

Joint Event

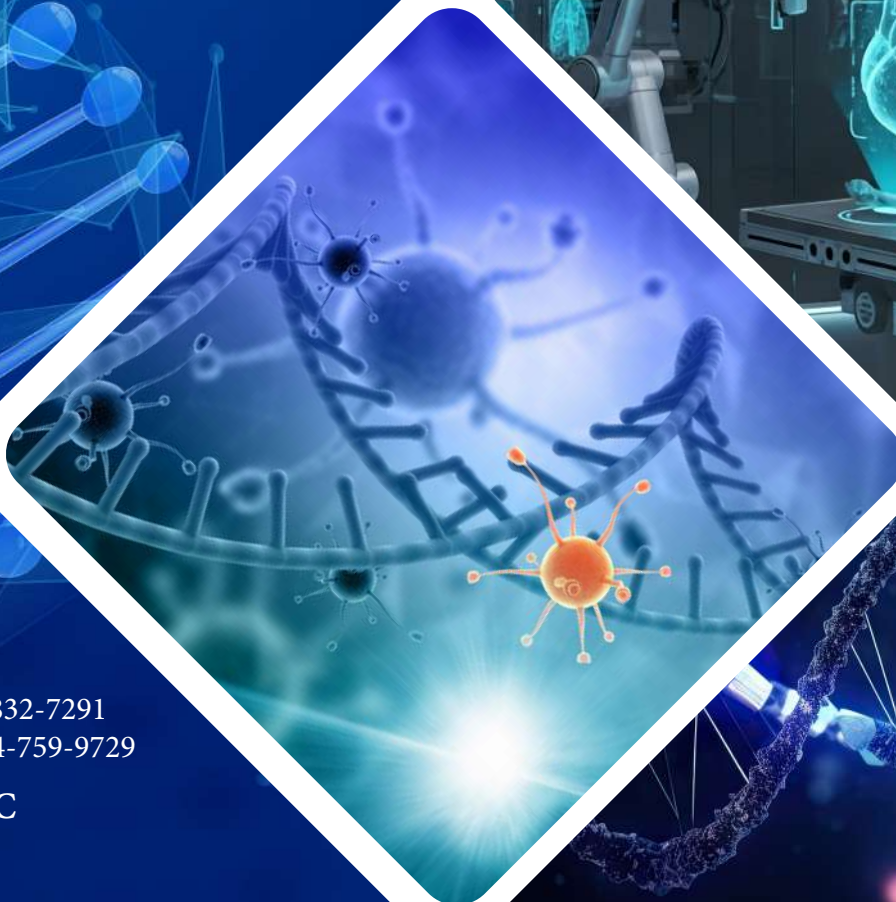
4th European Congress on

Biomedical Science and Engineering

&

Human Genetics

April 27-28, 2026 | Berlin, Germany



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Scisynopsis LLC

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Floor Map

Holiday Inn Berlin Airport Conference Centre

Hans-Grade-Allee 5 · 12529 Schönefeld bei Berlin



Conference Hall - London

Wifi Details

Username: CONFERENCE
Password: HOLIDAY12529

Speaker Representations



Day 1

27th April

Session Chairs

Gulsen Meral, Epigenetic Coaching Company, UK and Nisantasi University, Turkey
Chen Yong Lin, Georgetown University, USA

Conference Programme

Day 1 - April 27, 2026

Meeting Hall: London

08:00 - 08:45 Registrations

08:45 - 09:00 Opening Ceremony and Introduction

Keynote Presentations

09:00 - 09:40 Chen Yong Lin, Georgetown University, USA

Title: SPINT2 Mutations in the Kunitz Domain 2 Found in SCSD Patients Inactivate HAI-2 as Proastasin Inhibitor *via* Abnormal Protein Folding and N-glycosylation

09:40 - 10:20 Gulsen Meral, Epigenetic Coaching Company, UK and Nisantasi University, Turkey

Title: Nutrigenetic-Based Epigenetic Modulation: Prevention of Neurodegenerative Diseases and Reversal of Biological Aging for Healthy Longevity

Networking & Refreshments: 10:20 - 10:35 @ Lobby Nord

10:35 - 11:15 Alexander Lazarov, Sofia University, Bulgaria

Title: The New Reality of AI in Healthcare

11:15 - 11:55 Cees Th Smit Sibinga, University of Groningen and IQM Consulting, Netherlands

Title: How to Master and Sustain Quality in Transfusion Medicine

Oral Presentations

Session Chair Gulsen Meral, Epigenetic Coaching Company, UK and Nisantasi University, Turkey

Session Chair Chen Yong Lin, Georgetown University, USA

Sessions: Biomedical Engineering | Pharmacogenomics | Nano and Micro Technologies | Bioinformatics and Computational Genetics | Cancer Biology | Immunogenetics | Biomedical Imaging | Drug Discovery & Delivery | Ethics and Policies in Human Genetics | Neurogenetics | Cytogenetics | Genetic Disorders | Genetic Mapping | Biomechanics

11:55 - 12:25 Amine Sabri, Graduate School of Biomedical Engineering and Health Techniques, Morocco

Title: The Integration of Artificial Intelligence in Medical Imaging

12:25 - 12:55	Marcel Młyńczak, Clebre, Poland
Title: Validation of a Multi-Algorithm Respiratory Analysis Platform with Embedded Sensor for Home-based Sleep Monitoring	
Group Photo: 12:55 - 13:10	
Lunch: 13:10 - 14:00 @ Open Lobby	
14:00 - 14:30	Mohammadmahdi Karimi, University of Iceland, Iceland
Title: Developing Reliable Sensory Feedback Pathways for Prosthetic Users <i>via</i> Vibrotactile Encoding	
14:30 - 15:00	Faranak Rostamjoud, University of Iceland, Iceland
Title: Enhanced EMG Control through Residual Muscle Training in Individuals with Transtibial Amputation	
15:00 - 15:30	Abyt Ibraimov, International Higher School of Medicine, Kyrgyzstan
Title: Adaptive Changes of Chromosomal Q-heterochromatin in The Human Population	
15:30 - 16:00	Neval Burkay, Epigenetic Coaching Company, UK
Title: Genetic Variants Affecting Inflammation, Methylation, and Recovery in Elite Athletes: A Nutrigenetic Viewpoint	
Networking & Refreshments: 16:00 - 16:30 @ Lobby Nord	
Poster Presentations 16:30 - 17:00	
Poster Judge	Cees Th Smit Sibinga, University of Groningen and IQM Consulting, Netherlands
PP 001	Mauricio Martínez, Universidad La Salle, Mexico
Title: Neural Network–Driven Intelligent System for Early Detection of Amyotrophic Lateral Sclerosis	
PP 002	Andrea Martinez Zayas, Cinvestav Research Institute, Mexico
Title: H2A:Z as An Epigenetic Target for Eliminating Pancreatic Cancer Stem Cells (PCSCs)	
PP 003	Tomasz Gredes, Dresden University of Technology, Germany
Title: Electrospun Biodegradable PLA/Hydroxyapatite Nanocomposite Membranes for Bone and Soft Tissue Regeneration	

PP 004	Dimitra Kourti, National and Kapodistrian University of Athens, Greece
Title: Detection of Uropathogenic Bacteria through A White Light Reflectance Spectroscopy Biosensing Platform	
PP 005	Michailia Angelopoulou, National and Kapodistrian University of Athens, Greece
Title: Multiplex Detection of Antimicrobial Resistant Uropathogens through A White Light Reflectance Spectroscopy Biosensor	
PP 006	Sotirios Kakabakos, National and Kapodistrian University of Athens, Greece
Title: Optical Biosensor for Detection of Enterococcus Faecalis in Urine Samples	
PP 007	Andres Moron Mendoza, Autonomous Metropolitan University Iztapalapa Unit, Mexico
Title: Musculoskeletal Biomechanical Evaluation using Magnetic Resonance Imaging in Hemodialysis Patients: Organizational and Public Health Policy Implications with A Gender Perspective	
Oral Presentations	
17:00 - 17:30	Ipek Meral, Epigenetic Coaching Company, UK
Title: The Convergence of AI and Epigenetics: Revolutionizing Precision Health through a Global Virtual Clinic Framework	
17:30 - 18:00	Margarida Santos, Imperial College London, United Kingdom
Title: Characterisation of Skin Mechanics and the Effects of Ageing through Non-invasive Methods	
Video Presentation	
VP 001	S Surya, Saveetha School of Law, India
Title: Neural Genetic Regulatory Concerns in National and Multinational Companies in Chennai- an Genome Law Inefficiency Perspective	
E-Poster Presentation	
EP 001	Giuseppe Gargano, UCAM Catholic University of Murcia, Italy
Title: Vitamin D and Articular Cartilage: The Role of Genetic Biomarkers in Osteoarthritis	
Day-1 Concludes followed by Certificate Distributions	

Day 2

28th April

Session Chairs

Gulsen Meral, Epigenetic Coaching Company, UK and Nisantasi University, Turkey
Chen Yong Lin, Georgetown University, USA

Day 2 - April 28, 2026	
Meeting Hall: London	
Keynote Presentations	
10:00 - 10:40	Uri Zilberman, Barzilai Medical University Center, Israel
Title: Amelogenesis Imperfecta Genes and New Mutations of Peculiar Types	
10:40 - 11:20	Alexander Lazarov, Sofia University, Bulgaria
Title: Patient-Safe Clinical Methods for Assessing the Reliability of Autonomously Generated AI Diagnostics: Theoretical Framework	
Networking & Refreshments: 11:20 - 11:35 @ Lobby Nord	
11:35 - 12:15	Chen Yong Lin, Georgetown University, USA
Title: ST14 Mutations Disrupt the Matriptase-EpCAM/Trop-2 Axis in Autosomal Recessive Ichthyosis with Hypotrichosis	
12:15 - 12:55	Gulsen Meral, Epigenetic Coaching Company, UK and Nisantasi University, Turkey
Title: Understanding Vitamin D Deficiency Personalized Approaches to Vitamin D Deficiency: The Role of Nutrigenetics and Epigenetics	
Lunch: 12:55 - 14:00 @ Open Lobby	
Oral Presentations	
Session Chair	Gulsen Meral, Epigenetic Coaching Company, UK and Nisantasi University, Turkey
Session Chair	Chen Yong Lin, Georgetown University, USA
Sessions: Gene Therapy Biomedical Engineering Genetic Engineering Stem Cell Genetics Cancer Genetics Molecular Biology and Genetics Global Health Tech Neural Engineering Cellular Bioengineering Translational Genetics Tissue Engineering Biomedical Imaging Cancer Technologies	
14:00 - 14:30	Motahareh Mirzadeh, Friedrich-Alexander University of Erlangen-Nuremberg, Germany
Title: Clinical Application of 3D Printed Scaffold to Regenerate Congenital Cleft Palate Defects	
14:30 - 15:00	Ceren Can, CARMED Pharmaceuticals, Turkey
Title: Genetic Insight to Daily Behavior: Bridging the Gap Between Science and Consumer Health	

15:00 - 15:30	Oyku Gonul Geyik, Istinye University, Turkey
Title: Translational Epigenetic and Multi-Target Therapeutic Potential of Carvacrol-based Essential Oil Formulations in Precision Oncology	
15:30 - 16:00	Gaurav Badoni, All India Institute of Medical Sciences Rishikesh, India
Title: Screening Himalayan Flora for Inhibitory Effects on Dengue Serotype 2 Replication	
Networking & Refreshments: 16:00 - 16:30 @ Lobby Nord	
16:30 - 17:00	Motahareh Mirzadeh, Friedrich-Alexander University of Erlangen-Nuremberg, Germany
Title: Optimising Polymer-Ceramic Ink Formulations for Clinically Effective 3-D-Printed Hydroxyapatite Meshes in Craniofacial Reconstruction	
17:00 - 17:30	Eric Z M Gbotoe, Grand Gedeh University College, Liberia
Title: Building Resilient Health Systems in Low-Resource Settings through Biomedical Science and Engineering: A University-Led Model for Sustainable Health and Innovation in Liberia	
Day-2 Concludes followed by Certificate Distributions and Vote of Thanks	

Virtual

28th April

Virtual Programme

Virtual Presentations

Day 2 - April 28, 2026, 10:00 BST

Keynote Presentation

10:00- 10:40

Nadya AlYacoub, King Faisal Specialist Hospital and Research Centre, Saudi Arabia

Title: DCAF17 Deficiency Triggers Ferroptosis and Inflammatory Cell Death via Mitochondrial-Lysosomal Dysfunction in Germ Cells

Oral Presentation

10:40 - 11:05

Raghda Abdelmonem Abdelmajeed Mahmoud, German University, Egypt

Title: N-methyladenosine RNA base Modification Regulates NKG2D-dependent and Cytotoxic Genes Expression in Natural Killer Cells

Poster Presentation

11:05 - 11:15

Lala A Akhundova, MSE Republic of Azerbaijan, Azerbaijan

Title: Genetic Association of Polymorphisms of the KCNJ11, PPARG, and TCF7L2 Genes with T2D in Azerbaijan Population

Oral Presentations

11:15 - 11:40

Homaira Arian, Anadolu University, Turkey

Title: Genetic Advancements in Breast Cancer Treatment: a Review

11:40 - 12:05

Nermeen Mohamed Sayed Ahmed Badr Elbakary, Egyptian Atomic Energy Authority, Egypt

Title: Nattokinase Mitigates Myocardial Damage and Renal Dysfunction in γ -Irradiated Rats Treated with Isoproterenol

12:05 - 12:30

Laiba Rehmat, Aga Khan University, Pakistan

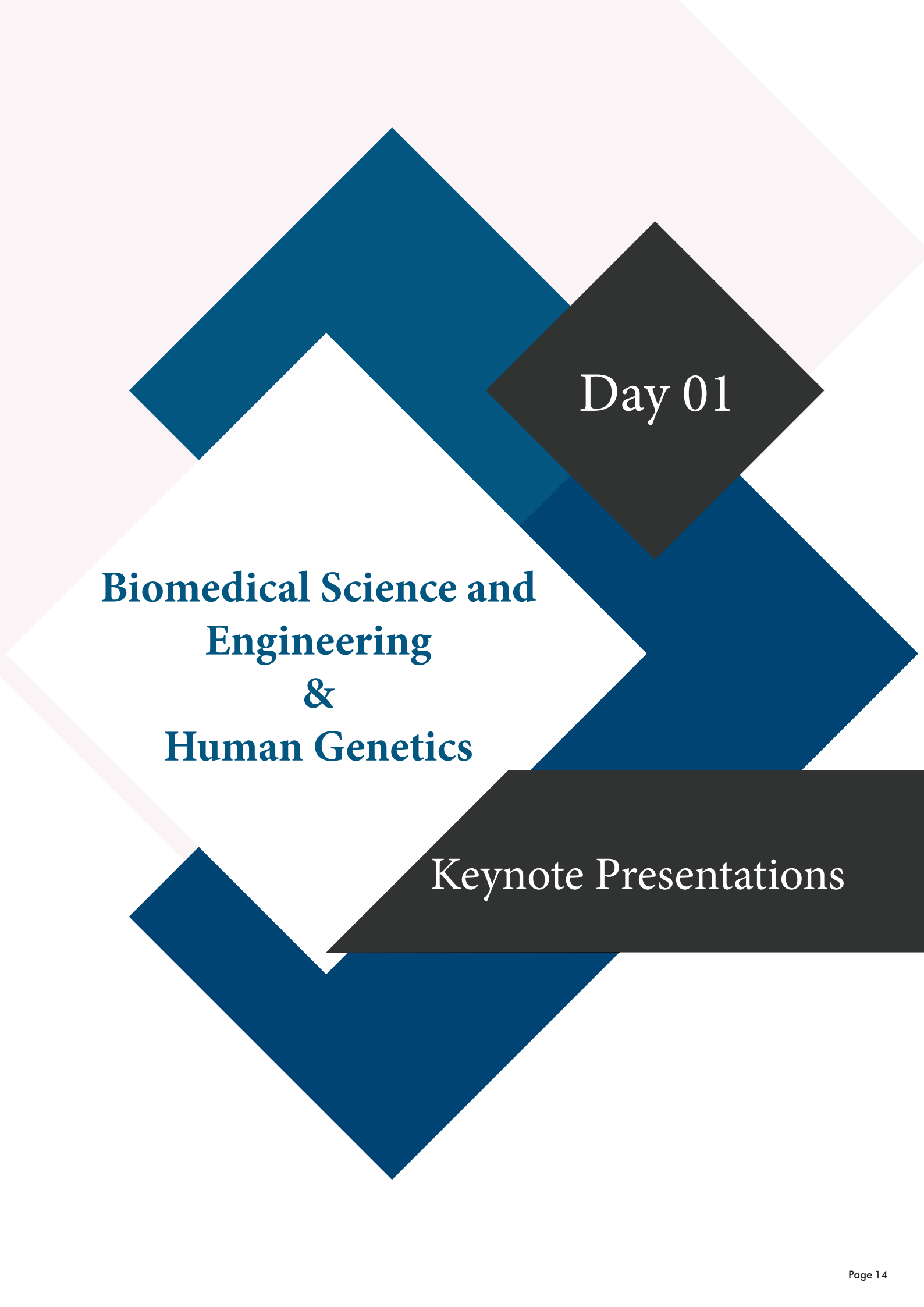
Title: Anti-Mullerian Hormone Gene Polymorphism in Polycystic Ovary Syndrome: A Pilot Study

12:30 - 12:55

Hema Kumar Chandru, Dayananda Sagar College of Engineering, India

Title: Bioinformatics Analysis of Genes Responsible for Diseases such as Breast Cancer, Lupus, and Gonorrhea

12:55 - 13:20	Sheikh Zinia Rahman, University of Dhaka, Bangladesh
Title: Integrated Genetic and In silico Analysis of GSTT1 and GSTM1 in Bangladeshi Patients with Chronic Obstructive Pulmonary Disease	
13:20 - 13:45	Humayra Ferdous, American International University-Bangladesh, Bangladesh
Title: Biomedical Science and Research for Lower and Middle-income Countries:From Public Health and Health Finance Perspective	
13:45 - 14:10	Raheel Bayat, Kavosh Nonprofit Educational-Research Institute, Kabul, Afghanistan
Title: Effects of Urtica dioica on Cognition in Hyperglycemic Animal Models: A Systematic Review	
14:10 - 14:35	Mariano Votta, Italian NGO Cittadinanzattiva, Italy
Title: A Broader Narrative on Respiratory Diseases. A Citizens and Patients Perspective towards the Development of An EU Respiratory Health Plan	
14:35 - 15:00	S Surya, Saveetha School of Law, India
Title: Neural Genetic Regulatory Concerns in National and Multinational Companies in Chennai- an Genome Law Inefficiency Perspective	
Program Concludes	



Day 01

**Biomedical Science and
Engineering
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Human Genetics**

Keynote Presentations

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



SPINT2 MUTATIONS IN THE KUNITZ DOMAIN 2 FOUND IN SCSD PATIENTS INACTIVATE HAI-2 AS PROSTASIN INHIBITOR VIA ABNORMAL PROTEIN FOLDING AND N-GLYCOSYLATION



Chen Yong Lin, Nanxi Huang, Qiaochu Wang, Robert B Bernard, Chao Yang Chen, Je Ming Hu, Jehng Kang Wang, Khee Siang Chan, and Michael D Johnson

Georgetown University, USA

Abstract:

Mutations in the Kunitz-type serine protease inhibitor HAI-2, encoded by SPINT2, are responsible for the pathogenesis of syndromic congenital sodium diarrhea (SCSD), an intractable secretory diarrhea of infancy. Some of the mutations cause defects in the functionally required Kunitz domain 1 and/or subcellular targeting signals. Almost all SCSD patients, however, harbor SPINT2 missense mutations that affect the functionally less important Kunitz domain 2. How these single amino acid substitutions inactivate HAI-2 was, here, investigated by the doxycycline-inducible expression of three of these mutants in HAI-2-knockout Caco-2 human colorectal adenocarcinoma cells. Examining protein expressed from these HAI-2 mutants reveals that roughly 50% of the protein is synthesized as disulfide-linked oligomers that lose protease inhibitory activity due to the distortion of the Kunitz domains by disarrayed disulfide bonding. Although the remaining protein is synthesized as monomers, its glycosylation status suggests that the HAI-2 monomer remains in the immature, lightly glycosylated form, and is not converted to the heavily glycosylated mature form. Heavily glycosylated HAI-2 possesses full anti-protease activity and appropriate subcellular targeting signals, including the one embedded in the complex-type N-glycan. As predicted, these HAI-2 mutants cannot suppress the excessive prostatic proteolysis caused by HAI-2 deletion. The oligomerization and glycosylation defects have also been observed in a colorectal adenocarcinoma line that harbors one of these SPINT2 missense mutations. Our study reveals that the abnormal protein folding and N-glycosylation can cause widespread HAI-2 inactivation in SCSD patients.

Biography

Chen Yong Lin is an Associate Professor at the Lombardi Comprehensive Cancer Center, Georgetown University. His research focuses on membrane-associated proteolysis and its implications in molecular medicine. Dr. Lin investigates the molecular mechanisms underlying the pathogenesis of two rare inherited genetic disorders caused by mutations in SPINT2 and ST14. With more than 100 peer-reviewed publications, his work has significantly advanced understanding in epithelial biology, molecular genetics, and cancer therapeutics. He has received multiple awards recognizing his scientific excellence. Deeply committed to translational research, Dr. Lin strives to bridge fundamental genetic discoveries with clinical applications to improve patient outcomes.

4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



NUTRIGENETIC-BASED EPIGENETIC MODULATION : PREVENTION NEURODEGENERATIVE DISEASES AND REVERSAL OF BIOLOGICAL AGING FOR HEALTHY LONGEVITY



Gulsen Meral^{1,2}

¹*Epigenetic Coaching Company, UK*

²*Nisantasi University, Turkey*

Abstract:

Neurodegenerative diseases represent a growing global health burden, strongly associated with aging, environmental factors, and complex gene-environment interactions. Emerging evidence suggests that epigenetic mechanisms, including DNA methylation, histone modifications, and non-coding RNAs, play a central role in the pathogenesis and progression of disorders such as Alzheimer's and Parkinson's disease. Importantly, these epigenetic modifications are dynamic and potentially reversible, offering promising targets for preventive and therapeutic strategies.

Nutrigenetics provides a personalized framework to modulate epigenetic pathways through dietary interventions tailored to individual genetic profiles. Key metabolic pathways, particularly one-carbon metabolism, influence methylation capacity and are critically involved in neurodegeneration through mechanisms such as hyperhomocysteinemia, oxidative stress, and neuroinflammation. Genetic polymorphisms in genes such as *MTHFR*, *VDR*, and *BCMO1* further modulate nutrient metabolism and susceptibility to disease.

Specific nutrients, including vitamins B12, B9, D, and A, along with bioactive compounds and dietary patterns such as the Mediterranean diet and methionine restriction, have demonstrated potential to regulate epigenetic marks and support neuroprotection. Additionally, lifestyle factors such as physical activity may contribute to the modulation of the epigenetic clock, thereby influencing biological aging and disease risk.

This review highlights the integrative role of nutrigenetic-based epigenetic modulation in preventing neurodegenerative diseases and potentially reversing biological aging processes. By bridging molecular mechanisms with personalized nutrition and lifestyle interventions, this approach offers a novel paradigm for promoting healthy longevity within the framework of predictive, preventive, personalized, and participatory (4P) medicine.

Biography

Gulsen Meral graduated from Istanbul University Cerrahpasa Faculty of Medicine in 1994. She became a Pediatrician in 2001 and served as a specialist physician, deputy chief physician, and chief physician at various hospitals. She completed her doctorate in Medical Genetics at Biruni University. She holds a master's degree in Hospital Management and a bachelor's degree in Turkish Language and Literature. She served as Advisor to the Rector at Northern Cyprus ITU between 2019 and 2021. She has taught Nutrigenetics at the postgraduate level and has taught both undergraduate and postgraduate courses in child development.

She is also an acupuncture instructor. She currently serves as a professor in the Department of Child Health and Diseases at Istanbul Nisantasi University. She also continues her research and educational activities as the founder and manager of Epigenetic Coaching (UK).

Prof. Meral has numerous national and international scientific publications and has served on editorial boards and as a reviewer for various

4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



academic journals. In addition to her scientific work, Prof. Meral is also interested in literature and has published five poetry books. She is the founder of the Nutrigenetics and Epigenetics Association in Turkey and the UK and is a member of Yeşilay, the Rumeli Association, the Istanbul Acupuncture Association, and the International Nutrigenetics and Nutrigenomics Association. She has chaired the First, Second, and Third International Epigenetics Congresses and continues to provide leadership and training in the Epigenetics Coaching Program. Additionally, she delivers internationally accredited Continuing Professional Development (CPD) training in Nutrigenetics and Epigenetics Consulting to healthcare professionals worldwide.

4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



THE NEW REALITY OF AI IN HEALTHCARE



Alexander Lazarov

Sofia University St. Kliment Ohridski, Bulgaria

Abstract:

Artificial intelligence (AI) has become an increasingly influential component of contemporary healthcare, and in certain contexts it already operates with a degree of autonomy. Although AI will not replace physicians, clinicians who effectively integrate AI into their practice may ultimately substitute for those who do not.

Successful implementation of AI requires physicians to develop a nuanced understanding of its capabilities and operational logic, including aspects such as Big Data processing, the “Black Box” phenomenon, and conceptual frameworks like the Inform-Perform-Transform triad associated with perceptual deformation. Despite its ability to use natural language and generate sophisticated analytic-synthetic outputs-sometimes exceeding human cognitive performance-AI does not think. This distinction demands careful attention from medical professionals who rely on AI driven tools in clinical decision making.

The purpose of this presentation is to advocate for a cautious and informed adoption of AI in patient care. By clarifying the fundamental principles underlying AI systems, it aims to help clinicians avoid being misled by technologies that, while powerful, remain non sentient and fundamentally distinct from human reasoning.

Biography

Alexander Lazarov is a retired lecturer in Philosophy of AI at Sofia University “St. Kliment Ohridski” (2017–2025), where he taught within the Master’s and Doctoral programs in Philosophy in English. His central research perspective emphasizes that the effective integration of AI into healthcare requires transdisciplinary collaboration among AI developers, clinicians, and philosophers, rather than a purely interdisciplinary exchange. He is currently engaged in advancing clinician–philosopher collaborative frameworks with Elena Goranova of University Hospital “Lozenets” in Sofia, Bulgaria, and President of the Balkan Venous Forum; Sergio Ganesini of the University of Ferrara and the Uniformed Services University of Health Sciences in Bethesda, USA, who also serves as President of the World Union of International Phlebology and the Venous-lymphatics World International Network Foundation; Rashad Bishara, President of the Egypt & Africa Vein and Lymph Association and Chairman of the International Committee of the American Venous Forum; and Alexander Gungov, a philosopher and expert in phenomenology and ethics at Sofia University.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



HOW TO MASTER AND SUSTAIN QUALITY IN TRANSFUSION MEDICINE



Cees Th Smit Sibinga

University of Groningen and IQM Consulting, Netherlands

Abstract:

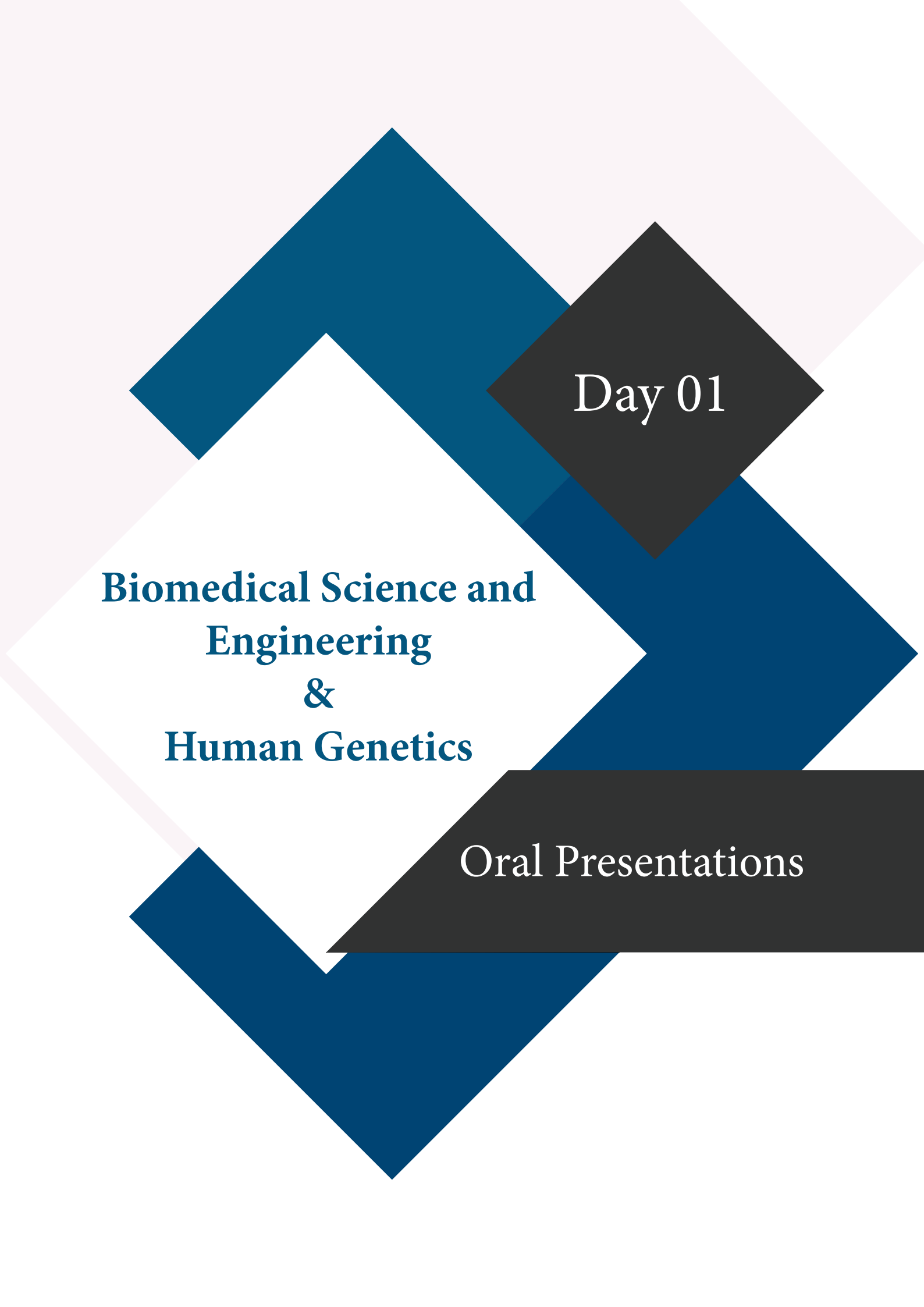
The vein-to-vein transfusion chain consists of two distinct elements

- 1) The procurement part, focused on the manufacturing of safe, effective and quality-assured blood products from blood donated by (preferably regular) voluntary blood donors;
- 2) The clinical decision making, prescription and use of blood components in the hospitals.

To allow consistent preparation and use of blood components that are safe and clinically efficacious, an appropriate quality system should be put in place that covers both the management, as well as the technical operations of facilities involved in the chain. This presentation describes and discusses the different managerial and operational systems available and their applicability in transfusion medicine; how to master and sustain.

Biography

Cees Th Smit Sibinga is a clinical hematologist and Transfusion Medicine specialist. He has dedicated his professional life with WHO to support developing countries (Low- and Middle-Income Countries or LMICs) - organization, governance, Quality Systems and Management, education and the structuring of the primary operations and the clinical Transfusion Medicine. He published >400 peer reviewed publication, hundreds of scientific abstracts and >40 books (edited and written). He organized >30 scientific symposia, congresses and meetings.



Day 01

**Biomedical Science and
Engineering
&
Human Genetics**

Oral Presentations

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



THE INTEGRATION OF ARTIFICIAL INTELLIGENCE IN MEDICAL IMAGING

Amine Sabri

Graduate School of Biomedical Engineering and Health Techniques, Morocco

Abstract:

Medical imaging plays a central role in modern biomedical practice, enabling the visualization, diagnosis, and monitoring of a wide range of diseases. Modalities such as X-ray, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound generate large volumes of complex data that require accurate and timely interpretation. In recent years, artificial intelligence (AI) has emerged as a valuable tool to support medical imaging workflows by enhancing image analysis and assisting clinical decision-making.

This work explores the integration of artificial intelligence within medical imaging from a biomedical engineering perspective. The study focuses on how machine learning and deep learning techniques can be incorporated into key stages of the imaging pipeline, including image preprocessing, feature extraction, segmentation, and classification. Particular attention is given to clinically relevant applications such as disease detection, anatomical measurement, and screening support, where AI can improve consistency and reduce inter-observer variability. Rather than replacing clinicians, AI-based systems are designed as assistive tools that provide quantitative outputs, visual annotations, and decision-support insights to complement medical expertise. The integration process also requires careful consideration of biomedical constraints, including image acquisition protocols, variability between imaging devices, and patient safety. Performance evaluation relies on standard biomedical metrics such as accuracy, sensitivity, specificity, and reproducibility to ensure clinical relevance. The integration of artificial intelligence into medical imaging demonstrates significant potential to improve diagnostic efficiency and support personalized healthcare. However, successful clinical adoption depends on rigorous validation, transparency of algorithms, and ethical deployment within healthcare systems. This work highlights the role of biomedical engineering in bridging medical knowledge and artificial intelligence to develop reliable and clinically meaningful imaging solutions.

Biography

Amine Sabri is a biomedical engineer specializing in the installation, commissioning, and maintenance of medical imaging equipment. He is currently pursuing a State Engineering Degree in Biomedical Engineering at the Graduate School of Biomedical Engineering and Health Techniques (SUPTECH Santé) in Morocco. His academic background also includes a Professional Bachelor's degree and a University Diploma in Biomedical Instrumentation and Maintenance.

4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



Amine has acquired solid hands-on experience in clinical environments, working with a wide range of medical imaging systems such as radiography, computed tomography (CT), magnetic resonance imaging (MRI), mammography, ultrasound, and interventional imaging platforms. He has been involved in preventive and corrective maintenance, system calibration, software deployment for medical image management, and technical support of imaging equipment from manufacturers including Siemens, Fujifilm, Canon, General Electric, and Perlove. Alongside his technical expertise, Amine has a strong interest in the integration of artificial intelligence into medical imaging workflows, particularly for improving measurement accuracy, diagnostic support, and system reliability. His professional and academic interests reflect a biomedical engineering approach that combines medical technology, clinical needs, and emerging digital solutions to support safer and more efficient healthcare systems.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



VALIDATION OF A MULTI-ALGORITHM RESPIRATORY ANALYSIS PLATFORM WITH EMBEDDED SENSOR FOR HOME-BASED SLEEP MONITORING

Marcel Młyńczak
Clebre, Poland

Abstract:

Background: The demand for scalable, non-invasive, and user-friendly solutions for long-term sleep monitoring is increasing, particularly for detecting sleep-disordered breathing outside clinical settings. Manual annotation of respiratory episodes and reliance on costly hospital-based polysomnography (PSG) remain major limitations.

Objective: To develop and validate a comprehensive platform integrating a wearable sensor and machine learning-based algorithms for automated respiratory event detection, body position analysis, and extended home monitoring.

Methods: A collaborative platform comprising a mobile app and web system was developed to enable expert annotation of respiratory events. Two segmentation methods were tested: (1) adaptive short-time energy thresholding of body-acquired audio and (2) spectral variability analysis with the first selected for implementation due to computational efficiency. A neural network classifier was trained on previously labelled episodes. Motion analysis used adaptive vector magnitude thresholding. All algorithms were implemented directly on the device. Pilot home studies assessed sensor functionality and ease of self-installation using dedicated double-sided patches, verified through audio data quality. User feedback on comfort and usability informed design refinements. Bioethical approval (No. 25/2020/VII) was obtained, and the study was registered in EudraCT (2020-000684-23). Forty parallel overnight recordings with the wearable sensor and PSG were performed to evaluate algorithms.

Results: A neural network classifier trained on ~28,000 episodes achieved high performance (Accuracy=98.6%, Recall=98.3%, Precision=99.0%). The best apnoea detection accuracy was 87.3% for AHI classification, with 92% accuracy at the AHI=30 threshold. Similar performance for AHI=15 was achieved by combining approaches A2 and A3. Sleep/wake classification reached 90.4% agreement with PSG. Extended analysis confirmed body position classification accuracy (mean positional error: $3.1 \pm 2.8\%$). Multi-night home recordings (2-6 nights per patient) demonstrated feasibility and revealed a median reduction in supine position from 61% to 26% compared to hospital PSG. Final hardware and firmware were optimized for size, energy

4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



efficiency, and user comfort.

Significance: The developed platform enables reliable at-home detection of respiratory disorders and sleep parameters. High diagnostic accuracy, seamless data processing, and usability make it a promising tool for scalable sleep health monitoring and long-term therapeutic assessment.

Biography

Marcel Młyńczak serves as an Associate Professor at the Faculty of Mechatronics at Warsaw University of Technology, Poland, where he earned his Ph.D. in 2018. He previously held a Visiting Assistant Professorship at Stanford University's School of Medicine. His research expertise spans Biomedical Engineering, Data Science and Machine Learning, Medical Technology, and related fields, including Physiological Measurements, Cardiorespiratory Activity, Impedance Pneumography and Spectroscopy, Sports and Sleep Medicine, Clinical Investigations, Biostatistics, and Signal and Image Processing. Dr. Młyńczak has completed professional development programs such as Transformation.Doc in Soft Skills, Entrepreneurship, and Economic Collaboration at the University of Alberta, and the Healthcare Leadership Programme at Oxford University. His contributions have been recognized, i.e., the Best Paper Award from the Journal of Science and Medicine in Sport (2022) or the Minister of Education and Science Scholarship for Outstanding Young Scientists (2021).

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



DEVELOPING RELIABLE SENSORY FEEDBACK PATHWAYS FOR PROSTHETIC USERS VIA VIBROTACTILE ENCODING

Mohammadmahdi Karimi

University of Iceland, Iceland

Abstract:

The integration of naturalistic sensory feedback is essential for improving control, embodiment, and user confidence in modern prosthetic systems and effective sensory feedback remains one of the key challenges in the development of advanced transfemoral prosthetic systems. This study examined vibrotactile encoding parameters to determine optimal conditions for conveying lower-limb motion cues through upper-limb stimulation. A custom-designed, forearm-mounted vibrotactile system was used, comprising three adjustable bands with paired dorsal and volar actuators that represented toe-off, heel strike, ankle, and knee movements. Twelve healthy adults participated in each of two controlled experiments. Experiment 1 investigated the influence of interstimulus interval (ISI) on recognition accuracy across eight vibrotactile patterns, with ISIs ranging randomly between 10ms and 110ms in 20ms steps. Experiment 2 examined the effect of waveform type (sine vs square) while holding other parameters constant. Participants identified each presented pattern using a graphical interface, and recognition accuracy was analyzed. Results showed consistently high recognition accuracy across all tested ISIs (mean range: 82-84%) with no significant effect of ISI ($p=0.70$). Similarly, accuracy remained high for both waveform types (mean $\pm$ SD: 90% $\pm$ 5.4 for sine, 93% $\pm$ 5.1 for square) without a significant difference between them ($p=0.17$). These outcomes indicate that participants were able to reliably discriminate complex vibrotactile patterns regardless of timing or waveform variations. Overall, the findings suggest that vibrotactile pattern recognition remains robust across both temporal and waveform parameters, providing a stable basis for sensory encoding. These results help define optimal design conditions for developing intuitive and reliable sensory feedback systems for transfemoral prosthetic applications.

Biography

Mohammadmahdi has his expertise in biomedical engineering with a strong focus on bioinstrumentation, signal processing, and system modeling. His passion lies in advancing human-machine interfaces to improve the quality of life for individuals using assistive technologies. Building upon his academic foundation, earning both his B.Sc. and M.Sc. in Biomedical Engineering from the Islamic Azad University in Tehran, he developed a deep understanding of algorithms, sensors, and biomedical system design. His professional experience as a biomedical engineer further strengthened his skills in medical device evaluation and clinical applications. Currently, he is pursuing a Ph.D. in Bioengineering at the University of Iceland within the school of engineering and natural sciences. His research, in collaboration with Össur and the University of Iceland, focuses on designing and developing tactile sensory feedback systems to enhance perception and control in bionic prosthetic limbs. Through his research and innovation, Mohammadmahdi aims to bridge engineering and human physiology to create smarter, more intuitive prosthetic solutions.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



ENHANCED EMG CONTROL THROUGH RESIDUAL MUSCLE TRAINING IN INDIVIDUALS WITH TRANSTIBIAL AMPUTATION

Faranak Rostamjoud

University of Iceland, Iceland

Abstract:

Accurate and stable voluntary muscle activation is essential for intuitive myoelectric control of lower-limb prostheses, yet residual limb muscles in transtibial amputees (TTAs) often display inconsistent activation patterns. This study examined whether a four-week structured training could enhance the accuracy and stability of muscle contractions during a trajectory-tracking task.

Eight male TTAs were assigned to either biofeedback training plus home exercises (Group A, n=3) or home exercises alone (Group B, n=5). Participants used real-time surface EMG feedback to follow a target trajectory at 40% of maximum voluntary contraction (MVC) for the tibialis anterior (TA), peroneus longus (PL), and gastrocnemius (GAS). Tracking accuracy was quantified by root-mean-square error (RMSE) between the recorded and target trajectories, while signal stability was evaluated as time outside bound (TOB), the percentage of each contraction spent outside $\pm 20\%$ of its mean amplitude.

Across participants, both RMSE and TOB significantly decreased after training ($p < 0.001$), indicating improved control precision and steadiness. Mean RMSE reductions from pre- to post-training were $-2.0 \pm 5.1\%$ MVC for TA, $-4.5 \pm 6.0\%$ for PL, and $-4.3 \pm 7.8\%$ for GAS, with muscle-specific differences evident ($p = 0.006$). Similarly, TOB decreased by $-9.6 \pm 7.8\%$ for GAS and $-10.0 \pm 6.0\%$ for PL ($p \leq 0.001$), whereas changes in TA were minimal ($-1.7 \pm 5.1\%$, $p = 0.78$). Improvements occurred in both groups with no significant difference, suggesting that consistent home-based practice alone was sufficient to elicit early neuromuscular adaptation.

These results demonstrate that even brief, low-intensity training can improve residual muscle activation in TTAs. Enhanced control precision and reduced signal variability strengthen the reliability of EMG inputs for prosthetic control, representing an important step toward more intuitive and responsive lower-limb prosthesis operation.

Biography

Faranak holds both a B.Sc. and an M.Sc. in Biomechanical Engineering and is currently nearing the completion of her PhD in Biomechanical Sciences at the University of Iceland. Her doctoral research, conducted in collaboration with Össur, focuses on the development of an EMG-controlled prosthetic ankle designed to enhance mobility and adaptability for lower-limb amputees. Her work combines experimental and computational approaches, evaluating the performance of residual muscles in amputees using EMG and ultrasound imaging, designing biofeedback systems and home-based training protocols aimed at improving neuromuscular control, and conducting kinematic and kinetic analyses of EMG-controlled prosthetic performance. She is passionate about engineering solutions that improve mobility, functionality, and quality of life.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



ADAPTIVE CHANGES OF CHROMOSOMAL Q-HETEROCHROMATIN IN THE HUMAN POPULATION

Abyt Ibraimov, Stalbek Akhunbaev and Orozali Uzakov

International Higher School of Medicine, Kyrgyzstan

Abstract:

Homo sapiens is the only one of the animals that managed to populate the entire Earth while remaining a single tropical biological species. It is noteworthy that modern man started and implemented this unprecedented biological experience in a very short period of time (50,000-70,000 years). There are many hypotheses that try to answer this question: the role of reason, a large brain with neocortex, high physiological plasticity, bipedalism, the peculiarity of the forelimbs and many others. After the completion of the Human Genome Project, the possible role of genes in the adaptation to different ecological zones began to be studied purposefully. Yet many questions remain unanswered, including why exactly did man manage to master of the Earth, if there are no genes in his genome, which in one form or another would be absent in other animals? We believe that a part of the so-called 'excess' DNA in the human genome, which represents chromosomal heterochromatin regions (HRs), probably played and continues to play an important role in this process. In particular the chromosomal Q-heterochromatin regions (Q-HRs), which are present in the genome of only three higher primates (*Homo sapiens*, *Pan troglodytes* and *Gorilla gorilla*). The peculiarity of chromosomal Q-HRs is that they show wide heritable variability only in the human populations. We managed to obtain data indicating the adaptive changes in the chromosomal of Q-HRs in the human population, which due to circumstances beyond their control migrate to the territory with extreme climatic conditions.

Biography

Abyt Ibraimov has more than 50 years experience in studying of human chromosomal Q-heterochromatin regions (Q-HRs) polymorphisms in norm and pathology. His first papers were published in 80th (*Hum. Genet.*, 1982, 66:1-7; 62: 252-265). To-date, two types of heterochromatin are known: C- and Q-heterochromatin. There are several significant differences between them, including the fact that C-heterochromatin is encountered in chromosomes of all higher eukaryotes, while Q-heterochromatin is only present in man, the chimpanzee and gorilla. In his laboratory, these studies were developed in two directions: 1) Possible role of different amounts of Q-HRs in human adaptation to different ecological zones; 2) In pathogenesis of certain purely human pathologies such as atherosclerosis, obesity, alcoholism and drug addicts.

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Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



GENETIC VARIANTS AFFECTING INFLAMMATION, METHYLATION, AND RECOVERY IN ELITE ATHLETES: A NUTRIGENETIC VIEWPOINT

Neval Burkay

Epigenetic Coaching Company, UK

Abstract:

Background: Athletic performance, recovery capacity, and injury risk in elite athletes are influenced not only by training load and environmental factors but also by individual genetic differences. Single nucleotide polymorphisms (SNPs) that impact inflammatory signaling pathways and cellular stress responses may have a significant role in the level of post-exercise inflammation, tissue repair processes, and long-term performance sustainability.

Objective: This presentation aims to thoroughly assess genetic variants related to inflammation, one-carbon metabolism, and methylation capacity, and to analyze their effects on performance enhancement, recovery efficiency, and injury risk management in elite athletes.

Methods: Key polymorphisms in pro-inflammatory cytokine genes, including IL6, IL1B, and TNF, were studied in relation to exercise-triggered inflammatory responses and the risk of soft-tissue injury. Additionally, variants in genes involved in one-carbon metabolism and methylation pathways (MTHFR, MTRR, CBS) were evaluated for potential associations with hyperhomocysteinemia and vascular dysfunction.

Results: Variants in IL6, IL1B, and TNF were linked to increased post-exercise inflammation, delayed recovery, and higher risk of soft-tissue injuries. Polymorphisms in methylation-related genes were associated with elevated homocysteine levels, which could impair vascular health and mitochondrial function. Targeted optimization of key nutrients-including active folate, vitamins B6 and B12, riboflavin, and choline-proved to be an essential approach for managing these genetic risks. It was highlighted that anti-inflammatory dietary patterns, omega-3 fatty acid supplementation, and polyphenols (such as quercetin and curcumin) might not be suitable for all genotypes. Consideration of genetically driven food sensitivities, including lactose intolerance, gluten sensitivity, and histamine intolerance, further underscores the need for personalized dietary protocols for athletes.

Conclusion: Epigenetic interventions guided by nutrigenetic testing are a powerful and essential way to boost performance longevity, improve recovery, and unlock biological potential in elite athletes. Using genetic data to customize nutrition and recovery plans offers a precise approach for long-term athletic success.

4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



Biography

Neval Burkey earned a BS in Nutrition and Dietetics with High Honors in 2023 from Muğla Sıtkı Koçman University, Faculty of Health Sciences, Department of Nutrition and Dietetics. She is currently pursuing a Master's degree in Nutrition and Dietetics at Mediterranean University. She is now a trainer and consultant within the Epigenetic Coaching team. Her work in epigenetics and nutrigenetics includes delivering lectures, developing personalized nutrition reports, providing dietary counseling, and contributing to educational programs. She is also an active member of the Epigenetics and Nutrigenetics Organization. Her research interests include epigenetic mechanisms, methylation cycles, nutrigenetic pathways, and personalized nutrition.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



THE CONVERGENCE OF AI AND EPIGENETICS: REVOLUTIONIZING PRECISION HEALTH THROUGH A GLOBAL VIRTUAL CLINIC FRAMEWORK

Ipek Meral

Epigenetic Coaching Company, UK

Abstract:

The rapid evolution of precision medicine necessitates a shift from static genomic analysis to dynamic, actionable epigenetic interventions. This study introduces an integrated global virtual clinic framework that synergizes AI-driven epigenetic coaching with a decentralized healthcare delivery ecosystem. At the core of this platform is a proprietary bioinformatics pipeline that utilizes machine learning algorithms to analyze complex DNA methylation patterns and multi-omic data, translating molecular signals into personalized lifestyle protocols. Beyond data analysis, the framework functions as a comprehensive digital health hub where patients can discover specialized clinics, manage personalized accounts, and engage in longitudinal health tracking via automated scheduling and remote consultation tools. By bridging the gap between high-throughput epigenetic sequencing and real-time patient management, this end-to-end solution facilitates a "Clinic-as-a-Service" model that enhances patient engagement and intervention adherence. Our findings suggest that centralizing the patient journey—from initial clinic discovery to AI-assisted coaching—significantly reduces the latency between data acquisition and clinical action. Ultimately, this virtualized approach demonstrates how the integration of artificial intelligence and epigenetic science can scale personalized preventive care, transforming the future of global healthcare into a more accessible, data-driven, and patient-centric reality.

Biography

Ipek Meral is an MSc candidate in Advanced Computing at Birkbeck College, University of London, with a BSc in Computing Science from the University of East Anglia. She is a co-founder of Epigenetic Coaching, where she integrates computational tools with genetic and epigenetic analysis to develop personalized healthcare solutions. Her expertise spans artificial intelligence, bioinformatics, and data science, with a focus on precision medicine. Previously, she worked at SAP Intelligent Enterprise Institute, contributing to AI-driven solutions, and managed a DNA analysis research project for autism. She has also served as the Secretary of the 2nd International Epigenetics Congress. Ipek's work has been recognized with an iGEM Bronze Award and a City Council Award for STEM innovation. Fluent in Turkish, French, and English, she actively participates in AI research, coding hackathons, and health-tech initiatives. Her passion lies in leveraging AI to revolutionize biomedical science and personalized medicine.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



CHARACTERISATION OF SKIN MECHANICS AND THE EFFECTS OF AGEING THROUGH NON-INVASIVE METHODS

Margarida Santos

Imperial College London, UK

Abstract:

Skin is subject to structural and mechanical remodelling due to ageing. Invasive skin biopsies, whilst informative of composition and architecture at a single timepoint, do not provide insights into longitudinal changes and have clinical risks. This study aimed to non-invasively characterise the effects of ageing on skin's biomechanical properties, specifically looking at skin surface images, suction and indentation data.

33 healthy participants were recruited: young ($n=15$; 28.4 ± 3.9 years) and aged ($n=18$; 64.1 ± 5.2 years). Testing was performed within 30x30mm regions of interest on the volar and dorsal forearm. Magnified skin surface images were segmented to investigate skin topography. Suction-based testing was performed followed by viscoelastic indentation using a bespoke manual indenter. During indentation, a $\emptyset 5\text{mm}$ spherical probe was lowered into the skin up to 0.3N before being retracted. This generated load-vs-indentation curves from which the skin's stiffness (E) and a viscoelastic loss factor (W) from the hysteresis area were calculated.

Image data showed that older participants had fewer segments compared to their younger counterparts. Suction data showed that gross elasticity, net elasticity, and immediate elastic recovery all decreased significantly with age ($p<0.02$), implying the skin is less able to return to its original position visco-elastically. Skin's maximum extension and the ratio of viscous to elastic extension under suction increased with age, implying the skin is less able to withstand tensile loads. Indentation showed a statistically significant decrease in E (48-55%) and an increase in W (121-141%) with respect to age.

All three non-invasive techniques could differentiate between age cohorts. Whilst skin stiffness is a commonly evaluated parameter, the hysteresis area (W) is less so; this data shows the possibility of using W to characterise age-based skin changes. Future work will include further investigations involving both non-invasive and invasive measurements on the same cohort and finding predictive links between them.

Biography

Margarida is a PhD student investigating the biomechanics of skin. Her research is focused on understanding how ageing impacts the behaviour and function of skin, both from a mechanical and a biochemical standpoint. She is pushing to understand menopausal effects on skin mechanics and

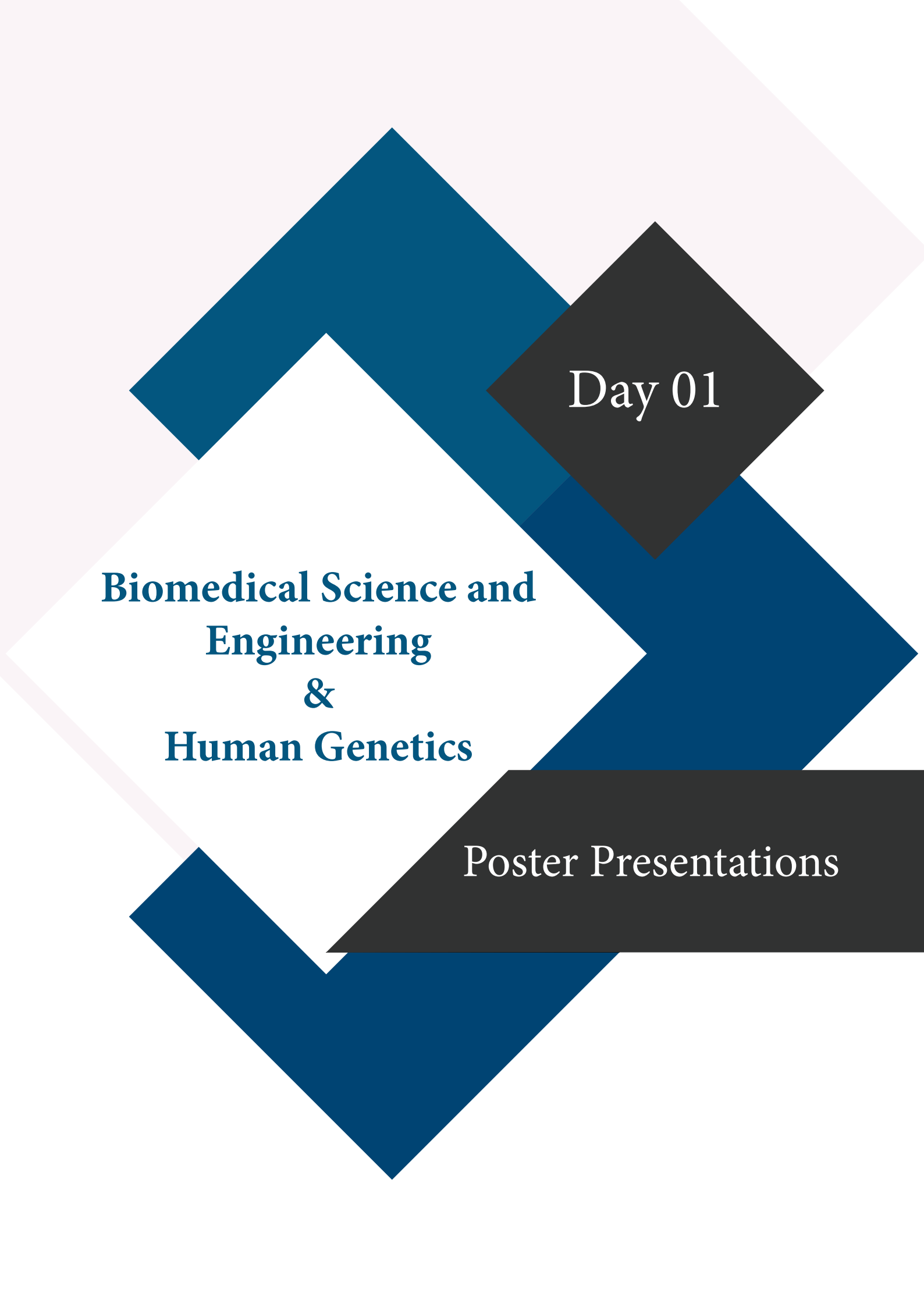
4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



protein makeup, and how these vary with respect to chronological aging. In a present and ongoing study, she is gathering a comprehensive dataset of in vivo non-invasive and invasive skin measurements with the aim of finding a predictive link between the two, ultimately helping reduce the need for invasive measures and aid skin diagnosis. Margarida completed her MEng at Imperial College London, graduating in 2021. She went on to work for a year as an R&D engineer at KwickScreen and MeshWorks where she developed her understanding of design in medical and medical-adjacent technology. Having returned to Imperial, she is now in her final year of doctoral studies, pursuing her interest in the field of Biotribology and Biomechanics.



Day 01

**Biomedical Science and
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4th European Congress on
Biomedical Science and Engineering
&
Human Genetics

April 27-28, 2026 | Berlin, Germany



**NEURAL NETWORK-DRIVEN INTELLIGENT SYSTEM FOR EARLY
DETECTION OF AMYOTROPHIC LATERAL SCLEROSIS**

**Mauricio Martínez García, Elizabeth Pérez Rodríguez, Luis Enrique Amaro Lara,
Rafael Carreño Olvera, Jesús Alejandro Gómez Pérez and Mario Alberto Rodríguez
Cruz**

Universidad La Salle, Mexico

Abstract:

Amyotrophic Lateral Sclerosis (ALS), is a neurodegenerative disease that causes progressive neurological deterioration affecting cerebral and spinal motor functions, resulting in damage to speech and voice production. This disease has become a global health crisis. In particular, the prevalence ranges between 3.4 and 12.3 per 100,000 inhabitants and, according to the Ministry of Health, in Mexico it affects around 7,000 inhabitants in this country.

In this work we develop a neural network-based approach for non-invasive diagnosis through early detection of ALS. We propose utilizing the aforementioned symptoms to train and validate a neural network-based intelligent computing system for detecting the disease in its early stages, thereby contributing to mitigate its impact and consequences.

Biography

Mauricio Martínez is an Electronics Engineer with a Master's and Ph.D. in Digital Signal Processing, currently affiliated with Universidad La Salle, Mexico. His research expertise focuses on the analysis, modeling, and interpretation of biomedical signals, with a particular emphasis on time-frequency analysis, advanced signal processing techniques, and data-driven methodologies. His work is dedicated to extracting clinically meaningful information from complex physiological data, bridging rigorous theoretical frameworks with practical applications in biomedical engineering. At BIOMED 2026, he presents collaborative research on the application of neural network architectures for the detection of Amyotrophic Lateral Sclerosis (ALS). His contribution centers on integrating time-frequency signal representations with machine learning models to enhance feature extraction, pattern recognition, and diagnostic accuracy. His research aims to support early detection strategies and contribute to the development of robust computational tools for neurological assessment.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



H2A.Z AS AN EPIGENETIC TARGET FOR ELIMINATING PANCREATIC CANCER STEM CELLS (PCSCS)

Andrea Martinez Zayas

Cinvestav, Mexico

Abstract:

Pancreatic ductal adenocarcinoma (PDAC) is a highly lethal cancer with a five-year survival rate of ~11%. This high mortality is due in part to a small population of cells that constitute the tumor, the pancreatic cancer stem cells (PCSCs). These cells have two properties: 1) Self-renewal, which means they have an unlimited replication capacity, allowing them to maintain a pool of stem cells; and 2) Pluripotency, which means they can differentiate into the different cells that constitute the tumor. Furthermore, PCSCs are quiescent cells, so chemo/radiotherapy treatments do not affect them. For this reason, PCSCs are implicated in tumor initiation, progression, metastasis, chemo/radioresistance, and recurrence. Therefore, it is urgent to identify molecules that act on them. In this sense, one of the epigenetic mechanisms that regulates stem cells is the histone variant H2A.Z, which is involved in several processes, including heterochromatin regulation, DNA repair, and transcriptional regulation. Furthermore, it is known that H2A.Z regulates the stem cell population by regulating genes that control pluripotency and self-renewal. Therefore, the present study aimed to determine whether the decrease in H2A.Z by a knockdown would have an impact on PCSCs. The results obtained show that H2A.Z.1 and H2A.Z.2 are significantly increased in PCSCs. Besides, the decrease in both isoforms in the PANC-1 cell line led to a 10-fold decrease in the PCSC population compared to the untransfected cell line, as demonstrated by flow cytometry analysis. Furthermore, analysis of RNA-seq data obtained from the KDH2A.Z vs PANC-1 NT showed that the reduction of H2A.Z affects signal transduction pathways and transcription factors that regulate stem cells. Therefore, based on this, we propose H2A.Z as a potential therapeutic target against PCSCs that would help reduce the recurrence of this fatal cancer.

Biography

Andrea Martinez Zayas is a PhD student specializing in Molecular Biomedicine, with intensive study in cancer biology, neurodegenerative diseases, and stem cell biology. Her academic journey is driven by a strong interest in understanding how complex cellular mechanisms contribute to disease development and how this knowledge can inform future therapeutic strategies. Through her doctoral studies, she is investigating the molecular and cellular dynamics underlying these interconnected fields, with a focus on innovative research approaches and interdisciplinary collaboration. In addition to her academic work, Andrea is passionate about scientific dissemination and actively engages in outreach activities aimed at making science accessible to broader audiences. She contributes to various platforms through writing, public speaking, and educational events, helping to bridge the gap between the scientific community and the public. Her goal is not only to advance scientific knowledge but also to foster a deeper public understanding of biomedical research and its impact on society.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



ELECTROSPUN BIODEGRADABLE PLA/HYDROXYAPATITE NANOCOMPOSITE MEMBRANES FOR BONE AND SOFT TISSUE REGENERATION

Tomasz Gredeš

Dresden University of Technology, Germany

Abstract:

Electrospun biodegradable scaffolds have emerged as highly promising materials for guiding bone and soft tissue regeneration due to their structural similarity to the natural extracellular matrix, tunable porosity, and ability to incorporate bioactive phases. In this study, poly (lactic acid) (PLA) nanofibrous membranes modified with hydroxyapatite (HA) nanoparticles were fabricated by electrospinning and systematically characterized in terms of morphology, composition, thermal stability, and surface properties.

Optimized electrospinning conditions (20 kV applied voltage, 3 mL h⁻¹ feed rate, 12 cm needle-collector distance) yielded uniform fibers with diameters of 300-500 nm and interconnected pore sizes of 2-6 μ m. Three types of HA nanoparticles were used to modulate bioactivity and interfacial properties: commercial HA (40-60 nm), porous HA (200-300 nm), and Mg²⁺/Sr²⁺-doped HA (80-100 nm). Scanning electron microscopy (SEM) confirmed smooth and continuous fiber morphology, while energy-dispersive X-ray spectroscopy (EDS) verified homogeneous distribution of calcium and phosphorus without agglomeration. X-ray diffraction (XRD) and Fourier-transform infrared spectroscopy (FTIR) analyses revealed the coexistence of crystalline HA within the amorphous PLA matrix, confirming chemical stability and successful incorporation of the inorganic phase.

Thermal analyses demonstrated that HA addition improved the degradation onset temperature and increased PLA crystallinity. Contact-angle measurements indicated enhanced surface hydrophilicity of PLA/HA composites, particularly for Mg/Sr-doped HA, which is expected to promote better cell adhesion. The produced membranes exhibited excellent morphological uniformity, mechanical integrity, and tunable degradability - features critical for their performance as barrier membranes and osteoconductive scaffolds.

These results demonstrate that electrospun PLA/HA nanocomposites combine biodegradability, bioactivity, and structural stability, making them strong candidates for use in guided bone regeneration and other applications in regenerative medicine and oral surgery. The developed approach offers a scalable and versatile route for producing bio functional membranes capable of supporting tissue integration and healing.

4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



Biography

Tomasz Gredes, MD, PhD, is a dentist at the Orthodontic Polyclinic of the Technische Universität in Dresden (Germany). After completing his master's degree at the Faculty of Chemistry of the University of Wrocław and his dental studies, in 2006 he began his scientific work at the University in Greifswald (Germany), where he completed his specialization in orthodontics. His stay in Greifswald was interrupted by a short research internship at the Dental School in Gold Coast (Queensland), Australia. In 2013, he began working at the Orthodontic Polyclinic of the Carl Gustav Carus University Hospital in Dresden, where he continues to work today as both a specialist orthodontist and an academic teacher. In addition to his main employment at the University Hospital in Dresden, since 2021 he has also been working as an assistant professor at the Clinic for Masticatory System Disorders at the Medical University of Poznań (Poland) and in an orthodontic practice in Dippoldiswalde (Germany). He is a leader and collaborator in research projects in the field of regenerative medicine.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



DETECTION OF UROPATHOGENIC BACTERIA THROUGH A WHITE LIGHT REFLECTANCE SPECTROSCOPY BIOSENSING PLATFORM

Dimitra Kourti

National and Kapodistrian University of Athens, Greece

Abstract:

Urinary tract infections (UTIs) impose a major global health burden, affecting about 150 million people annually. Conventional diagnostics, such as urine culture and microscopy, are often time-consuming and labor-intensive. Furthermore, enzyme immunoassays and flow cytometry require expensive instrumentation and specialized personnel. Therefore, rapid, accurate, and point-of-need methods are urgently needed. In this work, an optical bioanalytical platform based on white light reflectance spectroscopy (WLRS) for multiplex detection of uropathogens, including *Escherichia coli*, *Enterococcus faecalis*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Proteus mirabilis*, is presented. WLRS uses silicon chips coated with a transparent SiO₂ layer functionalized with biorecognition molecules. Reflections generated at the SiO₂/Si and SiO₂/environment interfaces produce an interference spectrum, and biomolecular binding on the surface causes a red shift that enables real-time and label-free detection. For multiplex analysis, discrete biofunctionalized regions are created on the SiO₂/Si chip by immobilizing target-specific recognition molecules. The chip is integrated into a microfluidic cell and mounted on a docking station aligned with a compact motorized stage. During the assay, the chip is scanned through a fixed reflection probe, allowing sequential acquisition of reflectance spectra from the individual sensing regions. As proof of concept, chips immobilized with *E. coli* bacteria were evaluated applying a competitive immunoassay configuration which requires signal-enhancement, using biotinylated secondary antibodies and streptavidin. The assay was completed in less than 30 minutes, the chips were reusable for up to 10 assay cycles, and measurements showed no cross-reaction between neighboring bands, with band-to-band variation below 8%, and great repeatability (intra-/inter-assay CVs<9%). The system is currently being further developed for the simultaneous detection of five uropathogens directly in human urine samples.

Biography

Dimitra Kourti is a Postdoctoral Researcher at the Immunoassays/Immunosensors Laboratory of the National Center for Scientific Research "Demokritos" and the Biomedical Engineering Laboratory of School of Medicine, National and Kapodistrian University of Athens (NKUA), specializing in biosensors for rapid and multiplex pathogen detection. She received her PhD in Chemistry from NKUA in 2025, where her research focused on optical immunosensors for the detection of harmful agents in food samples, including toxins and bacteria. She holds an MSc in Polymer Science (2020), with a thesis centered on the microfabrication of Si surfaces using a novel polymeric material for cell patterning, and a BSc in Chemistry (2018) from the same department. Her expertise includes optical and electrochemical biosensing strategies, ELISA, cell and bacteria culture, and optical lithography. She has published twelve papers in peer-reviewed international journals and has an h-index of 7.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



MULTIPLEX DETECTION OF ANTIMICROBIAL RESISTANT UROPATHOGENS THROUGH A WHITE LIGHT REFLECTANCE SPECTROSCOPY BIOSENSOR

Michailia Angelopoulou

National and Kapodistrian University of Athens, Greece

Abstract:

Antimicrobial resistance (AMR) is a global challenge affecting considerably human health. This is mainly caused by the extensive use of antimicrobial agents across various sectors of human activity. In the present work, we present the development of an integrated and portable system for the rapid detection of antibiotic resistance genes of microorganisms detected in urine samples. The system is based on a white light reflectance spectroscopy (WLRs) sensing principle for multiplex detection of antibiotic resistance genes (e.g., *E. coli*: *bla*TEM-1 and *sul*2; *K. pneumoniae*: *bla*CTX-M and *bla*TEM-1; *E. faecalis*: *vanA* and *vanB*) of the targeted uropathogens to specific classes of antibiotics commonly used in clinical practice for the treatment of urinary tract infections. WLRs employs silicon chips coated with a transparent SiO₂ layer functionalized with biorecognition molecules. Reflections generated at the SiO₂/Si and SiO₂/environment interfaces produce an interference spectrum, and biomolecular binding on the surface causes a red shift that enables real-time and label-free detection. For multiplex analysis, discrete biofunctionalized regions are created on the SiO₂/Si chip by immobilizing target-specific DNA probes. The chip is covered with a microfluidic module and placed on a specially designed holder aligned with a compact motorized stage. During the hybridization reaction, taking place between the immobilized probes and the amplified gene products, the chip is scanned through a fixed reflection probe, allowing sequential acquisition of reflectance spectra from the individual sensing regions. The determination of bacterial antibiotic resistance, a process that in routine clinical practice typically takes over 48 hours, is completed in less than 2 hours (including bacterial DNA extraction and amplification) thereby contributing to the effective management of urinary tract infections.

Biography

Michailia Angelopoulou received her BSc (2009), her MSc (2012), and her PhD (2017) from the Department of Chemistry, National and Kapodistrian University of Athens. From 2017-2020 she was a Postdoctoral Fellow in Immunoassays/immunosensors Lab, INRASTES, NCSR "Demokritos" through an Industrial Postdoc Fellowship funded by Stavros Niarchos Foundation. Then, she participated in a Young Researchers Support Program funded by Greek General Secretariat for Research and Innovation. Currently, she is an Associate Researcher at NCSR "Demokritos" and Assistant Professor of Clinical Chemistry at the University of West Attica. Her research interests focus on the development of immunochemical methods, optical and electrochemical sensors for the detection of biomarkers in biological fluids, as well as of toxins and bacteria in food and environmental samples. She is the author/co-auth or of 25 publications in international journals and more than 30 presentations in International Conferences..

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



**OPTICAL BIOSENSOR FOR DETECTION OF *ENTEROCOCCUS
FAECALIS* IN URINE SAMPLES**

Sotirios Kakabakos

National and Kapodistrian University of Athens, Greece

Abstract:

Infections of the urinary tract remain a major global healthcare challenge, affecting millions of people annually and requiring rapid diagnosis for effective treatment. Conventional methods such as urine culture and microscopy are labor-intensive and time-consuming, while techniques like flow cytometry and immunoassays require costly instrumentation and specialized personnel. These limitations highlight the need for rapid, sensitive, and cost-effective diagnostic tools suitable for point-of-need testing. Here, we present a biosensing platform based on White Light Reflectance Spectroscopy (WLRs) for the detection of *Enterococcus faecalis*, a clinically important urinary tract infection pathogen. The system uses silicon chips coated with a transparent SiO₂ layer, whose sensing surface is functionalized with lysed *E. faecalis* bacteria. The biochip is covered with a microfluidic cell and scanned using a reflection probe. In the competitive immunoassay format employed, urine samples are mixed with a rabbit anti-*E. faecalis* antibody and flowed over the chip for 15 min, followed by biotinylated anti-rabbit IgG antibody and streptavidin for signal enhancement. Binding events occurring on the sensor surface induce a shift in the reflected interference spectrum, enabling real-time, label-free monitoring of the immunoreactions. The platform has been designed to support multiplex analysis of uropathogens in a single run, with six discrete sensing bands functionalized with different bacterial targets. Proof-of-concept experiments were performed using *E. faecalis*-functionalized sensing zones arranged in distinct bands on the chip. The assay duration was 25 min, and provided a detection limit of 3.104 cfu/mL with good reproducibility (coefficients of variation < 10%), highlighting its potential for rapid bacterial detection. Further work is focused on the simultaneous determination of five uropathogens in human urine samples, aiming to offer early diagnosis and treatment of urinary tract infections.

Biography

Sotirios Kakabakos received his B.Sc. in Pharmacy from the University of Athens in 1980 and his Ph.D. in Pharmacy from the University of Patras in 1989. He conducted postdoctoral research at the University of Toronto Medical School during 1990–1991 and joined the Institute of Radioisotopes and Radiodiagnostic Products (IRRP) in 1992. He was appointed Assistant Researcher in 1995, Senior Researcher in 1998, and has served as Director of Research since 2004. He was also a member of the Scientific Advisory Council of IRRP and INRASTES from 1999 to 2020 and held the position of Vice Director from 2012 to 2019.

His research focuses on advanced immunoassay technologies, including multi-analyte immunoassays, optical and electrochemical immunosensors, novel solid supports, surface patterning and nanostructuring, innovative assay labels, and miniaturized diagnostic tools. He has led or contributed

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



to numerous national and EU-funded projects in biosensing and bioanalytical surface engineering. Dr. Kakabakos has supervised many Ph.D., M.Sc., and diploma students and has authored 175 journal papers, 39 conference proceedings papers, 6 book chapters, and over 200 conference presentations. He also holds 21 national, international, and European patents, including 10 related to novel biosensing platforms.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



**MUSCULOSKELETAL BIOMECHANICAL EVALUATION USING
MAGNETIC RESONANCE IMAGING IN HEMODIALYSIS PATIENTS:
ORGANIZATIONAL AND PUBLIC HEALTH POLICY IMPLICATIONS
WITH A GENDER PERSPECTIVE**

Andres Moron Mendoza

Autonomous Metropolitan University Iztapalapa Unit, Mexico

Abstract:

Chronic kidney disease (CKD) represents one of the most significant public health challenges in Latin America. The increasing prevalence of metabolic disorders such as diabetes mellitus, arterial hypertension, and obesity has led to a growing number of patients requiring renal replacement therapies, particularly hemodialysis. In addition to renal impairment, patients undergoing long-term hemodialysis frequently develop musculoskeletal alterations including muscle atrophy, weakness, chronic fatigue, and reduced functional capacity, all of which significantly affect their quality of life and independence. This study proposes an integrated approach to evaluate musculoskeletal biomechanical alterations in patients undergoing hemodialysis through the combination of functional biomechanical analysis and high-resolution magnetic resonance imaging (MRI) at 3 Tesla. Functional evaluations include standardized biomechanical tests such as the six-minute walk test, chair stand test, and handgrip dynamometry, allowing the assessment of muscular strength, endurance, and general physical performance. Magnetic resonance imaging is used to analyze skeletal muscle structure in regions such as the thigh and calf, with MRI sequences including T1-weighted imaging for anatomical analysis, T2-weighted imaging for detecting inflammatory processes or muscle edema, and Dixon sequences to quantify intramuscular fat infiltration. Structural parameters obtained from MRI, including muscle volume and cross-sectional area, are correlated with the results of the biomechanical functional tests. Preliminary findings suggest that patients undergoing hemodialysis present significant musculoskeletal alterations compared with healthy individuals of similar age, including reduced muscle volume, decreased muscle cross-sectional area, and increased fat infiltration, all associated with reduced functional performance. From an organizational and public health perspective, the results highlight the need to incorporate biomechanical assessment and musculoskeletal rehabilitation programs into hemodialysis care models. The integration of advanced medical imaging technologies with functional evaluation may improve early diagnosis, clinical management, and the development of more inclusive healthcare policies with a gender-sensitive approach.

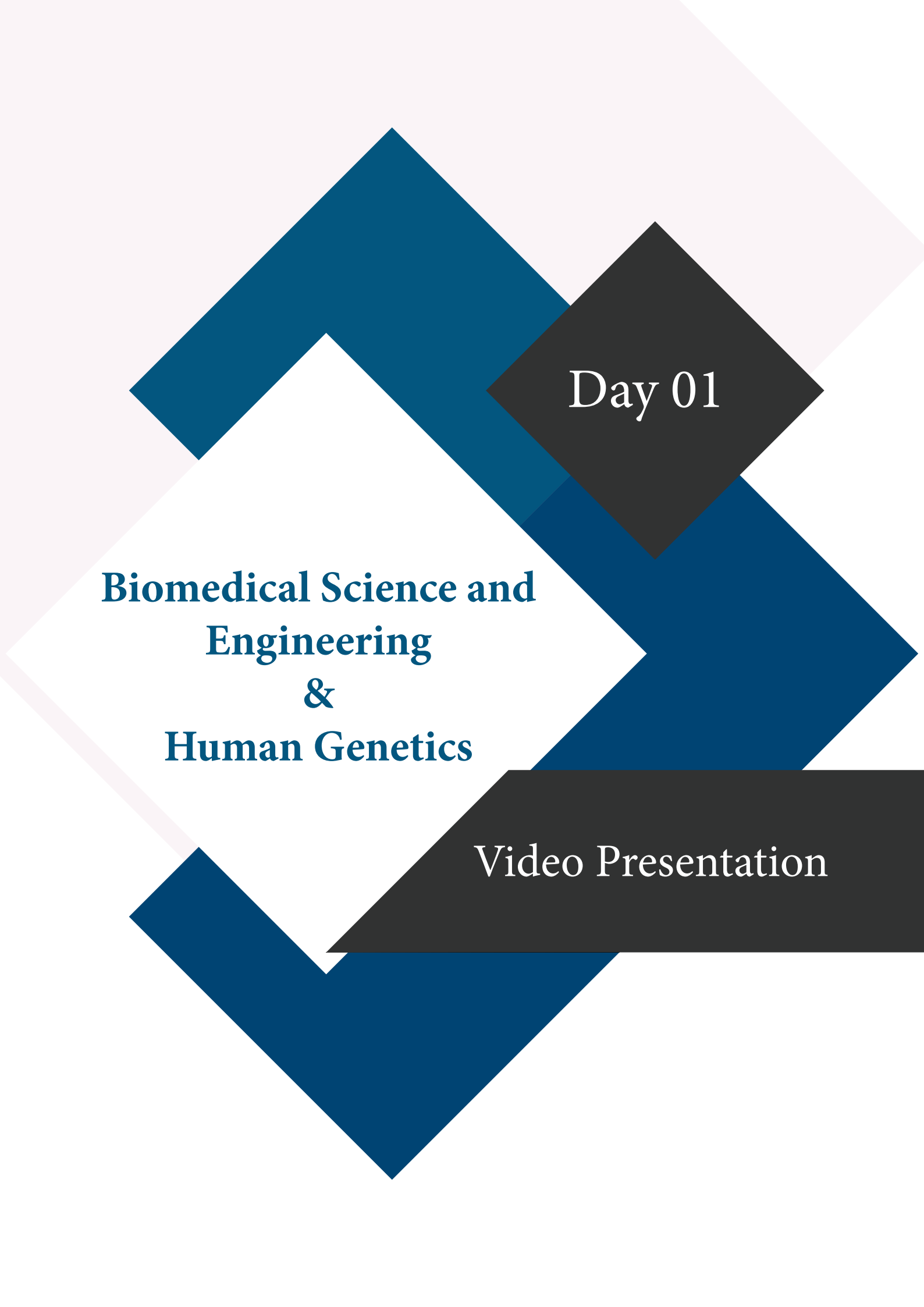
4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



Biography

Andrés Morón Mendoza is a biomedical researcher and academic affiliated with the Universidad Autónoma Metropolitana (UAM), Iztapalapa campus, Mexico. His research focuses on biomedical engineering, medical imaging technologies, and the development of innovative diagnostic and rehabilitation strategies for complex health conditions. His work integrates advanced imaging technologies such as high-field magnetic resonance imaging (3 Tesla) with biomechanical and functional assessments to better understand the impact of chronic diseases on the musculoskeletal system. His research interests include musculoskeletal biomechanics, medical instrumentation, health technology innovation, and the development of technological solutions to improve the diagnosis and treatment of patients with chronic kidney disease. He collaborates in multidisciplinary projects that combine engineering, medicine, and health sciences to strengthen scientific research and technological development in Latin America. Andrés Morón is also actively involved in initiatives related to the implementation of advanced medical technologies and healthcare innovation through the Centro Nacional de Investigación en Imagenología e Instrumentación Médica (CI3M). His work aims to bridge biomedical engineering, clinical research, and organizational studies in order to contribute to more efficient, inclusive, and patient-centered healthcare systems.



Day 01

**Biomedical Science and
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&
Human Genetics**

Video Presentation

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



NEURAL GENETIC REGULATORY CONCERNS IN NATIONAL AND MULTINATIONAL COMPANIES IN CHENNAI – AN GENOME LAW INEFFICIENCY PERSPECTIVE

S Surya

Saveetha School of Law, India

Abstract:

The decentralized methods of administration and policies that has been adopted in Indian national and multinational companies has the critical legal incongruence with neural genome framework that has been in relation with human brain and gene ethical concerns and data theft. That violates the law from Indian constitution and article specifying right to data privacy, this methodology of Ascertaining the drawbacks on legal privacy based on neural laws needs an ethical framework in order to address the issues caused due to neural disorders, HR hiring process, Health laws incompatibility, lack in data protection-brain cognitive theft and to improve the efficiency to access the neural laws to address the problems faced by employees in terms of stress, privacy to health and data, behavior regulations and applying these laws in judgement, forensic assessment and medical ethical committee to analyse the human psychological state before proceeding with any course of action further based on the detailed report of neural health. The need for a health and psychological support for employees in global companies, the health laws relating to neuro laws and neuro cognitive laws are not still none existed in India. To enhance the variance of emotional stress and trauma faced by women employees, there is a need for neuro cognition skills therapy methods like seethea framework (safety, equity, ethics, humanity, awareness and tranquility framework) that can enhance the psychological balance in humans to improve the efficiency in judging, decision making skills and health indicators to predict the future and consequences in more effective way to avoid risk. Some of these major applications for neuro cognitive skills are in branches of legal firms especially judges' judgement, forensic psychology, health wellness, in HR policies utilized by CEO and directors in management aspects etc.

Biography

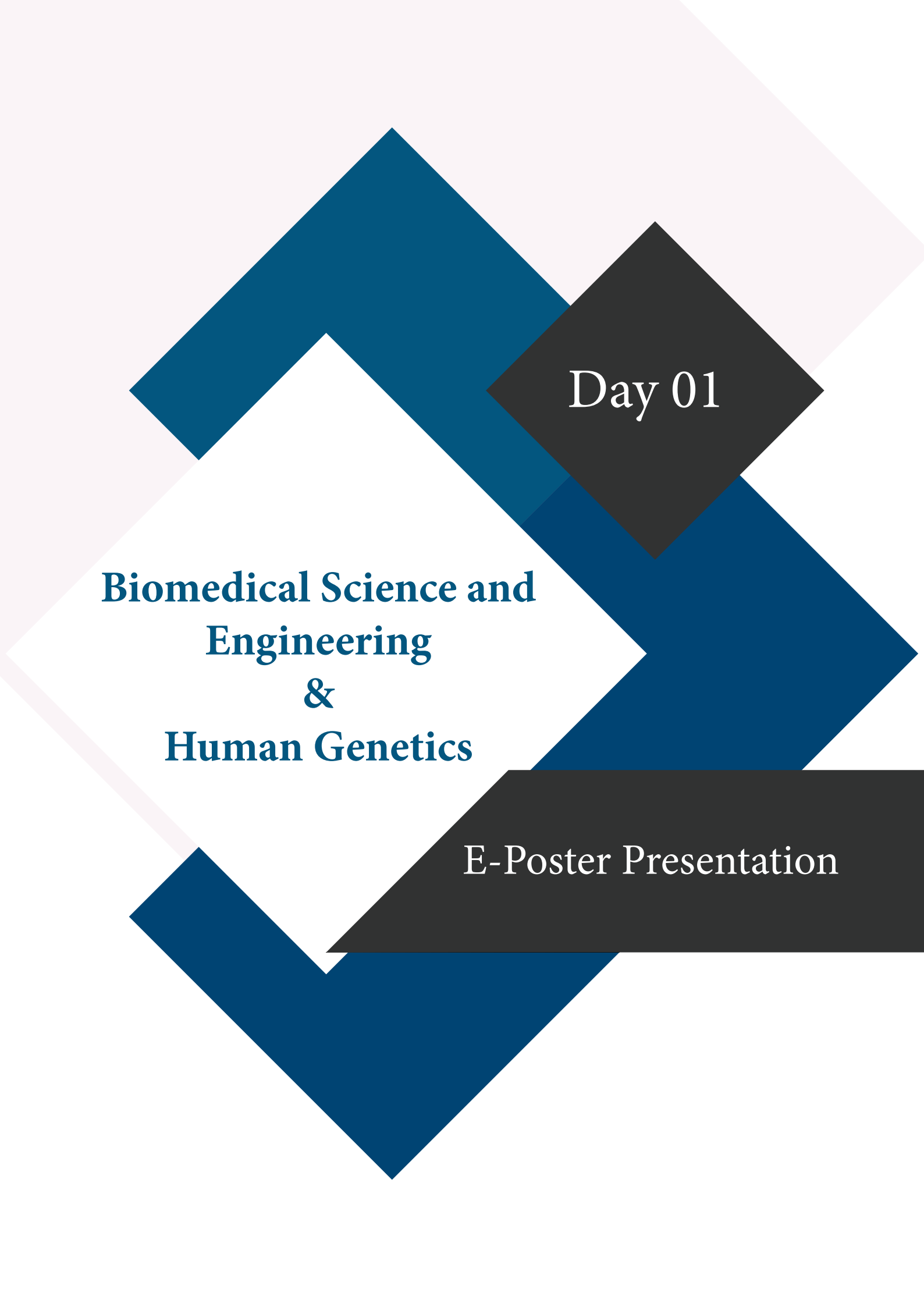
Surya S, B.E, M. Dip, M. Sc, M.E, MBA, EDPM, Doctor of business administration, F card candidate CBIC, PhD in law, MA in psychology. She is a Research scholar in psychology and law in Saveetha School of Law Simats Pursuing Master of arts in psychology at Amity university. Research scholar in AI and data science in international finance from SP Jain school of global management Australia Sydney. Research scholar who have presented research paper on Electrical communication computer software and engineering (ICECCE) at international institute of Academic research and publications-International conference. Research scholar who has presented research article titled "Legal psychology in HR policies" at

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



the International Conference on Global Psychology Society (ICGPS-25) Antalya, Türkiye. Young entrepreneur, undertaking training and a custom executive- have been practicing the procedures for clearance of goods under the rules and regulations of central government excise in trading (customs) Ministry of Finance for the past 6 years. Permanent member at Maadhyam conflict resolution council, New Delhi.



Day 01

**Biomedical Science and
Engineering
&
Human Genetics**

E-Poster Presentation

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



VITAMIN D AND ARTICULAR CARTILAGE : THE ROLE OF GENETIC BIOMARKERS IN OSTEOARTHRITIS

Giuseppe Gargano

UCAM Catholic University of Murcia, Italy

Abstract:

Introduction: Osteoarthritis (OA) is a leading cause of chronic pain and disability and is now considered a joint disease involving cartilage, subchondral bone, and synovium. The literature clearly shows that vitamin D is a systemic factor that influences cartilage biology through activation of the vitamin D receptor (VDR) in chondrocytes. However, evidence linking vitamin D status to cartilage integrity remains conflicting, which appears to be due to measurement heterogeneity and individual differences. This systematic review aimed to synthesize molecular, biochemical, and imaging evidence to clarify the relationship between vitamin D exposure and cartilage-related outcomes in OA.

Method: A qualitative systematic review was conducted that included observational studies, longitudinal cohorts, randomized controlled trials, post hoc analyses, and a combined in vivo/in vitro study. Eleven studies focusing on knee OA met the inclusion criteria. Vitamin D exposure was assessed by measuring serum 25-hydroxyvitamin D [25(OH)D] concentrations, dietary intake, or supplementation.

Results: Molecular studies have demonstrated VDR expression in osteoarthritic cartilage and associations between reduced vitamin D status and increased cartilage-degrading enzymes, particularly matrix metalloproteinases. Findings for broader turnover markers, such as cartilage matrix oligomeric protein, have been inconsistent. There are biological changes in vitamin D receptors in elderly subjects. This could be a cause of or a consequence of aging itself.

Conclusion: Vitamin D appears to be biologically active in cartilage and can modulate chondrocyte behavior and early structural change, but it does not consistently alter late-stage disease progression. The study of molecular genetic mechanisms can help us define some alterations to vitamin D receptors that could influence chondrocytes and cellular aging.

Biography

Giuseppe Gargano is an Italian medical doctor specialized in Orthopedics and Traumatology. He currently practices in Italy, where he is dedicated to the diagnosis, treatment, and rehabilitation of patients affected by musculoskeletal disorders and traumatic injuries. Alongside his clinical activity, he is pursuing a PhD at UCAM University, further strengthening his academic profile and research expertise.

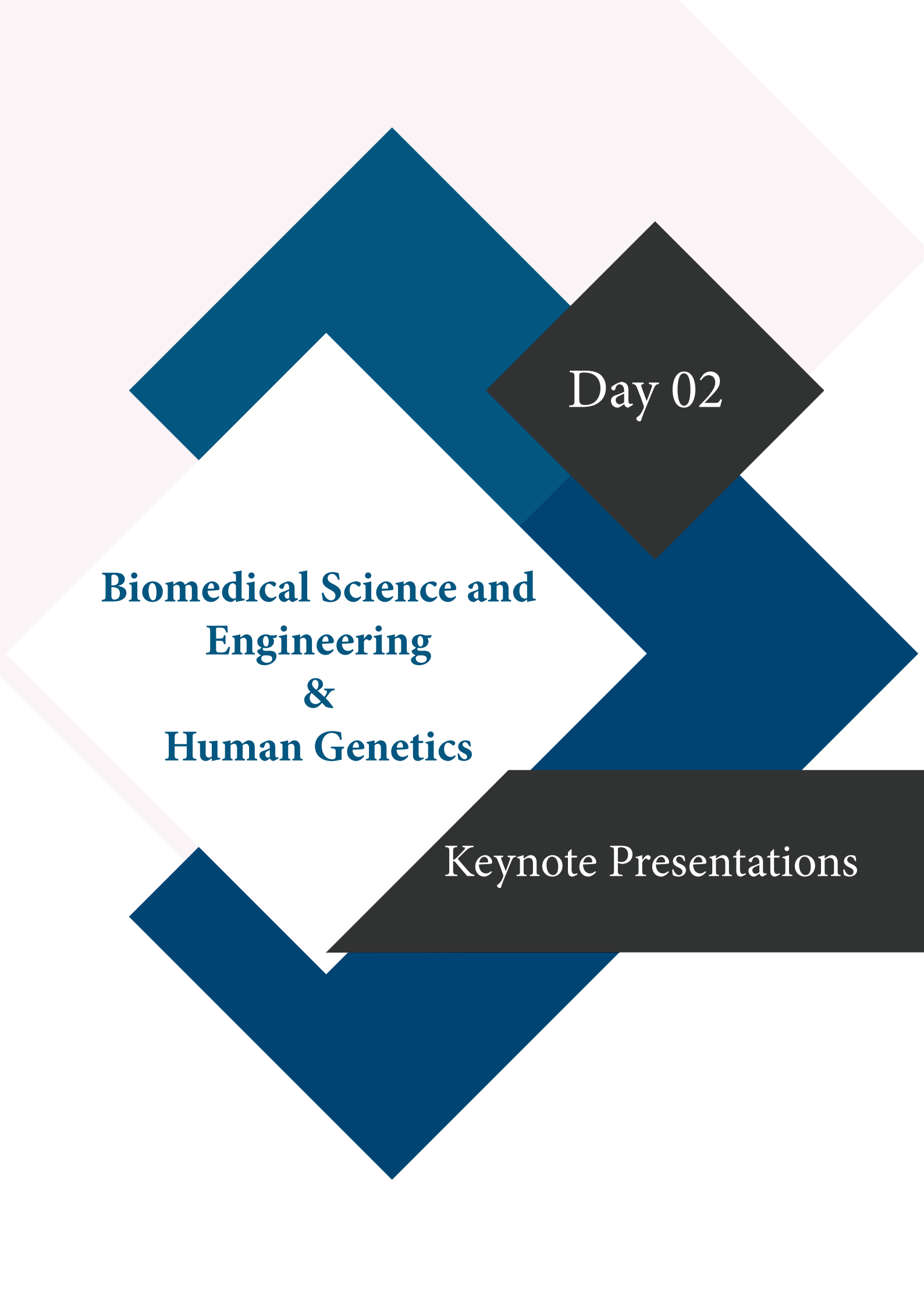
4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



Dr. Gargano has a strong interest in scientific research and is particularly focused on the relationship between genetics and orthopedic conditions. He is deeply motivated to investigate how genetic factors influence the development, progression, and treatment response of musculoskeletal diseases. His objective is to contribute to the advancement of personalized and precision medicine within orthopedic practice. Committed to continuous professional growth, he actively participates in scientific discussions, academic collaborations, and ongoing education programs. His long-term goal is to integrate high-level research with daily clinical practice, improving patient outcomes through innovative, evidence-based, and genetics-informed therapeutic strategies



Day 02

**Biomedical Science and
Engineering
&
Human Genetics**

Keynote Presentations

4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



AMELOGENESIS IMPERFECTA GENES AND NEW MUTATIONS OF PECULIAR TYPES



Uri Zilberman

Barzilai Medical University Center, Israel

Abstract:

Introduction: Amelogenesis Imperfecta (AI) represents a broad spectrum of genetic disorders affecting enamel formation in both primary and permanent dentition. AI is the oldest hereditary disorder affecting enamel, observed in early hominins. The prevalence of AI in Israel has been reported to be 1:8000. The inheritance patterns reported include autosomal dominant or recessive as well as X-linked dominant or recessive heredity. All AI patients are affected with clinical problems of poor esthetics, tooth density and loss of occlusal vertical dimensions.

Aim of The study: A. To analyze the genotype-phenotype correlation in affected individuals with a peculiar type of AI in a large Bedouin family. B. To examine the effect of loss of function of the encoded tight junction protein claudin-1 on ectodermal derived features including AI.

Population and Methods: A. Blood samples were obtained from 6 affected offsprings, five obligatory carriers and two unaffected siblings. DNA was extracted from all blood samples and sequencing was performed in the DNA microarray and sequencing unit at Soroka Medical Center, Beer-Sheva. B. Phenotyping of neonatal ichthyosis and scleroting cholangitis syndrome (NISCH) was by senior dermatologist and genetists. Genetic analysis was performed at Soroka Medical Center, Beer-sheva.

Results: A. The Sanger sequencing of FAM20A unraveled a novel homozygous deletion mutation in exon 11 (c.1523delC), predicted to insert a premature stop codon (p.Thr508Lysfs*6). B. Seven patients from four families of North African Jewish ancestry harboring CLDN1 p.Arg81His variant showed phenotypes that include AI and hair and liver/bile duct involvement.

Conclusion: We tried to show that the oral cavity is part of the human body and mutations in genes affects also ectodermal derived tissues of teeth.

Biography

Uri Zilberman received his DMD degree in 1983 from the Dental Faculty, Hebrew University, Jerusalem, and his PhD degree in 2000 on basic dental science, especially dental anthropology. Dr. Zilberman has a specialist degree in pediatric dentistry from 1990 and treated children and adolescents for the last 40 years. Prof. Zilberman is the head of the Pediatric Dental Unit at Barzilai Medical University Center, a unit recognized for specialization in pediatric dentistry since 2007. Associated Professor at the Faculty of Health Science, Ben-Gurion University of the Negev, Beer-Sheva, and teaches a course on Pathophysiology of the Oral Cavity for fourth year pharmacology students. Prof. Zilberman published more than 90 research papers and chapters in pediatric dentistry and dental anthropology. His main interests are new dental procedures and devices for pediatric dentistry, hereditary disorders and their effect on tooth development, and the use of biomimetic materials in pediatric dentistry, like Glass-Ionomers Cements. He developed new dental procedures and a patented new dental device for pediatric dentistry.

4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



PATIENT-SAFE CLINICAL METHODS FOR ASSESSING THE RELIABILITY OF AUTONOMOUSLY GENERATED ARTIFICIAL INTELLIGENCE DIAGNOSTICS: THEORETICAL FRAMEWORK



Alexander Lazarov
Sofia University, Bulgaria

Abstract:

A constant increase in the use of artificial intelligence (AI) has been observed across various professional fields, including medicine. Although AI currently operates in a narrowly specialized manner and functions differently from human cognition, it is already demonstrating remarkable analytic and synthetic capabilities. In certain domains, these capabilities even surpass human performance, particularly in the analysis of unstructured, real-time Big Data streams. However, significant uncertainty remains regarding the accuracy and precision of diagnostic and treatment decisions generated autonomously by AI systems. This concern extends to the potential risks faced by patient populations exposed to such autonomous decision-making processes. These issues demand particular attention within the highly sensitive and ethically rigorous field of medicine, where any AI-induced bias may directly affect human health and well-being, while simultaneously advancing the commercial interests of technology companies. This presentation outlines reliable prospective and retrospective methodologies for investigating the outcomes generated autonomously by AI. The prospective approach involves conducting large-scale, triple-blind studies, modeled after randomized double-blind trial protocols traditionally applied to certify new pharmaceutical products. In contrast, the retrospective approach presents a feasible opportunity for individual clinicians or clinical teams to independently evaluate AI's autonomous informational output. Importantly, both approaches are applicable to all types of medical AI systems—whether based on computer vision, natural language processing, or multimodal AI architectures. Furthermore, both testing methods adhere to established ethical standards, as they pose no risk to patients involved in the investigative studies; patients continue to receive traditional, exclusively human-provided medical care. Finally, the proposed methodological framework ensures standardization and reproducibility, thereby enabling large-scale meta-analyses and contributing to the development of robust evaluation standards for medical AI.

Biography

Alexander Lazarov is a retired lecturer in Philosophy of AI at Sofia University “St. Kliment Ohridski” (2017–2025), where he taught within the Master's and Doctoral programs in Philosophy in English. His central research perspective emphasizes that the effective integration of AI into healthcare requires transdisciplinary collaboration among AI developers, clinicians, and philosophers, rather than a purely interdisciplinary exchange. He is currently engaged in advancing clinician–philosopher collaborative frameworks with Elena Goranova of University Hospital “Lozenets” in Sofia, Bulgaria, and President of the Balkan Venous Forum; Sergio Ganesini of the University of Ferrara and the Uniformed Services University of Health Sciences in Bethesda, USA, who also serves as President of the World Union of International Phlebology and the Venous-lymphatics World International Network Foundation; Rashad Bishara, President of the Egypt & Africa Vein and Lymph Association and Chairman of the International Committee of the American Venous Forum; and Alexander Gungov, a philosopher and expert in phenomenology and ethics at Sofia University.

4th European Congress on
Biomedical Science and Engineering
&
Human Genetics

April 27-28, 2026 | Berlin, Germany



**ST14 MUTATIONS DISRUPT THE MATRIPTASE–EPCAM/TROP-2 AXIS
IN AUTOSOMAL RECESSIVE ICHTHYOSIS WITH HYPOTRICHOSIS**



Chen Yong Lin

Georgetown University, USA

Abstract:

Mutations in ST14, encoding the epithelial transmembrane serine protease matriptase, underlie autosomal recessive ichthyosis with hypotrichosis (ARIH), a rare disorder characterized by profound defects in skin barrier function and hair follicle integrity. Although matriptase is broadly expressed across epithelial tissues, its proteolytic activation is highly restricted to progenitor-like epithelial compartments, including basal keratinocytes, follicular bulge stem cells, and matrix cells of the hair bulb. These populations exhibit efficient conversion of matriptase zymogen to its active form, suggesting that spatially controlled proteolysis is central to epithelial homeostasis. This restricted activation pattern is consistent with the predominantly cutaneous phenotype observed in ARIH, including defective desquamation, impaired barrier function, and fragile, hypotrichotic hair. Here, we identify the adhesion molecules EpCAM and Trop-2 as key physiological substrates of matriptase and define a previously unrecognized protease-driven mechanism governing epithelial adhesion dynamics. Matriptase-mediated cleavage of EpCAM and Trop-2 initiates a cyclical process of adhesion remodeling, characterized by rapid internalization of cleaved adhesion complexes, transient weakening of intercellular contacts, and subsequent restoration of adhesion through de novo protein synthesis. This dynamic turnover is essential for maintaining epithelial plasticity. Loss of matriptase activity disrupts this adhesion remodeling cycle, leading to compromised epithelial integrity and defects in fundamental cellular processes, including cell extrusion, mitotic progression, and collective migration. These findings position matriptase as a critical regulator of adhesion turnover in epithelial progenitor populations and reveal its essential role in coordinating epidermal proliferation and early differentiation. Collectively, our study uncovers a matriptase–EpCAM/Trop-2 proteolytic axis as a central mechanism linking ST14 mutations to epithelial dysfunction in ARIH. Disruption of this pathway provides a unifying explanation for the cutaneous and hair follicle abnormalities characteristic of the disease and highlights protease-mediated adhesion remodeling as a fundamental process in skin biology.

Biography

Chen Yong Lin is an Associate Professor at the Lombardi Comprehensive Cancer Center, Georgetown University. His research focuses on membrane-associated proteolysis and its implications in molecular medicine. Dr. Lin investigates the molecular mechanisms underlying the pathogenesis of two rare inherited genetic disorders caused by mutations in SPINT2 and ST14. With more than 100 peer-reviewed publications, his work has significantly advanced understanding in epithelial biology, molecular genetics, and cancer therapeutics. He has received multiple awards recognizing his scientific excellence. Deeply committed to translational research, Dr. Lin strives to bridge fundamental genetic discoveries with clinical applications to improve patient outcomes.

4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



UNDERSTANDING VITAMIN D DEFICIENCY : PERSONALIZED APPROACHES TO VITAMIN D DEFICIENCY: THE ROLE OF NUTRIGENETICS AND EPIGENETICS



Gulsen Meral^{1,2}

¹*Epigenetic Coaching Company, UK*

²*Nisantasi University, Turkey*

Abstract:

Vitamin D deficiency continues to be a major health problem in the world. Since it is known to be associated with autoimmune diseases, diabetes, cardiovascular diseases, allergies, depression and bone mineral density. Considering the mechanisms involved in immune modulation by vitamin D, the role of coactivators including histone acetyltransferases (HATs), which express acetylation of histones in ligand binding to the 1,25-D VDR/RXR complex, is important. It has shown that the variability of vitamin D status depends on a number of environmental and genetic factors. However, investigation of the genetic background of vitamin D metabolism has highlighted the importance of many genes such as CG, DHCR1, CYP2R1, CYP24A1 and VDR. When the effect of nutrition on vitamin D metabolism is examined, CYP2R1 and CYP27A1 (25-27A1) are seen to play a role in vitamin D metabolism in high-fat diet and glutathione deficiency. hydroxylase) CYP27B1 Gene-specific hypermethylation of 1- α -hydroxylase VDR Hypomethylation of CYP24A1 has been observed. Looking at the relationship between vitamin D and microbiota, vitamin D and VDR interactions protect the intestinal microbiota by regulating the expression of antimicrobial peptides (AMPs) and maintaining the barrier functions of the intestinal mucosa. Considering whether the microbiota has an effect on the blood level of vitamin D, studies have shown that the microbiota can regulate both commensal and pathogenic intestinal microbiota, VDR expression and localization. Probiotic treatment can increase VDR expression and activity in the host, thereby inhibiting intestinal inflammation. An increase in VDR expression was observed in human epithelial colonic cells treated with probiotics lactobacillus rhamnosus strain gg and lactobacillus plantarum.l. reuteri ncimb 30242 may increase serum 25(oh)d by expanding intraluminal lactic acid production or increasing 7-dehydrocholesterol (7-dhc) synthesis. In a study we conducted, we showed that the use of vitamin D and probiotics increases vitamin D levels more than the use of single vitamin D or single probiotics. Both nutrigenetic and epigenetic mechanisms play a role in vitamin D mechanisms. I believe that both conditions should be taken into account when treating vitamin D.

Biography

Gulsen Meral graduated from Istanbul University Cerrahpasa Faculty of Medicine in 1994. She became a Pediatrician in 2001 and served as a specialist physician, deputy chief physician, and chief physician at various hospitals. She completed her doctorate in Medical Genetics at Biruni University. She holds a master's degree in Hospital Management and a bachelor's degree in Turkish Language and Literature. She served as Advisor to the Rector at Northern Cyprus ITU between 2019 and 2021. She has taught Nutrigenetics at the postgraduate level and has taught both undergraduate and postgraduate courses in child development.

She is also an acupuncture instructor. She currently serves as a professor in the Department of Child Health and Diseases at Istanbul Nisantasi

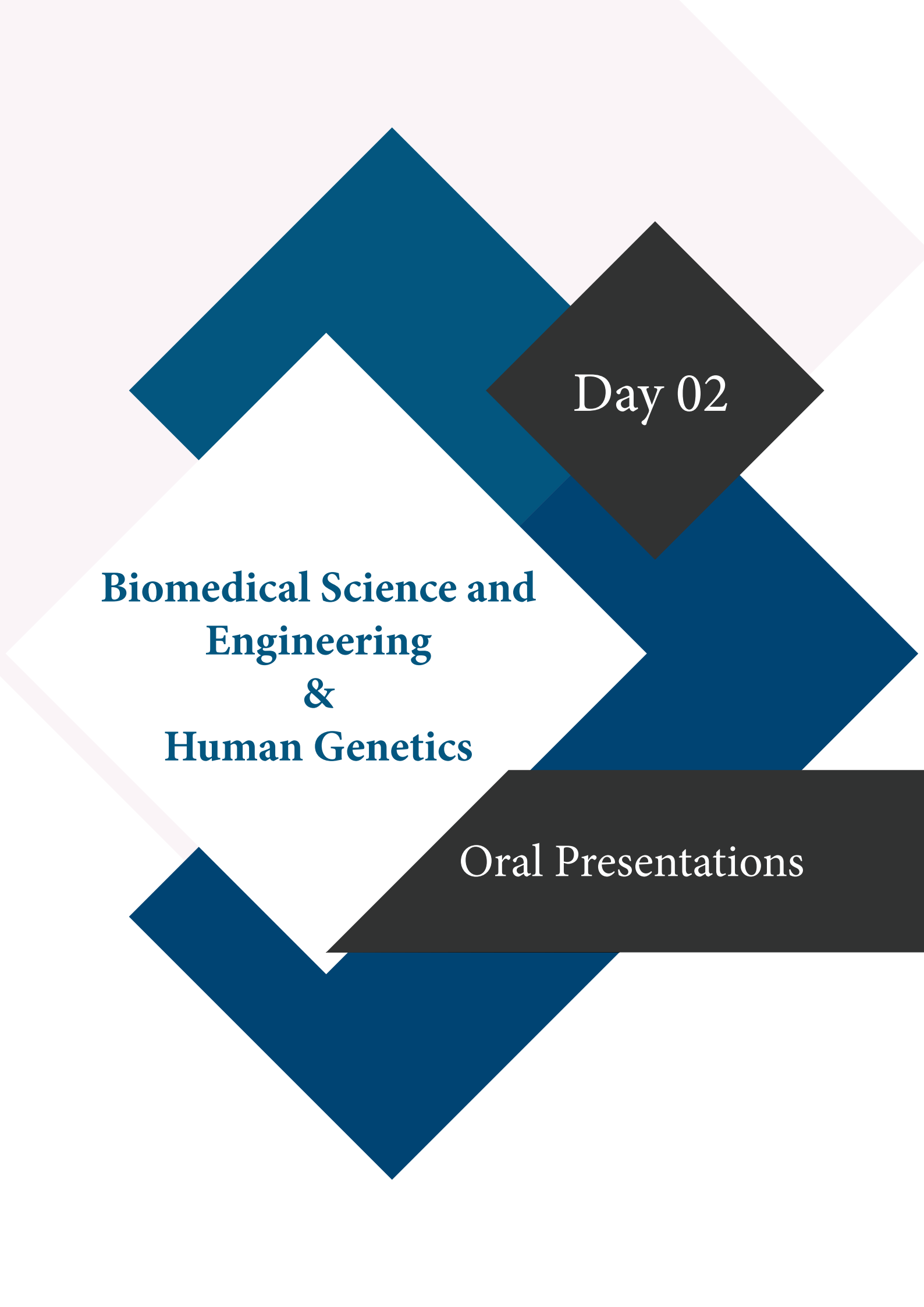
4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



University. She also continues her research and educational activities as the founder and manager of Epigenetic Coaching (UK).

Prof. Meral has numerous national and international scientific publications and has served on editorial boards and as a reviewer for various academic journals. In addition to her scientific work, Prof. Meral is also interested in literature and has published five poetry books. She is the founder of the Nutrigenetics and Epigenetics Association in Turkey and the UK and is a member of Yeşilay, the Rumeli Association, the Istanbul Acupuncture Association, and the International Nutrigenetics and Nutrigenomics Association. She has chaired the First, Second, and Third International Epigenetics Congresses and continues to provide leadership and training in the Epigenetics Coaching Program. Additionally, she delivers internationally accredited Continuing Professional Development (CPD) training in Nutrigenetics and Epigenetics Consulting to healthcare professionals worldwide.



Day 02

**Biomedical Science and
Engineering
&
Human Genetics**

Oral Presentations

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



CLINICAL APPLICATION OF 3D PRINTED SCAFFOLD TO REGENERATE CONGENITAL CLEFT PALATE DEFECTS

Motahareh Mirzadeh

Friedrich-Alexander University of Erlangen-Nuremberg, Germany

Abstract:

This presentation reports the results of a clinical study that used 3D printed scaffold to regenerate the Orofacial clefting defect. This congenital defect represents one of the most prevalent craniofacial anomalies worldwide. Achieving a desirable clinical outcome remains particularly challenging, as conventional repair strategies-primarily reliant on local and regional flap techniques-are frequently associated with tissue tension, limited availability of adjacent mucosa, and high recurrence rates. In this context, the present study evaluates the feasibility of three-dimensional (3D) printed polycaprolactone/hydroxyapatite (PCL/HA) composite meshes as an alternative reconstructive approach for cleft palate defects. Specifically, the influence of pore size (1000, 1500, and 2000 μm) and pore geometry (triangular versus square) on mechanical performance, physicochemical properties, and biological response was systematically investigated. Square pore architectures demonstrated high dimensional accuracy and structural uniformity, particularly at larger pore sizes ($2000.93 \pm 41.13 \mu\text{m}$), while all fabricated meshes exhibited porosity values exceeding 70%. Among all groups, the triangular mesh with 1000 μm pores (T1000) achieved the highest tensile strength and elastic modulus under both dry and hydrated conditions. Notably, triangular configurations consistently outperformed square designs of equivalent pore size in flexural testing, with T1000 exhibiting the highest hydrated flexural modulus ($26.20 \pm 3.24 \text{ MPa}$). Water absorption and degradation rates increased proportionally with pore size. In vitro assays using MG-63 cells revealed enhanced adhesion and viability at smaller pore sizes after seven days, with triangular structures promoting superior cellular attachment. These findings were further validated in Wistar rat models, guiding selection for clinical evaluation. Clinical outcomes (IRCT20220807055633N2, 2024-06-03) demonstrated promising efficacy in preventing fistula recurrence, supporting broader translational application in cleft palate reconstruction.

Biography

Mirzadeh is a graduate in both Polymer Engineering and Chemistry from the Iranian Polymer Institute and Shiraz University. She is currently pursuing a Master's degree in Materials Engineering at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany. Before moving to Germany, she was part of a MedTech startup in Iran that developed the country's first clinically approved custom-made 3D-printed maxillofacial implants for the regeneration of maxillofacial defects. She was deeply involved in the development of the technical file and regulatory framework

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



required for the product's clinical approval. She also contributed to the design and manufacturing of the 3D-printing platform certified for the production of these implants. As part of her responsibilities, she maintained close contact with medical teams and personally supervised implantation procedures in the operating room alongside clinical staff. This work is the result of her involvement in those projects and is not affiliated with her current studies at FAU.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



GENETIC INSIGHT TO DAILY BEHAVIOR: BRIDGING THE GAP BETWEEN SCIENCE AND CONSUMER HEALTH

Ceren Can

CARMED Pharmaceuticals, Turkey

Abstract:

The rapid advancement of human genetics has significantly expanded our understanding of individual health differences. However, a critical gap remains between scientific knowledge and its application in everyday consumer behavior. Despite the growing availability of data related to personalized health, most individuals continue to make wellness decisions based on trends, general recommendations, or incomplete information. This disconnect highlights a “translation problem” rather than a lack of scientific progress. This talk explores how complex health insights-particularly those associated with genetics and personalization-can be transformed into simple, accessible, and actionable consumer products. Drawing on real-world experience in brand development within the wellness industry, it examines how scientific concepts can be effectively simplified without losing their integrity. The presentation introduces a behavior-first approach, emphasizing that long-term health outcomes depend not only on accurate information but also on consistent user engagement and habit formation. Furthermore, the session discusses the future of scalable personalization in health, where genetic insights may inform product development and individual recommendations. However, for such innovations to be impactful, they must be designed with accessibility and usability in mind. Rather than positioning health solutions as complex or exclusive, brands have the potential to act as bridges that translate scientific knowledge into everyday routines. Ultimately, this talk argues that the future of personalized health will not be defined solely by data generation, but by the ability to convert that data into meaningful, daily decisions. It highlights the evolving role of branding as a critical interface between science and society.

Biography

Ceren Can is a Strategy Analyst and Marketing Manager with a multidisciplinary background spanning business strategy, entrepreneurship, and consumer health. She holds a Master's degree in Entrepreneurship and Innovation from University College London (UCL), where she focused on building scalable and user-centric business models. She is actively involved in her family's multi-sector business, which operates across maritime services, hospitality, and consumer goods, contributing to strategic decision-making and financial planning. In addition to her role in corporate strategy, she leads brand development for Carmed, a wellness brand focused on making health solutions more accessible, practical, and aligned with everyday consumer behavior. Her work emphasizes the intersection of scientific insight and user experience, particularly in translating complex health concepts into simple, actionable products. Ceren's approach combines analytical thinking with a strong understanding of consumer behavior, aiming to bridge the gap between emerging health research and real-world application. Her interests include personalized health, behavioral design, and the future of consumer-driven healthcare innovation.

4th European Congress on
Biomedical Science and Engineering
&
Human Genetics

April 27-28, 2026 | Berlin, Germany



**TRANSLATIONAL EPIGENETIC AND MULTI-TARGET THERAPEUTIC
POTENTIAL OF CARVACROL-BASED ESSENTIAL OIL FORMULATIONS
IN PRECISION ONCOLOGY**

Öykü Gönül Geyik

Istinye University, Turkey

Abstract:

Cancer remains a leading global health challenge, characterized by complex interactions between genetic alterations, epigenetic dysregulation, and metabolic reprogramming. Conventional single-target therapies often fail to address this complexity, highlighting the urgent need for integrative, multi-target therapeutic strategies. In this context, naturally derived bioactive compounds have emerged as promising candidates due to their ability to modulate multiple interconnected pathways with relatively low toxicity profiles. Carvacrol, a phenolic monoterpene abundantly found in essential oils, has demonstrated significant anticancer, anti-inflammatory, and antioxidant properties. Increasing evidence suggests that its biological activity can be markedly enhanced through synergistic interactions with complementary terpenes such as thymol, p-cymene, and α -pinene. These combinations enable a systems-level modulation of key cellular processes, including redox homeostasis, mitochondrial integrity, and inflammatory signaling. Importantly, recent studies indicate that carvacrol-based formulations may exert regulatory effects on epigenetic mechanisms, including DNA methylation, histone modification, and transcriptional control. Modulation of critical signaling pathways such as PI3K/Akt, NF- κ B, and MAPK, along with activation of sirtuin-mediated networks and FOXO transcription factors, suggests a potential role in reprogramming cancer cell fate and influencing biological aging processes. Preclinical and in vitro investigations have consistently demonstrated that these formulations induce significant antiproliferative and pro-apoptotic effects across multiple cancer models, including lung, breast, and prostate cancer. Notably, synergistic interactions appear to amplify these effects, supporting the concept of multi-component phytotherapeutic formulations as a novel therapeutic paradigm. Taken together, carvacrol-based essential oil formulations represent a promising translational strategy within the framework of precision oncology. By integrating natural product chemistry with molecular oncology and epigenetic regulation, these formulations offer potential as complementary or adjunctive therapeutic agents. Further clinical validation is warranted to establish their efficacy and safety in personalized cancer management and healthy longevity interventions.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



Biography

Öykü Gönül Geyik is an Assistant Professor in the Department of Medical Biology, Faculty of Medicine, İstinye University (İstanbul, Türkiye). She received her BSc in Biochemistry and her MSc in Medical Biochemistry from Ege University, and completed her PhD in Medical Biology and Genetics at Dokuz Eylül University. She currently conducts research in cancer biology and translational oncology, focusing on tumor heterogeneity, chemotherapy resistance, and biomarker discovery, and she also evaluates plant-derived bioactive compounds and multi-component formulations using integrated in vitro and in vivo-relevant models. In parallel with her research activities, she teaches undergraduate and graduate courses in molecular and cellular biology-related fields and supervises student research projects. Dr. Gönül Geyik is involved in national and international scientific networks and collaborative initiatives and European COST Actions, and contributes to community-facing scientific efforts through academic event organization and editorial initiatives including FEBS Press.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



SCREENING HIMALAYAN FLORA FOR INHIBITORY EFFECTS ON DENGUE SEROTYPE 2 REPLICATION

Gaurav Badoni

All India Institute of Medical Sciences Rishikesh, India

Abstract:

Dengue is a life-threatening disease and is spread by *Aedes* mosquitoes in humans. According to WHO, 5.2 million cases have been reported globally, including 0.7 million from India. Due to the lack of effective treatment in many developing countries, alternative treatment will be one of the options. This study explores the potential antiviral effects of phytochemicals present in the medicinal herbs of the Himalayas. Two medicinal herbs of the Himalayan region are used to check the antiviral effects against DEN-2 in C6/36 cell lines. HPLC and FT-IR techniques were used to identify the phytochemicals, and an in-vitro study was used to test the plant extract against DEN-2. Quantitative real-time PCR was used to quantify the viral load after MNTD analysis. Fluorescence microscopy followed by Shapiro-Wilks and Wilcoxon signed-rank tests were used to confirm the results. After being treated with the test compound, the viral-load analysis showed decreased viral load (634 viral copies/ μ l in 10 μ g/ml of dose). Six phytochemicals were identified as possible viral inhibitors. Microscopic analysis confirms the cell viability during the reduction of viral load. Linear correlation and Wilcoxon signed-rank tests were statistically significant ($r=0.869$, $p=0.002$). At present, the dengue vaccine is available in some countries, but due to the unavailability of this vaccine in many developing countries, this research on alternative treatment provides grounds for researchers searching for antiviral drugs for dengue.

Biography

Gaurav Badoni is a Senior Resident in the Department of Microbiology at the All-India Institute of Medical Sciences (AIIMS), Rishikesh, India. He holds a doctoral degree (PhD) and brings a strong foundation in both clinical microbiology and laboratory-based research. His technical expertise spans virology, in-vitro studies, and computational analysis, reflecting a multidisciplinary approach to understanding microbial pathogenesis and therapeutic strategies. Badoni's research interests lie at the intersection of viral drug delivery and the computational analysis of antimicrobial compounds, with a focus on translating laboratory findings into meaningful clinical insights. His work aims to address complex biological challenges through the integration of molecular biology techniques and data-driven analytical frameworks. A passionate microbiologist and molecular biologist, Dr. Badoni is committed to advancing scientific knowledge across both academic and research settings. He actively contributes to the scientific community through teaching, laboratory research, and collaborative inquiry, with the broader goal of developing innovative solutions to pressing infectious disease and antimicrobial resistance challenges.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



OPTIMISING POLYMER-CERAMIC INK FORMULATIONS FOR CLINICALLY EFFECTIVE 3-D-PRINTED HYDROXYAPATITE MESHES IN CRANIOFACIAL RECONSTRUCTION

Motahareh Mirzadeh

Friedrich-Alexander University of Erlangen-Nuremberg, Germany

Abstract:

Background: Hydroxyapatite (HA)-based scaffolds are widely used in bone tissue engineering because of their osteoconductivity and similarity to native bone mineral, while poly-ε-caprolactone (PCL) provides a degradable polymer matrix suitable for extrusion-based printing. Recent studies suggest that nano-hydroxyapatite (nHA) morphology can strongly affect ink rheology and scaffold performance.

Objective: To evaluate how nHA particle shape and loading influence the rheological behavior, printability, and mechanical and clinical performance of PCL-based inks for 3D-printed HA meshes.

Methods: Plate and rod-shaped nHA particles (<100 nm) were characterized and incorporated into a 50% w/v PCL solution at nHA/PCL ratios of 35/65, 45/55, 55/45, and 65/35 wt%. Rheological properties and printability were assessed, and selected inks were used to fabricate meshes with square, hexagonal, and triangular pore geometries by liquid deposition modelling. Mechanical testing and dimensional analysis were then performed. The triangular mesh was further evaluated in a pilot clinical cleft-palate application.

Results: Plate-shaped nHA showed more favorable rheological behavior than rod-shaped nHA, enabling smoother extrusion and better filament control. The optimal formulation contained 45% plate-shaped nHA. Square-pore meshes showed the best dimensional accuracy, while triangular meshes achieved the highest tensile strength and elastic modulus. Clinical follow-up indicated encouraging outcomes, including high defect-closure rates and no adverse inflammatory response.

Conclusion: Optimizing nHA morphology and loading, particularly using 45% plate-shaped nHA, improved both printability and mechanical performance and supported the clinical potential of PCL/nHA meshes for craniofacial reconstruction.

Biography

Motahareh Mirzadeh is a researcher in biomaterials and tissue engineering with academic and practical experience in polymer-based composites,

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



biofabrication, and 3D printing for regenerative medicine. Her work focuses on the development and optimisation of biomaterial systems for clinically relevant applications, with particular interest in polymer–ceramic composites, scaffold design, and translational strategies for craniofacial and bone tissue regeneration. She has been involved in research on extrusion-based printing, rheological characterisation of composite inks, and evaluation of scaffold architecture in relation to mechanical performance and clinical functionality. Her broader interests include biomaterials processing, additive manufacturing, and the translation of engineered constructs from laboratory development to clinical use.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



BUILDING RESILIENT HEALTH SYSTEMS IN LOW-RESOURCE SETTINGS THROUGH BIOMEDICAL SCIENCE AND ENGINEERING: A UNIVERSITY-LED MODEL FOR SUSTAINABLE HEALTH AND INNOVATION IN LIBERIA

Eric ZM Gbotoe

Grand Gedeh University College, Liberia

Abstract:

The rapid evolution of biomedical science and engineering presents unprecedented opportunities to strengthen health systems, particularly in low- resource and developing settings. However, the effective translation of biomedical innovation into improved population health outcomes remains a major challenge for countries such as Liberia, where limited infrastructure, workforce gaps, and resource constraints persist. This presentation aligns with the core sub-themes of BIOMED 2026 by demonstrating how universities can serve as strategic platforms for biomedical innovation, digital health integration, and sustainable health system development.

Drawing on the experience of Grand Gedeh University College (GGUC), this paper presents a university-led model that integrates biomedical sciences, public health, biomedical engineering, and digital health solutions to address priority national health challenges. The model emphasizes interdisciplinary training, applied research, and technology adaptation aimed at improving disease surveillance, diagnostics, and health service delivery in underserved communities. In alignment with the Biomedical Science sub-theme, the presentation highlights the role of academic research in infectious disease control, non-communicable disease monitoring, and maternal and child health. Through strengthened laboratory science, molecular diagnostics, and community-based research, universities can generate evidence that directly informs clinical practice and health policy.

Addressing the Biomedical Engineering and Medical Technology sub-theme, the paper explores the potential of low-cost, context-appropriate medical devices, point-of-care diagnostics, and health data systems designed for rural and resource-constrained environments. These innovations support early diagnosis, reduce referral delays, and improve patient outcomes.

In line with the Digital Health and Health Informatics sub-theme, the presentation underscores the integration of digital tools for disease surveillance, telemedicine, and health information

4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



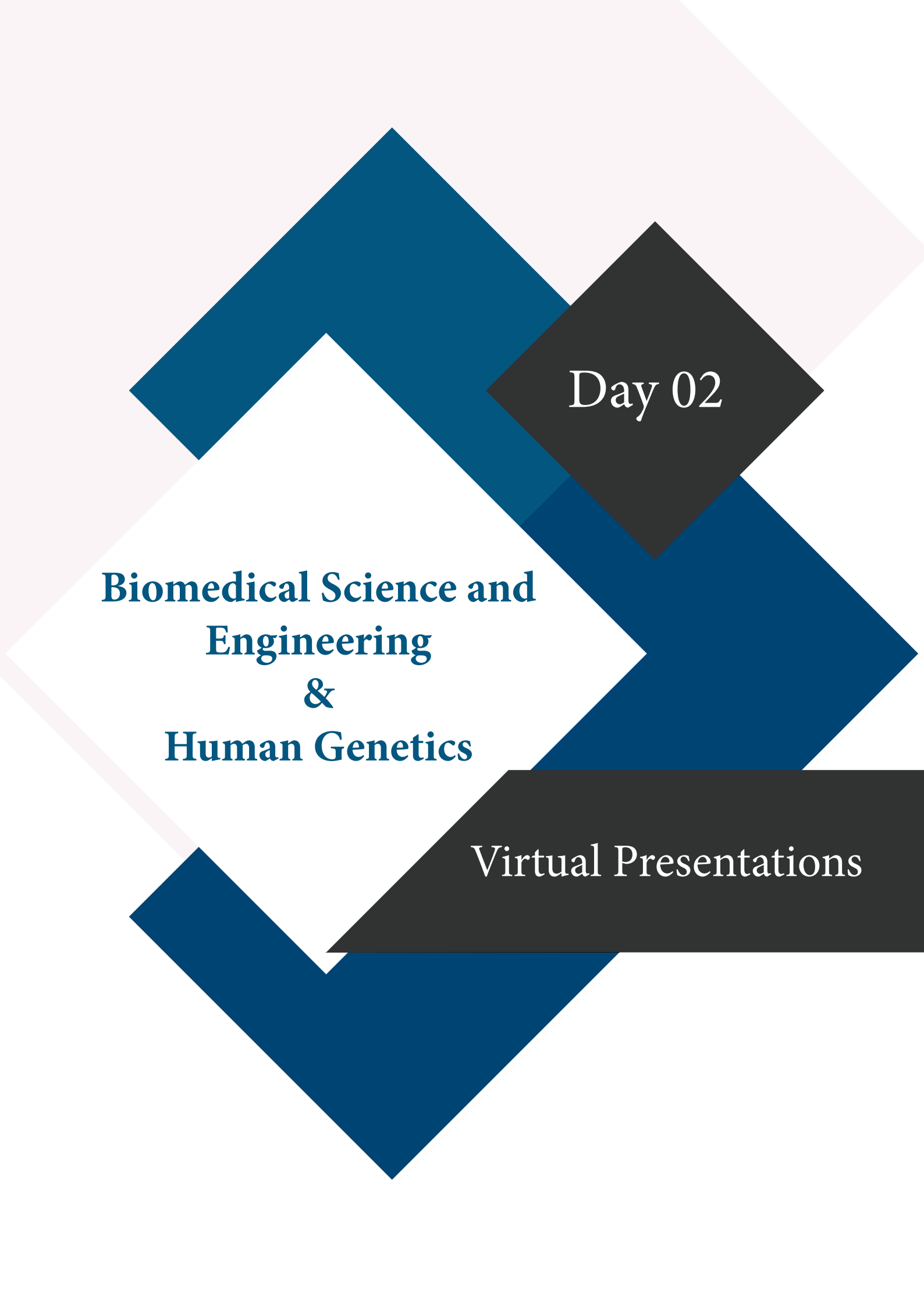
management. Such systems are critical for strengthening epidemic preparedness, improving data-driven decision-making, and enhancing healthcare accessibility in remote regions of Liberia.

The participation of the GGUC delegation at BIOMED 2026 reflects a commitment to translational research and global collaboration, core pillars of this congress. Engagement with international experts enables knowledge transfer, curriculum modernization, faculty development, and the establishment of long-term research partnerships that benefit both the institution and the nation.

Ultimately, this presentation positions biomedical science and engineering not merely as academic disciplines, but as drivers of national development. By empowering universities to lead biomedical innovation, Liberia can build resilient health systems, strengthen its health workforce, and advance sustainable development at both county and national levels. BIOMED 2026 provides a vital platform for advancing this shared global vision.

Biography

Eric ZM Gbotoe is a distinguished Liberian academic, researcher, and higher education leader currently serving as President of Grand Gedeh University, a rural-based institution committed to expanding access to quality education in southeastern Liberia. Appointed by the President of the Republic of Liberia, he brings a strong vision for academic transformation, institutional development, and community impact through education. Gbotoe holds a PhD in African Anthropology from the University of Pretoria, South Africa, along with a Master of Arts and advanced studies in religion and missiology. He is also pursuing doctoral studies in Educational Policy and Leadership at the University of San Francisco in California, USA. His academic background is complemented by interdisciplinary expertise spanning education, leadership, research methodology, and African anthropology. With over two decades of professional experience, Dr. Gbotoe has served in diverse roles across academia, administration, and international organizations. He previously lectured at the University of Pretoria and Lutheran Theological Seminary in Pretoria, contributed as a voluntary researcher with the Lutheran World Federation in Namibia, and held leadership roles in both Liberia and the United States, including General Manager of American Equal Care Inc. His early career also includes work in information technology as a system administrator and programmer at the National Port Authority of Liberia. An active member of several international professional bodies, including the International Leadership Association and the International Research Council, Dr. Gbotoe is deeply engaged in advancing research, leadership development, and policy innovation. His work emphasizes interdisciplinary collaboration and the application of scientific approaches to societal challenges. As a speaker at the Biomedical and Engineering Conference in Berlin, Dr. Gbotoe brings a unique perspective from rural Africa, highlighting the critical intersection of education, technology, and sustainable development. His leadership at Grand Gedeh University reflects a commitment to fostering innovation, capacity building, and global partnerships to address pressing challenges in underserved communities.



Day 02

**Biomedical Science and
Engineering
&
Human Genetics**

Virtual Presentations

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



DCAF17 DEFICIENCY TRIGGERS FERROPTOSIS AND INFLAMMATORY CELL DEATH VIA MITOCHONDRIAL-LYSOSOMAL DYSFUNCTION IN GERM CELLS

Nadya Alyacoub

King Faisal Specialist Hospital & Research Centre, Saudi Arabia

Abstract:

DCAF17, a substrate receptor of the CUL4-DDB1 E3 ligase complex, plays a crucial role in male fertility. Pathogenic mutations in DCAF17 cause Woodhouse-Sakati Syndrome (WSS), a rare autosomal recessive disorder characterized by hypogonadism and infertility. However, the cellular mechanisms by which DCAF17 supports germ cell function remain poorly understood. To address this, we investigated the consequences of Dcaf17 knockdown in GC-1 spermatogonial cells and validated key findings in lymphoblastoid cell lines (LCLs) derived from WSS patients, as well as in Dcaf17-knockout (KO) mice. Dcaf17 knockdown significantly impaired cell viability, induced G1 cell-cycle arrest, and elevated apoptotic cell death. These changes were accompanied by mitochondrial dysfunction, including a reduction in membrane potential and mitochondrial mass, despite an upregulation of oxidative phosphorylation proteins-suggesting a compensatory response to dysfunction. Lysosomal integrity was similarly compromised, as evidenced by reduced acidification and increased p62/SQSTM1 accumulation, indicative of impaired degradative capacity. Remarkably, Dcaf17 deficiency resulted in significant perturbations in iron and redox balance: intracellular ferrous iron (Fe^{2+}) was elevated, while glutathione (GSH) levels were significantly reduced, and lipid peroxidation (MDA) was increased-key molecular hallmarks of ferroptosis activation. These cellular defects were accompanied by down-regulation of xCT and transferrin and upregulation of the transferrin receptor, indicating an interruption in cellular iron homeostasis. Inflammatory and necroptotic signaling pathways were also triggered, as indicated by increased expression of MLKL, NLRP3, cleaved IL-1 β , and LDH release. These molecular and cellular defects were significantly recapitulated in WSS patient-derived LCLs and testicular tissue and spermatozoa from Dcaf17-KO mice, confirming their biological and clinical relevance. Together, these findings identify DCAF17 as a critical regulator of mitochondrial and lysosomal function, redox balance, iron homeostasis, and regulated cell death pathways in male germ cells. Its deficiency initiates a cascade of ferroptotic, necroptotic, and inflammatory signaling pathways, providing a mechanistic basis for the infertility observed in both WSS patients and Dcaf17-KO mice. These insights underscore the therapeutic potential of targeting DCAF17-regulated pathways in genetic male infertility and

4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



highlight the broader value of rare disease genetics in uncovering conserved cellular mechanisms relevant to precision medicine.

Biography

Nadya Alyacoub is a scientist in the Research Laboratories Department at King Faisal Specialist Hospital and Research Centre. She received her PhD from Charité - Universitätsmedizin Berlin and holds a Diploma degree in biochemistry from Freie-Universität Berlin. Her work centers on understanding how dysregulation of key cell death pathways—including apoptosis, endoplasmic reticulum (ER) stress, autophagy, ferroptosis, and mitochondrial dysfunction—contributes to the pathogenesis of inherited and complex disorders. She identified the first novel mutation associated with familial dilated cardiomyopathy in the Saudi population. She partially defined its underlying disease mechanism, demonstrating a critical role for ER-stress-mediated apoptotic signaling in FBXO32-related cardiomyopathy. In parallel, her recent studies on Dcaf17 deficiency have linked mitochondrial and lysosomal dysfunction to inflammasome activation and necroptosis, providing mechanistic insights into male infertility and related reproductive phenotypes. Through the integration of functional genomics, proteomic analyses, and cellular models, Dr. Alyacoub seeks to unravel disease mechanisms and strengthen molecular characterization in genetic medicine.

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



N-METHYLADENOSINE RNA BASE MODIFICATION REGULATES NKG2D-DEPENDENT AND CYTOTOXIC GENES EXPRESSION IN NATURAL KILLER CELLS

Raghda Abdelmonem Abdelmajeed Mahmoud, Ghada Abdelhady, Doris Urlaub, Mina Sandusky, Ola Khorshid, Mohamed Z Gad, Khaled Abou Aisha, Carsten Watzl and Mona Rady

The German University in Cairo, Egypt

Abstract:

Background: Breast cancer (BC) is the most commonly diagnosed cancer in women. N⁶-methyladenosine (m⁶A) is the most prevalent internal modification in mammalian mRNAs and plays a crucial role in various biological processes. However, its function in Natural killer (NK) cells in BC remains unclear. NK cells are essential for cancer immunosurveillance. This study aims to assess m⁶A levels in transcripts involved in the NKG2D cytotoxicity signaling pathway in NK cells of BC patients compared to controls and to determine their impact on mRNA levels. Additionally, it evaluates how deliberately altering m⁶A levels in NK cells affects mRNA and protein expression of NKG2D pathway genes and NK cell functionality.

Methods: m⁶A methylation in transcripts of NKG2D-pathway-related genes in BC patients and controls was determined using methylated RNA immunoprecipitation-reverse transcription-PCR (MERIP-RT-PCR). To deliberately alter m⁶A levels in primary cultured human NK cells, the m⁶A demethylases, FTO and ALKBH5, were knocked out using the CRISPR-CAS9 system, and FTO was inhibited using Meclofenamic acid (MA). The impact of m⁶A alteration on corresponding mRNA and protein levels was assessed using RT-qPCR and Western blot analysis or flow cytometry, respectively. Additionally, NK cell functionality was evaluated through degranulation and ⁵¹Cr release cytotoxicity assays.

Results: Transcripts of NKG2D, an activating receptor that detects stressed non-self tumour cells, had significantly higher m⁶A levels in the 3' untranslated region (3'UTR), accompanied by a marked reduction in their corresponding mRNA levels in BC patients compared to controls. Conversely, transcripts of ERK2 and PRF1 exhibited significantly lower m⁶A levels, accompanied by higher mRNA expression in BC patients relative to controls. The mRNA levels of PI3K, PAK1, and GZMH were also significantly elevated in BC patients. Furthermore, artificially increasing transcripts' m⁶A levels via MA in cultured primary NK cells reduced mRNA levels

4th European Congress on Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



of NKG2D pathway genes and death receptor ligands but did not affect protein expression or NK cell functionality.

Conclusion: Transcripts with higher m⁶A levels in the 3'UTR region were less abundant, and vice versa. However, changes in mRNA levels of the target genes didn't impact their corresponding protein levels or NK cell functionality.

Biography

Raghda Elsabbagh completed her PhD in 2021 at the German University in Cairo (GUC). During her doctoral studies, she conducted part of her research at the Leibniz Research Centre for Working Environment and Human Factors (IfADo), Dortmund, Germany. Her postdoctoral research interests include epigenetic regulation in immunity, salivary metabolomics, hydrogen sulfide (H₂S) signaling, and the therapeutic potential of plant-derived bioactives in polycystic ovary syndrome (PCOS). Her work employs molecular and biochemical approaches to explore disease mechanisms and therapeutic strategies.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



**GENETIC ASSOCIATION OF POLYMORPHISMS OF THE KCNJ11,
PPARG, AND TCF7L2 GENES WITH T2D IN AZERBAIJAN POPULATION**

Lala A Akhundova, Nurmammad Sh Mustafayev and Irada M Huseynova

MSE Republic of Azerbaijan, Azerbaijan

Abstract:

Type 2 diabetes (T2D) is a complex multifactorial metabolic disorder caused by the interaction of genetic and environmental factors and characterized by insulin resistance, impaired insulin secretion, and progressive pancreatic β -cell dysfunction. Several candidate genes have been associated with susceptibility to T2D, including KCNJ11, PPARG, and TCF7L2. The KCNJ11 rs5219 polymorphism has been linked to altered potassium channel activity and impaired insulin secretion. PPARG rs1801282 is associated with insulin sensitivity and adipocyte differentiation. Additionally, TCF7L2 polymorphisms (rs12255372 and rs7903146) have been widely studied for their role in β -cell function and glucose metabolism through the Wnt signaling pathway. The aim of this study is to evaluate the association of PPARG (rs1801282), KCNJ11 (rs5219), and TCF7L2 (rs12255372 and rs7903146) gene polymorphisms with genetic susceptibility T2D in the Azerbaijani population. A total of 305 patients with T2D and 315 healthy controls were enrolled. Genomic DNA was isolated from peripheral blood samples, followed by PCR amplification of the target regions with specific primers. Statistical analysis was carried out according to assay requirements using SPSS software. The results obtained from allele and genotype analyses showed that mutant T allele and TT genotype of both TCF7L2 gene polymorphisms rs12255372 (T allele OR=1.71, 95%CI=1.31-2.22; TT genotype OR=3.10, 95%CI=1.55-6.18) and rs7903146 (T allele OR=1.67, 95%CI=1.33-2.09; TT genotype OR=3.91, 95%CI=2.34-6.53) showed significant association with T2D. These results were corresponded to the results of previous studies and prove the major role of TCF in the pathogenesis of T2D. In contrast to TCF7L2 gene, the polymorphisms of KCNJ11 (rs5219, T mutant allele OR=1.45, 95%CI=1.16-1.81; TT genotype OR=2.12, 95%CI=1.36-3.31) and PPARG (rs1801282, G mutant allele OR=1.47, 95%CI=1.12-1.93; GG mutant genotype OR=3.23, 95%CI=1.56-6.68) showed moderate but also significant predisposition. Overall, these findings suggest that studied gene polymorphisms play an important and statistically significant role in genetic predisposition to T2D in Azerbaijan population.

Biography

Lala Akhundova is a molecular biology and genetics researcher who focuses on the genetic basis of diabetes in the Azerbaijani population. She graduated from the Faculty of Biology at Baku State University and later earned a Master's degree in molecular biology from Wageningen University.

4th European Congress on
Biomedical Science and Engineering
&
Human Genetics

April 27-28, 2026 | Berlin, Germany



in the Netherlands. L. Akhundova is currently conducting PhD research in molecular biology at the MS ERA Institute of Molecular Biology PLE, Laboratory of Population Genomics. Her research centers on the molecular genetic investigation of hereditary predisposition to different forms of diabetes mellitus, including types 1 and 2. Her scientific interests include single-nucleotide polymorphism (SNP) genotyping, genetic association studies, population genetics, and identifying genetic risk factors involved in complex, multifactorial diseases. L.Akhundova participates in national and international scientific conferences and engages in academic research aimed at improving the understanding of disease susceptibility in understudied populations. Her work contributes to the development of population-specific approaches for early risk assessment and personalized medicine.

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



GENETIC ADVANCEMENTS IN BREAST CANCER TREATMENT : A REVIEW

Homaira Arian

Anadolu University, Turkey

Abstract:

Breast cancer remains a significant global health burden and continues to rank among the leading causes of cancer-related mortality in women. While conventional therapeutic modalities, including surgery, chemotherapy, and radiotherapy, have contributed to improved survival, their effectiveness is frequently constrained by systemic toxicity, therapeutic resistance, and metastatic progression. Advances in genetic engineering are reshaping the therapeutic landscape by introducing highly targeted and personalized treatment strategies. In particular, CRISPR/Cas9 genome editing and oncolytic virotherapy represent transformative innovations in precision oncology. CRISPR/Cas9 technology enables precise modification of oncogenic pathways, including key drivers such as HER2 and MYC, thereby addressing the molecular mechanisms underlying tumor initiation, progression, and drug resistance. Concurrently, oncolytic viruses selectively infect and lyse malignant cells while activating systemic anti-tumor immune responses, offering a synergistic biological effect that enhances therapeutic selectivity and efficacy. The integration of gene-based therapies with immunotherapeutic and conventional treatment modalities further supports a multimodal strategy capable of overcoming current clinical limitations in advanced breast cancer management. Moreover, the emergence of personalized medicine, supported by genomic profiling and mutation analysis of genes such as BRCA1 and BRCA2, enables individualized therapeutic planning and improved clinical outcomes. Despite substantial progress, challenges related to delivery efficiency, off-target effects, long-term safety, and ethical considerations persist. Continued interdisciplinary research focusing on optimized vector systems, targeted delivery platforms, and combination therapies is essential for clinical translation. The convergence of molecular genetics, biomedical engineering, and oncology holds considerable promise for advancing precision breast cancer treatment and enhancing patient survival and quality of life.

Biography

Homaira Arian is a graduate researcher in Pharmaceutical Biotechnology at Anadolu University, Türkiye, with an academic background in pharmacy and biomedical sciences. She holds a Bachelor's degree in Pharmacy and has completed her Master's degree in Pharmaceutical Biotechnology, focusing on molecular and cellular approaches in drug development and therapeutic innovation. Her training includes laboratory experience in molecular biology techniques such as PCR, Western blotting, HPLC analysis, and cell culture, alongside skills in scientific data analysis and research documentation.

4th European Congress on
Biomedical Science and Engineering
&
Human Genetics

April 27-28, 2026 | Berlin, Germany



Homaira has professional experience in healthcare administration and research support, having worked with public health institutions in Afghanistan. These roles strengthened her interdisciplinary perspective on healthcare systems and biomedical applications. Her research interests include genetic therapies, pharmaceutical biotechnology, and translational approaches in disease treatment. She is fluent in English and Turkish and actively engages in collaborative scientific environments. Homaira is committed to continuous academic development and aims to contribute to innovative biomedical research that bridges laboratory science and clinical impact.

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



NATTOKINASE MITIGATES MYOCARDIAL DAMAGE AND RENAL DYSFUNCTION IN Γ -IRRADIATED RATS TREATED WITH ISOPROTERENOL

Nermeen Mohamed Sayed Ahmed Badr Elbakary

Egyptian Atomic Energy Authority, Egypt

Abstract:

Background: Acute myocardial infarction (MI) remains the deadliest form of coronary artery disease, caused by interrupted blood flow and subsequent myocardial injury. Isoproterenol (ISO), a synthetic nonselective β -adrenergic agonist, induces cardiac energy depletion, coronary hypotension, oxidative stress, and calcium overload. Nattokinase (NK) has reported benefits in conditions including hemorrhoids, diabetes, muscle spasm, chronic inflammation, cardiovascular disorders, Alzheimer's disease, and stroke. Radiation-induced heart disease (RIHD) encompasses pericarditis, cardiomyopathy, coronary and valvular disease, and conduction abnormalities resulting from cardiac radiation exposure. This study evaluates nattokinase's effectiveness against ISO-induced MI in rats exposed to whole-body fractionated gamma irradiation.

Methods: Male rats received oral nattokinase (720 FU/kg body weight/day) for ten days, combined with 5 Gy of fractionated gamma irradiation (0.5 Gy/day for ten days) and ISO (150 mg/kg body weight, subcutaneous, for two consecutive days starting on day 1). Control groups included irradiated rats without NK and ISO exposure.

Results: NK co-treatment significantly modulated cardiac injury markers. ANP, troponin, GSH, MDA, TNF- α , and eNOS in heart tissue showed notable improvements in NK plus ISO and gamma-irradiation groups versus ISO with gamma irradiation alone. Renal indicators improved: NGAL, aldosterone, ANG-II, and eNOS. Additionally, kidney markers KIM-1, GSH, MDA, and TNF- α demonstrated favorable changes. Serum inflammatory index IL-18 and the organ damage index LDH were attenuated. Overall, NK's antioxidant and anti-inflammatory properties helped preserve myocardial perfusion and function by modulating cardiac (ANP, cTnI, GSH, MDA, TNF- α), renal (KIM-1, ANG-II, aldosterone, NGAL), and systemic (IL-18, LDH) pathways, potentially via eNOS regulation.

Conclusion: NK offers multi-faceted protection against ISO- and radiation-induced myocar-

4th European Congress on **Biomedical Science and Engineering & Human Genetics**

April 27-28, 2026 | Berlin, Germany



dial and renal injury, supporting its potential as an adjunct strategy in radiation exposure and cardiotoxic contexts.

Biography

Nermeen M El Bakary is a radiobiology and biochemistry researcher with extensive experience in characterizing radiation-induced tissue injury, developing radioprotective strategies, and exploring molecular pathways relevant to cancer therapy. She serves as Associate Professor of Biochemistry at the National Center for Radiation Research & Technology, Atomic Energy Authority, Cairo, Egypt. Her PhD in Biochemistry is from the Faculty of Science, Ain Shams University, Cairo, Egypt. Her research focuses on cancer biology and the effects of radiation on the human body, with responsibilities spanning preclinical modeling, translational research, and radiation risk management. Her work aims to advance radioprotection, cancer therapy adjuncts, and diagnostic imaging for radiation-related pathologies within national energy and health safety programs. Key roles include:

1. Implementing robust preclinical models for radiation-related disease management to enable stepwise translation to clinical practice and regulatory readiness.
2. Evaluating novel radiotracers for diagnostic imaging of radiation-induced tissue damage and related pathologies, enhancing early detection and monitoring.

Nermeen has authored and co-authored numerous articles in high-profile journals, including Discover Oncology, Life Sciences, Integrative Cancer Therapies, and Technology in Cancer Research & Treatment. She has supervised numerous Master's and PhD theses across various Egyptian universities, contributing to the training and development of the next generation of researchers in radiobiology and biochemistry.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



**ANTI-MULLERIAN HORMONE GENE POLYMORPHISM IN
POLYCYSTIC OVARY SYNDROME : A PILOT STUDY**

Laiba Rehmat, Rehana Rehman, Unab Khan, Samar Zaki and Haq Nawaz
Aga Khan University, Pakistan

Abstract:

Background & Objective: Polycystic ovary syndrome (PCOS) is a heterogeneous endocrine condition characterized by ovulatory disturbance, which is attributed to elevated anti-Müllerian hormone (AMH) levels. We compared AMH levels in females with and without PCOS and aimed to determine the genetic variant, rs10407022, in AMH of Pakistani females with PCOS.

Methodology: This case-control study was conducted at Aga Khan University from January 2024 to November 2024, involving 99 female subjects (49 PCOS, 50 controls). Serum AMH levels were measured using commercially available kits, and the genotyping of AMH rs10407022 SNP was done by Tetra-ARMS-PCR in both groups. Results were validated by Polymerase Chain Reaction-Restricted Fragment Length Polymorphism (PCR-RFLP). Final validation was conducted via Sanger DNA sequencing of randomly selected samples of PCOS females.

Results: Higher AMH levels were observed in females with PCOS [6.47 ± 6.05 vs 3.06 ± 1.91 (ng/ml); p value < 0.0001]. PCR amplified AMH (rs10407022) in PCOS samples, showing a 238 bp control band and a 135 bp band for the genotype. Further, the SNP (Homozygous WT/MT and heterozygous) was validated by RFLP and a gold standard Sanger DNA sequencing.

Conclusion: High AMH levels associated with the genetic variant (rs10407022) of AMH suggest role of AMH gene dysregulation in the manifestation of PCOS.

Biography

Laiba Rehmat is a biomedical researcher with an MPhil in Biomedical Sciences from Aga Khan University, Pakistan. Her research focuses on the genetic and molecular mechanisms underlying polycystic ovary syndrome (PCOS). She investigated the association of the Anti-Müllerian Hormone (AMH) gene polymorphism rs10407022 with PCOS using ELISA, ARMS-PCR, RFLP, and DNA sequencing. Her findings demonstrated elevated AMH levels in PCOS patients and confirmed the involvement of the rs10407022 variant in disease susceptibility. Her research interests center on molecular genetics, reproductive health, and translational biomedical research.

4th European Congress on
Biomedical Science and Engineering
&
Human Genetics

April 27-28, 2026 | Berlin, Germany



BIOINFORMATICS ANALYSIS OF GENES RESPONSIBLE FOR THE DISEASES SUCH AS BREAST CANCER, LUPUS, AND GONORRHEA

Hema Kumar Chandru, Ravindranath BS and Dario C Ramirez

Dayananda Sagar College of Engineering, India

Abstract:

Cancer is one of the most life-threatening diseases affecting both males and females, and there are about 19.3 million new cases reported by the GLOBOCAN in the year 2020. Human heparan sulfatase-2 (HSULF-2) is an oncoprotein overexpressed in the surface of all types of tumor cells and its activity plays a critical role in cancer survival and progression. Our previous studies have shown that bael fruit extract, containing marmesin and marmelosin, inhibits the HSULF-2 activity and kills breast tumor cells, but the mechanism of these processes remains fairly known mainly because the HSULF-2's 3D structure is partially known. Herein, we aimed at providing an in silico molecular mechanism of the inhibition of human HSULF-2 by phytochemicals from bael fruit extract. Pharmacokinetic parameters of the main phytochemicals contained in the bael fruit extract, sequence-based 3D structure of human HSULF-2, and the interaction of bael fruit's phytochemicals with the enzyme active site was modelled, evaluated, and verified. Docking studies revealed marmesin and marmelosin as potential inhibitors with binding score -8.5 and -7.7 Kcal/mol; these results were validated using molecular dynamics simulations, which exhibited higher stability of the protein-ligand complexes. Taking together, with our earlier in vitro data, our computational analyses suggest that marmesin and marmelosin interact at the active site of HSULF-2 providing a potential mechanism for its inhibition and consequent antitumor activity by phytochemicals contained in the bael fruit extract.

Bioinformatics tool that we have used in for the study is Neisseria gonorrhea, the causative agent of genitourinary infections, which has been associated with asymptomatic or recurrent infections and has the potential to form biofilms and induce inflammation and cell transformation. Herein, we aimed to use computational analysis to predict novel associations between chronic inflammation caused by gonorrhea infection and neoplastic transformation. Prioritization and gene enrichment strategies based on virulence and resistance genes utilizing essential genes from the DEG and PANTHER databases, respectively, were performed. Using the STRING database, protein-protein interaction networks were constructed with 55 nodes of bacterial proteins and 72 nodes of proteins involved in the host immune response. MCODE and cyto Hubba were used to identify 12 bacterial hub proteins (murA, murB, murC, murD, murE, purN, purL, thyA, uvrB, kdsB, lpxC, and ftsH) and 19 human hub proteins, of which

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



TNF, STAT3 and AKT1 had high significance. The PPI networks are based on the connectivity degree (K), betweenness centrality (BC), and closeness centrality (CC) values. Hub genes are vital for cell survival and growth, and their significance as potential drug targets is discussed. This computational study provides a comprehensive understanding of inflammation and carcinogenesis pathways that are activated during gonorrhea infection.

We have used bioinformatic tools for the study of Systemic lupus erythematosus (SLE or lupus) which is a clinically heterogeneous, systemic autoimmune disease affecting 2 million people in the USA, about 90% of whom are women. The profound morbidity and mortality of SLE stem from chronic inflammation and multiple organ damage. Because lupus patients have weakened immune systems from standard immunosuppressant, treatment and immune dysregulation, infection is a leading cause of morbidity and mortality, accounting for more than 25% SLE-related deaths.

Biography

Hema Kumar Chandru has his expertise in evaluation and passion in improving the health and wellbeing. He has expertise in molecular regulation of genes and cell signaling studies that is protein- protein interactions in diseases like breast cancer and inflammatory diseases. He has worked in the area for more than 25 years at well reputed Universities and Research Institutions such as University of Texas Health Science Center at Tyler, Texas, USA, Oklahoma Medical Research Foundation, USA, Oklahoma State University, USA, Chonnam National University, South Korea, JSS Pharmacy College, India, and CSIR-CFTRI, India. Currently serving as an Associate Professor, at Dayananda Sagar College of Engineering, Bangalore India, working on Nutraceuticals and formulations of food for the prevention, good health and wellbeing. He has more than 30 research publications in well reputed and peer reviewed journals.

4th European Congress on
**Biomedical Science and Engineering
&
Human Genetics**

April 27-28, 2026 | Berlin, Germany



INTEGRATED GENETIC AND IN SILICO ANALYSIS OF GSTT1 AND GSTM1 IN BANGLADESHI PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Sheikh Zinia Rahman

University of Dhaka, Bangladesh

Abstract:

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of morbidity and mortality worldwide, yet only a subset of chronic smokers develop symptomatic disease, indicating a significant genetic contribution. Glutathione S-transferases (GSTs), particularly GSTM1 and GSTT1, are key detoxification enzymes that neutralize cigarette smoke-derived oxidants. Null polymorphisms in these genes have been associated with COPD susceptibility, but no data are available from Bangladesh.

In this case-control study, 140 individuals (70 COPD patients and 70 healthy controls) were genotyped for GSTM1 and GSTT1 deletions using multiplex PCR. Logistic regression assessed associations with COPD risk. GSTT1 null genotype was observed in 20% of cases *versus* 8% of controls (OR 2.67; 95% CI 0.96–7.41), GSTM1 null in 26% *versus* 10% (OR 3.11; 95% CI 1.21–8.02), and dual-null in 11% *versus* 2% (OR 8.90; 95% CI 1.08–73.0),

indicating a genetic predisposition to COPD in this population. Functional relevance of these polymorphisms was investigated via in silico analysis. GeneMANIA and STRING revealed that GSTM1 and GSTT1 interact with oxidative stress, inflammatory pathways, and drug metabolism networks. Structural modeling indicated disruptions near glutathione-binding regions, and KEGG enrichment highlighted glutathione metabolism and xenobiotic detoxification as key pathways. These findings suggest that GSTM1 and GSTT1 null polymorphisms compromise antioxidant defenses and redox homeostasis, positioning them as potential predictive biomarkers for COPD susceptibility. Future work will expand to larger cohorts, functional assays, gene expression profiling, and drug-response analyses to validate these genes for risk-stratified and personalized COPD management in Bangladesh.

Biography

Sheikh Zinia Rahman is an emerging biomedical researcher specializing in molecular disease mechanisms and immunoinformatics. She is a Master's student in the Department of Biochemistry and Molecular Biology at the University of Dhaka, working at the intersection of molecular genetics and translational biomedical research. Her thesis investigates genetic susceptibility to Chronic Obstructive Pulmonary Disease in the Bangladeshi population, combining wet-lab experiments with computational analysis, and has earned her the National Science and Technology Fellowship. She has also designed a multi-epitope subunit vaccine against Nipah virus using reverse vaccinology. Currently, she is leading a transcriptomic meta-analysis of Parkinson's disease, including construction of miRNA-mRNA regulatory networks and pathway enrichment analysis. She has

4th European Congress on

Biomedical Science and Engineering & Human Genetics

April 27-28, 2026 | Berlin, Germany



advanced proficiency in molecular biology and microbiological laboratory techniques. Beyond research, Zinia is actively engaged in science communication and education through teaching, volunteering, and YouTube-based content creation, with a strong interest in ethical and interdisciplinary dimensions of science. Her global outlook is further strengthened by participation in academic competitions and proficiency in French and German, preparing her to contribute effectively to international research communities.

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BIOMEDICAL SCIENCE AND RESEARCH FOR LOWER AND MIDDLE-INCOME COUNTRIES : FROM PUBLIC HEALTH AND FINANCE PERSPECTIVE

Humayra Ferdous

American International University Bangladesh, Bangladesh

Abstract:

Public Health is a subject that focuses on improving population health rather than individual patients through education, policy making research and health services. Health service can be delivered efficiently if the existing resources are utilized at their maximum level. However, technological involvement in the domain of health services has been increasing day by day. In this respect Biomedical Engineers (BME) and other relevant professionals often play vital role particularly in reducing the cost through early detection and providing clinical engineering services. Unfortunately, in least income countries (LIC's), these fields were not given importance, the way it should be. One of the major reasons for such situation is due to the absence of multidisciplinary approaches while taking policies. Excluding technological people in the decision- making process leads to increase the financial cost for healthcare service. The current study shows how the cost of health service can be decreased if medical service providers including doctors, are given adequate BME training and knowledge, specially for the country like Bangladesh, which plan to alleviate its status from least to developing countries. An inclusive approach in the field of health care service is necessary to gain the maximum benefit from the professionals to the society. Comparative study also shows how the health service delivery is directly linked with management and in corporation of BME professionals these days, which directs the more engagement of technological people in the field of health sector in the era of Artificial Intelligence (AI).

Biography

Humayra Ferdous is currently the Head and Associate Professor of the Department of Physics at the American International University-Bangladesh (AIUB). After completing her PhD at the University of Oslo (UiO), Norway, with a dissertation titled "Study of Changes in Lung Transfer Impedance due to Ventilation Using Focused Impedance Measurement (FIM) Technique," she returned to AIUB in 2015. Her primary research interests include bioimpedance and the respiratory system. In addition to her academic duties, Dr. Ferdous serves as the Publication Secretary of the Bangladesh Medical Physics Association (BMPA). She has also contributed significantly to the organization of major scientific events, serving as convener of the publication committee and a member of the scientific committee for the International Conference on Physics in Medicine (ICPM-2020, ICPM-2022, and ICPM-2025) held in Dhaka, Bangladesh. Beyond BMPA, she is a life member of the Bangladesh Physical Society (BPS). Her broader academic interests include sustainable technology, physics education, and the development of biomedical engineering education in Bangladesh. She has published several research papers and book chapters in her areas of expertise.

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EFFECTS OF URTICA DIOICA ON COGNITION IN HYPERGLYCEMIC ANIMAL MODELS: A SYSTEMATIC REVIEW

Raheel Bayat

Kavosh Nonprofit Educational-Research Institute, Afghanistan

Abstract:

Diabetes mellitus is a chronic metabolic disorder associated with cognitive impairments and neurodegenerative changes, largely driven by oxidative stress, chronic inflammation, and impaired glucose metabolism. Growing evidence has highlighted the potential of natural compounds as alternative or adjunct therapeutic agents for mitigating these deficits. Among these, *Urtica dioica* has attracted considerable attention due to its diverse pharmacological properties, including antioxidant, anti-inflammatory, and antihyperglycemic effects. This systematic review aimed to comprehensively evaluate the effects of *Urtica dioica* on cognitive function in hyperglycemic animal models.

A structured search was performed across major scientific databases, including PubMed, Scopus, Web of Science, Cochrane Library, and ScienceDirect, to identify relevant studies published between 2000 and 2024. Eligible studies were selected based on predefined inclusion criteria focusing on experimental models of diabetes and cognitive disorders.

The findings consistently demonstrate that *Urtica dioica* exerts significant cognitive-enhancing effects through multiple interconnected mechanisms. These include attenuation of oxidative and nitrative stress, modulation of pro-inflammatory cytokines, inhibition of apoptotic pathways, and improvement of metabolic parameters such as blood glucose levels. In addition, *Urtica dioica* was shown to reduce astrocyte density, alleviate histopathological alterations, and restore neuronal structures, including granule cells, particularly in brain regions involved in learning and memory. Furthermore, improvements in cholinergic neurotransmission and behavioral performance were observed, supporting enhanced cognitive function in treated animal models.

Overall, the current body of evidence suggests that *Urtica dioica* holds considerable promise as a cognitive-enhancing agent for diabetes-induced cognitive impairments. However, despite these encouraging preclinical findings, further well-designed clinical studies are required to validate its efficacy, safety, and translational potential in human populations.

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Biography

Raheel Bayat is an Afghan medical student at Tehran University of Medical Sciences and a researcher at the Department of Cognitive Neuroscience, Neuroscience Research Center, Kavosh Nonprofit Educational Research Institute, where she has been actively involved since 2022. Her research focuses on the effects of medicinal plants on learning, memory, and neuroprotection, with particular interest in neuropharmacology, traditional medicine, and metabolic disorders. Raheel has co-authored peer-reviewed publications, including a systematic review on *Urtica dioica* and its neuroprotective effects in diabetic animal models. She has also contributed to research on the cognitive effects of almond consumption. In addition to her research activities, she has experience in teaching, web development, and programming, with a growing interest in Python for scientific and data analysis applications. She is multilingual, fluent in Persian and English, and has received several academic honors, including a full scholarship for medical studies.

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A BROADER NARRATIVE ON RESPIRATORY DISEASES : A CITIZENS AND PATIENTS PERSPECTIVE TOWARDS THE DEVELOPMENT OF AN EU RESPIRATORY HEALTH PLAN

Mariano Votta

Italian NGO Cittadinanzattiva, Italy

Abstract:

Respiratory diseases represent a major and persistent public health challenge in the European Union, contributing substantially to morbidity, mortality, healthcare utilization, and health inequalities. Despite existing initiatives, respiratory health remains insufficiently integrated into broader infection, prevention and control strategies, vaccination plans, programs to fight antimicrobial resistance. For instance, as COVID-19 transitions from a pandemic to an endemic disease, its integration into the broader policy and healthcare framework for respiratory diseases becomes imperative.

The presentation will provide a concrete example of activities that CSOs (Civil society organizations) and PAGs (Patients advocacy groups) can carry out in support of public policy, with a particular focus on vaccine preventable respiratory diseases: main findings from a European qualitative survey-promoted by the Italian NGO Cittadinanzattiva through its EU branch, called "Active Citizenship Network"-conducted among PAGs and CSOs to evaluate progress and gaps in policy, service transformation, public awareness, and preparedness for future respiratory health threats; a consensus-based expert policy analysis conducted through a multidisciplinary European Working Group on Respiratory Care to outline policy priorities to support a more integrated, equitable, and resilient European respiratory health strategy; a communication campaign realized with 13 national patient advocacy groups across Europe, calling the EU to move towards a comprehensive EU Respiratory Health Plan

Biography

Mariano Votta is responsible for EU Affairs at the Italian NGO Cittadinanzattiva and Director of its EU branch "Active Citizenship Network". Passionate about health & consumer issues, Mariano has 25 years of experience in advocacy, stakeholder engagement, communication, European Public Affairs & EU funded-projects. Mariano holds a Degree in Political Science and two post-graduate master's degrees in European Public Relations and Corporate Social Responsibility. He is also a journalist with more than 50 publications in international peer-reviewed journals. He led the political initiative to launch in 2015 at the EU Parliament the Interest Group "EU Patients' Rights & Cross-Border Healthcare," – now at its third mandate - endorsed by more than 100 organizations across Europe and dozens of Members of the European Parliament. In 2016 Mariano won the Efhre International University Excellence Awards on patients rights.

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We sincerely thank all our esteemed committee members, session chairs, keynote speakers, plenary speakers, and oral and poster presenters for their insightful contributions and for sharing their valuable expertise.

Your participation has truly enriched the success of the Conference.

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