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Abstracts Book

EUCHEMBIOJ 2024

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I. International Conference on Chemistry and Biotechnology

EUCHEMBIOJ 2024

December 9th, 2024

I. International Conference on Chemistry and Biotechnology

The aim of "**EUCHEMBIOJ 2024: I. International Conference on Chemistry and Biotechnology**" is to investigate the rapidly developing topic of biotechnology and to bring together researchers in the field of Chemistry and Biotechnology.

The topics discussed at the conference include application areas of biotechnology such as biomedical technology, biosensors, molecular biology, medicine, environment, agriculture, nanotechnology, and chemistry studies for application in the field of chemistry and biotechnology.

Leading experts from around the world came together at the conference to share their studies, perspectives, and ideas on the latest developments in biotechnology. This dynamic and multidisciplinary field is fully explored at the conference, from cutting-edge technologies to creative applications, from fundamental concepts to theoretical frameworks.

The conference took place online on **December 9, 2024**, based in **Istanbul, Türkiye**.

Invited Speakers

Tommaso Beccari	Professor of Biochemistry and Molecular Biology at the University of Perugia, Department of Pharmaceutical Sciences, Perugia, Italy
Baris Binay	Professor in the Department of Bioengineering at Gebze Technical University
Irina Nakashidze	Assoc. Professor at Batumi Shota Rustaveli State University (Georgia)
Oliver Feeney	Researcher in the Ethics of Genome Editing Research Unit, Institute of Ethics and History of Medicine, University of Tübingen, Germany
Jean-Marie Fontmorin	Researcher at the Chemical Engineering Research Center of Toulouse (France)

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Suhendan Ekmekcioglu	MD Anderson Cancer Center, USA
Yolina Hubenova	Institute of Electrochemistry and Energy Systems, Bulgaria

Scientific Programme

Time	Speaker	Title	Affiliation
09:00 - 09:05	**Introduction - Opening Speech: Prof. Dr. Muhsin Konuk**		
	Moderator: Prof. Dr. Muhsin Konuk		
09:05 - 09:45	Keynote Speaker: Irina Nakashidz	The genetics and genomics of autoimmune thyroid disease: Susceptibility genes associa	Batumi Shota Rustaveli State University, Georgia
09:45 - 10:25	Keynote Speaker: Barış Binay	Enzyme-based solutions for sustainability	Gebze Technical University, Türkiye
	Moderator: Prof. Dr. Tunç Çatal		
10:25 - 11:05	Keynote Speaker: Oliver Feeney	Genome Editing and non-ideal Justice: the case of sickle cell disease (SCD)	University of Tübingen, Germany
11:05 - 11:45	Keynote Speaker: Jean-Marie Font	Bioelectrochemical Systems: from fundamentals to applications	Chemical Engineering Research Center of Toulouse, France
11:45 - 12:25	Keynote Speaker: Tommaso Becc	Emerging Therapies and Therapeutic Concepts For Lysosomal Storage Diseases	University of Perugia, Italy
12:25 - 12:40	**Break**		

Session 1 : Biotechnology		
Time	**Speaker**	**Title**
Moderator: Asst. Prof. Çiğdem Sezer Zhmurov		
13:00 - 13:20	Mustafa Emre Aydemir	Detecting Diabetes Disease Depending on Medical Parameters Using Current Artificial Intelligence Algorithms
13:20 - 13:40	İsmail Caner	Investigating the impact of algae bioreactive facades on energy consumption in buildings
13:40 - 14:00	Buğçe Aydın	A Dual-Targeting Approach for Cancer Treatment: Folic Acid-Conjugated Protein Coated Magnetic Carbon Nanotubes
14:20 - 14:40	Ali Yiğithan Ertürk	Determination of the Antifungal Effect of Laurus nobilis Plant on Candida albicans by Molecular Docking Method
Moderator: Res. Asst. İrem Gülfem Albayrak		
14:40 - 15:00	Dilara Karaman	Prediction of anthelmintic effects of some naphthyl derivatives via molecular dockings
15:00 - 15:20	Dilara Karaman	In silico molecular dockings of bioactive compounds of anthelmintic plants
15:20 - 15:40	Elchin Babayev	Immobilization of Ni metal to PVP/Gelatin copolymer and investigation of its structure
15:40 - 16:00	Burak Kılınç	Biodegradation of DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl) ethane) using New Designed Soil Microbial Fuel Cell
16:00 - 16:20	Yağız Sarıoğlu	Investigation of Simultaneous Electricity Production and Herbicide Biodegradation in Microbial Fuel Cells Using Psychrobacter sp. TaeBurcu001 Isolated from Antarctica
16.20-16.30	Pinar Sen	Palladium porphyrins and their chitosan immobilization derivatives and their photodynamic activities against Staphylococcus aureus
16.30-16.40	Merve Yildirim	Antibacterial properties of substituted phenethylamine-based β-lactam derivatives in oral infections

Session 2: Chemistry		
Time	**Speaker**	**Title**
Moderator: Asst. Prof. Shirin Tarbiat		
12:40 - 13:00	Halil Yavuz	Investigation of the potential Anti-Metastatic Effect of Combined Treatment of Metformin (MET) and Caffeic Acid (CA) in Breast Cancer Cell Line in-In Vitro Culture Model
13:00 - 13:20	Yasin Tülüce	Neuroprotective effect of royal jelly on pentylenetetrazole-induced neurotoxicity via ROMO1 pathway in SH-SY5Y neuroblastoma cells
13:20 - 13:40	Sakshi Adhav Mph	Co-development of Breast Cancer Health Promotion educational materials for ethnically diverse women working with hairdressing and beauty salons: BELONG Study
13:40 - 14:00	Bipasha Deuri Bharali	The effect of GLP-1 receptor agonists on liver health in participants living with overweight/obesity: a systematic review and meta-analysis
14:20 - 14:40	Nameera Parveen Shaikh	The Impact of elevated Vitamin B12 levels in Diagnostic Challenges: A Retrospective Analysis
Moderator: Res. Asst. İrem Olgun		
14:40 - 15:00	Ahmed Fehim Sağırlı	Molecular Level Investigation of the Stimulant Effect of Camellia sinensis and Coffea arabica
15:00 - 15:20	Aleena Parveen Shaikh	Ferritin Levels in COVID-19 Patients: A Study of the Adjara Population
15:20 - 15:40	Sana Zain	Estimating the prevalence of multimorbidity among the adult population (18 years and above) in primary care settings of European countries – A systematic review and meta-analysis
15:40 - 16:00	Dilara Karaman	In silico potential of arteannuin-B derivatives in case of anthelmintic drug resistance
16:00 - 16:20	Barış Güzel	Method Optimization and Validation for Simultaneous and Accurate Quantification of Important Fourteen Aliphatic Hydrocarbons in Tap Water
16.20-16.30	Gülşah Çelik Gül	Inhibitory effects of nanoborate solution against CA I, II and XII
16:40 - 16:45	**Closing Remarks**	

Invited Speakers

EMERGING THERAPIES AND THERAPEUTIC CONCEPTS FOR LYSOSOMAL STORAGE DISEASES

Tommaso Beccari

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Lysosomal storage diseases (LSDs) are a group of over 70 diseases that are characterized by lysosomal dysfunction, most of which are inherited as autosomal recessive traits. These disorders are individually rare but collectively affect 1 in 5,000 live births. LSDs typically present in infancy and childhood, although adult-onset forms also occur. Most LSDs have a progressive neurodegenerative clinical course, although symptoms in other organ systems are frequent. LSD-associated genes encode different lysosomal proteins, including lysosomal enzymes and lysosomal membrane proteins. The interest in lysosomal biology and related genetic diseases has surged over the past decade not only in the halls of science but also in pharmaceutical companies. As the complexity of LSDs increasingly becomes revealed, so do novel therapeutic targets continuously nurturing the development of new candidate drugs for these devastating diseases. Among this multitude of therapeutic strategies, the Enzyme Replacement Therapy (ERT) still accounts for the vast majority of approved therapies but a number of interesting alternative approaches are emerging targeting various components of the pathophysiological cascade. This evolution of the field is much needed as the presently available treatments are unable to address all clinical aspects of these multifaceted diseases. Future therapy will most likely consist of combinations of these established and emerging approaches as well as other yet-to-be-discovered concepts as the complexity of the diseases demands a certain degree of humbleness to the expectations for a cure based on a single therapy. Targeted treatments for LSDs, in the form of enzyme replacement and/or substrate reduction, be relatively safe and effective in reversing core disease features in selected clinical subtypes (including Gaucher disease types I and III and Fabry disease). These approaches have expanded the therapeutic options available to patients with rare genetic disorders, beyond palliative measures (such as liver or kidney transplantation for end-organ failure) and cellular replacement through bone marrow transplantation. Present efforts are focused on the development of novel strategies, including chaperone-mediated enzyme enhancement and genetically engineered stem cell therapy. Among the many challenges will be the determination of the extent to which these therapies have modified the course of disease beyond merely extending the age of survival, but also enabling a meaningful patient quality of life. In summary, after considerable in vitro and in vivo testing of a very large number of therapeutic candidates, a number of clinical trials are now in progress for many neuropathic LSD.

Keywords: Enzyme, Lysosome, Therapy.

Invited Speakers

Enzyme-based solutions for sustainability

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Millions of tons of CO_2 are released into the atmosphere each year due to the use of fossil fuels and industrial activities. Many different solution proposals have been reported to reduce the amount of CO_2 released. However, considering the excessive dependence on fossil fuels, especially for industrial activities, in a significant part of the world, these solution proposals remain weak. Therefore, the strongest and most realistic solution proposal is to convert the resulting CO_2 into molecules with high added value (such as hydrocarbons with energy value) without releasing it into nature. The chemical reduction of CO_2 to other molecules is possible with chemical and biological methods. The fact that chemical methods require a lot of energy for this purpose and produce by-products makes biological methods more attractive. It is possible to reduce CO_2 to valuable chemicals with biological methods using microbiological organisms and enzymes. In this regard, the use of formate dehydrogenase enzyme has attracted considerable attention and promising data has been obtained in practice. In this presentation, data obtained from projects on the use of formate dehydrogenase enzymes and the use of formic acid with high added value and energy potential, as well as ongoing and planned studies, will be shared.

Keywords: Formate dehydrogenase, CO_2 conversion, CO' emissions, Formic acid, Global Warming

References

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– Tulek, A., Günay, E., Servili, B., Essiz, S., Binay, B., Yıldırım, D., 2023 "Sustainable production of formic acid from CO2 by a novel immobilized mutant formate dehydrogenase", Separation and Purification Technology, 309,123090.

Invited Speakers

The genetics and genomics of autoimmune thyroid disease: Susceptibility genes associated with autoimmune thyroid disease

Irina Nakashidze

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The thyroid hormones (TH) have a significant implication in regulating numerous physiological functions in the whole organism, including thyroid disease, therefore they are linked to morbidity. As mentioned, Thyroid dysfunction is linked to several conditions, including diseases related to the organ of endocrine, cardiovascular, and reproductive systems, etc. It is suggested that thyroid diseases, among them, are autoimmune thyroid diseases/thyroid cancer, causing high heritability. According to the investigations genetics/genomics significantly contributes to the predisposition/susceptibility of thyroid diseases. Moreover, the thyroid function, represented by thyroid stimulating hormone (TSH) and free thyroxine (T4), is also known to be partly genetically determined. Genetic factors are implicated in the alteration of TSH and FT4 concentrations, as well. Studies regarding The genome-wide association studies (GWAS) several genetic variants are implicated in altering TSH and FT4 concentrations; Taken all together, most thyroid diseases, including autoimmune thyroiditis and thyroid cancer are linked the genomic alteration; Some Gene changes have a crucial contribution to case of the most thyroid-related phenotypes. Moreover, genetic factors are connected to disease onset. According to GWAS numerous genetic variants have a predisposition to thyroid diseases (including autoimmune disease and thyroid cancer). The numerous genes' SNP showed susceptibility toward the disease. Taken all together the genetics/genomics studies provide wide opportunities regarding the molecular mechanisms/aspects of the diseases' pathogenesis, therefore enhancing the capacity to develop new therapies ways. Taken together, the alterations of genetic/genomics have undeniable key implications to improve the knowledge regarding diagnostic/prognostic biomarkers. Genetic variations, including SNPs in genes linked to thyroid disease, can predict/enhance the understanding of the pathogenesis of developing thyroid disease, including autoimmune thyroiditis.

Keywords: Autoimmune Thyroid, Gene, Genomics, Genetics, SNP, Susceptibility

Invited Speakers

Genome Editing and non-ideal Justice: the case of sickle cell disease (SCD)

Oliver Feeney[1]

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Innovations in genome editing are steadily realising the possibilities of making effective and realistic genetic therapeutics, highlighted by the breakthrough of Casgevy - a CRISPR–Cas9 gene editing therapy to treat sickle-cell disease (SCD). As it moves from clinical trials to regulatory approvals in the US, UK, and the EU, questions turn to issues of justice and access. The concerns of distributive justice regarding inequalities in the distribution of access to potential genome editing technologies is highlighted with Casgevy – particularly notable by the expected 2 million Euro (plus) cost per patient for treating a disease overwhelmingly bourn by less advantaged communities. While requiring an ideally just egalitarian distribution of costly technologies is unrealistic, the focus on fairly expanding access is the pertinent question. Even if access could be sufficiently widened for this and other high-cost medical technologies, the next question has to be on how far should this access be prioritized over other allocations of finite healthcare resources. In this paper, I will explore the case for widening access from a broadly egalitarian perspective within a non-ideal theoretical framework. I will assess an important application of this perspective to widening access to genomics technology with a focus on encouraging innovation and justifying the use of patent protection – both justified for broadly egalitarian goals. I conclude that the broadly egalitarian case (ideal or non-ideal) for widening treatments to SCD does not necessarily translate to a case for widening access to Casgevy, and, in some respects, may argue against it.

Invited Speakers

Bioelectrochemical Systems: from fundamentals to applications

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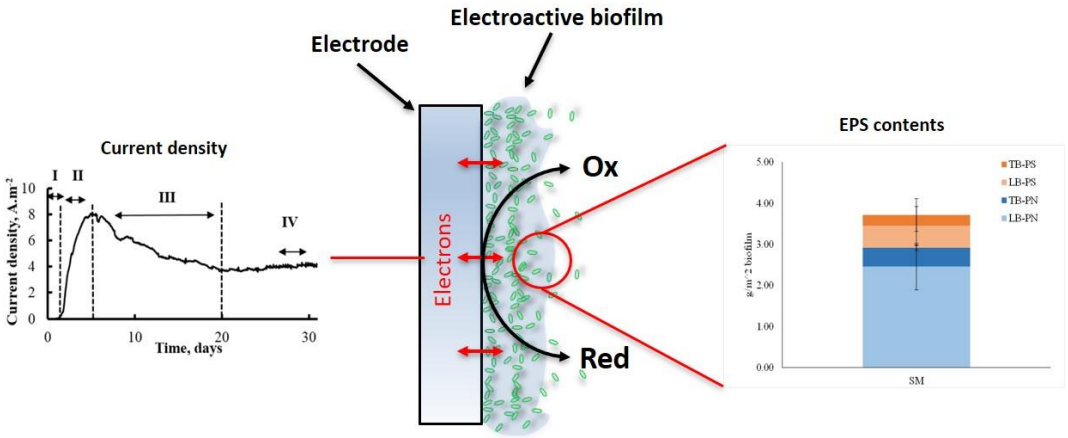
Bioelectrochemical systems (BES) offer significant potential for sustainable energy production and environmental management. However, critical knowledge gaps in understanding the fundamental mechanisms that drive their performance remain. For example, maintaining maximal current densities in the long term is still a challenge. Our research addresses some of these gaps by investigating the role of extracellular polymeric substances (EPS) in the development and performance of electroactive anodic biofilms. We aim to elucidate how EPS affects biofilm formation, electrochemical activity, and stability in BES. A key focus of our study is establishing correlations between the contents of proteins and polysaccharides in the biofilm, biofilm morphology, and current density.
In addition to exploring these fundamental aspects, our research extends to practical applications of electroactive biofilms and BES in general. We evaluate their effectiveness in several key areas, including wastewater treatment, CO_2 conversion, biohydrogen production, and reinforced concrete protection. By integrating fundamental studies with practical applications, we aim to bridge the gap between theoretical understanding and real-world implementation. Our work demonstrates how insights into EPS and biofilm behavior understanding can be leveraged to develop innovative solutions for pressing environmental and energy challenges, highlighting the potential for enhancing BES technologies and their applications.

Keywords: Bioelectrochemical systems, Electroactive biofilms, Extracellular polymeric substances



Regular Sessions

Investigation of the potential Anti-Metastatic Effect of Combined Treatment of Metformin (MET) and Caffeic Acid (CA) in Breast Cancer Cell Line in-In Vitro Culture Model

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According to the World Health Organization's data for 2020, cancer remains a significant health issue, with approximately 19.3 million new cases and 9.9 million deaths. Cancer ranks as the second leading cause of death worldwide, with breast cancer being the leading cause of cancer-related deaths in women (approximately 2.3 million new cases and 690,000 deaths). The invasion and metastasis of cancer cells transform localized cancers into systemic and life-threatening diseases, posing one of the most significant challenges in cancer treatment. Despite various treatment strategies, clinical efficacy is often limited by metastasis, making cancer invasion and metastasis critical challenges in cancer eradication. Recent research has shown that metformin (MTF), a first-line oral medication for type 2 diabetes, inhibits cancer invasion and metastasis through various mechanisms, potentially improving the prognosis for cancer patients. Caffeic acid (CA), a natural phenolic compound, exhibits antioxidant, anti-inflammatory, and antiproliferative properties, with reports suggesting it acts as an antioxidant in normal cells and a pro-oxidant in cancer cells, inducing cancer cell death. Given its promising benefits as a dietary component, exploring the anti-metastatic and anti-cancer potentials of CA in combination therapy is highly valuable. This study tested the hypothesis that combined treatment with CA and MTF could inhibit or reduce effective signaling pathways involved in the proliferation, survival, and metastasis of MCF-7 breast cancer cells. Anti-proliferation analysis determined the IC50 values for MTF (4.5 mM) and CA (163 µM) after 72 hours. Cell migration analysis showed that MTF and CA significantly inhibited MCF-7 cell migration by the 72nd hour, both alone and in combination, without affecting HME1 healthy cell migration from the 48th hour. Colony formation analysis revealed that CA completely inhibited colony formation in MCF-7 cells, while MTF reduced it by 19%. ELISA results indicated that neither CA nor MTF affected the levels of VEGF, E-cadherin, or TINAGL-1 proteins, which are involved in MCF-7 cell migration and invasion. However, MTF significantly reduced IL-1β protein levels, and CA significantly reduced IL-4 protein levels in MCF-7 cells. RT-qPCR results largely supported the ELISA findings. Overall, CA and MTF exhibited potential to inhibit MCF-7 cell apoptosis, migration, tumor microenvironment modulation, and metastasis.

Keywords: Caffeic acid, Breast cancer, Metformin

Regular Sessions

Detecting Diabetes Disease Depending on Medical Parameters Using Current Artificial Intelligence Algorithms

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Recent advancements in diabetes detection have focused on improving accuracy, early diagnosis, and patient convenience. Artificial Intelligence (AI) and Machine Learning (ML) algorithms can analyze large datasets from various sources (e.g., wearable devices, and electronic health records) to predict diabetes risk and provide early warnings. These algorithms can also be used to personalize treatment plans based on individual patient data. Overall, the integration of AI and ML in diabetes care has the potential to significantly improve outcomes and reduce the burden on healthcare systems. In this study, considering the above factors, the performance analysis of Linear Multiple Regression and Support Vector Machines, which are among the popular AI and ML algorithms, for diabetes detection was carried out. For this purpose, a suitable internationally accepted database was selected to be applied to these algorithms. It was observed that satisfactory results were achieved on a test set with the discussed methods.

Keywords: Artificial Intelligence, Machine Learning, Disease Detection, Diabetes, Mellitus, Linear Multiple Regression, Support Vector Machines

Regular Sessions

Neuroprotective effect of royal jelly on pentylenetetrazole-induced neurotoxicity via ROMO1 pathway in SH-SY5Y neuroblastoma cells

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In the brain, the production of free radicals is increased due to high oxygen utilization and active metabolism, resulting in oxidative damage neurological changes, and neurodegeneration. Various neurotoxic substances function in different mechanisms and cause cellular damage, leading to neuronal apoptosis and the development of numerous diseases.
Neurotoxicity is the result of biochemical and metabolic changes in the structure and function of the nervous system. Neurotoxicity represents a significant public health concern, as it has the potential to result in neuronal death or impairment in various regions of the nervous system responsible for signal transduction. It is, therefore, crucial to recognize the detrimental effects it can have on individuals. SH-SY5Y neuroblastoma cells, which represent an optimal model for neurotoxicity studies, are extensively employed to evaluate neurotoxicity and elucidate the underlying pathways
Pentilentetrazole (PTZ), a stimulant employed in clinical settings for the treatment of specific ailments, has been linked to the onset of neurotoxic effects, including alterations in cellular morphology, nerve conduction, and cell death. These changes can culminate in the occurrence of epileptic seizures at high doses. PTZ, a tetrazole derivative, has been demonstrated to be efficacious in in vivo epilepsy models. A multitude of natural substances have been employed to mitigate the neurotoxic effects of PTZ. However, the precise mechanism of action in neuronal cells remains elusive. The neuroprotective effect of royal jelly (RJ) on this model of neurotoxicity is of significant importance for the elucidation of the pathways involved in cellular survival. The positive effect of RJ on cellular health has been demonstrated in numerous experiments. The objective of this study is to investigate the effects of royal jelly (RJ) and its major fatty acid, trans-10-hydroxy-2-decanoic acid (10-HDA), on pentylenetetrazole (PTZ)-induced neurotoxicity in the SH-SY5Y cell line, as well as the underlying mechanisms.

Keywords: Apoptosis, Neuroblastoma, Oxidative stress, Pentylenetetrazole, Royal Jelly, SH-SY5Y

Regular Sessions

Investigating the impact of algae bioreactive facades on energy consumption in buildings

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Global energy consumption has been on a rapid rise for the past three decades [1]. Consequently, there is a growing recognition of the critical importance of exploring new renewable and clean energy sources on a global scale [2]. One of these new clean energy sources is microalgae and it has great potential to reduce energy consumption of buildings and maintain thermal comfort inside the building through their entire life cycles by increasing energy efficiency [3-4]. Utilizing closed microalgae photobioreactors as building components offers the additional advantage of serving as an efficient insulation system. Microalgae bio-adaptive façades serve as multifunctional solutions for buildings' thermal requirements, functioning as adaptive shading elements, thermal insulators, solar thermal collectors, and converters of light into biomass essential for biofuel production. [5]. The usage of microalgae on building facades such as windows or shading devices offers multiple benefits: it lowers construction costs by sharing building materials, reduces land competition by utilizing vertical spaces suited for microalgae growth, and potentially decreases pollutant emissions through recycling building effluents into the microalgae culture [6]. The factors that significantly influenced the reduction in energy consumption were the concentration of algae, the size of the window, and their combined effect. This study aims to examine the latest advancements in microalgae bioreactive facades and assess the potential impact of integrating microalgae [7]. Moreover, the efficiency of microalgae facades in reducing energy consumption is analyzed and some recommendations for future research are given [8].

Keywords: energy consumption, microalgae, photobioreactors

Regular Sessions

A Dual-Targeting Approach for Cancer Treatment: Folic Acid-Conjugated Protein Coated Magnetic Carbon Nanotubes

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Dual-targeted delivery is a crucial aspect of optimal cancer treatment. Magnetic nanoparticles (mNPs) are considered one of the most promising delivery systems to decrease unwanted side effects of cancer treatment. Active targeting agents have been conjugated to nanocarriers in addition to their magnetic features to increase the selectivity of chemotherapy drugs for cancer cells.[1,2] These attributes make them effective drug delivery agents, potentially reducing the amount of drug needed for treatment and consequently easing side effects. Among the ligands, folic acid (FA) is the most sensible targeting molecule because of its low cost, nontoxicity, and high stability.[3] Moreover, FA has a high binding affinity to the folate receptor (FR), and FRs are overexpressed in many different types of cancer cells. In this study, we developed bovine serum albumin-coated magnetic carbon nanotubes modified with FA (mCNT-BSA-FA) to enhance targeting specificity. The novel carrier was characterized using FT-IR, SEM, XPS, VSM, and TGA analyses. Then, mitoxantrone (MTO) loading and release properties of the nanocarriers were determined. VSM analysis demonstrated that the nanocarrier could be magnetically directed to tumor sites. mCNT-BSA-FA showed less drug loading capacity but more release response than mCNT. Decreased loading and increased release behavior contributed to the enhanced hydrophilicity by BSA and FA conjugation onto the surface of mCNT. The cytotoxicity effects of nanocarriers were examined on healthy (HEK293T) and cancerous (MDA-MB-231) cell lines using MTT assay. Nanocarriers showed dose-dependent cytotoxicity against both cell lines. Modification with FA decreased the toxicity of mCNTs. Experimental results showed that free MTO had a higher cytotoxic effect than mCNT-BSA-FA/MTO on the MDA-MB-231 cancer cell line. Since at the same MTO concentration, while the free drug shows higher cytotoxicity on the cells, nanocarrier systems require specific conditions and time to release the drug. In cell images of MTO-loaded nanocarriers under an inverted microscope, a reduction in the number of cells was observed compared to control cells, indicating that the cytotoxic properties of the nanocarriers affected the treated cells.

Keywords: Bovine serum albumin, dual-targeting, folic acid, magnetic carbon nanotube, mitoxantrone

Regular Sessions

Co-development of Breast Cancer Health Promotion educational materials for ethnically diverse women working with hairdressing and beauty salons: BELONG Study

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Introduction: Improved screening uptake is essential for early breast cancer detection, women's health, and reducing health disparities. However, minority ethnic and deprived communities often face lower breast cancer screening rates and limited access to culturally tailored educational materials. A recent review found limited culturally tailored materials for breast cancer education.

Aim: To investigate the culturally appropriate interfaces and preferences of salon staff in educating their clients about breast cancer

Methods: We used a two-stage approach, following the Double Diamond framework; discover and define phases. Relevant breast cancer materials (i.e., based on cultural appropriateness, English language presentation, and alignment with the UK context) were assessed using the Suitability Assessment of Materials (SAM) toolkit. Interviews with ethnically diverse salon staff provided insights into their needs and preferences for client education materials. Thematic analysis was applied to interview transcripts.

Results: Cultural appropriateness was evident in 9/14 (64%) of the materials identified (e.g., targeting black ethnicities with positive representations). Of those, six of them demonstrated an overall SAM rating of 76% ("Superior"). Thematic analysis of interviews identified seven key themes, including the importance of engagement strategies, education and awareness for health promotion, salon staff's role, preferred training methods, supportive materials, inclusivity, representation, and participant satisfaction.

Conclusion: This study highlights the SAM toolkit's role in selecting suitable educational materials for breast cancer prevention. The research offers prospects for improving breast cancer awareness in ethnically diverse communities and addressing healthcare access disparities, with salon hairdressers emerging as crucial advocates for health promotion.

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Regular Sessions

The effect of GLP-1 receptor agonists on liver health in participants living with overweight/obesity: a systematic review and meta-analysis.

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ABSTRACT

Background: Overweight and obesity are associated with various metabolic disturbances, including non-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH), which pose significant health risks. Glucagon-like peptide-1 receptor agonists (GLP-1RA), known for their effects on glucose metabolism, are novel anti-obesity medications, but their efficacy in treating NAFLD is unclear. This study aims to systematically review and conduct a meta-analysis to evaluate the impact of GLP-1RA on hepatic health in participants living with overweight or obesity.

Methods: A comprehensive search of electronic databases (Medline, Embase, Scopus, Cochrane, ClinicalTrials.gov) was performed to identify relevant studies published up to November 2023. Randomized controlled trials (RCTs) comparing GLP-1RA to placebo/standard care in adults living with overweight/obesity without type 2 diabetes and that reported on liver parameters were included. Data were extracted, and quality assessment was conducted using RoB2 and GRADE. Pooled mean differences (MD) or Estimated Treatment Ratio (ETR) with 95% CI were calculated using random-effects models.

Results: The final review incorporated a total of 16 studies with 8296 participants, each investigating one of six distinct glucagon-like peptide-1 receptor agonists (GLP-1 RAs): Liraglutide (n=6), Semaglutide (n=5), Tirzepatide (n=2), Retatrutide (n=1), Dulaglutide (n=1), and Orforglipron (n=1). Out of these, 11 unique studies were selected for inclusion in the meta-analysis. The duration of intervention ranged from 16 weeks to 72 weeks.

Compared to control, GLP-1RA significantly reduced Alanine Transaminase (ALT) (MD = -18.55IU/L; 95%CI [-21.01, -16.10]), Aspartate Aminotransferase (AST) (MD = -7.38IU/L; [-8.61, -6.15]), Body Mass Index (BMI) (MD = -3.43kg/m^2; [-5.48, -1.37]) and Waist Circumference (WC) (MD = -5.68cm; [-8.09, -3.27]). The subgroup meta-analysis showed differences in efficacy between specific GLP-1RA - Semaglutide appeared more effective than Liraglutide in treating overweight/obesity, with more significant reductions in liver enzymes ALT and AST, BMI, and WC.

Limitations and Implications:

A significant reduction in ALT levels compared to AST levels is observed in participants treated with GLP-1RA, but the precise mechanisms mediating these liver enzyme benefits remain unclear. Sensitivity analysis on GLP-1RA dosages showed Semaglutide has more potent effects than Liraglutide in similar settings, but dose-response relations remain unclear due to limited data. Tirzepatide and Retatrutide, dual and triple receptor agonists, show greater efficacy than single GLP-1RAs, but it's unclear if liver benefits are solely due to GLP-1 receptor activation.

This meta-analysis demonstrates that GLP-1RAs significantly improve key liver health parameters (ALT, AST) in participants living with overweight/obesity. These agents may represent a new pharmacotherapy for NAFLD. However, additional large randomized controlled trials in diverse populations are warranted to confirm the efficacy of different GLP-1RAs for treating obesity-associated liver disease.

Regular Sessions

The Impact of Elevated Vitamin B12 levels in Diagnostic Challenges: A Retrospective Analysis

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Vitamin B12 testing primarily serves to identify its deficiency. However, encountering elevated B12 levels is rare and could indicate underlying serious conditions such as solid cancers. We present a unique case of a geriatric patient with consistently high Vitamin B12 levels, despite not taking supplements, raising suspicions of a potential link to cancer. Subsequent examinations revealed a tumor, indicating a possible association between B12 elevation and gastrointestinal cancer. This highlights the need for further research to understand the relationship between Vitamin B12, homocysteine, and cancer. A comprehensive review of the literature reveals a compelling association between elevated Vitamin B12 levels and various malignancies, including gastric, colon, breast, lung, prostate, and childhood brain tumors, suggesting B12's potential as a biomarker for efficient and early cancer diagnosis. Macro-vitamin B12, an often-overlooked cause of abnormally high cobalamin plasma levels, warrants careful consideration to prevent potentially misleading clinical judgments.

Keywords: Hyperhomocysteinemia, Macro-vitamin B12, Solid cancers.

Regular Sessions

Molecular Level Investigation of the Stimulant Effect of Camellia sinensis and Coffea arabica

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In the contemporary era, tea and coffee have become integral components of the daily routines of many individuals. One of the primary factors contributing to this phenomenon is the acceleration in the pace of modern life. The increasing tempo of modern life has the effect of causing people to become fatigued more rapidly and to feel weak. To maintain pace with the demands of modern life, individuals frequently consume caffeine-containing beverages such as coffee and tea. These substances offer a beneficial effect. Tea (Camellia sinensis) and coffee (Coffea arabica) plants contain molecules that have been shown to have effects that promote wakefulness in humans. These effects are formed as a result of the presence of voltage-gated calcium channels in the human body. These channels are formed by a system called the Reticular Activation System (RAS), which activates the system. This system is responsible for triggering the sensation of alertness in the human body. The activated channels enhance the speed of synaptic transmission throughout the body, thereby increasing overall alertness. The effects of tea and coffee on the human body have been the subject of numerous experiments. These experiments have revealed that the molecules present in tea and coffee bind to Voltage Gated Calcium Channels in the body. The extent to which tea and coffee activate this system is dependent on the binding energy of the molecules. This allows us to measure the extent to which the body is activated in silico. The analysis yielded the following results: the proportional ratio of molecules in the coffee plant is 17.45% more arousing. The results of the experiment demonstrate that the differences between tea and coffee consumption patterns enhance the awakening effect. In contrast, dilution when consuming tea, conversely, allows for more intense absorption of molecules when drinking coffee as a brew, thereby increasing the effect of tea. Consequently, the total effect is significantly higher than that of tea.

Keywords: Ligand, Voltage-gated Calcium Channels, Coffee consumption, Tea consumption

Regular Sessions

Determination of the Antifungal Effect of Laurus nobilis Plant on Candida albicans by Molecular Docking Method

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The polymorphic fungus Candida albicans is a member of the normal human microbiome. In most individuals, C. albicans lives harmlessly as a lifelong commensal. However, under certain conditions, C. albicans can cause infections ranging from superficial skin infections to life-threatening systemic infections. C. albicans asymptomatically colonizes oral, gastrointestinal, and genital regions. Among the Candida species, C. albicans is observed to have the highest pathogenicity. In individuals with weakened immune systems, particularly HIV patients or those undergoing immunosuppressive therapy, C. albicans can lead to serious systemic infections. The frequent and prophylactic use of antifungal drugs over time has led to many pathogenic fungi developing strong resistance to these drugs. Therefore, it is necessary to identify new candidate drug molecules with antifungal effects against pathogenic fungal organisms and conduct related studies. In this study, the active molecules of the Laurus nobilis plant were accessed through the Dr. Duke database. The inhibition potentials of these molecules on the target C. albicans organism's biofilm formation and the main virulence factors, Secreted Aspartyl Proteinase-3 (SAP3) and Secreted Aspartyl Proteinase-5 (SAP5) enzymes were investigated in silico through molecular docking studies. The molecular docking studies were performed using the Autodock Vina software, and the visualization studies were completed using the BIOVIA Discovery Studio software. As a result of the studies, the active molecules Juglanin, Cyanidin, Leucocyanidin, Kaempferol, Boldine, and Catechin are proposed as candidate active molecules that may exhibit antifungal effects against the C. albicans pathogen, based on their binding energies and types of interactions and distances with the active site amino acids compared to drug molecules.

Keywords: Antifungal, *Candida albicans*, Molecular Docking, Laurus nobilis

Regular Sessions

Ferritin Levels in COVID-19 Patients: A Study of the Adjara Population

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Aim: COVID-19 (caused by SARS-CoV-2) is considered a global problem due to its high transmission and mortality rates. Thus, a necessity is a thorough study of the mechanisms of disease pathogenesis. The study of ferritin is one of the most significant issues regarding numerous aspects, including those with Covid-19. Higher levels of ferritin were associated with severe forms of COVID-19 disease. Given the above, our goal was to investigate associations between ferritin levels with demographic characteristics and the disease outcome and mortality among COVID-19-infected individuals from the Adjara population).

Methods: A nasopharyngeal swab was collected from 318 individuals and SARS-CoV-2 infection was detected by the polymerase chain reaction (PCR)-method SARS-CoV-2., while ferritin was investigated from the blood serum of the same individual.

Results: Thus, the study of ferritin in COVID-19 patients (in Adjara population revealed significantly higher ferritin levels in COVID-19 patients. Higher levels of ferritin were detected in the male subjects than in the women population. COVID-19 patients with lethal outcomes had nearly 3 times higher levels of ferritin than the reference value, while those who successfully recovered had 1.9 times above the reference value. It should be noted that the individuals with lethal outcome As were between 81-90 years of age. An increased level of D-dimer compared to the reference level was also detected in the male population and was nearly 4.1 times higher in the ones with lethal outcomes. D-dimer was also significantly increased in patients at the age 71-80 years, while their CRP levels were approximately 5.8 times above the reference level; Moreover, CRP level was 24.4 times increased in the case of women with lethal outcomes; In particular, according to the comparing age groups, a high level of CRP was observed in 61-70 years patients.

Conclusions: According to our study, the diseased population showed significantly higher ferritin levels. The level of ferritin in the patients with lethal outcomes was significantly higher than in patients who successfully recovered.

Keywords: COVID-19, Ferritin, lethal outcome, Recovered patients.

Regular Sessions

Estimating the prevalence of multimorbidity among the adult population (18 years and above) in primary care settings of European countries – A systematic review and meta-analysis

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Background: With the increase in the aging population, multimorbidity (MM) is also increasing which is a major concern for both primary care and public health. In recent years, significant work has been done in the field of multimorbidity (2,3). Nonetheless, evidence of multimorbidity is limited, particularly in primary care settings, which is the first point of contact for patients in most of the European countries including the UK.

Objective: The purpose of this systematic review (SR) and meta-analysis is to estimate the prevalence of multimorbidity among adults aged 18 and above in European primary care settings.

Methods: Six electronic databases (Embase, Medline, Global Health, PsycINFO, CINHAL, and Web of Science) were searched using a well-structured search strategy. Multimorbidity (MM) in this review is defined as "two or more Chronic Conditions (CC) or Long-term Conditions (LTCs) in an individual". Out of 6135 retrieved articles, 12 articles were included in the final analysis based on eligibility criteria. For quality assessment, the Newcastle-Ottawa scale (1) was used. Meta-analysis was performed using a random-effects model to assess the pooled prevalence, and I^2 statistics (4,5) were used to quantify heterogeneity.

Results: A total of 12 studies were included, with 2.9 million participants and the number of defined CCs in the studies ranged from 17 to 147 for seven European countries (Switzerland, Netherlands, Spain, Germany, Portugal, West of Ireland, and the United Kingdom). The overall prevalence of multimorbidity in the adult population in European primary care settings was 39% (95% CI [26, 54]; I^2= 100%). Subgroup analysis found variation in MM prevalence based on age ranging from 13% (95% CI [7, 22]; I^2 = 100%) in the youngest age group to 83% (95% CI [72, 89]; I^2 = 100%) in the oldest age group, based on gender prevalence rates were found to be 41% (95% CI [26, 58]; I^2 = 100%) and 44% (95% CI [29, 61]; I^2 = 100%) among males and females respectively, and prevalence based on coding system was found to be 43% (95% CI [26, 62]; I^2 = 100%) for ICD, 47% (95% CI [24, 72]; I^2 = 100%) for ICPC, and 21% (95% CI [15, 28]; I^2 = 100%) for read codes.

Conclusions: Multimorbidity is a growing problem in primary care settings throughout Europe. We found approximately 1 in 3 adults have multimorbidity, which highlights the importance of developing appropriate clinical recommendations and healthcare policies to manage and support this rising patient population with multimorbidity. Standardized guidelines and frameworks are needed in multimorbidity research and management as currently multimorbidity is defined differently among nations and studies.

Keywords: Prevalence, Multimorbidity, Primary Care

Regular Sessions

In silico potential of arteannuin-B derivatives in case of anthelmintic drug resistance

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Drug resistance to anthelmintics is a very significant problem in terms of social health. The two main elements are the prevalence of helminthic infections in developing countries and the donation of millions of anthelmintic drugs in the epidemic regions. In this case, it is inevitable resistance to anthelmintic drugs. Therefore, before the drug resistance problem has become, it is a necessity to discover novel and effective drugs. In this study, the mutations that could be related to drug resistance against Mebendazole (MBZ), which is one of the most preferred anthelmintic drugs, were searched. According to *in silico* docking results, the mutant protein sequence (*C. elegans* β-tubulin protein) predicted that it would be resistant and was docked with seventy-five different arteannuin-B derivatives designed *de novo*. As a result, it was the first time shown via *in silico* modeling that some arteannuin-B derivatives could inhibit MBZ resistance mutants. These results are original due to the methodology that predicted resistance development to MBZ and in terms of showing that arteannuin-B derivatives would be useful in the condition of anthelmintic resistance development. Therefore valuable *in silico* data were provided for the next *in vitro* studies.

Keywords: Arteannuin-B, anthelmintics, drug resistance, MBZ, molecular docking

Regular Sessions

Prediction of anthelmintic effects of some naphthyl derivatives via molecular dockings

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Helminthic infections are a global health problem affecting more than one billion people worldwide. The problem of resistance development to anthelmintics necessitates the discovery of new drugs, especially in preventing the prevalence of helminthic diseases, which are the only drug options in their treatment. Beta tubulin proteins found in helminths are the known target of benzimidazole group drugs. The fumarate reductase enzyme in the parasite is targeted by Thiabendazole, and the inhibition of the carnitine palmitoyl transferase 2 enzyme (CPT 2) indirectly leads to the death of the helminth. In this study, the anthelmintic effects of some naphthyl derivatives were investigated by *in silico* molecular docking experiments on these three different target proteins. As a result of this study, it was revealed for the first time that some naphthyl derivatives could have an anthelmintic effect through CPT 2 enzyme inhibition (*Ki*: 62.47 nM). The results of this study contain *in silico* data that can be used in *in vitro* and *in vivo* research to develop new anthelmintics.

Keywords: Naphthyl derivatives, anthelmintics, molecular dockings, CPT 2 enzyme

Regular Sessions

Method Optimization and Validation for Simultaneous and Accurate Quantification of Important Fourteen Aliphatic Hydrocarbons in Tap Water

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The quality and safety of water are becoming more and more important. Therefore, improved procedures are required to monitor water for unwanted organic substances [1]. Usually, tap water is monitored for its content of organohalogen compounds. However, organic compounds such as aliphatic and aromatic hydrocarbons also need to be reported when they occur in dissolved form in tap water. Aliphatic hydrocarbons are a type of organic compound that can be present in tap water. Of course, aliphatic hydrocarbons and other organic compounds, including some natural organics, are found in tap water and are related to waterborne diseases and cancer. Therefore, the planning and assessment of procedures to determine the content of organic compounds in tap water is not a simple task. However, there are large families of alkylated compounds which, if present in tap water, present a much more serious health problem primarily because of their chronic toxicity and the mutagenicity of the metabolites. The study aimed to develop a method for simultaneously analyzing fourteen volatile aliphatic hydrocarbons in tap water. The method involved direct injection of the sample into a purge and trap (PT) gas chromatography (GC) system, which was then coupled with mass spectrometry (MS). The goal was to identify and quantify these substances in the tap water. The developed and optimized method has been validated and confirmed by following certain guidelines and standards such as the Commission Decision Eurochem Guideline [2] and Guidelines for Standard Method Performance Requirements [3]. In addition, during the method development phase, similar studies in the literature were taken into account, apart from certain guidelines and standards [4-7]. In method optimization of PT extraction, the maximum efficient conditions were obtained at 40 mL/min purge gas flow rate, 11 min purge time, and 180 °C desorb temperature. All the aliphatic hydrocarbons investigated in this study were sufficiently and reliably determined within the performance limits of the PT-GC-MS system. It includes studies of selectivity, linearity, limit of detection (LOD) and limit of quantification (LOQ), precision (recovery), accuracy, precision, and measurement uncertainty. In the selectivity study, no significant findings were found in the retention time intervals of the relevant analytes as a result of the duplicate analysis of six blank samples. Calibration curves for linearity study have high and sufficient correlation coefficients between 0.9956-0.9996 at seven concentration levels (0.15-20.00 µg/L). In accuracy, the recoveries of each analyte ranged from 83.1% to 98.1% (RSD (%) <10), indicating that the method has sufficient analytical conditions for the accurate and precise measurement of the relevant aliphatic hydrocarbons in tap water. This method performed acceptable precision (intra-day recovery: 81.2–96.5%, relative standard deviation (RSD): 1.99–7.21%; inter-day recovery: 85.6–98.8%, RSD: 1.71–7.11%). The recovery of these analytes in water CRM ranged from 90.1% to 107.9% and the RSD (%) values for these achieved below 10%. The proposed method was successfully applied in the determination of relevant analytes in real-time tap water samples. In these samples, trichloromethane (0.22-2.83 µg/L), bromodichloromethane (0.15-1.21 µg/L), and dibromochloromethane (0.16-1.18 µg/L) were detected more than other substances both in number and quantity.

Keywords: Aliphatic hydrocarbons, Gas chromatography, Measurement uncertainty, Purge & trap, Tap water

Regular Sessions

In silico molecular dockings of bioactive compounds of anthelmintic plants

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Helminthic infection is an important health problem that affects the growth of hundreds of millions of humans and animals, especially in developing countries. In treating recurrent helminthic diseases, it is the best way to take orally the natural compound with the least side effects. In drug research, *in silico* simulations, the first and probably the most important step, help to estimate the pharmacokinetics, pharmacodynamics, and side effects of the drug. This study aims to research some natural compounds that can be used continuously in the treatment of recurrent helminthic infections. For this purpose, we predicted the anthelmintic properties of some bioactive compounds from *Artemisia annua* L., *Momordica charantia*, and *Origanum vulgare subsp. hirtum*, and *Rubus canescens* DC. Bioactive components were docked with anthelmintic target proteins (β-tubulin, fumarate reductase, and carnitine palmitoyl transferase 2 (CPT 2) enzyme) using AutoDock 4.2 and Biovia Discovery Studio 2020 Client programs. In the results, it was demonstrated based on molecular interactions that oreganol, momordicin II, cucurbitacin-B, and charantadiol-A have multi-inhibitory properties against different anthelmintic proteins. It was revealed for the first time that cucurbitacin-B can inhibit rat CPT 2 enzyme with an exceptionally good score value (K_i= 57,11 picomolar and ΔG=-13,97 kcal/mol), These findings hold significant implications in the medical field, as they indicate that the compounds in question could serve as broad-spectrum anthelmintic drugs. Based on the study results, future anthelmintics may be based on cucurbitans, joining benzimidazoles and macrocyclic lactones as effective treatments. This study marks the first time that the necessary *in silico* scientific data has been obtained to support this insight.

Keywords: anthelmintic*, Artemisia, Origanum*, *Momordica, in silico* docking

Regular Sessions

Immobilization of Ni metal to PVP/Gelatin copolymer and investigation of its structure

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Gelatin is a protein of animal origin and is a very important material due to its biocompatibility, biodegradability, and cheap price [1]. Gelatin is often considered the prototype of natural polymer gel-forming systems. To improve the chemical, physical, mechanical, and thermal properties of these systems, their copolymers based on synthetic polymers are obtained [2]. Polyvinylpyrrolidone (PVP) is a synthetic polymer derived from the monomer N-vinylpyrrolidone. It has a polar structure and is widely used in the pharmaceutical, cosmetic, and food industries [3]. PVP and gelatin-based copolymers are used in various fields due to their ability to coordinate, trap, and immobilize metal ions such as heavy metal removal, biosensors, and catalysts.

In this study, PVP and gelatin-based copolymer structures were synthesized and nickel (Ni) metal salt immobilization was performed. For this, PVP and gelatin are first dissolved in a suitable solvent (water) until a homogeneous mixture is formed. The copolymerization reaction proceeds by mixing and therefore heating the solution. The resulting compound was dried and analyzed by Fourier Transform Infrared Spectroscopy (FTIR). The characteristic peaks of both PVP and gelatin were observed in the FTIR spectrum of PVP-gelatin copolymer. Then, 1 g of copolymer (PVP/gelatin) is dissolved in 50 ml of water, metal-containing salt ($NiCl_2 \cdot 6H_2O$) is added to the solution, and it is stirred again for 3 hours, and a reducing agent ($NaBH_4$) is added to the solution to bring the nickel ions to Ni^0. Then, it is washed with ether (diethyl ether) and distilled water to remove Cl^- ions and salt residues. Finally, the cross-linking process is carried out with the cross-linking agent N,N/-methylene-bis-acrylamide. Identification of the material obtained as a result of the experiment was carried out by various physico-chemical research methods.

Keywords: copolymer, nickel, immobilization

Regular Sessions

Investigation of Simultaneous Electricity Production and Herbicide Biodegradation in Microbial Fuel Cells Using *Psychrobacter sp. TaeBurcu001* Isolated from Antarctica

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Dalapon (2,2-DCP) is one of the herbicides that has been frequently used in Türkiye since the mid-1950s and has a polluting effect in nature. The maximum concentration limit (MCL) for Dalapon in drinking water, determined worldwide, is 200 µg/L. The accepted concentration for Dalapon to be poured into water in Türkiye is 6000 mg/L. In studies conducted on the effects of Dalapon on aquatic organisms, it was observed that Dalapon at a concentration of 3800 mg/L had a toxic effect on *Rasbora heteromorpha* species fish when touched for 48 hours. According to research, Dalapon was detected in around 0.61 µg/L in drinking water, 0.01 µg/L in wastewater, and 0.23-0.28 µg/L in tap water. This research, it is aimed to provide simultaneous Dalapon biodegradation and electricity production by using the *Psychrobacter sp. Taeburcu001* strain, which was recently isolated from Antarctica and can use Dalapon as a carbon source, with microbial fuel cells (MFC). Single-chamber MFCs were prepared and operated according to previous papers. Five experiment groups are carried out with single-chambered MFCs, and voltage graphs at different Dalapon concentrations (10 mM and 20 mM) are drawn accordingly using a computer-based data acquisition device. Experiment groups contain MFCs that include only *Psychrobacter sp. Taeburcu001,* only mixed culture taken from the local wastewater treatment plant, and *Psychrobacter sp. Taeburcu001* with mixed culture, respectively. An open system and an abiotic system are also used as control groups. For the analysis, microbial ecology analysis is done for the evaluation of microbial communities that form on the anode, and biodegradation analysis is done via LC-MS device. Findings indicate that higher concentrations of Dalapon were causing lower voltage production on only mixed culture experiment groups. It is thought that the information obtained will be a pioneer for the investigation of other pollutants.

Keywords: Biodegradation, Dalapon, Herbicide, Microbial Fuell Cell, *Psychrobacter sp. TaeBurcu001*

Regular Sessions

Biodegradation of DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl) ethane) using New Designed Soil Microbial Fuel Cell

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Pesticides, particularly those used in agriculture, pose significant environmental and health risks, with DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl) ethane) being one of the most concerning due to its widespread use and classification as an environmental pollutant. Developing biosensors for the early detection of DDT before it spreads from contaminated soils to other components of the ecosystem is crucial. Additionally, the remediation of DDT-contaminated soils is vital for public health, and various bioremediation strategies have been proposed. This study aims to investigate the impact of DDT on the performance of soil-based microbial fuel cells, which have been selected as the model system for this investigation. By addressing the public health risks and soil contamination caused by DDT, this study seeks to contribute to the development of biosensor technologies and bioremediation solutions. Over four months, the effects of DDT on electricity generation in soil-based microbial fuel cells were examined. The chemical properties of soil samples were analyzed both before and after the operation. Key performance indicators of the microbial fuel cells, including power density, current density, coulombic efficiency, and chemical oxygen demand (COD) removal, were analyzed using a data acquisition system. Additionally, the study evaluated the vitamin-mineral content, ion exchange, pH, salinity, electrical conductivity, and total organic carbon (TOC) removal in soil samples before and after the operation. DDT and its metabolites were quantified using gas chromatography-mass spectrometry (GC-MS). The decomposition and physicochemical parameters of these pesticides were analyzed through computational chemistry and correlated with the electricity generation data.

Keywords: Biodegradation, Environmental Microbiology, Insecticide, Microbial Fuel Cells, Soil Microbiology.

Regular Sessions

Palladium porphyrins and their chitosan immobilization derivatives and their photodynamic activities against Staphylococcus aureus

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Porphyrins are an important class of macrocyclic bioorganic molecules that occur naturally in biological living organisms (Kadish et al., 2001). Porphyrins are suitable molecular dyes for photodynamic therapy (PDT) applications, a therapeutic method for many diseases, including cancer (Vicente et al., 2001). PDT requires the administration of a photosensitizer (PS) drug in conjunction with the light of appropriate wavelength to form a cytotoxic effect. Upon photoexcitation, the PS is excited to its lowest energy singlet excited state (^{1}PS*). If the PS can undergo non-radiative intersystem crossing (ISC), the converted PS is converted to the triplet excited state (3 PS*). Subsequent energy transfer to molecular dioxygen, produces highly cytotoxic species, such as singlet oxygen, causing photoinduced damage to the tumor cells or bacteria (Robertson et al., 2009). Infectious diseases are still one of the biggest health problems worldwide. The situation has been exacerbated due to the emergence of antibiotic resistance. For this reason, new treatment methods have gained importance in the fight against antimicrobial resistance (Smith et al., 2002). Photodynamic antimicrobial therapy (PACT) applying the mechanism described above has been considered a promising strategy for treating pathogen-associated infections (Liu et al., 2015). Metal-free tetra-*meso*-dibutylaminophenylporphyrin (**P1**) was prepared along with its palladium complex (**P2**) and subsequently a tetra cationic quaternized species (**P3**). **P1**–**P3** were immobilized by chitosan, which is known to be an environmentally friendly biomaterial (Kumar et al., 2000). The photophysical and photochemical properties of **P1**–**P3** and their chitosan conjugates were investigated along with their photodynamic activities against *Staphylococcus aureus (S. Aureus)* as a typical gram-(+) bacterium.

Keywords: Chitosan, palladium porphyrins, photosensitizer, photodynamic antimicrobial therapy

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Regular Sessions

Inhibitory effects of nanoborate solution against CA I, II, and XII

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Abstract:

Carbonic anhydrase (CA) is a widely present class of metalloenzymes that catalyzes the reversible hydration and dehydration of carbon dioxide, a process essential for several physiological functions such as respiration, CO2/bicarbonate transport, pH regulation, electrolyte secretion, gluconeogenesis, and more. There are five main classes of CA enzymes: α, β, γ, δ, and ζ. Among the 16 known α-class isoforms, human CA I and II are cytosolic enzymes distributed throughout the body and serve as drug targets for diuretics, antiglaucoma drugs, and anticonvulsants. Additionally, hCA IX and XII are transmembrane glycoproteins linked to hypoxic tumors. Overexpression of these tumor-associated isoforms acidifies the extracellular environment, aiding tumor cell survival and reducing the efficacy of weakly basic anticancer drugs. Moreover, these isoforms supply the bicarbonate necessary for cell growth. Thus, selective inhibition of hCA IX and XII, while avoiding hCA I and II, is a promising strategy for cancer therapy (Ram et al., 2014). On the other hand, Boric acid and borax have been recognized as mild antiseptics for approximately a century. Their biocidal effect requires prolonged exposure to microorganisms, which is a limitation. Additionally, their low solubility in water (4.90 g for boric acid and 5.14 g for borax at 20 °C) hampers the enhancement of their antibacterial properties. Therefore, the preparation of stable nanosized sols at concentrations above a certain threshold may be an effective approach to improve the inhibition action of these compounds (Tsuyumoto et al., 2007). Against hCA I, II, and XII, nine types of nanoborate compounds have been investigated at pH 7.4. Although all tested compounds were comparatively less potent against CA I, II, and XII, the derivation process of nanoborate solution and inhibitory effects against different types of human enzymes will be continued.

Keywords: nanoborate solution, carbonic anhydrase, CA I, CA II, CA XII.

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Regular Sessions

Antibacterial properties of substituted phenethylamine-based β-lactam derivatives in oral infections

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Oral infections are a type of infection that occurs in and around the mouth, typically arising when proper oral hygiene is neglected (1). These infections manifest as symptoms such as mouth sores, dental caries, and periodontal diseases, with dental caries being the most common form. Streptococcus and Lactobacillus bacteria are the primary causative agents in dental caries (2). These bacteria act as opportunistic pathogens, potentially leading to serious diseases. Moreover, antibiotic resistance is developing in these pathogenic bacteria, limiting treatment options (3). B-lactam antibiotics are particularly important due to their broad spectrum and selective toxicity (4). In this study, the antibacterial activities of previously synthesized phenethylamine-based β-lactam derivatives against oral pathogens were investigated. The antibacterial activities of the compounds were determined using agar well diffusion and microdilution assays. The study observed that β-lactam derivatives formed inhibitory zones against the growth of oral pathogens, while imine compounds did not form such zones. The diameter of the inhibition zones for the β-lactam compounds ranged from 0.9 to 2.1 cm. The MIC values were calculated to be between 12.5 and 100 µM. These data suggest that β-lactam derivatives could be potent therapeutic agents for oral infections.

Keywords: β-lactam, Imine, Phenethylamine, Oral pathogens, Antibacterial activity.

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