found as competitive.

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Purification of Glutathione S-Transferase Enzyme From Human Erythrocytes, Investigation of The Effects of Some Carbazole Derivatives on Enzyme Activity

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Glutathione (GSH) is a tripeptide molecule consisting of glutamic acid, cysteine and glycine amino acids, which are found in high concentrations (5 millimolar) in the cell. GSH provides protection by acting as a free radical inhibitor and reducing agent with non-enzymatic mechanisms. It also has a significant effect on the immune system such as fibrogenesis, apoptosis and cell proliferation. Glutathione S-transferases (GSTs) catalyze the addition of electrophilic, nucleophilic and a wide variety of hydrophobic molecules of GSH to the central sulfur atom. Besides their catalytic role, GSTs can also non-catalytically bind a number of exogenous and endogenous compounds. These include hormones, fatty acids, flavonoids, bilirubin and xenobiotics. GSTs mediate signal transduction to minimize the effects of oxidative stress and oxygen toxicity. Therefore, GSTs are found in both prokaryotes and eukaryotes and can be divided into four families: cytosolic GST, mitochondrial GST, microsomal GST. [1]

Carbazole and carbazole derivatives, which contain a nitrogenous structure, have an important place among aromatic heterocyclic compounds. In addition, carbazole and its derivatives have various uses; they are widely used in the medical field in the healing processes of diseases by being used as antimicrobial, anti-inflammatory, antitumor, psychotropic agent, and antioxidant.[2]

In this study, firstly GST enzyme was purified from human erythrocytes. Then, in vitro inhibition effects of 3,6-dichlorocarbazole, 2,7- dimethoxy-9H-carbazole, 3,6- dimethyl carbazole, 2-fluoro-9H-carbazole compounds on GST enzyme activity were investigated. All the studied pyrrole compounds demonstrated micromolar levels of inhibitory effect against GST. IC_{50} values of compounds are in the range of 101-158 µM and K_i values of compounds are in the range of 114±32- 274±88 mM. Besides, 3,6- dimethyl carbazole showed higher inhibitor effect on GST.

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Assessment of Anticholinergic Properties of Some Schiff Base Metal Complexes

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The Schiff base is one of the most well-known pathways for synthesizing multidentate ligands, having outstanding proficiency in forming metal complexes of diverse structures.[1] Some of these ligands are derived from substituted salicylaldehydes and various amines, and their metal complexes have been widely investigated because of their wide range of applications.[2,3] Herein, we reported on a novel metal complex series of (*E*)-3-{[(5-chloro-2-hydroxyphenyl)imino]methyl}benzene-1,2-diol investigated as inhibitors of acetylcholinesterase (AChE) and butyrylcholinesterase (BChE). The results showed that the synthesized complexes were potent inhibitors of ChEs, with IC_{50}s in the low nanomolar range (32.76 ± 0.59-69.26 ± 2.92 nM for AChE and 104.90 ± 4.05-147.20 ± 6.63 nM for BChE) than the reference drug tacrine.[4,5]

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Synthesis and Antioxidant Capacity of Some Metal Complexes

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In the past few years, researchers have increasingly focused on the Schiff base structure due to its simplicity in synthesis, versatility, and wide range of activities, including antioxidant, antibacterial, anti-inflammatory, and anti-tumor activities. Also, the presence of the imine bond in the Schiff base offers opportunities for interaction with various nucleophiles and electrophiles, thereby exerting inhibitory effects on different metabolic enzymes.[1,2] In this research, firstly, (*E*)-4-chloro-2-[(2-hydroxybenzylidene)amino]phenol as ligand and its metal complexes were successfully synthesized, and some spectroscopic techniques completed their structural characterization.[3] Later, different in vitro bioanalytical methods were performed to determine its antioxidant activity using butylated hydroxyanisole, butylated hydroxytoluene, α-tocopherol, and Trolox as the reference antioxidants.[4,5] All complexes showed more effective DPPH-reducing activity than the standard antioxidant BHT. The ligand has an IC_{50} value of 11.36 µg/ml and was determined to have reduced activity as much as other antioxidants.

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Conjugated Conducting Polymer Based Impedimetric Human Chorionic Gonadotropin (hCG) Aptasensor

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Human Chorionic Gonadotropin (hCG) is a biomarker that can help preventing pregnancy related diseases.[1,2] In addition, hCG biomarker also reported to diagnose HIV/AIDS, rheumatoid arthritis, breast cancer, prostate cancer and Alzheimer's disease.[3] Herein, conjugated conducting polymer based impedimetric aptasensor has been developed to detect hCG from human urine samples. First, gold electrodes were coated with pyrrole, pyrrole-3-carboxylic acid [(Ppy)-(Ppy-COOH)] copolymer by cyclic voltammetry. Then, bHCG specific peptide aptamer was covalently linked onto the surface. The sensor was electrochemically characterized in order to confirm modification steps by cyclic voltammetry, electrochemical impedance spectroscopy, and chronoamperometry. The sensor was also characterized by scanning electron microscopy, atomic force microscopy, Fourier transform infrared spectroscopy, and contact angle measurements. The analytical performance of the sensor was evaluated in the concentration range from 1 μg/mL to 100 μg/mL. The sensor successfully detected bHCG even in the presence of interference agents. The results have also revealed that the sensor was a good, and easy to prepare alternative to other clinical methods.

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L-Asparaginase: Production and Applications in Pharmaceuticals and the Food Industries

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L-asparaginase is an enzyme with considerable commercial significance and can be sourced from various organisms such as animals, plants, and microorganisms. It plays a vital role in the pharmaceutical and food industries. For example, L-asparaginase has a long history of successful use, especially when combined with other medications for chemotherapy in treating acute lymphoblastic leukemia. The pharmaceutical industry predominantly manufactures L-asparaginase through biotechnological processes using specific bacterial strains. However, its bacterial origin often leads to various side effects and allergic reactions. Recently, there has been a growing focus on producing asparaginase enzymes from fungi. Enzymes derived from fungi are believed to be more compatible with the human body due to post-translational modifications, resulting in reduced allergic reactions and side effects. In recent years, the significance of utilizing fungi for asparaginase enzyme production has gained momentum. This is primarily fueled by the pharmaceutical sector's efforts to minimize side effects associated with bacterial-derived asparaginase. Additionally, the food industry favors eukaryotic sources like fungi for asparaginase due to their alignment with human consumption standards. In this study, an analysis was conducted on the existing research in the literature regarding the production and applications of the L-asparaginase enzyme. The study's findings offer valuable insights into recommended production methods and enzyme optimization tailored to specific application areas.

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Bioinks from Decellularized Tissues: Expertise of bteLAB

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Decellularization, or the removal of cellular components from tissues while retaining the extracellular matrix (ECM), has emerged as a viable regenerative medicine approach. This acellular matrix functions as a natural scaffold for cell adhesion, proliferation, and differentiation. Moreover, the novel use of decellularized animal tissues as a source of bioinks for 3D bioprinting, emphasizes its potential to transform tissue engineering and regenerative medicine. Bioinks are essential in 3D bioprinting because they provide structural support as well as signaling signals to the encapsulated cells. Traditional bioinks are either manufactured or derived from natural polymers, but they do not have the complexity and uniqueness of the original tissue milieu. Decellularized animal tissues, on the other hand, can provide a biomimetic bioink solution that is similar to the target tissue, promoting enhanced cell behavior and tissue regeneration.

In a typical procedure carried out at bteLAB, relevant animal tissues, such as skin, tendon, etc. (source: bovine, rat, etc), are obtained and subjected to a comprehensive decellularization that involves chemical, physical, and enzymatic methods. After decellularization, the tissues are lyophilized to obtain a powdered form. Concurrently, the dECM bioink was prepared in neutral condition and well-mixed with the desired cells, resulting in the formation of a hydrogel. This bioink is then 3D printed into the desired size and shape. Alternatively, powdered dECM samples are subsequently modified using methacrylic anhydride and crosslinked with a photoinitiator at a wavelength of 365nm. The resulting bioinks may undergo thorough chemical and physical characterization, including NMR, FTIR, as well as rheology analysis.

In conclusion, the decellularization of animal tissues and the generation of bioinks from these materials represent a groundbreaking approach in the field of regenerative medicine. Researchers seek to design bioinks that closely imitate real tissues by exploiting the intrinsic intricacy of ECM, increasing the capabilities of 3D bioprinting and opening the road for the generation of functioning, patient-specific tissues and organs. This novel method has the potential to change the face of regenerative medicine, giving patients in need of life-saving therapies and transplants hope.

Decellularized Cabbage and The Material Characterization

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The objective of this study was to explore decellularization of cabbage leaves and assess their suitability for tissue engineering applications, accompanied by a detailed characterization of the resulting acellular plant matrix. We employed a decellularization process utilizing sodium dodecyl sulfate (SDS) as a chemical detergent to effectively remove cellular components from cabbage leaves. Subsequently, a comprehensive suite of analytical methods was employed to evaluate key properties, including DNA content, biodegradation behavior, contact angle, swelling characteristics, and microscopic structure through scanning electron microscopy (SEM).

Our findings establish the successful decellularization of cabbage leaves, as evidenced by a substantial reduction in DNA content, achieving a reduction of approximately 76%. Biodegradation experiments were conducted in both native and decellularized samples, both immersed in phosphate-buffered saline (PBS) and cellulase solutions. These experiments revealed consistent mass loss trends in both sample types, with particularly intriguing observations of enhanced resilience in the decellularized matrices during later stages of degradation. Contact angle measurements indicated improved wettability in the decellularized samples, suggesting their potential for enhanced fluid interactions. Swelling tests yielded diverse outcomes, with some samples displaying increased mass while others exhibited mass reduction.

The implications of this study are significant, offering a promising avenue for the application of decellularized cabbage leaf matrices in tissue engineering. Our research encourages further exploration and dedicated investigations into plant-based matrices like decellularized cabbage leaves within the broader field of tissue engineering. While our study provides a strong foundation, future research should encompass in-depth assessments of how cells interact with the decellularized cabbage leaf matrix. In vitro studies will elucidate vital aspects such as cell adhesion, proliferation, and differentiation on this novel substrate. These insights will be instrumental in unlocking the full potential of decellularized cabbage leaves for tissue regeneration and cell production.

Investigation of the Relationship between the Chemical Structures and the Cytotoxicity of Some Maleic Anhydride-Containing Copolymers as Polymeric Drug Carriers

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Polymer-based substances have been an important biomaterial in the advancement of drug delivery systems as they enabled the controlled release of therapeutic agents in fixed doses with high bioavailability, lower toxicity, and higher pharmaceutical efficacy. This study aimed to find out whether there is a relationship between cytotoxicity and the chemical structure of the copolymers that act as carriers in many copolymer-drug conjugates by carrying out their characterization using spectroscopy and morphology-elucidated techniques described in our previous studies. Selected maleic anhydride, including polymeric carriers such as poly(maleic anhydride-*co*-methyl methacrylate) (MAMMA), poly(maleic anhydride-*alt*-vinyl acetate) (MAVA), and poly(maleic anhydride-*alt*-allylphenyl ether (MAAPE) were synthesized via a charge transfer complex (CTC) produced by a radical chain copolymerization reaction.[1,2,3] In addition, the commercial form of poly(4-styrenesulfonic acid-*co*-maleic acid) (PSSMA) was purchased. The cytotoxic effects of all samples were examined using MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) analysis for L929 (fibroblast cell), MDA (breast cancer), MCF7 (breast cancer), and C6 cell lines (glial tumor) were examined in vitro by comparison with cisplatin (reference compound). The Annexin V binding assay was also studied for all copolymers. When compared with cisplatin, which is actively used in the clinic for cancer therapy, PSSMA was found to have a cytotoxic effect on C6 cells, although not as strong as cisplatin, but the most effective copolymer was MAMMA due to its low IC50 value. In summary, the pharmaceutical agents delivered with these carriers could represent a promising and effective therapeutic modality for glioblastoma.

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Partial Purification of Glutathione Reductase Enzyme from Gill Tissue of Bonito *(Sarda sarda)* Fish and Examination of Its Inhibition Kinetics

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Glutathione (GSH), a natural reducing molecule, can be readily used by cells to protect themselves against oxidative stress. This protective effect against ROS is achieved by interacting with enzymes such as glutathione peroxidase and glutathione reductase.[1] Glutathione reductase (EC 1.8.1.7; GR), an important enzyme in glutathione metabolism, is important for maintaining the reduced form of glutathione, which is strongly nucleophilic for many reactive electrophiles.[2,3] Reduced glutathione (GSH), which has an important role especially in the liver, has an important effect on drug detoxification and hydrogen peroxides removal reactions. Pollution in the seas accumulates mainly in marine organisms. Pesticides that reach the marine environment through various transport mechanisms are diluted and spread by processes such as currents and waves. As a result, pesticides accumulated in aquatic ecosystems can cause toxic effects and accumulation on human health. In this study, glutathione reductase enzyme from bonito *(Sarda sarda)* fish gill tissue was subjected to partial purification and some characteristic features were examined. The purification process consisted of three stages; homogenate preparation, ammonium sulfate precipitation and dialysis. As a result of the study, the optimization results of the GR enzyme obtained from bonito fish gill tissue were determined as 200 mM KH_2PO_4 (Ph: 6.5), and the optimum substrate amount was determined as 2 mM NADPH. The results of the inhibition effects of atrazine, oxamyl and simazine pesticides on the GR enzyme were determined as 64.5 µM, 56.43 µM and 53.45 µM, respectively.

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Purification of Glutathione Reductase Enzyme from Whiting Fish Liver and Examination of Inhibition Kinetics

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Antioxidants are the most important weapon of the human body to eliminate the oxidative stress that can be created by free radicals.[1] Glutathione (GSH) is of great importance as an antioxidant molecule in the structural and functional preservation of the integrity of cell, tissue and organ systems.[2] Glutathione metabolism is an important element of the antioxidant defense system. The basic element of the system, reduced glutathione, is a reducing agent against oxidative formations. The glutathione reductase enzyme, which functions in this system, is the key enzyme that plays a role in maintaining the reduced glutathione (GSH)/oxidized glutathione (GSSG) ratio.[3] Pollution in the seas basically accumulates in marine organisms. The most important of these pollutions are heavy metals and pesticides. Heavy metal and pesticide residues found in aquatic ecosystems can pass into food and cause toxic effects and accumulation on human health. In this study, glutathione reductase enzyme was partially purified from whiting fish *(Merlangius euxmus)* liver tissue. The purification process consisted of three stages; homogenate preparation, ammonium sulfate precipitation and dialysis. As a result of the study, the optimization results of the GR enzyme obtained from whiting fish liver tissue were determined as pH: 6.5 in 100 mM KH_2PO_4 buffer and the optimum substrate amount as 2 mM NADPH. The results of the inhibition effects of Cd^{+2} heavy metal and oxamyl pesticide on the GR enzyme were determined as 172.4 µM and 50.51 µM, respectively.

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Comparison of Pesticide Loads and Degradation Potentials of *Punica granatum L.* Samples Collected from Two Different Regions in the South Aegean

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In parallel with global industrial activities, the agricultural industry is developing rapidly every year. Within the scope of these activities, quality products, high yields and different product varieties constitute the focus of production. In this regard, the use of pesticides, which are indispensable tools in the fight against diseases, weeds and pests in agricultural activities, is gradually increasing.[1] In applications, 94% to 99.9% of chemicals reach non-target organisms, soil, water and other ecosystems as chemical pollutants due to reasons such as runoff, leaching and drift.[2] Detection and monitoring of the pesticide load accumulated in the ecosystem is also important for a sustainable environment and safe food production.

In this study, samples of *Punica granatum L.*, which has a significant share in Turkey's agricultural product exports, obtained from production areas on the border of two different provinces in the south of the Aegean Region, were analyzed by QuEChERS extraction followed by LC-MS/MS and GC-MS/MS.[3] As a result of the analyses, pesticide residues, mainly insecticide and fungicide, were detected. While insecticides were the most frequently detected type of pesticides in the samples taken from Ortaca district of Muğla province, fungicides were the most frequently detected type of pesticides in the samples taken from Selçuk district of İzmir province. The average pesticide load in 23 samples analyzed in Ortaca region was 0.291 $mgkg^{-}$, while the average load in 37 samples collected from Selçuk district was 0.185 $mgkg^{-}$. In addition, photocatalytic and biological degradation potentials of the pesticide loads detected in the study were evaluated.

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Determination of Pesticide Residue Levels in *Citrus limon L.* Samples by Tandem Mass Spectrometry Multiple Reaction Monitoring (MRM) Method

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Pesticides have always played a major role in modern agricultural practices. The identification and monitoring of residues in the final product, increases its importance in terms of environmental health and food safety.[1] *Citrus limon L.* is a fruit that grows in certain regions due to the climatic conditions it needs and is transported to the rest of the world through trade routes.[2] Particularly in international trade, compliance with certain criteria is required for pesticide residue levels, but flexible spanning can be applied for some parameters in these criteria.[3] For this reason, even if the final product is considered suitable for trade, it may have a certain level of residue charge. Therefore, knowing residue levels is an important resource for raising awareness in terms of safe food consumption.

In this study, the determination of 572 different pesticides extracted from 39 *Citrus limon L.* samples collected from randomly selected gardens in Ortaca district of Muğla province using the QuEChERS® method was analyzed by LC-MS/MS and GC-MS/MS.[4] At least 2 different ion transitions were determined for each compound in the methods where MRM mode was applied for analysis. Recovery studies were carried out with the matrix with high acid and water content used for method validation and the recovery percentages obtained for 572 pesticides were found between 72% and 113%. In 39 samples analyzed in this study, 17 different pesticides were identified 167 times. The concentrations of these pesticide residues range from 0.010 $mgkg^{-}$ to 0,424 $mgkg^{-}$ in addition total accumulation was determined as 14.2 $mgkg^{-}$ and average was 0.085 $mgkg^{-}$.

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Investigation of Hydrophobicity and Microbial Activity of Boron Containing Nano Coatings

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In recent years, the interest in functional nano coatings is steadily increasing due to their tremendous potential applications in many sectors including healthcare, defense, biotechnology, and others. Different methods can be used to produce functional coatings such as Plasma enhanced chemical vapor deposition (PECVD) on different application surfaces. PECVD is a solvent-free deposition technique which can yield conformal coatings around complex-geometry substrates at high deposition rates.Boron-containing materials have many attributes that attract attention from researchers such as thermal delay effect, antibacterial effect, antiviral effect, and high hydrophobicity.[1,2]

In this study, boron-containing nano coatings were deposited on different surfaces, tissue paper and polymethyl methacrylate substrates, by using PECVD method and antifungal, antibacterial, and hydrophobic properties of the coatings were examined. The structural analyzes of the monomer and coatings were carried out by Fourier Transform Infrared (FTIR) and Nuclear Magnetic Resonance (NMR) Spectroscopy

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Investigation of DNA Binding Properties and Antidiabetic Effect of a New Water-Soluble Nonperipheral Zn(II) Phthalocyanine Complex and *In Silico* Computational Studies

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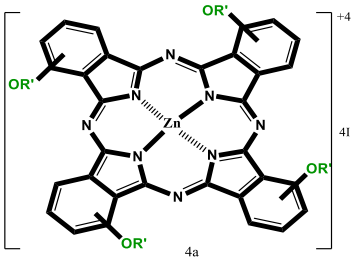
The interaction/reaction of metal complexes with DNA and proteins is one of the important fields of study for the development of new molecules in biotechnology and medicine. In this study, the interaction of the newly synthesized and characterized, water-soluble non-peripheral Zn(II) phthalocyanine complex with DNA was examined both *in vitro* studies including spectroscopic and electrophoretic methods and *in silico* studies including molecular docking and ADMET analyses. Additionally, the effect of complex on α-amylase and α -glucosidase activity was investigated spectrophotometrically.

The results showed that the compound interacted with DNA, probably in the form of external electrostatic interactions, and had effective nuclease activity. It was also seen that the complex inhibited both α-glucosidase and α-amylase. The inhibition types of the molecule were determined as noncompetitive for α-glucosidase and as competitive for α-amylase. The results support that molecule may be a suitable agent for cleavage of DNA and may have antidiabetic potential.



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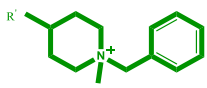

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Cyclodextrin and Halloysite Based Nanosponges for Enhanced Drug Carrier

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Cancer is one of the most challenging diseases in human history with its increasing death rates and people with this disease have to fight clinical treatments with many negative side effects such as surgery, chemotherapy and radiotherapy.[1,2] Therefore, the search for innovative and bio-safe treatments to make anti-cancer therapy most effective is seen as an emergency.[3] The development of new colloidal carriers called nanosponges has the potential to solve these problems. Nanosponges play a vital role in targeting drug delivery in a controlled manner. Many drugs, such as both lipophilic and hydrophilic drugs, can be loaded into nanosponges to target drug delivery. Hydroxyurea, which is currently used as a cancer chemotherapeutic agent, is a simple organic compound. Hydroxyurea is used as a combination therapy in the treatment of malignant melanoma, head and neck cancers, and brain tumors. In addition to its beneficial effects when used as an anticancer drug; There are also serious dangerous side effects such as nausea, vomiting, abdominal pain, skin peeling or color changes, flu-like symptoms, hair loss, rash, headache.[4] In this study, various nanosponges based on β-cyclodextrin (β-CD) containing halloysite will be obtained and the drug is encapsulated in these nanosponges. In this direction, it is possible to carry out passive transport of hydroxyurea in the body by eliminating the negative effects as much as possible and increasing only the positive effects of the drug. Structure-property characterization of prepared cyclodextrin-based and hydroxyurea conjugated HNT-CD nanosponges were enlightened by Fourier Transform Infrared (FTIR) and Nuclear Magnetic Resonance (NMR) spectroscopic methods. Morphology of nanosponges were followed by Scanning Electron Microscopy (SEM).

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Enhancing Micropropagation and Secondary Metabolite Production in *Lavandula Dentata* for Therapeutic and Cosmetic Applications

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The plant *Lavandula dentata* is widely known for its phenolic compounds which have great promise for both therapeutic and cosmetic uses. In order to optimize the production of biomass and accumulation of secondary metabolites in *Lavandula dentata plants*, our research aims to increase our understanding of its *in vitro* propagation procedures. We carefully examined how different medium compositions affected important factors including germination, plant development, shoot induction, and callus formation. In addition, we performed a thorough phenolic compound extraction technique on *in vitro* shoots and wild *Lavandula dentata* plants. The total phenolic content of these various extracts was then evaluated. According to our research, the medium supplemented with 0.25 mg/L of BA and 0.5 mg/L of GA3 produced the highest number of axillary buds and nodes among all the evaluated hormone treatments. This hormone treatment raised axillary buds and nodes by 145.45% and 170.27%, respectively, compared to the control.

These findings bring up new opportunities for possible medicinal and cosmetic applications by shedding information on the optimization of *Lavandula dentata* micropropagation and secondary metabolite synthesis.

Glioblastoma-Blood-Brain-Barrier-on-a-Chip

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Glioblastoma (GBM) is a highly malignant primary central nervous system (CNS) tumor that originates from astrocytic glial cells.[1] GBM is characterized by its aggressive proliferation rate, which leads to angiogenesis and the growth of a solid tumor.[2] Despite being rarely metastatic, GBM has a poor prognosis and significantly reduces survival rates in a short period of time. Common genetic abnormalities associated with cell signaling transduction pathways in GBM limit treatment options.[3] However, some therapeutics have shown promising results by targeting key factors in these signaling pathways, such as vascular endothelial growth factor receptor (VEGFR), platelet-derived growth factor receptor (PDGFR), and mammalian target of rapamycin (mTOR).[4] Unfortunately, the success of these agents is often hindered by the blood-brain barrier (BBB), which acts as a protective barrier against toxins and pathogens from the periphery.[5]

To overcome the challenges in GBM treatment, we are developing a physiologically relevant human cell-based *in vitro* model for GBM, which incorporates a BBB component to explore novel drug delivery approaches to the brain in disease conditions. Our model utilizes both transwell models and in house made 2-channel organ chip (organ-on-a-chip) devices that we have developed to recreate an *in vivo*-like mechanobiological environment for cell culture. In our 2-channel microfluidic chips, we employ induced pluripotent stem cell (iPSC)-derived brain-like endothelial cells, obtained using a new version of developmentally inspired differentiation protocol, to achieve high barrier function and morphology.[6] These cells are seeded in the top channel to mimic the brain vasculature. Additionally, we use primary human astrocytes and pericytes, along with U87 cells, in the bottom channel to simulate the brain's side.

In this study, we present the characterization of our model through cell-specific immunostainings in both static and dynamic coculture environments to observe cellular interactions and overall health. We also perform transendothelial electrical resistance (TEER) measurements and apparent permeability assays to quantify barrier integrity under both healthy and GBM conditions.

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Investigating Interactions Between Exosome and Polymeric Matrix: An *in Silico* Study

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Cancers kill millions of people, especially in developing countries, and to curb this disease, more effective steps can start at earlier stages along with an effective treatment.[1,2,3] The recent studies present that exosomes have pivotal potential to function as a biomarker, and they can be employed for noninvasive early cancer detection and evaluation of treatment effect.[4] Briefly, exosomes are formed of a double lipid layer, and CD63 is one of tetraspanin surface proteins.[5] In this study, through molecular docking calculation and molecular dynamics (MD) simulations, we have designed an *in silico* modelling to delve the interactions between CD63 protein on the exosomal membrane and a polymeric matrix, containing single polymers (i.e., methacrylic acid (MA) and 2-hydroxyethyl methacrylate (HEMA) monomers) and co-polymers (i.e., MA-HEMA). Our results show that the ligands fully interact with protein and these interactions are not hindering the structures of protein notably. Particularly, a notable affinity was observed between the ligands and CD63, and MA-HEMA dimer showed the greatest affinity among the other counterparts. Predicting the behavior of biomolecules through the computational methods can be cost-effective; thereby, allowing to enhance sensitivity, accuracy and specificity in developing exosome-based biosensors.[6]

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Design of Micro/Nano-Patterned and Conductive PCL/PLGA Scaffolds for the Oriented Growth of Motor Neurons

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Motor neurons (efferent neurons) in the central nervous system (CNS) carry information to muscles and other peripheral organs. Various neurodegenerative diseases may occur as a result of damage to motor neurons. Recent advances in nanoscience and neural tissue engineering area have opened new avenues for SCI treatment.[1] Polycaprolactone (PCL) and poly-lactic-glycolic acid (PLGA) are highly biocompatible, biodegradable, and FDA-approved biopolymers, and they have been frequently preferred in the field of tissue engineering due to their superior mechanical properties. Gold nanoparticles (AuNPs) have been investigated for a wide spectrum of biomedical applications, due to their unique chemical, optical and physical properties.[2]

In this study, we aimed to develop channeled PCL/PLGA hybrid film scaffolds, modify their surfaces by IKVAV pentapeptide/AuNPs or polypyrrole (PPy) and investigate the behavior of motor neurons on the designed scaffold surfaces *in vitro* under static/bioreactor conditions. PCL/PLGA films (10:1 ratio) with three various groove widths (500 nm, 1µm and 5µm) were fabricated using silicon wafer molds which were prepared by e-beam lithography technique. Also, PPy (1%, v/v) and Au-sputter coatings were applied on the scaffolds as alternative surface conductivity designs. In addition, poly-D-lysine (PDL, 10%, v/v) and pentapeptide-IKVAV (0.2 mg/mL) surface modification were performed for neural cellular studies. The motor neurons were cultured on the smooth (S) and micro/nano-grooved (G) scaffolds for 72 hours under static and bioreactor conditions. The developed materials did not show any toxic effects on the neural cells, except for PPy modified scaffolds. The group with a groove width of 1 µm gave the most suitable results in terms of axonal guidance. Moreover, the AuNPs surface modification highly promoted axonal orientation under bioreactor conditions. The developed biocompatible, biodegradable, nano-conductive and mechanically strong PCL/PLGA film scaffold with micro/nano-grooved topography was evaluated as a good implant material candidate for the treatment of nerve damages.

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Synthesis and Characterization of Quercetin Modified Gold Nanoparticles

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Quercetin (3,3',4',5,7-pentahydroxyflavone) is an important bioflavonoid found abundantly in more than 20 plant materials. It has antioxidant, anti-inflammatory, anticancer and antibacterial properties. There are main difficulties in the clinical use of quercetin due to its hydrophobic structure, instability, poor oral bioavailability, and limited blood-brain barrier (BBB) transition. Considering such disadvantages of quercetin, its synergistic use in complex with micro/nano structures can overcome these problems.[1,2] Gold nanomaterials are biocompatible, stable, and highly popular metallic nanomaterials that can be easily synthesized in various shapes and sizes. Due to their unique physicochemical properties, gold nanoparticles are preferred in many fields such as medicine, electronics, biomedical engineering, electronics, pharmacy, and chemistry.[3]

The aim of this study, the synthesis and characterization of various gold nanoparticles functionalized with quercetin and polyethyleneimine (PEI) for potential biomedical applications. Highly monodisperse gold nanoparticles with two different sizes ($AuNP_{20}$ and $AuNP_{50}$) were synthesized and their surface modifications were successfully carried out. The gold nanoparticle size increased depending on the surface coatings. The changes in the surface plasmon resonance (SPR) peak wavelength in the AuNP groups occurred depending on the surface functionalization. Quercetin and PEI surface coatings of the particles were also confirmed by Fourier-transform infrared spectroscopy (FTIR). Scanning electron microscopy (SEM) characterizations of all the synthesized AuNP groups were performed. After PEI functionalization, there was a significant positive increase in the zeta potentials. On the other hand, the zeta potential values remained negative after quercetin modifications. It was concluded that the synthesized nanoparticles can be used as a potential nanotherapeutic agent for various *in vitro/in vivo* nanomedicine applications (such as antibacterial, anticancer, anti-inflammatory, antioxidant studies).

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Development of Liposomal Juglone Formulation and Determination of its Antibacterial Activity

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Juglone is a bioactive substance with allelochemical properties secreted from walnut trees. Many studies in the literature show that it has antimicrobial, antioxidant, and anticancer properties. However, juglone's toxicity and low solubility make its free use difficult. For this purpose, studies are being carried out to reduce the toxicity of juglone, increase its bioavailability and improve its solubility.[1] Liposomes, one of the current drug carrier particles, are an important system for transporting both hydrophilic and hydrophobic molecules. The use of cyclodextrins to improve the efficiency of liposomal formulations is also an exciting field of study.[2] Therefore, using these systems as biopesticides in agriculture has many advantages.

In light of this information, in this study, inclusion complexes of juglone with β-cyclodextrin were formed and encapsulated into liposomes. For this purpose, juglone dissolved in DMSO was combined with β-cyclodextrin in an aqueous phase under certain conditions. These inclusion complexes were then mixed with the prepared liposomes, and encapsulation was achieved. The encapsulation efficiency of this formulation was measured by indirect method in UV spectroscopy, and chemical group analysis was determined by FTIR spectrophotometry. Kirby-Bauer disk diffusion test was carried out against the tomato pathogens *Clavibacter michiganensis subsp. michiganensis*, *Pseudomonas syringae pv. tomato* and *Xanthomonas euvesicatoria* for antibacterial activity. According to the results obtained, the formulation prepared with juglone, β-cyclodextrin and liposome has an antibacterial effect on the tested bacterial strains.

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Step by Step Coimmobilization of Lipases with Very Different Stability Using Heterofunctional Octyl Agarose Beads: Reuse of the Most Stable Immobilized Lipase to Build a New Combilipase After the Least Stable Lipase Inactivation

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While enzyme coimmobilization is increasingly popular, some related problems are usually ignored. One of these problems is the possibility of very dissimilar enzyme stabilities, that using standard coimmobilization protocols can promote that one immobilized enzyme must be discarded even retaining the full initial activity.[1]

In this communication, we show the use of octyl-.glyoxyl agarose as a support that permits the step by step coimmobilization of enzymes, enabling the reuse of the most stable immobilized enzymes, which will be covalently immobilized, when the least stable enzymes become inactivated. The least stable enzymes are immobilized after the reduction of the support, avoiding the promotion of covalent bonds and enabling its release by incubation in a detergent solution. The full elimination of the detergent from the biocatalyst is one of the problems of this strategy.[2,3,4,5,6]

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Use of Vinyl Sulfone Activated Supports for the Step by Step Coimmobilization of Enzymes Following Different Events. Reutilization of the Most Stable and Covalently Immobilized Enzyme to Build New Combienzymes

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Vinyl sulfone is a support recently described as very adequate for the immobilization/stabilization of enzymes via multipoint covalent attachment.[1] The support requires a last reaction end point, and this step is usually considered as a further complexity in its utilization. However, this step also provides a last opportunity of tuning the enzyme features and also open the possibility of transforming the support in a ion exchanger. This way, it is possible to immobilize/stabilize enzymes susceptible of being stabilized by this multipoint covalent strategy, and coimmobilize on the support less stable enzymes only via ion exchange. After its inactivation, they can be released and the covalently immobilized/stabilized enzyme can be reused to build a new combienzyme. We will exemplify this strategy with different enzymes partners, some that cannot be covalently immobilized on this support, some enzymes that resulted highly benefited from this immobilization protocol.[2,3,4.5]

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Purification of Lactoperoxidase Enzyme from Different Sources By Hydroxamic Acid Based Affinity Chromatography

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Lactoperoxidase (LPO), a member of the peroxidase family, is found mostly in exocrine glands such as mammary tissue, saliva, and tears of mammals, including humans, cattle, buffalo, goats, sheep, llamas, cows, camels, and mice.[1] LPO acts as a natural defense system component in milk. This system, known as the lactoperoxidase system (LPS), is formed between hydrogen peroxide and thiocyanate, but its full activity is achieved by the combination of three components (LPO-SCN-H2O2).[2]

The widespread use of LPO in food and chemistry fields and the aim of developing potential application areas of the enzyme have increased the interest in enzyme purification studies. It is known that hydroxamic acid molecules, whose inhibition effect on different enzymes has been determined in the literature[3], also inhibit metalloenzymes due to their chelating properties.[4] It has been determined by preliminary studies that it has a reversible inhibition effect on the LPO enzyme, which contains Fe^{2+} ions in its active sites. These results also revealed the ability of hydroxamic acid molecules to be affinity ligands. It is envisaged to achieve commercial purification efficiency by preparing a practical and long-term usable affinity gel with new ligands to be synthesized for the LPO enzyme. For this purpose; Hydroxamic acid derivative molecules were synthesized and their potential to be used as ligands in affinity chromatography was determined by examining the inhibition effect of these molecules on the LPO enzyme.

According to obtained results, the IC_{50} value and K_i value for 4-amino-3-methyl benzohydroxamic acid molecule were calculated as 0,022 µM and 0,008 µM, respectively. A new affinity gel were prepared with 4-amino-3-methyl benzohydroxamic acid that showing reversible-inhibition effect and LPO enzyme was isolated in a single step with 1924.40 fold and with a yield of 26.65% from bovine milk.

In conclusion, with this study, a method that can be used to purify the LPO enzyme with affinity chromatography technique in a single step, at a lower cost, and in high purity, without applying any different chromatographic techniques, has been introduced to the literature.

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A New Dithiolopyrrolone Antibiotic Derivative Induced by Adding Cystine to the Culture Medium of *Saccharothrix Algeriensis* NRRL B-24137

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Saccharothrix algeriensis NRRL B-24137 is an actinobacterium discovered in the Saharan soil of Algeria.[1] This microorganism possesses the ability to produce various derivatives of dithiolopyrrolone antibiotics conditional on the nature of the amino acides and organic acides added to the culture medium.[2] These antibiotics are recognized for their potent effects against both pathogenic microbes and cancer cells. Among this grpoup of antibiotics, holomycin, has already been isolated from several species of actinobacteria belonging to the genus *Streptomyces* or certain Gram-negative bacteria. In this study, holomycin was produced for the first time in the culture broth of a non-*Streptomyces* actinobacteria. This antibiotic was induced by adding 5 mM of L-cystine as precursor to the semi-synthetic (SSM) fermentation broth of *Sa. algeriensis* NRRL B-24137 and then fully identified after HPLC purification.

The analysis of the extract of the culture medium supplemented with cystine, by analytical HPLC on C18 column, showed the appearance of a new peak, named cyst1, different from that produced in the basal semi-synthectic medium. The maximal production of the new compound cyst1 was 0,21±0.02 mg/L, obtained after 4 days of fermentation. This new obtained molecule was purified by semi-preparative HPLC on C18 column. The UV-visible spectra of cyst1 showed three absorption maxima at 245, 300 and 384 nm. Through EI-MS analysis, cyst1 exhibited a mass unit of *m/z* 214 and 172 base peak, indicating an extra hydrogen in the heterocyclic ring as reported for other dithiolopyrrolones.[3] The 1H chemical shifts of the compound were as follows: 1H NMR (CD2Cl2, 500 MHz) *δ 8.03/7.93 (1H, br s, N–H), δ 6.83 (1H, s, H3), δ 2.14 (3H, s, CH3).* Based on the UV, MS and NMR results, the compound Cyst1 was identified as holomycin.

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Antibacterial Activity of MD14 Strain of *Streptomyces* Isolated from Algerian Soil

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Actinobacteria are filamentous bacteria that naturally inhabit soils.[1] They are of great importance in biotechnological process because of their ability to produce a large number of antibiotics and other bioactive secondary metabolites.[2,3] A strain of actinobacteria (Md14), isolated from Algerian soil in the Médéa region and belonging to the *Streptomyces* genus, was evaluated for its antagonistic potential against pathogenic bacteria using the agar cylinder method.[4] The antibacterial activity was significant against all tested bacteria, especially *Staphylococcus aureus*, *Listeria monocytogenes*, and *Escherichia coli*.

The kinetics of pH, growth and production of antibiotics by the Md14 strain of *Streptomyces*, were carried out on three liquid culture media, including Bennett medium (a complex medium containing glucose, peptone, and yeast extract), MSD medium (synthetic medium added with glucose), and MSGE medium (semi-synthetic medium supplemented with glucose and yeast extract). *S. aureus*, *L. monocytogenes*, and *E. coli* were used as target bacteria. The results showed that the growth of the Md14 strain of *Streptomyces* can be a classical growth with a single exponential phase (MSD medium), or a diauxic growth with two exponential phases and a stationary phase (Bennett medium), or even a cryptic growth (MSGE medium). Antibacterial activity was highest in the Bennett medium, reaching its peak on the 8th day of the kinetics. The bioactive molecules were extracted using four organic solvents of varying polarities (n-hexane, dichloromethane, ethyl acetate, and n-butanol), and the best solvent for extraction, ethyl acetate, was determined through antibiography. The results obtained indicate that the Md14 strain of *Streptomyces* produces hydrophobic bioactive molecules with highly significant antibacterial activity.

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Determination of the Antiaging and Antidiabetes Effects of *Astragalus Leporinus* Boiss. var. *Hirsutus* (Post) Chamberlain, *A. Distinctissimus* Eig and *A. Schizopterus* Boiss. Species, Three Endemic Species Growing in Anatolia

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Astragalus L. is the largest flowering genus of the Fabaceae family and is represented by approximately 3000 species in the world.[1,2] Species of the genus *Astragalus* are used in many areas. These areas can be listed as food, medicine, cosmetics and textiles.[2,3] This study aims to determine the antiaging and antidiabetes effects of *Astragalus leporinus*, *A. distinctissimus* and *A. schizopterus*, which are three endemic species in Anatolia. Antiaging effects with elastase and collagenase enzyme activities, and antidiabetic effects with α-glucosidase and α-amylase enzyme activities were determined. Some triterpene contents were determined by GC-MS. Ursolic acid (85855.50 µg/g extract) and oleanolic acid (49112.65 µg/g extract) were detected in the acetone extract of A. *schizopterus* species, and only oleanolic acid (2105.35 µg/g extract) was detected in the methanol extract of *A. schizopterus* species. α-amyrin (5465.94 µg/g extract), oleanolic acid (6088.85 µg/g extract) and ursolic acid (8952.53 µg/g extract) were detected in the acetone extract of *A. distinctissimus* species. In terms of antiaging, *A. leporinus* var. *hirsutus* methanol extract showed the highest activity in elastase and collagenase methods (respectively, % inhibition: 17.26±1.08 and 11.47±4.65, oleanolic acid: 37.47±1.32, epicatechin gallate: 69.22±1.32). When we evaluated it in terms of antidiabetic properties, it was determined that acetone extracts of A. schizopterus and *A. distinctissimus* species inhibited α-glucosidase at a higher level than acorbose at concentrations of 12.5 µg/mL, 50 µg/mL and 200 µg/mL. Additionally, it was found that both acetone and methanol extracts of the three studied species exhibited moderate inhibitory activity against the α-amylase enzyme. When the results are evaluated; It can be said that *A. schizopterus* and *A. differentissimus* species, which are rich in oleanolic and ursolic acids and used as animal feed, should be subject to more detailed studies in order to be used in the pharmaceutical industry due to their antidiabetic properties.

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Determination of Antiaging and Antidiabetes Effects of Four *Centaurea* L. Species from Anatolia

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Centaurea is the fourth largest genus of the *Asteraceae* family, with more than 600 species distributed worldwide, especially in Western Asia and the Mediterranean regions, and there are 179 native species in Turkey, 109 of which are endemic. This study aimed to determine the antiaging and antidiabetes effects of four *Centaurea* species from Anatolia. Some triterpene contents of *Centaurea lycopifolia*, *Centaurea balsamita*, *Centaurea depressa*, *Centaurea iberica* species were determined by GC-MS. α-amyrin (respectively, 4271.54; 2872.28 µg/g extract) was found in acetone extracts of *C. lycopifolia* and *C. balsamita* species. It was detected as α-amyrin (3564.05 µg/g extract) in the methanol extract of *C.balsamita* species. In terms of antiaging, elastase and collagenase methods; Acetone extracts of *C. lycopifolia*, *C. depressa* and *C. iberica* species showed moderate inhibitory activity against the elastase enzyme (respectively, % inhibition: 27.83±1.31, 14.09±1.31, 16.33±0.91, oleanolic acid: 37.47±1.32). It was determined that both acetone and methanol extracts of all studied species exhibited low level inhibitory activity against collagenase enzymes. When we evaluate it from an antidiabetic perspective; It was determined that the acetone extract of the *C. depressa* species showed high level inhibitory activity of the α-glucosidase enzyme at concentrations of 12.5, 50 and 200µg/mL (respectively, % inhibition: 29.03±18.49, 45.87±6.46, 84.81±19.22, acarbose: 1.23±0.03, 28.51±0.44, 64.37±1.80). Acetone and methanol extracts of *C. lycopifolia* species, methanol extracts of *C. depressa* species and acetone extracts of *C. Iberica* species were found to inhibit the α-glucosidase enzyme at a moderate level. It was observed that the methanol extract of *C. balsamita* species inhibited the α-glucosidase enzyme at a low level, while the acetone extract was inactive. It was observed that the methanol extract of *C. balsamita* species exhibited a high level of α-amylase inhibition activity (65.43±1.40, α-amylase: 67.18±2.73) at a concentration of 800 µg/mL. It was determined that *C. lycopifolia* acetone and methanol extract, *C. balsamita* acetone extract, *C. depressa* species both acetone and methanol extract, and *C.iberica* species acetone extract inhibited the α-amylase enzyme at a low level. As a result, considering the high activity levels of *C. depressa* against α-glucosidase inhibition and *C. balsamita* against α-amylase inhibition, it is thought that these two species will be pharmaceutically useful when evaluated in more detailed antidiabetic studies.

Evaluation of Antioxidant Potential of Some Schiff Base Metal Complexes

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Schiff bases are compounds containing an imine group with active electrons, prepared from the reaction of the carbonyl group of an aldehyde or ketone with an amine.[1] They have been observed to exhibit a multitude of applications in medicinal chemistry due to their pharmacological profiles.[2] These compounds, as well as their metal complexes, have been recognized for their extensive array of biological, physical, chemical, and agricultural uses.[3] In this research, firstly, an azomethine compound and its metal complexes were successfully synthesized, and various spectroscopic techniques were used to elucidate the structures of these synthesized compounds. Finally, the antioxidant abilities of synthesized complexes were evaluated and compared to standards, such as butylated hydroxyanisole, butylated hydroxytoluene, α-tocopherol, and Trolox.[4,5] While the Cd(II)-complex showed the best activity in the DPPH radical scavenging method, the Co(II)-complex exhibited in the ABTS radical scavenging method.

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Some Metal Complexes Containing Schiff Base: Synthesis and Bioactivity Study

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Schiff bases and their complexes are compounds of great versatility that are synthesized through the process of condensation between an amino compound and carbonyl compounds. These compounds showcase a wide spectrum of biological activities, encompassing antifungal, antibacterial, antimalarial, antiproliferative, anti-inflammatory, antiviral, and antipyretic properties.[1,2] In this study, novel synthesized (*E*)-2,4-dibromo-6-{[(2-hydroxyphenyl)imino]methyl}-3-methoxyphenol and its metal complexes were characterized using various spectroscopic techniques.[3] Additionally, *in vitro*, the inhibition potential of these agents against ChEs (AChE, acetylcholinesterase, and BChE, butyrylcholinesterase) was investigated.[4,5] They exhibited a highly potent inhibition effect against AChE and BChE with IC_{50} values in the range of 22.69 ± 0.63 to 51.96 ± 1.22 nM and 57.99 ± 0.83 to 159.70 ± 4.26 nM, respectively.

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Development of a Veterinary Health Product That Accelerates Wound Healing From Acellular Tissue-Based Biomaterials

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Animal-derived xenogeneic biomaterials used in the field of veterinary surgery are promising for various applications in tissue engineering. However, in order to use these tissues safely and to obtain a bioactive extracellular matrix (ECM) that can be transplanted, decellularization of the tissues is necessary. The scope of the study aimed to use acellular tissue-derived biomaterials in wound healing. Sheep small intestinal submucosa (SIS) contains bioactive factors that are preserved in its structure even after decellularization. These; glycosaminoglycans, proteoglycans, glycoproteins, fibronectins and various functional growth factors and play an important role in promoting cell adhesion, proliferation, differentiation, and tissue regeneration/repair.

The cytotoxic effect of decellularized SIS was examined by the MTT method according to ISO 10993-5:2009 standard. Following the cytotoxicity test results, three-dimensional antimicrobial wound dressing and SIS hydrogel were prepared and characterization tests were performed on both materials. As a result of the decellularization process, the presence of growth factors in the environment was proven by LC-MS-MS. Sterility, growth factor analysis, endotoxin (LAL test), cytotoxicity and antimicrobial tests were performed for both materials. In the light of the experimental results obtained, it was determined that both materials showed over 75% viability on 3T3 cells after a 24-hour application period.

As a result of the in-vivo study, it was determined that the hydrogel product was similar to the commercial product and was more effective and faster in the wound healing process. It was observed that it became fluid when it entered the body temperature and the application was easier. As a result of the in-vivo study, the wound size decreased to 1 mm at the end of the 7th day, proving that epithelialization occurs faster in the early period and has a positive effect on healing.

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A Smple and Rapid İmpedimetric Biosensor Modified with Magnetic İron Oxide Nanoparticles for the Detection of Cotinine

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Applications of nanomaterials to biosensors have recently gained a lot of attention owing to their high surface-to-volume ratio, high capacity for charge transfer, and strong adsorption ability. Among the various nanomaterials, magnetic nanoparticles have been utilized in different applications such as drug delivery, cell separation, biosensing systems, and enzymatic analyses.[1] Attachment of biological elements on magnetic nanoparticle surfaces is usually utilized because the magnetic behavior of these bioconjugates improves delivery and recovery of biomolecules for biomedical applications.[2]

In this study, a novel biosensor modified with iron-oxide nanoparticles was developed for the detection of cotinine. The fabrication process of the biosensor was composed of three steps: magnetic nanoparticle synthesis, modification of iron oxide nanoparticles with carboxyethyl-silanetriol, and anti-cotinine antibody immobilization. The properties of modified magnetic nanoparticles were studied by scanning electron microscopy, cyclic voltammogram, and electrochemical impedance spectroscopy. Under optimum conditions, the impedimetric responses were proportional to the cotinine concentrations in the range of 2-300 pg/mL. The detection limit was 606 fg/mL for cotinine. The biosensor exhibited good selectivity, suitable repeatability, and long storage stability. The sensor was suitable for the detection of cotinine amounts at low concentrations in human serum and saliva samples.

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Preparation and Characterization of Exosome Imprinted Cryogels

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Cryogels are supermacroporous gel matrices formed through cryogenic processes involving the freezing of solutions or colloidal dispersions of suitable precursors.[1] Molecularly imprinted cryogels offer high stability, low cost, and compatibility with the polymerization steps used in polymer technology, making them suitable for various practical applications. Additionally, these polymers are preferred due to their resistance to heat and pressure, physical durability, and high stability in environments such as acid-base solutions and organic solvents. They can be stored for several years without any changes in their performance.[2] Exosomes are vesicles that continuously facilitate the exchange of information between cancer cells. However, the lack of user-friendly, reliable, and reproducible platforms for exosome isolation and detection remains a prominent challenge in current research.[3]

This study aims to isolate exosomes with high selectivity and efficiency by imprinting them into cryogels using exosomes collected from microfluidic chips. The obtained cell-derived exosomes were characterized biologically, morphologically, and quantitatively using nanoparticle tracking analysis (NTA) and scanning electron microscopy (SEM). Then exosome-imprinted cryogels were prepared and characterized with various methods such as SEM, attenuated total reflection-Fourier transform infrared spectroscopy (ATR-FTIR), Brunauer–Emmett–Teller (BET) analysis, thermogravimetric analysis (TGA), X-ray photoelectron spectroscopy (XPS), and swelling test.

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α-Glucosidase Inhibition Potentials of Some New Pyrazoline Derivatives

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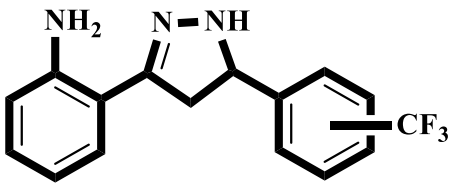
In today's world, many important diseases are being treated with enzyme inhibitors. One of them is Diabetes Mellitus (DM), which is characterized by chronic hyperglycemia. Hyperglycemia is a condition in which blood glucose levels remain high after eating and it is a very important factor to consider in the management of DM and its secondary complications such as diabetic retinopathy, neuropathy, and cardiovascular disease. Therefore, blood sugar must be kept within certain limits.[1] One way to control blood sugar is to use inhibitors of the α-amylase and α-glucosidase. However, these inhibitors can cause some unwanted side effects in the body. Therefore, researchers are working to discover new and alternative drugs that are clinically safer and have fewer side effects.[2]

In this study, the effect of three new pyrazoline derivatives on the activity of α-glucosidase was investigated.



Pz-1: 2-CF_3; Pz-2:3-CF_3; Pz-3: 4-CF_3

All of the three molecules inhibited the α-glucosidase, but the most effective was Pz-2 (IC_{50} = 2.17 µM). The inhibition type of the molecule was determined as noncompetitive. The results support that these pyrazoline molecules may have the potential to be used as antidiabetic agents.

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Recombinant Production and Characterization of ADP-Ribosyltransferase Enzyme

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American Foebrood (AFB) is a dangerous and fatal disease that threatens bee colonies.[1] The ADP-ribosyltransferase (ADP-RT) enzyme produced by Peanibacillus larvae catalyzes the transfer of ADP-ribose molecules to certain proteins within the cells of bee larvae, rendering the proteins of the larvae dysfunctional.[2] Thus, processes such as cell signaling, DNA repair and gene regulation are affected, causing the bees to lose their vital functions. In particular, the inactivation of proteins belonging to the immune system is one of the most important factors in the progression of AFB and the death of bee larvae.[3,4] This study addresses the recombinant production and characterization of this enzyme to better understand ADP-RT activity and mechanism. Our project aimed to develop an assay for measuring the activity of the expressed Art enzyme based on the remaining NAD levels. The ADP-RT enzyme was cloned and purified using synthetic gene. The purity of the resulting fraction was confirmed by SDS-PAGE and 95% purity was achieved. As a result of protein determination using the BCA method, the results showed that each milliliter of solution contained an average of 0.5 mg of enzyme. To measure the enzyme activity accurately and sensitively, the method we developed requires an additional enzymatic activity that can produce a detectable signal. In the study, it was utilized that the reaction provided a continuous absorbance at 340 nm when combined with glutamate dehydrogenase (GDH). In this way, the activity of the enzyme can be detected much faster and more accurately. In addition, GDH production was also carried out based on previous clones. The findings obtained will contribute to obtaining recombinant enzymes and developing an activity assay based on NAD detection. The results of this study made it possible to successfully obtain the recombinant ADP-RT enzyme and formed the basis for developing a diagnostic kit to test antibody levels in bee larvae in the future. In addition, more detailed research on inhibitors of the enzyme is important to initiate drug research against AFB.

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Chemical Analysis and Antioxidant Effect of Essential Oils Extracted from Two Algerian Teucrium Species: *T. Flavum* and *T. Polium*

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This study aimed to investigate the chemical composition and antioxidant properties of essential oils extracted from *Teucrium flavum* and *Teucrium polium* collected from the Babor mountains in Algeria. The essential oils obtained using the hydrodistillation method were analyzed using gas chromatography-flame ionization detector (GC-FID) and gas chromatography-mass spectrometry (GC-MS). In the essential oil of *T. flavum*, a total of fifty-five components were identified. Among its dominant constituents were germacrene D (18.0%), (Z)-γ-bisabolene (10.3%), β-caryophyllene (7.6%), α-pinene (6.7%), β-pinene (6.2%), α-humulene (5.8%), and limonene (5%). On the other hand, the essential oil extracted from *T. polium* comprised sixty-three components, with its major compounds being germacrene D (36.5%), β-pinene (11.8%), epi-α-cadinol (9%), and bicyclogermacrene (7.3%). Notably, sesquiterpene hydrocarbons constituted the predominant fraction in both oils. The antioxidant potential was assessed through *in-vitro* assays, including free radical scavenging against 1,1-diphenyl-2-picrylhydrazyl (DPPH) and the β-carotene–linoleic acid test. Both oils demonstrated moderate antioxidant activity, with the essential oil of *T. flavum* showing more pronounced effectiveness compared to that of *T. polium*.

Investigation of Shielding Properties of Conductive Cotton Composite Fabric Materials Against Electromagnetic Waves

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Electromagnetic waves are energy carriers formed by combining electric and magnetic fields. They rapidly propagate in space, can be of different frequencies and wavelengths, and change direction when they slow down or refract in another medium. It has been stated that the electromagnetic field causes side effects such as depression, stress disorder, headache, and insomnia in humans. In addition, when exposed to it for a long time, disorders such as heart diseases, brain tumors, and leukemia are frequently encountered.[1] Today, shielding methods have been developed to protect against the electromagnetic field created by the developing technology and these electronic devices that enter every aspect of life by reducing their interference and preventing the shortening of the life span of living beings and the lifespan of the devices. The materials for electromagnetic shielding are expected to be flexible, lightweight, low-cost, environmentally friendly, and should have high conductive and magnetic properties. These materials provide shielding by reflecting and absorbing electromagnetic waves.[2] In this study, one of the most widely used plant-based fibers, cotton fabric, was chosen as the main component to prepare a conductive and magnetic natural composite material. For this purpose, cotton fabrics were chemically and physically modified in two consecutive steps. In the first step, the conductive PAn/Cu/cotton composites were prepared by in situ oxidative polymerization of aniline in aqueous acidic media using ammonium persulfate (APS) oxidant and Cu(I) ions in the presence of cotton fabrics, resulting in the coating of both conductive polyaniline (PAn) and reduced Cu particles on the surfaces. This way, Cu(I) ions, and APS participated in the redox reaction, resulting in a homogeneous and dense deposition of Cu particles on cotton fabrics and conductive polyaniline. In the second step, the physical coating of individually synthesized magnetic Fe_3O_4 particles on PAn/Cu/cotton composites was also achieved. Electrical, structural, wettability, and morphological properties of the prepared conductive and magnetic composite fabrics were investigated by surface resistivity measurement, ATR-FTIR, contact angle measurement, and SEM techniques, respectively. Finally, the prepared composites' electromagnetic wave shielding properties (EMSE) were examined in the range of 15 MHz-3 GHz, and it was observed that the composite with the highest conductivity provided 60% absorption-based protection.

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Repurposing Biotech Waste: Production of Bioactive Peptides Through Histone Protein Isolation from Discarded Cells

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In recent years, the surge of interest in biotechnological studies across various sectors, from pharmaceuticals to the food industry, has intensified the significance of cell culture research.[1,2] As these studies expand in scale, the inevitable generation of substantial cell quantities has led to the discarding of a considerable number of cells through various methods.[3] Paradoxically, these discarded cells hold untapped potential as a reservoir of valuable biological resources, such as histone proteins, known for their richness in cationic amino acids which are the building block for bioactive peptides that have great therapeutic potential.[4] The study was designed to isolate histones from discarded waste cells which were characterized by SDS-PAGE. The histone proteins were subjected to enzymatic hydrolysis using Trypsin and Neutrase to produce hydrolysates-containing bioactive peptides. The hydrolysis process was optimized with regard to incubation time and enzyme substrate ratios (E/S) to achieve the maximum degree of hydrolysis (DH%). The resultant hydrolysates were fractionated using ultrafiltration, segregating them based on their molecular weights: those below <3 kDa and those between 3-10 kDa. These fractions were analyzed for potential biological activities, including antioxidant activity, DPP4 inhibition, and lipid peroxidation inhibition. The results showed that small fractions (<3 kDa) from both Trypsin and Neutrase digestion had higher biological activities than the bigger fractions (3-10 kDa), suggesting that small peptides are the ones with high therapeutic potential. These peptides demonstrated important levels of DPP-IV inhibition, antioxidant activities, and lipid peroxidation inhibition effect. In conclusion, this study embarks on a pioneering endeavor to tap into the wealth of discarded biotechnological cells, transforming them into a source of bioactive peptides with profound therapeutic potential. By addressing the challenges inherent in cell culture research and exploiting the inherent value of discarded cells, we chart a path towards sustainable biotechnological advancement with far-reaching implications for multiple industries.

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Utilizing *Lepidium Sativum L.* Extract as Biopesticides Against *Tetranychus Urticae* Koch for Effective Management of Food Crops

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The global agricultural landscape faces a significant threat from the two-spotted spider mite (*Tetranychus urticae* Koch), a common pest that jeopardizes vital food crops worldwide.[1] The conventional reliance on synthetic pesticides for pest management generally poses uncontrolled environmental risks. The quest for alternative, eco-friendly solutions has gained paramount importance.[2,3] In this study, we propose a practical and user-friendly biopesticide approach utilizing plant extract derived from *Lepidium sativum* against *T. urticae*. Employing a 30% ethanol extraction, we assessed the extract's toxicity, impact on egg-laying, and repellent properties using leaf discs. The biochemical analyses (total phenolic and flavonoid content) following GC-MS and LC-Q-TOF-MS/MS techniques were employed to comprehensively characterize the extract content. Our findings exhibit a remarkable dose- and time-dependent efficacy over a 96-hour period, with calculated LC_{50} values of 0.19 mg/mL *L. sativum.* To ensure the extracts' safety for plants, we evaluated its impact on tomato seeds, revealing no discernible toxicity to the host plant. The observed effects are attributed to the abundant presence of phenolics, flavonoids, terpenes, and alkaloids within plant, coupled with their inherent biological activities like antioxidation and free-radical scavenging.

This study makes a significant stride in advocating for the integration of plant extracts as potent biopesticides, poised to be seamlessly incorporated into upcoming pest management strategies.

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The Cytotoxic Effect of Green Walnut Husks on Melanoma Cancer Cells

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Skin cancer is one of the most common types of cancer in recent years. The drugs used in cancer treatments are expected to destroy cancer cells and also prevent metastasis by inhibiting cell migration[1]. Green walnut husk (GWHE), agricultural waste, is used for the treatment of skin diseases in traditional medicine, and has high antioxidant capacity[2,3]. This study aims to investigate the cytotoxic activity and inhibiting effects on the cell migration of GWHE on the SKMEL 30 melanoma cell line. GWHE extract was prepared with ethanol as solvent using the maceration method. The in vitro anticancer effect of GWHE extract on SKMEL 30 melanoma cells was investigated using MTT assay comparing with HACAT keratinocyte cell line. Its capacity to inhibit the cell migration using only SKMEL 30 melanoma cells was performed with scratch wound healing assay under the microscope. The cytotoxic activity of GWHE extract was determined as 66.54% for 48 h. Also, GWHE extract showed highly inhibition activity on the cell migration of the SKMEL 30 melanoma cell line

Total phenolic, flavonoid and tannin contents of the GWHE extract were determined to be 53.528 µg/mL as gallic acid equivalent, 128.964 µg/mL as rutin equivalent, and 158.388 µg/mg as tannic acid equivalent, respectively. DPPH radical scavenging activity of GWHE extract was determined using BHA (butylated hydroxyanisole) as a standard antioxidant compound, and the EC50 value was calculated to be 420 µg/mL. Also, the phenolic components of the GWHE extract were analyzed using LC/MS/MS. GWHE extract contained syringic acid, chlorogenic acid, gallic acid, 2-5-dihydroxybenzoic acid, salicylic acid, trans ferrulic acid, p-coumaric acid, abscisic acid, quercetin and naringenin. As a result, the phytochemicals of green walnut husk may be promising for the treatment of melanoma cancer with both their cytotoxic and cell migration inhibitory effects.

This study was supported by the TÜBAP 2023/34 project number as a student scientific research support project.

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Purification and Inhibition of Acetylcholinesterase from *Halyomorpha halys* (Stål) (Heteroptera: Pentatomidae)

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Halyomorpha halys (Stål) (Heteroptera: Pentatomidae) has brought about damage in agricultural districts throughout the eastern Black Sea coastline since 2017.[1] It continues to come to a threat because there are no adequate studies on managing this pest. One of the major rein strategies of insecticides is acetylcholinesterase (ACHE) inhibition. Therefore, this study aims to investigate an alternative way to struggle *H. halys* by inhibiting ACHE.

The ACHE was purified from *H. halys* using edrophonium-Sepharose 6B affinity chromatography and characterized by examining some kinetic properties. Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis and natural polyacrylamide gel electrophoresis determined the molecular weight of the purified enzyme. In addition, the inhibitory effects of tacrine and edrophonium chloride, and water extracts of olive leaf, walnut leaf and alder leaf on this ACHE were investigated. The ACHE was purified 403-fold with a yield of 83.3%. *H. halys* ACHE was found to have six subunits and a molecular weight of approximately 350 kDa. The K_m, V_{max}, and k_{cat} values of the ACHE were assigned to be 0.02±0.006 mM, 3,333.3±481 EU/mg protein, and 1070.2±184 min^{-1}, respectively. All inhibitors highly inhibited of activity of *H. halys* ACHE. IC_{50} values were appointed to be respectively 0.08±0.003 and 15.0±1.0 μM for ACHE of *H. halys* in inhibition studies with tacrine and edrophonium chloride. IC_{50} values were found to be 20.3±1.2 μg dry matter/mL with olive leaf aqueous extract, 108.0±40 μg dry matter/mL with walnut leaf aqueous extract, and 19.0±1.7 μg dry matter/mL with alder leaf aqueous extract. The natural extracts inhibited the ACHE very effectively. Especially, the fact that the water extracts of these plants are effective in ACHE inhibition is important for it to be environmentally amicable pesticides that may be used in the struggle with the pest.

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Label-Free Identification of Oxidative Stress through Exosomes Isolated from Stem Cells

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Mesenchymal stem cells (MSCs) have been used in treatment approaches for many years due to their self-renewal, differentiation capacity and proliferation ability. When studies conducted in recent years are examined, these treatments remain limited due to the difficulties in working with invasively obtained stem cells. The distinctive features of MSCs, such as their low immunogenic risk and rapid proliferation capacity, which are preferred in regenerative medicine, are associated with the exosomes they secrete. Exosomes, which have been the focus of attention in recent years, are extracellular vesicles secreted by all cells and surrounded by a double phospholipid layer that carries biomolecules such as DNA, RNA, proteins, and lipids. Various methods are used for the isolation and characterization of exosomes. In this study exosomes obtained from bone marrow derived stem cells (BM-MSC) were isolated by the precipitation method, which is cheaper and faster than current techniques. Biomolecules such as DNA, RNA, proteins, and lipids within exosomes under oxidative stress were identified by Raman Spectroscopy, which is a label-free molecular fingerprint.

When the peak changes in the Raman Spectroscopy of BM-MSCs exposed to oxidative stress were examined, it was observed that there was a significant increase in the peaks representing lipid, protein, polysaccharide, nucleic acid and C-H groups. When these results are examined, it shows that the molecular identification of stressed cells can be done in a label-free manner with the Raman Spectroscopy technique.

Synthesis and Characterization of Starch@Metal Oxide Bionanofilms for Immobilization of Lactoperoxidase

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Lactoperoxidases (LPO) are enzymes catalyze the oxidation of inorganic and organic substrates with hydrogen peroxide and have wide antimicrobial activity.[1,2] LPO is an enzyme important that plays a role in many biological processes and to have biocidal effects, serving as an active antibiotics and antiviral agent.Over recent years, LPO has become one of the most studied areas, due to this broad spectrum of biocidal activity, In this study; While ZnO and CuO NPs were synthesized with the precipitation method, MgO NPs were synthesized with the Taguchi method and then starch films were prepared. LPO enzyme was immobilized in the prepared films with two different methods both entrapment immobilization and surface adsorption. The immobilization of LPO enzyme to Starch and Starch@ (CuO, MgO, ZnO) films was successfully confirmed using Fourier transform infrared spectroscopy (FT-IR), XRD and field emission scanning electron microscopy (FE-SEM).

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Determination of Siderophores in Brucellosis Agents

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Brucellosis is a serious, contagious disease that affects many different mammalian species, including humans. It is reported that thousands of people are afflicted with this disease every year.[1] When Brucella strains are exposed to iron deprivation, they produce two catechol siderophores named 2,3-dihydroxybenzoic acid (2,3-DHBA) and 2,3-DHBA-based molecule brucebactin.[2] In the study, the presence of siderophores was investigated in Brucella species obtained as a result of isolation from samples taken from the placental cortex, bone marrow, liver and spleen for diagnosis before the controlled destruction of the aborted fetus. *Brucella abortus* and *B. melitensis* species were isolated from the blood of infected animals and cultured and their species were confirmed by Real-time PCR method. Siderophores synthesized by isolates grown under limited iron conditions were confirmed by thin layer chromatography and NMR analysis.

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Comparative Analysis of Lysis Buffers for Protein Extraction from Organ Chips

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Organ-on-a-chip technologies have revolutionized the cultivation of human cells within microfluidic chips, allowing us to replicate physiological conditions by applying mechanobiological forces. These systems are extensively used for complex modeling of functional units of organs in healthy and disease conditions. One of the many advantages of organ chip models is their allowance of sample collections for -omic analysis. In the concept of proteomic analysis, the commonly used RIPA lysis buffer has been the go-to choice for protein extraction from these microfluidic devices. However, concerns have arisen its adequacy for total protein extraction, as suggested by previous studies1,2. With this in mind, our study is dedicated to identifying the most efficient lysis buffer for protein extraction from the microfluidic organ chip models. Our objective is to ensure high-quality identifications and enable the successful collection of cells from the microfluidic chips.To achieve this, we initiated our study by seeding human umbilical vein endothelial cells (HUVECs) in custom-designed microfluidic chips. We subsequently harvested these cells using two different buffers: SDS buffer and RIPA buffer. Furthermore, following the initial protein extraction proteins the RIPA buffer, any remaining cell pellets underwent additional treatment with Urea buffer. The next step involved the digestion of proteins extracted with SDS, RIPA and RIPA+Urea buffers, followed by analysis of the resulting peptides using an untargeted label-free nLC-MS/MS approach. By conducting nLC-MS/MS analysis, we were able to identify and quantify the proteins extracted from each set of cells using various lysis buffers within the microfludic chips. SDS, RIPA, and RIPA+Urea buffers were compared in biostatistical and bioinformatic analyses to determine the most effective lysis buffer.The ultimate goal of our study is to establish an ideal protein extraction strategy that allows us to harvest cells from the limited volumes of microfluidic organ chip models in future experiments. This strategy will be determined based on protein yield and the identification of proteins, providing a solid foundation for future research.

We are grateful for the support of The Scientific and Technological Research Council of Turkey (TÜBİTAK; Project No: 122C088) and Sabanci University President Research Grant (Project No: F.A.CF-22-02456) in undertaking this study.

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An Investigation on Biological Activities of Jerusalem Artichoke Leaf

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Jerusalem artichoke (*Helianthus tuberosus* L.) from the Asteraceae family is cultivated as a valuable edible plant. Its tubers are rich in inulin which is among the most crucial raw materials for industrial production of fructose, used as a substrate to produce bioethanol[1] and as animal feed.[2] In the study, Jerusalem artichoke leaf extracts were obtained by both conventional extraction techniques using a shaking water bath (SWE) and modern techniques using ultrasound-assisted extraction (UAE) with ethanol solvent. The cytotoxic activity, in vitro wound healing effect and free radical scavenging activity of the extracts were investigated, and the total phenolic compounds and flavonoid contents were determined as gallic acid and quercetin equivalent, respectively. Also the phenolic compound quantification was determined by LC-MS/MS.

The cytotoxic effect of the extracts was determined by MTT assay on human melanoma cell line (SKMEL-30) and keratinocyte cell line (HACAT) both extracts showed cytotoxic effect on SKMEL-30 cells with increasing doses. In the invasion assay performed with HACAT cells, higher cell migration in the cells treated with UAE extract occurred than the control group. In the DPPH method, the extracts showed radical scavenging activity at high concentrations (500-1000 µg/mL) close to standard compound BHT. The major components of the extracts are chlorogenic acid, isorhamnetin, protocatechuic acid, abscisic acid, rutin and hesperidin.

This study was financially supported by Trakya University Scientific Research Fund (TUBAP-2022/227).

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Recombinant Thaumatin Production in *Pichia Pastoris* Using The *GAP* and *AOX1* Promoters

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P. pastoris, a methylotrophic yeast, is one of the most widely used host organisms in recombinant protein production in recent years. Studies conducted with *P. pastoris* in recent years aim to increase recombinant production and increase product productivity from the current level by using various methods and/or genetic modifications.[1]

Thaumatin, the sweetest substance known at the single molecule level, is a naturally occurring sweet protein isolated from the fruits of *Thaumatococcus daniellii* Benth, a tropical flowering plant native to West Africa.[2]

The aim of this study is to increase the production of thaumatin with *P. pastoris* to higher levels and increase product efficiency by using molecular methods.

E. coli XL1-Blue was used for cloning and *P.pastoris* GS115 strain was used for protein expression. Pre-THM, pre cTHM and mature-THM, mature-cTHM products obtained by PCR were obtained. The genes obtained by cutting with *EcoRI* and *XbaI* were ligated from the restriction sites (*EcoRI-XbaI*) to the pGAPZαA and pPICZαA vectors, which were cut with the same restriction enzymes. The resulting expression vectors were transformed into *P.pastoris* GS115 host cells by electroporation (Bio-rad electroporator) technique. Within the scope of the study, pre-THM and pre-cTHM thaumatin genes were visualized by X-Ray using the Western Blot technique using *GAP* and *AOX1* promoter clones.

Production levels of codon-optimized and non-codon-optimized Thaumatin proteins between the 72th and 240th hours were determined through *AOX1* promoter clones.

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Synthesis and Antimicrobial Activities Of New Donepezyl Derivative Thiotetrazole Compounds

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Adhesion is the first stage of microbial biofilm formation that can cause serious infections. Many strategies have been evolved against the biofilm of bacteria and fungi but failed due to these pathogens' ability to develop multidrug resistance. Therefore, it is necessary to find identified new chemically synthesized compounds against the biofilm as an alternative. One candidate could be donepezyl and thiotetrazole ring compounds, which are known to have antibacterial, antimycobacterial, and anticancer activities, are important members of the class of heterocyclic compounds. This study aims to synthesize new donepezil-like compounds containing thiotetrazole rings and investigate antimicrobial activities.[1]

This study consists of two steps. In the first step, substituted phenyl isothiocyanate compounds were converted into 5,6-dimethoxy-2-(1-substituted phenyl-5-thiotetrazole) indanone compounds.[2] The structures of the synthesized compounds were elucidated by spectroscopic methods such as 1H-NMR, ATR/13C-NMR, FT-IR, and HR-MS (Figure 1). In the second step of the study, the antimicrobial effects of the synthesized donepezil-like compounds were investigated.

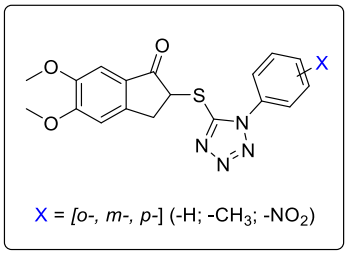

Figure 1. Molecular structure of 5,6-dimethoxy-2-(1-substituted phenyl-5-thiotetrazole) indanone compounds

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Synthesis, Characterization, and Anticancer Activities of New Phenothiazine Derivatives

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Cancer is a type of disease caused by the uncontrolled proliferation and growth of cells in any organ or tissue of the body. Cancer is named according to the tissue in which it occurs. There are more than 200 known types of cancer today. The most common and deadly types of cancer are lung, stomach, liver, colon, and breast. Contrary to popular belief, skin cancer is also common. Research has shown that almost one in five people will develop skin cancer at some point in their lives. With early detection, it is also possible to cure skin cancer completely. Compounds containing phenothiazine and the tetrazole ring are used to treat many diseases, including cancer. Many researchers have investigated their bioactivity by adding different groups to phenothiazine and tetrazole derivatives due to the bioactivity of the nitrogen atom.

In this study, new compounds containing phenothiazine and tetrazole with the same structure were synthesized. The structures of these compounds were confirmed by spectroscopic methods (^{1}H NMR, ATR/^{13}C NMR, FT-IR, and HR-MS). The cytotoxic activity of the new compounds (PCS-201-012) on dermal fibroblast cell lines was evaluated by MTT assay.

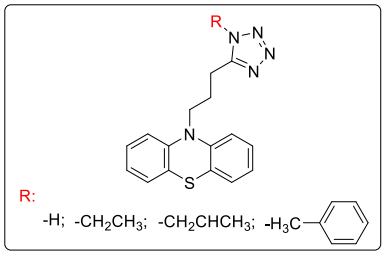

Figure 1. Molecular structures of synthesized 10-(3-(1-substituted-1*H*-tetrazol-5-yl)propyl)-10*H*-phenothiazine compounds

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Immobilization of Protease from *Bacillus* sp. on Magnetic Multi-Walled Carbon Nanotubes

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Proteases catalyze the cleavage of peptide bonds with the addition of water and have been found large application areas in industry.[1] However, poor stability and lack of reusability limit the industrial applications of free proteases.[2] Enzyme immobilization techniques were initially developed to surmount these shortcomings. Furthermore, enzyme immobilization allows ease of downstream processing, high product purity and yield, use in both batch and continuous systems, reduced production cost.[3] In this study, protease from *Bacillus* sp. was immobilized covalently on Fe_3O_4 and/or nickel oxide containing multi-walled carbon nanotubes (MWCNTs). The prepared immobilized proteases (Fe_3O_4/MWCNT@protease or NiO/MWCNT@protease) were characterized using FT-IR, SEM and VSM techniques. The optimum pH and temperature were determined to be 8.0 and 55 ^oC for all the free and immobilized protease preparations. After 24 h incubation time, the free protease protected 40% of its initial activity, while Fe_3O_4/MWCNT@protease and NiO/MWCNT@protease remained 88% and 92% of their initial activities, respectively. The half lives values were 12.9, 77.3 and 101 h for the free, Fe_3O_4/MWCNT@protease and NiO/MWCNT@protease preparations. After 10 reuses, both Fe_3O_4/MWCNT@protease and NiO/MWCNT@protease retained 88% of their initial activities.

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Characterization and Biocompatibility of Plant Oil-Based Polymer Nanocarriers for the Gene Delivery

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Gene delivery to cells is a key aspect of molecular biology and gene therapy. Various methods, like viral and nonviral vectors, facilitate this process. Viral vectors are effective but have drawbacks like low capacity, expensive production, immunogenicity, and genotoxicity. Nonviral vectors, including cationic liposomes, polymers, peptides, and natural compounds, offer advantages such as lower immunogenicity and toxicity, better cell specificity, modifiability, and higher productivity.[1]

In this study, novel polymer nanocarriers derived from renewable sources were developed for gene delivery into cells. Acrylated methyl ricinoleate monomer, synthesized from castor oil, and oleyl methacrylate, synthesized from olive oil were utilized as renewable and environmentally friendly raw materials. Plant oil-based monomers form the hydrophobic parts of the polymer nanocarrier, while polyethylene glycol methacrylate forms the hydrophilic parts. Scanning electron microscopy and Fourier-transform infrared spectroscopy techniques were used to characterize the physicochemical properties of the nanocarriers. Particle size distribution and Zeta potential were analyzed to determine particle size and surface characteristics of nanocarriers. Encapsulation efficiency of the nanocarriers was evaluated by agarose gel retardation assay and biocompatibility was assessed by MTT cell viability assay. The findings indicated that the polymer nanocarriers have positive surface charges and an average particle size of less than 200 nm. Cationic nanocarriers encapsulate the plasmid DNA with high efficiency and cell viability is higher than 90%. In the next stage of the study, the efficiency of biocompatible nanocarriers for gene delivery into cells will be examined by in vitro and in vivo studies.

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Use of Hydrocolloid Bioinks to Fabricate 3D Bioprinted Tumor Models

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Bioprinting enables the fabrication of 3D structures with designed shapes and required properties using hydrogel bioink. Bioinks affect the success of bioprinting and therefore the characteristics of the bioinks that will be utilized have a considerable impact on the construction of 3D bioprinted objects. Developing a new generation bioink is crucial to provide control over the scaffold, appropriate viscosity, and high biocompatibility.[1] In addition, the stability of bioink in cell culture and the rapid gelation ability of hydrogel are important.

Hydrocolloids are natural hydrogels that are composed of polysaccharide subunits. Quince seed hydrocolloid has high viscosity and biocompatibility in tissue engineering applications,[2] and it was thought to be used as bio-ink.[3] In this study, a new generation bioink was developed using quince seed hydrocolloid extracted from the quince seeds using water extraction. Following the characterization of bioink and bioprinted scaffolds, 3D tumor models were formed using A549 lung cancer cell line, HepG2 hepatocellular carcinoma cell line, MCF7 human breast cancer cell line and HeLa human cervical cancer cell line. Compared to 2D cell culture, bioprinted scaffolds provided 3D environment to cells by mimicking extracellular matrix and resulted in high cell viability throughout long-term culture. According to live dead and mtt assay results, bioprinted QSH scaffolds favor cell adhesion and proliferation while in 2D control, low cell viability was obtained due to overconfluency. These findings showed that the developed polysaccharide based bio-ink is a biocompatible and promising bio-ink material for further tissue engineering applications and has a potential for mimicking various tumor microenvironments.

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Biological Evaluation of Plant-Derived Exosomes

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Plant-derived extracellular vesicles (PDEVs) denote diminutive membranous vesicles of nanoscale proportions, exuded by plant cells, encompassing lipids, proteins, nucleic acids, and distinct pharmacologically active compounds. PDEVs bear distinctive cargo contents contingent upon the botanical or fruit origin, thereby dictating their biochemical functionality, inherent therapeutic attributes, bioaccessibility, and concomitant processes.[1] The volume of scientific literature regarding the prospective utilization of PDEVs as an indispensable wellspring of bioactive agents is steadily on the ascent. Prominent characteristics associated with PDEVs encompass antineoplastic, anti-inflammatory, antioxidative, and regenerative attributes.[2] Yang et al. have elucidated the antitumor efficacy of extracellular vesicles derived from bitter melon (BMEVs) against oral squamous cell carcinoma (OSCC), coupled with their inherent anti-inflammatory properties. The outcomes of the investigation have signified that BMEVs hold the potential for an extraordinarily efficacious synergistic therapeutic approach.[3] It has come to light that extracellular vesicles sourced from *Aloe vera* can incite antioxidant defense mechanisms and expedite the wound healing process via the activation of the Nrf2 pathway.[4] Extracellular vesicles derived from lemons are found to be particularly enriched in citric acid and vitamin C, imparting a notable safeguarding effect against oxidative stress in mesenchymal stem cells.[5] The exploration of PDEVs therapeutic potential is poised to represent a significant breakthrough in the healthcare sector.

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A Microfluidic Platform for Studying Macrophage Polarization Under Mechanically Dynamic Conditions

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Macrophages which act as the body's first line of defense undertake crucial roles in inflammation.[1] Depending on the signals they receive from the environment, macrophages can be polarized into two different phenotypes which are M1 (classically activated) or M2 (alternatively activated).[2] In different polarization states, macrophages release cytokines and present antigens that orchestrate the other immune cells.[3] In this study, we aimed to develop a microfluidic platform to study macrophage polarization in a more physiologically relevant way by incorporating mechanical forces which have been recently shown to play important roles in macrophage biology. M1 and M2 polarization was achieved successfully under dynamic and static conditions. We also showed that the dynamic environment present inside our microfluidic platform is more efficient at driving human monocyte-derived macrophages (HMDMs) into M1 phenotype.

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Preparation of Etoposide-Loaded Human Serum Albumin Nanoparticles and Controlled Release of Etoposide for Glioblastoma

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Etoposide is a potent anti-tumor drug belonging to the class of topoisomerase inhibitors.[1] It is a semi-synthetic derivative of podophyllotoxin and is increasingly preferred in cancer treatment. Etoposide is a phase-specific cytotoxic drug that acts in the late S and early G2 phases of the cell cycle. It has been observed that it causes breaks in DNA by interacting with the DNA topoisomerase II enzyme or through the formation of free radicals and acts in this way. Elucidating the effects of Etoposide on cell metabolism will increase our ability to use this drug in cancer treatment and expand our understanding of cancerous cells.[2] In this study, it was aimed to preparation of Etoposide-loaded human serum albumin (HSA) nanoparticles and controlled release of Etoposide for Glioblastoma. In this context, HSA nanoparticles loaded with Etoposide at different concentrations (5, 10, and 30 µg/mL) and control HSA nanoparticles without Etoposide were synthesized. The synthesized HSA nanoparticles were characterized by Zeta-sizer, Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM). Polymerization efficiencies of HSA nanoparticles were calculated and *In vitro* release studies were also tested. Etoposide released measurements were achieved at certain time intervals (0-180 minutes and 1-3 days). It is anticipated that Etoposide-loaded HSA nanoparticles will contribute to the literature in the development of anti-tumor drug delivery systems.

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Xylanase Immobilization and Characterization Used the Cross-Linking Method to BSA Nanoparticles with High Reliability for Application to Foods

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Xylan, linked via β-1,4-glycosyl bonds, is a homopolymer containing d-xylose monomers. Xylan is considered the second most abundant renewable biomass in nature after cellulose. Xylenase (1,4-β-xylan xylanohydrolase, EC 3.2.1.8, Xyl), the enzyme that hydrolyzes xylan, is preferred by many different industrial fields such as raw material improvement, fruit juice purification, energy production. There are some factors that limit the use of this enzyme, which is in great need of industrial use.[1] The most common method used to prevent this situation is enzyme immobilization. Immobilization briefly refers to the physical or chemical binding of the enzyme to a carrier matrix. The selection of the enzyme carrier matrix can be designed to suit the study. Bovine serum albumin (BSA) is a protein with various drug binding sites, low cost, low toxicity and high biodegradability. The biocompatible nature and low toxicity of BSA nanoparticles make these nanoparticles attractive for the immobilization of commercially important enzymes.

In this study, BSA nanoparticles were synthesized using the precipitation method in the presence of glutaraldehyde and ethanol. In the synthesis phase, firstly, non-enzyme immobilized forms of nanoparticles were prepared. Enzyme immobilization was carried out by applying similar nanoparticle synthesis steps, the only difference being that 100 IU enzyme solution was included in the structure after adding 8% glutaraldehyde solution. Characterization of all obtained materials was carried out with analyzes such as Fourier transform infrared spectrophotometer (FTIR), X-ray diffraction (XRD), scanning electron microscope (SEM), energy dispersion X-ray analysis (EDX), and dynamic light scattering (DLS). According to the findings obtained after the characterizations, it was confirmed that the enzyme immobilization was successful. In addition, optimum pH experiments were carried out and the pH values of free enzyme and immobilized enzyme were determined as 5. In addition, according to the findings obtained from the optimum temperature values, the optimum temperature value for both enzyme forms was determined as 40°C. As a result, BSA nanoparticles were successfully synthesized and xylanase was immobilized and their catalytic properties were examined.

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Cellulase Immobilization onto Quantum Dots Prepared from Bitter Apricot (*Prunus Armeniaca* L.) Kernel: A Robust Biocatalyst for Fruit Juice Clarification

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Cellulase enzyme (EC 3.2.1.4) are triple enzymatic complexes containing endoglucanase, exoglucanase, and β-glucosidase enzymes in their structure. The cellulase enzyme complex catalyzes the hydrolysis of cellulose to glucose.[1] Cellulases attract attention in different industrial areas such as biofuel production, food, paper, beverage, textile and agriculture. The poor thermal and storage stability of cellulases, their non-reusability, and the presence of impurities limit their use in industrial application. Enzyme immobilization strategies was developed to overcome this situation. Recently, quantum dots (QDs) have become increasingly popular as carrier supports in enzyme immobilization.

In this study, the carbonization method, which is one of the simplest methods to obtain QDs from bitter apricot (*Prunus Armeniaca* L.) kernel, was used.[2] In addition, to the best of our knowledge, no studies on the synthesis and characterization of QDs from bitter apricot kernels have been previously reported. Immobilization of cellulase enzyme onto QDs was carried out using the adsorption method. Structural and morphological characterization of free cellulase and cellulase immobilized QDs (Cellulase@QDs) was carried out. While the optimum pH values of free cellulase and Cellulase@QDs was determined as 6.0, the optimum temperature values were found to be 50 °C. Moreover, Cellulase@QDs retained 54.69% of the initial activity after reuse for 5 cycles. When the industrial effectiveness of Cellulase@QDs was examined, it was determined that it was a very effective biocatalyst in fruit juice clarification.

As a result, this study revealed that Cellulase@QDs are a promising bioreactor on an industrial scale with improved stability and reusability.

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Synthesis and Characterization of Chitosan Nanoparticles with Different Sizes and Charges by Ionıc Gelation Method

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Chitosan nanoparticles (CNP) were first synthesized by in 1994. Although the first studies were on drug release, they were later preferred by many different fields such as enzyme immobilization and biosensor applications. Chitosan nanoparticle synthesis methods can be classified into 5 main methods. These; ionotropic gelation, microemulsion, emulsification solvent diffusion, polyelectrolyte complex and reverse micelle methods. [1] Among these, the most commonly used method is the ionic gelation method. This method is a simple synthesis method, it does not require the use of organic solvents, and appropriate size control is easily achieved with this method.

In this study, chitosan nanoparticles were obtained by adding different amounts of Sodium tripolyphosphate (TPP) dropwise into solutions containing 1% chitosan. This solution was stirred for a while to ensure that it was homogeneous. Then, CNPs were collected with the help of centrifuge, lyophilized and characterized. Characterization processes were carried out with Fourier Transform Infrared Spectroscopy (FTIR), X-Ray Diffraction (XRD), Scanning electron microscope (SEM), energy dispersive x-ray spectrometers (EDX). In addition, particle sizes were checked by measuring their hydrodynamic diameters (DLS) and zeta potentials.

As a result, chitosan nanoparticles of different sizes and loads were successfully synthesized. Additionally, its structural and morphological properties were realized using various techniques. It is possible to say that these synthesized nanoparticles are very convenient to use in many fields, especially enzyme immobilization.

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Immobilization of Xylanase on ZnO Nanoparticles Obtained by Green Synthesis from *Eupatorium cannabinum* L. and its Application in Enrichment of Fruit Juices

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Xylanase (Xyl) enzyme, which hydrolyzes the β-1,4 glycosidic bonds in xylan polysaccharide, is one of the key enzymes used in many industrial applications such as food, agriculture, beverage, and paper. However, its low stability, recovery difficulties, and high sensitivity to changing conditions affect production costs and limit the use of Xyl on an industrial scale.[1] These difficulties can be overcome by immobilizing enzymes on solid supports. Nano-sized particles have widespread use in immobilization technology with their high surface/volume ratios.[2] Nanoparticles synthesized by the green synthesis method are obtained from parts of plants such as leaves, roots, and flowers. This method enables the production of non-toxic and cost-effective carrier supports.

In the study, ZnO nanoparticles (ZnONPs) were synthesized by a new, low-cost, and direct green synthesis strategy using *Eupatorium cannabinum* L. plant extract. Immobilization of Xyl on ZnONPs was carried out using the adsorption method. Structural and morphological characterization of synthesized ZnONPs and Xyl-immobilized ZnONPs (Xyl@ZnONPs) was carried out. In addition, biochemical characterizations such as optimum pH and temperature, and kinetic parameters of Xyl and Xyl@ZnONPs were investigated and compared to free Xyl. The optimum pH of free Xyl and Xyl@ZnONPs was determined as 5.0 and 8.0, respectively. On the other hand, the optimum temperature value was found 70 °C for free Xyl and Xyl@ZnONPs.

The obtained results showed that eco-friendly ZnONPs are carrier supports that exhibit enhanced stability for the Xyl enzyme. Furthermore, a promising industrial biocatalyst for fruit juice clarification was developed.

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The Investigation of Phenolic Components and Antioxidant Activities of Wild Olive Variety "Delice" in Winter and Summer Seasons

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"The olive plant (Olea Europaea L.) is divided into two subspecies: Olea Europaea L. subs. Sativa (cultivated olive) and Olea Europaea L. subs. Oleaster (wild olive or "delice" in Turkish). In addition to many cultivated olive varieties in our country, there are also two wild olive varieties known as Ak Delice (White Delice) and Kara Delice (Black Delice). Ak Delice is recognized by its light-colored and large leaves, while Kara Delice is known for its small and dark-colored leaves .[1]

In this study, the Kara Delice leaves were collected from the Arsuz district of Hatay province in summer and winter seasons. Leaves were washed, dried and extraction was performed using a 80% methanol-water solution in an ultrasonic bath for 4 hours. The obtained extract was analyzed for both phenolic components and antioxidant activities through methods such as ABTS, Ellman,Total flavonoid content (TFC), FRAP (TE), and total phenolic content (TPC). Oleuropein, tyrosol, and hydroxytyrosol concentrations were determined by HPLC using a double-phase system with formic acid-water (5:95, v/v, A) and Acetonitrile (ACN)-Phase A (80):(20, v/v, B). In the summer season, the highest values for phenolic components were determined in June as 28.56 mg/g, 0.56 mg/g, and 1.17 mg/g, respectively for oleuropein, tyrosol, and 3-hydroxytyrosol. In case of the winter season, the highest values were observed in december with values of 41.43 mg/g, 0.62 mg/g, and 2.57 mg/g, respectively. When comparing the summer and winter seasons, it was determined that the highest results were obtained during the winter season.

When the results of antioxidant activities were compared, the highest values were given in Table 1.

Table 1. Values and months with the highest antioxidant activities

Antioxidant Activity	June-July-August	October-November- December
ABTS (mg/ml)	49.12 - 25.78 - 34.35	25.77- 24.63- 26.92
Elmann (mg/ml)	11.14 - 10.022 - 9.05	12.13- 15.12 - 9.13
FRAP(mg/ml	517.66- 302.39 - 280	439.35 - 406.28-472.42
TPC(mg/ml)	11.16-10.12-11.69	9.64-8.24-11.05
TFC(mg/ml)	244.36 - 116.64 - 286.96	116.6 - 87.96- 145.24

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Investigation of Peroxidase Mimic Activity of Copper Phosphate Nanoflower

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Nanoflowers (NFs),a special class of nanomaterials, are 3-D materials materials that resemble flowers in microscopic appearance.[1] They have some properties such as high surface-to-volume ratio, high porosity, high adsorption capacity, high selectivity, easy synthesis, low cost and reusability. Due to their superior properties NFs are used in many applications such as enzyme mimetics, catalytic systems, drug delivery, tissue engineering, biomedical devices, biosensors.[2,3]

In this study, copper(II)phosphate nanoflower (Cu^{-} pNF) was fabricated using Cu(II) ions and PBS. Synthesized Cu-pNF was characterized by SEM, EDX, XRD, FTIR analysis. According to the SEM analysis results, the morphology of the Cu-pNF synthesized at pH 6, 7, 8 and 9 have the flower-like appearance. Especially the most uniform and compact flower-like morphology was seen at pH 7. Peroxidase mimic activity of synthesized Cu-pNF was also investigated. The effect of some parameters (pH, substrate concentration, temperature etc.) on the peroxidase activity of Cu-pNF was determined. According to the results obtained, the highest peroxidase mimic activities of Cu-pNFs synthesized at pH 7, 8 and 9 were found to be 1.323, 1.241, 0.463 EU/mg, respectively (pH 4, [ABTS]= 8 mM, [H_2O_2]= 25 mM, temperature= 55 C°). Then, the peroxidase mimic activities of the Cu-pNFs were examined for 5 cycles.

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Valorization of Grape Juice Wastes to Produce Citric Acid by *Aspergillus Niger*

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Citric acid, which is used as an acid regulator, sweetener, and preservative in many industries, especially food, beverage, and pharmaceuticals, can be obtained by chemical means, but it is commercially produced by fermentation from microorganisms. Many types of microorganisms can be used for the production of citric acid however, *Aspergillus niger* species are the most preferred in industrial production. Citric acid is obtained in the Krebs cycle during aerobic respiration. For this reason, carbon sources with high sugar content are preferred in citric acid fermentation. Grape pomace, an important waste of wine and fruit juice factories is a valuable carbon source for fermentation due to its 50-80% sugar content. Therefore, dried and ground grape pomace was used as the substrate in this study. To obtain high yields of citric acid, fermentation parameters need to be optimized. However, since testing all parameters is a negative situation in terms of time and cost, the optimum conditions of the parameters are determined by some statistical methods. In this study, the optimum conditions of substrate concentration, initial pH, fermentation temperature, and time were investigated using the Response Surface Methodology Box-Behnken Design, and the minimum and maximum values were determined as 30-120 g/L, 2-8, 25-35^{o}C, 48-168 hours, respectively. The optimum conditions for substrate concentration, initial pH, fermentation temperature, and duration were determined as 120 g/L, 5, 30^{o}C, and 168 hours, respectively, and the citric acid concentration was found to be 7.57 g/L. Statistical analysis showed that the created model was significant and R^2 was found to be 0.936.

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A Study on The Corrosion Properties of Hip Implants

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An attempt to improve the corrosion of hip implant was made by new surface modification. The components found in the main structure of bone were synthesized and deposited on hip implant alloy. The characterization of the nanoparticles and the coatings were characterized by SEM and XRD. The thickness and surface roughness of deposition were measured by optical microscope and surface profilometer. The nanobiocomposite which has the thickness of about 155 µm and the roughness(Ra) value of 3.0 µm adheres to hip implant surface with the strength of 1.5 MPa. The corrosion behavior of the modified hip implamt was studied by the open circuit potential, potentiodynamic polarization and electrochemical impedence spectroscopy measurements. The corrosion resistances was found as: The modified hip implant > bare.

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Investigation of Simultaneous Melatonin and Serotonin Selective Properties of Screen Printed Carbon Electrode Modified with Chlorogenic Acid-Based Polyurethane in Electrochemical Sensor Application

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Melatonin and Serotonin are involved in many biological and physiological processes in our body. In addition to its effects on circadian rhythm and endocrine, various studies have shown that melatonin has an antioxidant effect in living organisms and in the laboratory environment. In addition, various studies have shown that it has an antioxidant effect in living organisms and in the laboratory environment.[1] Melatonin (Mel) regulates body homeostasis by protecting the body against oxidative stress. For this reason, it is being researched with increasing interest all over the world. Serotonin (5HT) is the most studied neurotransmitter. Serotonin is a key mediator for mood physiology, vascular function, and gastrointestinal digestive disorders. In fact, serotonin levels in blood, serum and plasma can be used as a biochemical marker for depression.[2] Melatonin usually occurs in the presence of serotonin. Therefore, simultaneous determination of both molecules is extremely important for understanding biological systems.[3]

In this study, a Chlorogenic acid-containing polyurethane film as serotonin and melatonin selective film was synthesized and characterized. Polymeric membranes and electrochemical amperometric techniques have been successfully used to elimination of the interferant species for simultaneous determination of MEL and 5-HT. The following reactants were used in the syntheses of polyurethanes: 4,4'-diisocyanodiphenylmethane, chlorogenic acid and polyethylene glycol 200 (PEG200). The ratios of PEG–chlorogenic acid monomer units in the polyols were: 99:1, 97:3 95:5, and 90:10, respectively. Structural characterizations of polyurethanes were characterized by FTIR, DSC, DTA, TGA and dynamic contact angle measures. Furthermore, polyurethane film was formed by dropping of polyurethane solution on screen-printed carbon electrode to prepared MEL and 5-HT selective electrode. The voltametric results indicate that the polyurethane based electrodes can be used as a sensor for determination of MEL and 5-HT with the good sensitivity, selectivity, high reproducibility and high R-value (Mel:0,9809-Ser:0,9805).

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Synthesis of Gold Nanoparticles with UV light for Microfluidic Chip

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Gold nanoparticles are experiencing an exposion of researches of their properties and their application potentials. The physical, chemical, optical and electronic properties of individual nanoparticles are mainly determined by their size, shape and surface morphology, and the synthesis of such nanomaterials in a controlled manner is required. In this context, sodium citrate reduction method, phase transfer method, templating method, seed-mediated method, as well as γ-ray irradiation and UV irradiation, etc. methods are used. Among these, gold nanoparticle synthesis by UV radiation method attracts attention with its repeatability and shape controllability .[1] Thus, it can be used for diagnosis and treatment purposes with a gold nanoparticle prepared with the desired properties. The presence of such a gold nanoparticle on microchip surfaces, which are increasingly used in disease diagnosis, will make it easier to obtain the desired design.

In this study, under diffrent time of different power percent of UV light during synthesis of gold nanoparticles (AuNPs),were investigated on effect, extinction intensity and wavelength of the gold nanoparticle. This new approach UV light was employed as a photoinitiator for the reduction of Au(III) by citrate for synthesising gold nanoparticles of controlled size in the presence of trisodium citrate is presented.0.2 mg $HAuCl_4$.$3H_2O$ /3 mL water (w/v) and 2 mg sodium citrate was mixed. And then the mixture was exposed to UV light different time (5,10, 20, 30 min) and power percent (5,10, 20, 50, 75, 100W). The microfluidic chip was designed with three channel and two ports (inlet and outlet) for sampling/washing. After this step, the chip was coated by adding 100 µL of PLL hydrobromide solution diluted in PBS. (24 hours, room temperature). Then, gold solution mixtures prepared in different proportions were seeded into the channel to form nanoparticles on the microfluidic chip surface. The mixture was then exposed to UV light (10 min, 100W). Thus, a microchip containing gold nanoparticles on its surface that can be used in disease diagnosis was obtained.

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