



ICMTB 2026

ABSTRACT BOOK

*International Conference on Medicine and Translational
Biosciences*

Inaugural Edition

4–5 June 2026 | Tirana, Albania

Western Balkans University

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Opinions expressed are those of the authors and do not reflect views of the organising institutions.

WELCOME MESSAGES

Message from the Rector

It is my great pleasure to present the Abstract Book of the International Conference on Medicine and Translational Biosciences (ICMTB 2026). This volume brings together the scientific contributions presented during the conference and reflects the innovation, diversity, and collaborative spirit that define this important international gathering.

At Western Balkans University, we believe that scientific research is one of the most powerful drivers of societal progress. Advances in medicine, biotechnology, and translational biosciences have the potential to transform healthcare, improve quality of life, and address some of the most pressing challenges facing humanity. ICMTB was established with this vision in mind: to create a platform where researchers, clinicians, innovators, educators, students, and industry representatives can exchange ideas, share discoveries, and foster meaningful collaborations.

The abstracts collected in this book highlight the multidisciplinary nature of contemporary biomedical research. They encompass a wide range of topics, including precision medicine, clinical sciences, translational research, artificial intelligence, digital health, biotechnology, regenerative medicine, medical education, and public health. Together, they showcase both emerging discoveries and practical applications that contribute to the advancement of healthcare and scientific knowledge.

ICMTB 2026 represents an important milestone for Western Balkans University and for the broader scientific community. By bringing together distinguished experts and emerging scholars from numerous countries, the conference creates opportunities for dialogue, partnership, and innovation that extend well beyond the event itself.

I am particularly proud that ICMTB 2026 provides a platform for both established researchers and the next generation of scientists. The enthusiasm, creativity, and dedication demonstrated by students, young investigators, and early-career researchers reinforce our confidence in the future of medicine and translational biosciences.

This Abstract Book stands as a testament to the collective efforts of all authors, keynote speakers, invited speakers, reviewers, members of the Scientific and Organizing Committees, sponsors, and institutional partners whose contributions have made this conference possible. Their commitment to academic excellence and scientific rigor has ensured the high quality of the programme presented at ICMTB 2026.

As you explore these abstracts, I hope you will discover new ideas, identify opportunities for collaboration, and gain inspiration for future research and innovation.

On behalf of Western Balkans University, I extend my sincere gratitude to all participants and contributors for helping make ICMTB 2026 a success. I wish you a productive and inspiring conference experience and look forward to the scientific advances and collaborations that will emerge from this event.

Prof. Ferdinand Gjana

Rector

Western Balkans University, Tirana, Albania

Message from the Conference Chair

It is my great pleasure to welcome you to the First International Conference on Medicine and Translational Biosciences (ICMTB 2026) and to this Abstract Book, which brings together researchers, clinicians, and innovators from twenty countries across four continents.

The theme of this inaugural edition, Innovation in Clinical and Translational Research for Future Healthcare, reflects our shared commitment to advancing scientific discoveries that improve human health. The abstracts presented in this volume highlight the breadth of contemporary translational research, spanning artificial intelligence, neuroscience, regenerative medicine, pharmaceutical sciences, biomedical innovation, and clinical research.

Equally important is the spirit of collaboration represented throughout this collection. The diversity of perspectives and expertise demonstrates the value of international and interdisciplinary partnerships in addressing today's healthcare challenges.

I am especially encouraged by the participation of students and early-career researchers, whose enthusiasm and dedication will help shape the future of science and medicine.

On behalf of the Organizing Committee, I thank all authors, reviewers, speakers, and partners for their contributions. We are honored to welcome you to Tirana and look forward to the discussions, collaborations, and discoveries that ICMTB 2026 will inspire.

Assoc. Prof. Albana Halili

Chair, ICMTB 2026

Vice Rector for Research and Innovation

Western Balkans University, Tirana, Albania

Message from the Conference Co-Chair

Dear Colleagues,

Welcome to the First International Conference on Medicine and Translational Biosciences (ICMTB 2026). We are delighted to bring together a diverse community of clinicians and scientists for a stimulating exchange of ideas, research, and innovation.

The abstracts presented in this volume reflect the dynamism of contemporary biomedical research and the growing importance of collaboration across disciplines and borders. They showcase advances in diagnostics, therapeutics, artificial intelligence, regenerative medicine, pharmaceutical sciences, and biomedical innovation.

Artificial intelligence, in particular, emerges as a significant theme throughout this conference, highlighting both the opportunities and challenges associated with its integration into healthcare. Continued progress will depend on rigorous research, interdisciplinary collaboration, and thoughtful discussion.

I hope the work presented in these pages inspires new ideas, meaningful collaborations, and future discoveries that ultimately improve human health.

Assoc. Prof. Iris Allajbeu

Co-Chair, ICMTB 2026

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CONFERENCE PROGRAMME — DAY 1

Thursday, 4 June 2026 | Theme: *Precision Medicine, Clinical Impact and Future Healthcare*

Venue: Maritim Hotel Plaza Tirana

Time	Session / Event	Venue
08:30–09:00	Registration & Welcome Coffee	Queen Geraldine Conference Hall
09:00–09:30	Welcome Address & Opening Ceremony	Queen Geraldine Conference Hall
09:30–11:00	Opening Keynote Lectures	Queen Geraldine Conference Hall
11:00–11:30	Panel Discussion 1: Precision Medicine in Practice – From Genomics to the Bedside	Queen Geraldine Conference Hall
11:30–12:00	Coffee Break	
12:00–14:00	Parallel Session A: Precision Medicine & AI Innovation	Queen Geraldine Hall 1
12:00–14:00	Parallel Session B: Clinical Medicine, Neurology & Specialties	Queen Geraldine Hall 2
12:00–14:00	Parallel Session C: Surgery & Interventional Medicine	Jeronim De Rada Hall 1
12:00–14:00	Parallel Session D: Digital Health, AI & Biomedical Innovation	Jeronim De Rada Hall 2
14:00–15:00	Lunch Break	
15:00–17:00	Parallel Session E: Public Health & Infectious Diseases	Queen Geraldine Hall 1
15:00–17:00	Parallel Session F: Clinical Practice & Multidisciplinary Care	Queen Geraldine Hall 2
15:00–17:00	Parallel Session G: Ophthalmology & Clinical Specialties	Jeronim De Rada Hall 1
15:00–17:00	Parallel Session H: Regenerative Medicine, Tissue Engineering & Biomaterials	Jeronim De Rada Hall 2
20:00	Gala Dinner	TBC

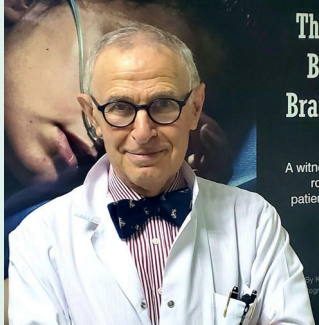
CONFERENCE PROGRAMME — DAY 2

Friday, 5 June 2026 | *Theme: Foundations & Innovations in Translational Biosciences*

Venue: Western Balkans University, Tirana

Time	Session / Event	Venue
09:00–09:30	Coffee & Networking	Conference Room A202
09:30–10:30	Morning Keynote Lectures	Conference Room A202
10:30–11:00	Panel Discussion 2: Bridging the Bench-to-Bedside Gap in Translational Biosciences	Conference Room A202
11:00–11:30	Coffee Break	
11:30–13:30	Parallel Session A: Translational Medicine & Molecular Research	Room A101
11:30–13:30	Parallel Session B: Biosensing, Digital Health and AI Applications	Room A102
11:30–13:30	Parallel Session C: Bioengineering & Translational Therapeutics	Room A103
11:30–13:30	Parallel Session D: Medical & Healthcare Education, Ethics and Leadership	Conference Room A202
11:30–13:40	Parallel Session E: Global Health, Public Health & One Health	Room A203
13:40–14:30	Lunch Break	
14:30–16:30	Parallel Session F: Public Health, Clinical Science & Patient Outcomes	Conference Room A202
14:30–16:30	Students & Young Investigators — Session 1: From Policy to Patient	Room A101
14:30–16:30	Students & Young Investigators — Session 2: From Mechanisms to Innovation	Room A102
14:30–16:30	Workshop: Forensic Molecular Diagnostics — DNA Chimerism & False-Negative Paternity Risk after Transplantation	Room A103
16:30–17:00	Poster Session & Networking	Poster Area
17:00–17:30	Closing Ceremony — Awards & Acknowledgements	Conference Room A202

KEYNOTE SPEAKER PROFILES



Mentor Petrela

MD, PhD, Chev LH, PU-PH Fr, WANS, IFAANS

Chairman, Department of Neurosurgery and Interventional Neuroradiology, American Hospital III; President, Albanian Neurosurgical Society; President, Albanian Stroke Association

Albania

Talk title: *Artificial Intelligence — Can Humans Create a Mind?*

Professor Mentor Petrela is one of Albania's most distinguished neurosurgeons, internationally recognized for his contributions to neurosurgery, neurovascular disease, and medical education. He served for many years as Professor at the University of Medicine, Tirana, and Head of the Neurosurgery Service at the Mother Teresa University Hospital Center, playing a pivotal role in the development of modern neurosurgical practice in Albania. He currently serves as Chairman of the Department of Neurosurgery and Interventional Neuroradiology at American Hospital 3, President of the Albanian Neurosurgical Society, and President of the Albanian Stroke Association. His achievements have been recognized through numerous distinctions, including the French honors *Chevalier de la Légion d'Honneur* and *Chevalier dans l'Ordre des Palmes Académiques*.



Prof. Dr. Felipe A. Calvo

Chair Professor of Radiation Oncology, Cancer Center Universidad de Navarra; Consultant, Proton Therapy Unit

Spain

Talk title: *Cancer, Precision Medicine, and Social Change*

Professor Felipe A. Calvo is an internationally renowned radiation oncologist and one of Europe's leading experts in advanced radiotherapy, proton therapy, and translational cancer research. He has held major academic and clinical leadership roles, including Chief of Oncology at Hospital General Universitario Gregorio Marañón in Madrid and Director of the Proton Therapy Unit at the Clínica Universidad de Navarra. Author of more than 350 scientific publications and supervisor of over 30 doctoral theses, he has made significant contributions to precision oncology and multidisciplinary cancer care. His achievements have been recognized through numerous international distinctions, including the ESTRO Lifetime Achievement Award.



Professor Ali M. Ghanem

MD, PhD, FRCS

Founder & Director, The Ghanem Clinic, London Visiting Professor of Aesthetic Medicine, Ulster University

United Kingdom

Talk title: *Evolution of Aesthetic Practice into Regenerative Longevity Medicine*

Professor Ali M. Ghanem is a consultant aesthetic plastic surgeon, Founder and Director of The Ghanem Clinic in London, and Visiting Professor of Aesthetic Medicine at Ulster University. Internationally recognized for his work in facial aesthetic surgery, regenerative medicine, and aesthetic education, he established the Department of Facial Aesthetics at Ulster University and leads its Master's programme. He is the originator of the Total Facial Refresh™ protocol and founder of the Academy of Aesthetic Regenerative Medicine. In recognition of his clinical and academic contributions, he was named Aesthetic Practitioner of the Year (Surgeon) in 2025.



Prof. Dr. Peter H. Abrahams

MBBS, FRCS, FRCR, DO(Hon), FHEA, FRSA

Emeritus Professor of Clinical Anatomy, Warwick Medical School Life Fellow, Girton College, University of Cambridge National Teaching Fellow, United Kingdom

United Kingdom

Talk title: *From Leonardo da Vinci to AI Medicine: Quo Vadis for Clinical Anatomy and Biological Sciences*

Professor Peter H. Abrahams is a globally recognized clinical anatomist and medical educator whose work has influenced anatomy education worldwide. He is Emeritus Professor of Clinical Anatomy at Warwick Medical School, Life Fellow of Girton College, University of Cambridge, and a UK National Teaching Fellow. Author of more than 30 textbooks, including *McMinn's Clinical Atlas of Human Anatomy*, with over two million copies sold worldwide, he has educated generations of healthcare professionals. Through his publications, teaching, and innovative use of technology in medical education, he has played a major role in advancing contemporary anatomy learning.



Prof. Naomi Low-Beer

MBBS, MD, MRCOG, MEd, SFHEA

Visiting Professor, Imperial College London Director, MedEd Solutions Ltd

United Kingdom

Talk title: *Preparing Tomorrow's Doctors for AI-Augmented Medical Practice: Capability, Collaboration and Community*

Professor Naomi Low-Beer is an internationally respected clinical academic and medical educator with more than 35 years of leadership experience in healthcare and higher education. She currently serves as Visiting Professor at Imperial College London and Director of MedEd Solutions Ltd. Previously, she was Founding Dean of Brunel Medical School and Vice-Dean for Education at the Lee Kong Chian School of Medicine in Singapore. Her work focuses on preparing future healthcare professionals for rapidly evolving healthcare systems through innovative and inclusive medical education. Her contributions have been recognized through the ASPIRE Award for Excellence in Curriculum Development.

PANEL DISCUSSION SUMMARIES

PANEL DISCUSSION 1

Precision Medicine in Practice: From Genomics to the Bedside – Opportunities and Barriers

Date / Time: Day 1, Thursday 4 June 2026 | 11:00–11:30

Venue: Queen Geraldine Conference Hall, Maritim Hotel Plaza Tirana

Moderator: Assoc. Prof. Iris Allajbeu (University of Cambridge / Western Balkans University)

Panelists: Prof. Mentor Petrela Prof. Felipe A. Calvo Prof. Ali M. Ghanem

This panel explores how precision medicine is moving from scientific promise into clinical reality. Bringing together perspectives from neuroscience, oncology, regenerative medicine, and clinical innovation, the discussion addresses the opportunities and practical barriers involved in applying personalised approaches at the bedside. Topics include the role of genomics, artificial intelligence, advanced diagnostics, and multidisciplinary care in improving patient outcomes, alongside challenges related to infrastructure, clinical implementation, professional training, and equitable access.

PANEL DISCUSSION 2

Bridging the Bench-to-Bedside Gap: Challenges and Future Directions in Translational Biosciences

Date / Time: Day 2, Friday 5 June 2026 | 10:30–11:00

Venue: Conference Room A202, Western Balkans University

Moderator: Prof. Dr. Arben Merkoçi (ICN2, Spain / Academy of Sciences of Albania)

Panelists: Dr. Nihal Engin Vrana Assoc. Prof. Aurel Ymeti Dr. Gladiola Goranci-Buzhala Dr. Sean Connell

This panel addresses the central mission of translational biosciences: transforming laboratory discoveries into practical medical applications. With expertise spanning biosensing, bioengineering, organoid models, antimicrobial research, and biomedical innovation, the panelists examine how scientific advances can be translated into diagnostics, therapeutics, and medical technologies. The discussion highlights the critical importance of interdisciplinary collaboration, validation, scalability, regulatory readiness, and productive partnerships between academia, healthcare institutions, and industry.

SUBMITTED ABSTRACTS

Peer-reviewed contributions | ICMTB 2026 | 154 abstracts

ORAL PRESENTATIONS

Tracks 1–8 | Days 1 & 2 | Abstracts 1–101

1

BREAST CANCER SCREENING: IS ARTIFICIAL INTELLIGENCE THE MISSING PIECE FOR RISK-ADAPTED SCREENING?

Iris Allajbeu^{1, 2}

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Introduction: Breast cancer screening programs have traditionally followed a uniform, age-based approach, despite substantial variation in individual risk. Risk-adapted screening aims to tailor screening frequency and modality according to factors such as breast density, genetic predisposition, and clinical history. Artificial intelligence (AI) offers the potential to improve individualized risk prediction by combining imaging, clinical, and demographic information.

Methods: A narrative review of recent literature (2020–2025) was conducted focusing on AI-based breast cancer risk prediction and risk-adapted screening strategies, including interim results from the BRAID randomized controlled trial, recently published in the Lancet.

Results: AI-based models demonstrate improved short-term risk prediction compared with traditional clinical models. Interim BRAID trial results showed supplemental imaging tailored to breast density improves cancer detection. AI-driven risk assessment may refine patient selection and optimize resources.

Conclusions: AI may enable transition toward personalized, risk-adapted breast cancer screening, improving early detection and reducing harms associated with over-screening.

Keywords: *breast cancer screening, artificial intelligence, risk-adapted screening, breast density, personalized screening, risk prediction*

2 PERSONALISING TREATMENT IN WOMEN'S CANCERS

Ramona Woitek

Department of Radiology, Danube Private University, 3500 Krems, Austria

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This presentation traces the evolution of personalised oncology in women's cancers from molecular biomarker discovery to AI-driven imaging diagnostics. Beginning with the paradigm-shifting identification of HER2 amplification and the subsequent development of targeted anti-HER2 therapies, the talk illustrates how precision medicine has transformed breast cancer survival outcomes. It then examines the remaining unmet needs: the absence of reliable predictive biomarkers for neoadjuvant chemotherapy (NACT) response and immune checkpoint inhibitor therapy, and the limitations of standard-of-care MRI in determining pathological complete response (pCR). Emerging modalities - including sodium-23 MRI at 7T, hyperpolarised ^{13}C -MRI, and AI models trained to predict actionable mutations such as PIK3CA from conventional imaging - are presented as promising tools to enable early, non-invasive treatment adaptation. The second focus of the presentation turns to high-grade serous ovarian cancer (HGSOC), a disease characterised by late-stage diagnosis, limited targeted therapies, and stagnant survival rates over the past 15 years. Using a cohort of 138 patients, the work demonstrates how CT-based radiomics combined with ensemble machine learning - integrating genomic markers of copy-number instability (tMAD from shallow whole-genome sequencing) - can predict tumour response to NACT from baseline scans alone. A complementary radiomics model further predicts histopathological chemotherapy response scores from omental disease, offering a potential route to selecting patients unlikely to benefit from NACT before treatment begins.

Keywords: *personalised oncology, breast cancer, ovarian cancer, HER2, neoadjuvant chemotherapy, radiomics, AI, treatment response prediction*

3

CLINICAL IMPACT OF MOLECULAR TESTING IN NON-SMALL CELL LUNG CANCER: INSIGHTS FROM THE EPROPA PROGRAMME IN ALBANIA

K. Mati¹; J. Tula², D. Xhemalaj³, K. Grosha¹, S. Vallone⁴

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²University Hospital “Shefqet Ndroqi”, Tirana, Albania

³University Hospital Center “Mother Teresa”, Tirana, Albania

⁴University of Turin, Turin, Italy

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Introduction: Non-small cell lung cancer (NSCLC) has evolved from a histology-based to a genomics-driven disease, with over 10 actionable oncogenic drivers now associated with targeted therapies achieving response rates of 64–84% and 5-year overall survival reaching 62% in ALK-positive disease. Despite these advances, real-world implementation of comprehensive molecular testing remains inconsistent, with nearly half of patients with advanced NSCLC missing the opportunity to benefit from personalized medicine due to testing gaps, insufficient tissue, and excessive turnaround times. Albania represents a particularly underserved setting, where lung cancer accounts for 24.3% of cancer-related deaths and NGS testing was unavailable prior to 2023.

Methods: Through the EPROPA (European Programme for Routine Testing in Advanced Lung Cancer Patients) initiative, 240 Albanian patients with NSCLC underwent comprehensive NGS-based molecular profiling between November 2023 and February 2025. Predictive biomarkers including EGFR, ALK, KRAS, ERBB2, BRAF, ROS1, MET, RET and PD-L1 were assessed. Patient demographics, smoking status, disease stage, turnaround time, actionability of results, and therapeutic impact were analyzed.

Results: The Albanian cohort showed a distinctive molecular landscape, with EGFR mutations comprising 57.4% of all detected driver alterations, predominating particularly among women, 99% of whom were never-smokers. Actionable mutations were identified in 89 patients, leading to therapy modification in 60. Mean turnaround time was 32 days. However, only three targeted agents are currently reimbursed nationally, leaving most patients with actionable alterations without access to matched therapies.

Conclusions: EPROPA demonstrates that structured international molecular testing programmes can meaningfully bridge precision oncology gaps in resource-limited settings. Expanding drug access, establishing Molecular Tumor Boards, and developing national NGS infrastructure are essential next steps to ensure that diagnostic advances translate into survival benefits for all NSCLC patients.

Keywords: *non-small cell lung cancer, molecular testing, next-generation sequencing, EPROPA,*

Acknowledgements: *The authors wish to acknowledge the EPROPA programme coordinators and all participating institutions for their support in implementing molecular testing in Albania.*

4

ADVANCES IN MOLECULAR BIOMARKERS IN MELANOMA: IMPLICATIONS FOR TARGETED THERAPY AND IMMUNOTHERAPY

*Anisa Cela¹, Kleida Mati¹*¹Oncology Department, American Hospital, Tirana, AlbaniaCorresponding author: anisacela77@gmail.com

Introduction: Melanoma is a biologically heterogeneous malignancy with rising global incidence and disproportionate mortality. The discovery of recurrent oncogenic drivers — notably BRAF V600E shifted management from empirical chemotherapy toward molecularly guided therapy. With targeted agents and immune checkpoint inhibitors now standard of care, biomarkers predicting response, detecting resistance, and enabling real-time monitoring have become clinical necessities. This review examines the current landscape of molecular biomarkers in melanoma and their therapeutic implications.

Methods: A narrative literature review was conducted using PubMed and MEDLINE, focusing on studies from the last decade. Search terms included "melanoma," "molecular biomarkers," "BRAF," "targeted therapy," "immune checkpoint inhibitors," "tumor mutational burden," and "liquid biopsy." Priority was given to clinically validated biomarkers and translational studies with direct therapeutic relevance.

Results: BRAF V600E mutations, present in 40–50% of cutaneous melanomas, drive MAPK pathway activation and define the largest biomarker-selected treatment population. Combined BRAF/MEK inhibition achieves high response rates, though acquired resistance through pathway reactivation remains near-universal. NRAS mutations (15–20%) confer aggressive biology with limited targeted options; KIT alterations in acral and mucosal subtypes represent actionable targets for tyrosine kinase inhibitors. TERT promoter mutations and CDKN2A loss contribute to disease progression and poor prognosis, while PTEN and TP53 alterations further dysregulate apoptosis and PI3K–AKT signaling. In immunotherapy, PD-L1 expression and tumor mutational burden (TMB) offer complementary predictive value, with TMB capturing immunogenic tumor characteristics that PD-L1 alone cannot. Circulating tumor DNA (ctDNA) is emerging as a non-invasive tool for residual disease detection, resistance monitoring, and treatment response assessment. LDH and S100B remain standard prognostic markers of tumor burden.

Conclusions: Molecular biomarkers underpin every major decision point in melanoma management. Single-marker approaches are insufficient given tumor heterogeneity and the complexity of resistance mechanisms. Integrated multi-omic strategies — combining genomic, transcriptomic, and liquid biopsy data — represent the most promising path toward durable responses and improved patient outcomes.

Keywords: *melanoma, molecular biomarkers, BRAF, targeted therapy, immune checkpoint inhibitors, tumor mutational burden, liquid biopsy*

5

GENOMIC PROFILING ALTERS ADJUVANT THERAPY DECISIONS IN EARLY BREAST CANCER: A SINGLE-CENTER EXPERIENCE FROM ALBANIA

Elvisa Kozma^{1, 2}, Kleida Mati¹, Burak Koza¹

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²University Hospital Center “Mother Teresa”, Tirana, Albania

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Purpose: To evaluate the alignment between oncologists' initial clinical decisions and genomic test-guided adjuvant treatments in hormone receptor-positive, HER2-negative early breast cancer.

Methods and materials: This single-center retrospective analysis included 55 patients with hormone receptor-positive, HER2-negative early breast cancer who underwent MammaPrint testing at the Oncology Department of the American Hospital, Tirana, between 2023 and 2024. Clinical and pathological parameters (age, grade, Ki67, tumor size, nodal status, menopausal status, and subtype) and genomic risk were extracted from institutional records. The oncologist's initial clinical decision, based on conventional clinicopathologic factors, was compared with the final adjuvant therapy administered after genomic testing. Concordance and discordance were evaluated using crosstabulation and Chi-square tests, while logistic regression was used to explore clinical and genomic predictors of treatment decisions.

Results: A total of 55 patients with hormone receptor-positive, HER2-negative early breast cancer were included. The median age was 56 years; 32.7% were premenopausal and 67.3% postmenopausal. Invasive ductal carcinoma was found in 85.5% of cases, invasive lobular carcinoma in 10.9%, and other histologies in 3.6%. Most tumors were grade 2 (83.6%), followed by grade 1 (10.9%) and grade 3 (5.5%). Ki67 was <20% in 63.6% and >20% in 36.4% of patients. Luminal B subtype was observed in 52.7% and Luminal A in 47.3%. Tumor size was pT1 in 40.0% and pT2 in 60.0%. Nodal status was pNo in 72.7% and pN1 in 27.3%. MammaPrint classified 9.1% of patients as very low risk, 38.2% as low risk, and 52.7% as high risk. Endocrine therapy was administered to 49.1% of patients and chemotherapy to 50.9%. A discordance of 56.4% was observed between the oncologist's initial clinical decision and the final adjuvant therapy administered. Menopausal status was significantly associated with the clinical decision ($p < 0.05$). The final adjuvant therapy was consistent with the MammaPrint genomic risk category in all cases.

Conclusions: Genomic profiling redefined adjuvant treatment recommendations in over half of patients, aligning final therapy with the genomic risk rather than the clinical estimate. While clinical factors such as grade, Ki67, subtype, nodal status, tumor size and menopausal status informed the initial decision, MammaPrint emerged as the determinant of final treatment choice. These findings underline the potential role of genomic risk assessment not only in systemic therapy selection but also as a future tool for tailoring radiotherapy intensity and eligibility in early breast cancer.

Keywords: *breast, genomic profiling, clinical, decision*

6

MAMMOGRAPHIC BIOMARKERS OF CARDIOVASCULAR RISK IN WOMEN: A NARRATIVE REVIEW OF RECENT EVIDENCE

Daide Capra¹, Zhongying Deng¹, Nicholas Payne¹, Marc Dewey¹, Fiona Gilbert¹, Iris Allajbeu¹

¹Department of Radiology, Addenbrookes Hospital, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK.

Introduction: Cardiovascular disease (CVD) remains the leading cause of mortality in women, yet risk is often underestimated. Mammography provides an opportunity for opportunistic cardiovascular risk assessment through imaging biomarkers such as breast arterial calcifications (BAC) and breast density (BD).

Methods: Narrative synthesis of most recent evidence evaluating BAC, breast density and cardiovascular outcomes, including meta-analyses and major cohort studies.

Results: In a meta-analysis including 45 studies and 68,584 women, BAC prevalence was 17.1%. BAC were significantly associated with history of known cardiovascular disease (OR 2.71, 95% CI 2.13–3.45, $p < 0.0001$) and cardiovascular risk factors, including diabetes (OR 1.97, 95% CI 1.71–2.27, $p < 0.0001$) and hypertension (OR 1.82, 95% CI 1.52–2.18, $p < 0.0001$). In cohort analyses, BAC were associated with incident stroke (RR 2.05, 95% CI 1.58–2.65, $p < 0.0001$), heart failure (RR 2.14, 95% CI 1.38–3.32, $p = 0.001$), cardiovascular mortality (RR 2.94, 95% CI 1.32–6.54, $p = 0.008$), and all-cause mortality (RR 2.04, 95% CI 1.08–3.84, $p = 0.027$). BD demonstrated an inverse association with cardiovascular risk. In a cohort of 4,268,579 women, progressively lower BD was associated with higher CVD risk, with hazard ratios up to 1.29 (95% CI 1.26–1.32) for fatty breasts, and improved risk stratification when added to the Framingham score (NRI +7.15%, 95% CI 6.85–7.69, $p < 0.0001$). In a prospective cohort of 16,763 women, low BD predicted major adverse cardiac events (HR 3.48, 95% CI 1.48–8.26). In a retrospective study on 153 women, low BD was associated with coronary artery disease (OR 3.21, 95% CI 1.58–6.53, $p = 0.001$) and with higher volume of epicardial adipose tissue (106.6 ± 43.0 ml vs 81.0 ± 31.6 ml in women with higher BD, $p < 0.001$).

Conclusions: BAC and BD are independently associated with cardiovascular risk and outcomes. Their integration into routine clinical practice may enable opportunistic, cost-effective cardiovascular risk stratification in women.

Keywords: Mammography, cardiovascular disease, breast arterial calcifications, breast density, risk assessment, heart disease risk factors.

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INTEGRATIVE ANALYSIS OF GENETIC VARIATION IN BREAST CANCER: A RETROSPECTIVE STUDY OF THE ALBANIAN COHORT

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Introduction: Breast cancer is a disease characterized by genomic alterations that influence prognosis and therapeutic response. Immunohistochemical biomarkers, including estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER2), and Ki-67, are routinely used for tumor classification and risk stratification. In a recent cohort of Albanian women, significant associations were observed between these biomarkers and clinicopathological parameters, with hormone receptor-positive tumors representing the predominant subtype and Ki-67 correlating with tumor stage and nodal involvement. Here we investigate copy number variations (CNVs) within the BRCA1 and BRCA2 genes in a selected subgroup with a family history of the disease and to integrate these findings with evaluated prognostic biomarkers

Methods: From a retrospective cohort of 253 breast cancer patients, 17 cases of formalin-fixed paraffin-embedded (FFPE) breast cancer tissue blocks with a documented family history were selected for genomic analysis. DNA was extracted using the QIAamp™ DNA FFPE Tissue Kit and Genome-wide CNV profiling was performed using an Affymetrix platform. Copy number variations and loss of heterozygosity (LOH), including copy-neutral LOH, were assessed and correlated with molecular subtypes defined by ER, PR, HER2, and Ki-67 expression.

Results: Copy number alterations affecting BRCA1 and BRCA2 were identified in 14/17 cases. BRCA1 deletions were observed in 23.5% of tumors, while LOH at the BRCA1 locus was detected in 47.1% of cases. BRCA2 deletions were identified in 17.6% and LOH in 41.2% of samples. BRCA1 alterations were predominantly associated with triple-negative breast cancer, where all cases showed evidence of genomic loss or allelic imbalance.

Conclusions: The observed alterations in BRCA1 and BRCA2 highlights the importance of integrating genomic data with immunohistochemical biomarkers. These findings provide preliminary evidence of BRCA-associated genomic instability patterns in breast cancer patients in Albania and support the potential utility of CNV analysis in refining risk stratification and guiding targeted therapeutic strategies.

Keywords: Breast cancer, CNV, BRCA1/2

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RADIONEUROMODULATION IN FUNCTIONAL NEUROSURGERY: CURRENT APPLICATIONS AND FUTURE PERSPECTIVES

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Introduction: The human brain consists of highly interconnected neural networks responsible for motor, sensory, cognitive, emotional, and behavioral regulation. Dysfunction within these neural circuits contributes to a wide spectrum of neurological and neuropsychiatric disorders. Neuromodulation has emerged as an advanced therapeutic strategy aimed at modifying pathological neural activity and restoring functional network balance. In recent years, significant advances in functional neurosurgery and radioneuromodulation have expanded treatment possibilities for patients with refractory conditions such as trigeminal neuralgia, essential tremor, obsessive-compulsive disorder (OCD), depression, movement disorders, and cancer-related pain.

Methods: This presentation provides a comprehensive overview of contemporary neuromodulation approaches and their role in functional neurosurgery. Current technologies and mechanisms of action are reviewed, including deep brain stimulation (DBS), stereotactic radiosurgery, pharmacological neuromodulation, and emerging non-invasive neuromodulatory techniques. The presentation integrates current scientific evidence, technological developments, and clinical experience related to neural targeting, modulation of dysfunctional circuits, and treatment optimization.

Results: Neuromodulation therapies have demonstrated substantial clinical efficacy in the management of several treatment-resistant neurological and psychiatric disorders. Deep brain stimulation and stereotactic radiosurgery have shown favorable outcomes in pain control, tremor reduction, modulation of abnormal neuronal activity, and improvement of patient quality of life. Advances in neuroimaging, precision targeting, connectomics, and adaptive stimulation technologies continue to improve therapeutic accuracy while minimizing adverse effects. Furthermore, the development of personalized and minimally invasive neuromodulation strategies is creating new opportunities for precision medicine in neuroscience.

Conclusions: Radioneuromodulation and functional neurosurgery represent rapidly evolving interdisciplinary fields with growing clinical and scientific relevance. Ongoing advances in neuroscience, neurotechnology, and brain network analysis are expected to further refine therapeutic indications and enhance patient-specific treatment approaches. Future developments will likely focus on individualized neuromodulatory therapies, integration of artificial intelligence and real-time neural feedback systems, and expansion of minimally invasive techniques for complex neurological and neuropsychiatric disorders.

Keywords: *neuromodulation, functional neurosurgery, Deep Brain Stimulation, radiosurgery, Neural Networks, precision neuroscience*

THE ROLE OF ENDOSCOPY IN TREATING TRIGEMINAL NEURALGIA AND CRANIOSYNOSTOSIS: CLINICAL EXPERIENCE

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Introduction: Microvascular decompression (MVD) is the definitive surgical treatment for trigeminal neuralgia. Endoscopic neurovascular decompression has emerged as a powerful technique offering enhanced illumination, magnification, and panoramic visualization. Craniosynostosis, the premature fusion of one or more cranial sutures, can lead to elevated intracranial pressure, neurodevelopmental delay, and significant craniofacial deformity. Over the past two decades, endoscopically assisted strip craniectomy has emerged as a primary minimally invasive alternative.

Methods: A prospective, non-comparative case series was conducted using the electronic medical record identifying all patients who underwent purely endoscopic microvascular decompression for TN and endoscopically assisted strip craniectomy, for the period January 2021 - March 2026 by a singular surgeon (AXh).

Results: Demographics: The study included 36 patients of whom 65.71% were females, 34.29% were males.

Etiology: Neurovascular Conflict (77.14%), Vestibular Schwannoma (11.43%), Pontocerebellar Angle

Meningiomas: (8.71%) Cerebellopontine Angle Epidermoid Cyst: 2.86%.

Pre operative clinical classification: TN1 78.8% TN2 20.3%, 1% trigeminal neuropathic pain.

Pre operative BNI (Barrow Neurological Institute Pain intensity score): score 4 63.8 %, score 5 36.1%.

Post-operative BNI: score 1 86.1%, score 2 8.3% score 3 5.6%.

Current Treatment: 1 patient receives Tegretol.

Two patients were operated for trigonocephaly and one for scaphocephaly and left anterior plagiocephaly.

Conclusions: Endoscopic microvascular decompression is a highly efficacious, safe, and anatomically precise alternative to the traditional microscopic approach, optimizing long-term clinical outcomes and reducing surgical morbidity. Endoscopic craniosynostosis surgery combined with postoperative helmet therapy represents a paradigm shift in pediatric neurosurgery. Early diagnosis and timely intervention—ideally before 4 months of age—are critical prerequisites for patient eligibility and optimal surgical outcomes.

Keywords: *trigeminal neuralgia, trigonocephaly, endoscopic, microvascular decompression, helmet therapy*

TIPIC SYNDROME: ATYPICAL HEADACHE AND PERIVASCULAR CAROTID INFLAMMATION

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Introduction: TIPIC syndrome (Transient Perivascular Inflammation of the Carotid Artery), previously known as carotidynia, is a rare vascular condition characterized by unilateral neck and facial pain with localized tenderness over the carotid artery.

Objectives: Transient perivascular inflammation of the carotid artery (TIPIC) syndrome is a clinical and also radiological entity yet not very well known among clinicians. The unclear etiology and symptoms that may suggest other important diagnoses, made its recognition crucial to avoid unnecessary interventions. This case and review of literature aim to provide a comprehensive survey of the existing literature to improve clinical awareness.

Methods: We report the case of a 65-year-old female presenting with severe unilateral headache. Ultrasonography revealed diffuse eccentric thickening of the ipsilateral carotid bifurcation without vessel narrowing. Other diagnostic tests ruled out other etiologies, and diagnosis of TIPIC syndrome was made. The patient was treated with corticosteroids with complete resolution in two weeks. We'll discuss and analyze literature on TIPIC syndrome, while we report our case of TIPIC syndrome.

Results: TIPIC syndrome should be considered a diagnosis of exclusion that needs evaluation for other conditions that require urgent medical management. On review of literature was seen a middle age female predominance, mainly present with head and neck pain mostly with unilateral involvement. On imaging, eccentric inflammatory infiltrates in the vessel wall and surrounding tissues, sometimes with luminal stenosis without blood flow disturbances. The median time to resolution of neck pain symptoms in patients was 2 weeks. Both clinical symptoms and imaging abnormalities may resolve spontaneously or following pharmacological treatment.

Conclusions: This case illustrates clinical picture and imaging guide to accurate diagnosis that avoided unnecessary treatments in patients with unexplained headaches. Recognizing TIPIC syndrome provides effective management and better patient outcomes.

Keywords: *Transient perivascular inflammation of the carotid artery syndrome (TIPIC); Unilateral headache; Carotid echography; Carotidynia; Anti-Inflammatory Treatment*

THE CONTRIBUTION OF HYPERCOAGULABLE STATES TO ARTERIAL ISCHEMIC STROKE

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Introduction: Ischemic Stroke in young patients is increasingly associated with non-atherosclerotic mechanisms, particularly hypercoagulable states. Both inherited and acquired thrombophilia contribute to arterial thrombotic risk. The aim of this study was to evaluate the prevalence and clinical relevance of hypercoagulability in patients with arterial ischemic stroke.

Methods: This prospective descriptive study was conducted from November 2022 to June 2025 and included 700 patients diagnosed with ischemic stroke. Targeted thrombophilia testing was performed in 40 patients based on clinical suspicion. The panel included genetic mutations (Factor V Leiden, prothrombin G20210A, MTHFR, PAI-1) and deficiencies of natural anticoagulants. Clinical, laboratory, and imaging data were analyzed descriptively.

Results: Among the 40 tested patients, 19 (47.5%) showed positive thrombophilia findings. MTHFR and PAI-1 mutations were the most frequent (63.2%), often combined with other polymorphisms. Notably, 89.5% of patients had ≥ 2 mutations, supporting a "multiple-hit" pathogenesis. High-risk combinations included genetic mutations with hyperhomocysteinemia and antiphospholipid syndrome. Anterior circulation strokes were most common (52.6%), while multiple infarcts were observed in 15.8% of cases, suggesting a strong prothrombotic profile. Megaloblastic anemia and hyperhomocysteinemia were associated with MTHFR mutations. Traditional vascular risk factors, including hypertension, dyslipidemia, and atrial fibrillation, acted synergistically with genetic predisposition.

Conclusions: Hypercoagulability represents a significant and often underrecognized contributor to arterial ischemic stroke, particularly in younger patients. The high prevalence of multiple thrombophilic abnormalities supports targeted screening and individualized management strategies. Early identification of high-risk patients may improve prevention and reduce recurrence.

Keywords: *Ischemic Stroke, Hypercoagulability, Thrombophilia, Antiphospholipid Syndrome, Young Stroke, Multiple-hit Pathogenesis*

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Introduction: Stroke continues to be a major cause of mortality and chronic disability around the world. A significant proportion of ischemic strokes are of cardiogenic origin, indicating that cardiologists play an integral role in both assessing patients immediately as well as preventing strokes in the future.

Objective: To emphasize the contribution of cardiology to the diagnosis, management, and prevention of stroke based on real life case examples.

Methods: A review of current evidence was combined with representative clinical cases demonstrating common and challenging cardioembolic stroke scenarios encountered in our clinical practice.

Results: Cardiologists are essential for diagnosis of the underlying atrial fibrillation, patent foramen ovale, intracardiac thrombi, and valvular disease, as well as the identification of possible interventional options. For example, a patient presenting with a cryptogenic stroke had their paroxysmal atrial fibrillation diagnosed by means of continuous cardiac monitoring. A young patient with ischemic stroke was diagnosed with a patent foramen ovale by transesophageal echocardiography. This was subsequently treated with percutaneous closure. These cases serve to illustrate the value of advanced cardiac imaging, rhythm monitoring, and individual patient assessment of cardiovascular disease risk.

Conclusion: Cardiologists play a key role in identifying the cause of a stroke and creating individualized solutions to prevent future strokes.

Keywords: *Stroke; Cardioembolic Stroke; Atrial Fibrillation; Patent Foramen Ovale; Cardiologist; Secondary Prevention; Anticoagulation; Echocardiography; Cardiac Monitoring; Multidisciplinary Care*

13 CLASSIFICATION OF GLIAL TUMORS: STANDARDS REQUIRED IN DAILY PRACTICE

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Introduction: The classification of central nervous system (CNS) tumors has undergone a major transformation with the integration of molecular diagnostics into histopathological evaluation. The 2016 and subsequently the 2021 World Health Organization (WHO) classifications introduced a combined histo-molecular approach, fundamentally redefining diagnostic criteria for glial tumors. This study aims to summarize the essential diagnostic standards required in daily neuropathology practice based on the latest WHO classification.

Methods: A narrative review approach was employed, focusing on the 5th edition WHO Classification of CNS Tumors (2021) and recent peer-reviewed literature. Key diagnostic criteria, including histological features, immunohistochemistry, and molecular markers (e.g., IDH mutation status, 1p/19q codeletion, ATRX, TP53), were analyzed and synthesized to identify practical requirements for routine diagnostics.

Results: The 2021 WHO classification emphasizes molecular stratification as a core component of diagnosis. Adult-type diffuse gliomas are now categorized into three main entities: astrocytoma, IDH-mutant; oligodendroglioma, IDH-mutant and 1p/19q-codeleted; and glioblastoma, IDH-wildtype. Molecular markers such as TERT promoter mutations, EGFR amplification, and chromosome 7 gain/10 loss have become critical for defining glioblastoma, even in the absence of classic histological features. Pediatric-type gliomas are now distinctly classified. These updates necessitate the routine implementation of molecular testing in daily practice.

Conclusions: The integration of molecular diagnostics into CNS tumor classification represents a paradigm shift with direct clinical implications. Accurate diagnosis now depends on combining histopathological and molecular data. Implementing these standards in routine practice is essential for precise tumor classification, prognostication, and therapeutic decision-making.

Keywords: glioma, CNS tumors, WHO classification, molecular pathology, IDH mutation, neuropathology

14 PRIMARY MUCINOUS BREAST CARCINOMA WITH SIGNET RING CELL DIFFERENTIATION MIMICKING METASTATIC GASTRIC CARCINOMA: A CASE REPORT AND REVIEW OF LITERATURE

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Introduction: Mucinous carcinoma of the breast is a rare subtype, accounting for approximately 2% of all invasive breast carcinomas. It is characterized histologically by clusters of tumor cells floating in abundant extracellular mucin and is generally associated with a favorable prognosis. Signet ring cell morphology, defined by intracytoplasmic mucin displacing the nucleus, is more commonly associated with carcinomas of the gastrointestinal tract, particularly gastric carcinoma. Its presence in breast carcinoma is uncommon and may pose a significant diagnostic challenge. The distinction is crucial, as it has major implications for patient management and prognosis. Here, we present a case emphasizing the diagnostic challenges and the importance of immunohistochemical evaluation.

Conclusion: Primary mucinous breast carcinoma with signet ring differentiation is rare. Proper evaluation is essential to avoid misdiagnosis and ensure correct management.

Discussion: Mucinous carcinoma is typically a well-differentiated tumor with favorable prognosis. The presence of signet ring features may lead to confusion with metastatic gastric carcinoma. Differential diagnosis includes metastatic gastric carcinoma and invasive lobular carcinoma. Strong ER/PR positivity and E-cadherin expression support a primary ductal breast origin. Accurate diagnosis relies on histology, immunohistochemistry, and clinical correlation.

Case Presentation: A 72-year-old woman presented with a breast mass. Imaging studies revealed a suspicious lesion, and a core needle biopsy was performed. Histopathological examination showed an invasive low-grade carcinoma composed of clusters and islands of tumor cells with signet ring morphology, floating in abundant extracellular mucin. Adjacent breast tissue showed fibrocystic changes and focal necrotic-inflammatory areas. Immunohistochemistry: ER: 100% PR: 100% HER2: 1+ Ki-67: 15% E-cadherin: +++ CK AE1/AE3: +++ CD45: negative. These findings support a diagnosis of primary mucinous carcinoma of the breast with signet ring cell differentiation.

Keywords: Mucinous breast carcinoma, signet ring cell differentiation, immunohistochemistry, differential diagnosis, metastatic gastric carcinoma.

EVALUATION OF THE EFFECTIVENESS OF ENDOSCOPIC, LAPAROSCOPIC, AND SURGICAL TREATMENTS FOR COMMON BILE DUCT STONES*Arben Beqiri¹, Arben Gjata¹*¹Department of General Surgery, UHC "Mother Teresa"**Corresponding author:** *arben.beqiri@gmail.com*

Cholelithiasis, or common bile duct (CBD) stones, represents one of the most significant pathologies of the extrahepatic biliary tract, with considerable prevalence in surgical clinical practice. It is characterized by the presence of stones within the common bile duct and is a frequent cause of obstructive jaundice, cholangitis, and acute biliary pancreatitis. This study aims to provide an in-depth exploration of the anatomical, physiological, and pathophysiological basis of cholelithiasis, while also evaluating the effectiveness of contemporary diagnostic and therapeutic modalities. The analysis is based on an extensive review of current scientific literature and clinical experience in digestive surgery. Both non-invasive and invasive diagnostic methods are described and compared, together with therapeutic strategies, including conservative management, endoscopic interventions, and both traditional open and laparoscopic surgical approaches. **Results and Conclusion:** Cholelithiasis may present with a broad spectrum of clinical manifestations, ranging from asymptomatic cases to medical emergencies such as septic cholangitis and acute pancreatitis. Early diagnosis and accurate risk stratification are essential for determining the most appropriate treatment approach. Endoscopic retrograde cholangiopancreatography (ERCP) remains the preferred minimally invasive method for the management of biliary tract stones, while surgical treatment continues to play a crucial role in complex cases or when endoscopic interventions fail. Optimal management of cholelithiasis requires a personalized and multidisciplinary approach. Treatment strategies should be tailored according to the patient's clinical condition, the availability of techniques, and institutional expertise. This study contributes to expanding the understanding of this pathology by providing a comprehensive overview of current best practices in diagnosis and treatment.

Keywords: *Cholelithiasis, ERCP, laparoscopic intervention, open surgical intervention*

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NEAR-INFRARED SPECTROSCOPY MONITORING IN CAROTID ENDARTERECTOMY – A FORETELL FOR HYPERPERFUSION SYNDROME

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Objectives: This study was designed to assess the value of NIRS for monitoring carotid endarterectomy and prediction of cerebral hyperperfusion syndrome.

Methods: This was a prospective cohort study. Patients undergoing CEA from December 2022 to September 2025 were included. Patients were divided in two groups, monitored with NIRS and without.

Results: Of a cohort of 697 patients, 230 of them were monitored with NIRS. Regional oxygen saturation (rSO₂) that reflects the perfusion and metabolism of the assessed tissue were registered in before and after carotid artery clamping, and at the end of the operation. We estimated baseline values and intraoperative changes of rSO₂ in terms of clinical and instrumental findings. Logistic regression analysis was aimed to define significant risk predictors of hyperperfusion. The most significant risk factors for HPS were hypertension, age and contralateral carotid occlusion. In the group monitored with NIRS, there was less neurological complication and encephalopathy and 2 patients' manifest headache and transitory mental changes but without cerebral lesions on imaging. In the group not monitored with NIRS, 12 patients had headache, encephalopathy and one minor cerebral hemorrhage. Our study revealed absolute reperfusion values of rSO₂ elevation of more than 12.1 to be the most significant predictor of hyperperfusion.

Conclusions: Our study demonstrated that NIRS could serve as a favorable monitoring tool during CEA for prediction of cerebral hyperperfusion. Use of regional oxygen saturation rSO (2) monitoring can guide the anesthesia plan to maintain adequate arterial pressure in perioperative period and to improve patient outcome.

Keywords: *Carotid endarterectomy; Cerebral hyperperfusion syndrome; Near-infrared spectroscopy; Regional oxygen saturation (rSO₂); Headache, Encephalopathy*

17 ENDOVASCULAR REPAIR FOR AORTIC DISEASE (EVAR/TEVAR)

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Introduction: Aneurysms, dissections and ruptures of infrarenal or descending aorta traditionally have been treated with conventional open surgical repair (OSR) or medical follow-up. However, over the past two decades endovascular aneurysm repair (EVAR) has gained popularity as a treatment option¹. Compared to open surgical repair, endovascular repair of the thoracic and abdominal aorta has been shown to reduce early perioperative morbidity and mortality². In this article we report our experience with thoracic and abdominal aortic cases treated endovascularly at our center and review the pertinent literature.

Materials and Methods: The Department of Cardiology & Cardio-Vascular Surgery of "American Hospital 3" in Tirana has been a leader in Albania regarding endovascular treatment of aortic pathologies since 2010. Each year approximately a dozen of patients or more, diagnosed with dissection or aneurysm of either thoracic or abdominal aorta are treated. The diagnostic tool of choice is Angio-CT scan which reveals detailed anatomical features of all parts of the aorta down to the femoral access site. Endovascular aortic repair (EVAR/TEVAR) was initially performed with surgical femoral cut-down, but during the last 5 years percutaneous access is predominantly used in all cases. Angio-CT scans at 6 months and 1 year are routinely performed to check remodeling of aorta and graft extension or further interventions are made when necessary.

Results: An abnormal dilatation of the aorta is referred to as an aortic aneurysm. Due to the risk of rupture, endovascular/surgical repair is offered electively to individuals with infrarenal aneurysms greater than 5.5 cm in size and in acute aortic syndromes such as Type B dissections. Although uncomplicated dissections may be initially managed conservatively, endovascular repair should be considered to achieve a good long term aortic remodeling and is life-saving in presence of complications (hemothorax, malperfusion syndrome, etc.) or high risk of rupture. Depending on the extent of the disease these patients require multidisciplinary approach, complex surgical procedures and a close long-term follow-up.

Conclusions: Aortic pathologies such as aneurysms and type B aortic dissections have an increasing incidence especially among elderly. EVAR/TEVAR is a minimal invasive procedure, performed with safety and excellent results in treatment of these patients.

Keywords: type B aortic dissection, infrarenal aneurysm, endovascular repair

TREATMENT OF VARICOSE VEINS: CONTEMPORARY ENDOVENOUS TECHNIQUES VERSUS CONVENTIONAL SURGERY*Bledar Hodo^{1,2}*¹Department of Vascular Surgery, Faculty of Medicine, Western Balkans University²Hygeia International Hospital, Tirana, Albania**Corresponding author:** *hodobledar@gmail.com*

Introduction: Chronic venous disease (CVD) represents a significant global health burden with substantial clinical and socioeconomic implications. Varicose veins are the most common manifestation, frequently associated with pain, edema, skin changes, and impaired quality of life. Traditionally, high ligation and vein stripping were considered the gold standard. However, advances in endovenous technologies have transformed the management paradigm toward minimally invasive approaches.

Methods: A narrative review of contemporary literature was conducted focusing on endovenous treatment modalities, including endovenous laser ablation (EVLA), radiofrequency ablation (RFA), ultrasound-guided foam sclerotherapy (UGFS), mechanochemical ablation (MOCA), and cyanoacrylate closure (CAC). Outcomes evaluated included technical success, complication rates, recurrence, postoperative recovery, and patient-reported outcomes.

Results: Endovenous techniques demonstrate high occlusion rates exceeding 90–95%, with significantly lower perioperative morbidity compared to conventional surgery. These methods reduce tissue trauma, avoid general anesthesia in most cases, and allow early mobilization. Lower rates of wound infection, hematoma, and postoperative neuralgia were consistently observed. Long-term outcomes indicate comparable recurrence rates when appropriate patient selection and duplex-guided strategies are applied.

Conclusions: Endovenous therapies have redefined the treatment algorithm for varicose veins and are currently recommended as first-line interventions in most clinical guidelines. Conventional surgery remains relevant in anatomically complex cases or where endovenous resources are unavailable. Optimal outcomes require a tailored, patient-specific approach based on venous anatomy, CEAP classification, and institutional expertise.

Keywords: *chronic venous disease, varicose veins, endovenous ablation, EVLA, radiofrequency ablation, vascular surgery*

ALPPS FOR INTRAHEPATIC CHOLANGIOCARCINOMA: A TRANSLATIONAL PERSPECTIVE ON LIVER REGENERATION AND SURGICAL STRATEGY

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Introduction: Intrahepatic cholangiocarcinoma (ICC) often necessitates major hepatic resection, which may be constrained by an insufficient future liver remnant (FLR). Associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) has emerged as a regenerative strategy capable of inducing rapid FLR hypertrophy and increasing resectability. In selected series, ALPPS has been reported to achieve FLR hypertrophy of up to 70% or more, exceeding the hypertrophy typically observed after conventional portal vein-based techniques; however, morbidity and mortality remains important limitations of this approach.

Case Presentation: We present the case of a 60-year-old female in whom a right hepatic lobe mass extending to the left lobe was incidentally detected on ultrasound imaging. Preoperative assessment included multiphasic contrast-enhanced CT of the liver, with volumetric analysis of the future liver remnant (FLR) and total liver volume (TLV) was performed using semiautomated segmentation software on portal-venous-phase images. A right trisectionectomy (Segments 1, 4-8) was planned, the FLR defined as the sum of segments II–III and the FLR/TLV ratio was 26 %. Given the presence of clinical jaundice and inadequate FLR, a two-stage liver resection surgery was planned. The patient underwent stage I ALPPS, followed by percutaneous biliary drainage due to jaundice immediately after the operation and subsequent inter-stage evaluation included contrast-enhanced CT scan at day 7 and 14 postoperatively to quantify FLR hypertrophy. The FLR volume increased from 320 mL to 592 mL on postoperative day 14, representing an 85% hypertrophy. In addition, functional assessment was guided by clinical parameters, laboratory markers (bilirubin, INR, albumin), and cross-sectional imaging for signs of regeneration and complications. The inter-stage period was complicated by dislocation of the percutaneous biliary drain, resulting in bile leakage and biliary peritonitis. The patient was managed with percutaneous abdominal drainage and supportive care, achieving clinical stabilization, which was considered adequate for proceeding to stage II hepatectomy. Stage II hepatectomy was successfully completed, and the pathology report confirmed a T3N1M0 tumor with negative surgical margins.

Conclusions: The case illustrates the challenge of achieving an adequate oncologic resection while simultaneously managing procedure-related complications, demonstrating both effective FLR hypertrophy and the significant impact of these complications on the overall surgical course. While ALPPS is an effective tool in complex liver surgery, its optimal use requires careful integration of surgical and biological understanding. Translational research may further enhance patient selection, improve complication management, and optimize overall outcomes.

Keywords: ALPPS, intrahepatic cholangiocarcinoma, liver regeneration, biliary peritonitis, surgical Complications

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EARLY PREDICTORS OF COMPLEX REGIONAL PAIN SYNDROME AFTER DISTAL RADIUS FRACTURE: A PROSPECTIVE COHORT STUDY*Neritan Myderrizi¹, Indrit Bimi²*¹Service of Orthopedy and Trauma. Regional Hospital Durrës, Durrës, Albania²"Aleksandër Moisiu" University Durrës, Durrës, Albania**Corresponding author:** *nmyderrizi@yahoo.com***Purpose:** To evaluate predicted factors of Complex Regional Pain Syndrome (Sudeck syndrome)**Methods:** A prospective cohort study including 158 patients with acute distal radius fracture. CRPS at 3 months, was diagnosed with Budapest criteria. Inclusion criteria: Adults ≥ 18 years, Acute distal radius fracture, Presentation within 7 days of injury. Exclusion criteria: Previous CRPS in the same limb, Associated major nerve injury, Open fractures with major soft-tissue destruction, Polytrauma. Predictors organized as Demographic (age, sex smoking and osteoporosis), clinical predictors (pain VAS, finger swelling, finger stiffness, temperature, cast discomfort), fracture related predictors (AO classification, displacement, DRUJ injury, energy of trauma) and treatment related predictors (conservative vs surgery, duration of immobilization and vitamin C administration) were all evaluated.**Results:** 158 patients of mean age 62.3years old (18-92) were diagnosed with CRPS in 12% of patients, which correlated with continuous pain $>VAS 6$ more than 2 weeks, greater swelling, finger stiffness, fracture complexity Type A3, B3, C2, C3 and duration of immobilization more than 6 weeks**Conclusion:** Higher early pain, greater swelling, finger stiffness, fracture complexity, and prolonged immobilization independently predict CRPS at 3 months.**Keywords:** *CRPS, Distal radius fracture*

MINIMALLY INVASIVE SURGICAL MANAGEMENT OF CENTRAL GIANT CELL GRANULOMA: A CASE REPORT

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Introduction: Central giant cell granuloma (CGCG) is a benign intraosseous lesion of the jaws characterized by fibrous tissue proliferation, multinucleated giant cells, hemorrhagic areas, and reactive bone formation. It is more commonly observed in children and young adults, particularly females, and frequently affects the mandible. Although many lesions are managed surgically, conservative approaches may preserve mandibular continuity, function, and aesthetics. This report describes the successful minimally invasive treatment of mandibular CGCG in an elderly patient.

Methods: A 73-year-old female presented with a large soft sessile swelling in the left retromolar region of the mandible. Panoramic radiography revealed extensive bone loss and tooth mobility without marked radiolucency. The patient had previously been advised to undergo hemimandibulectomy at another institution. After clinical and radiographic reassessment, conservative local excision of the lesion was planned. Careful dissection was performed to preserve adjacent anatomical structures, including the lingual and mental nerves. Excised tissue was submitted for histopathological examination.

Results: Microscopic analysis demonstrated multinucleated osteoclast-like giant cells dispersed within a fibrovascular stroma containing spindle-shaped mesenchymal cells, erythrocyte extravasation, and hemosiderin deposits, confirming the diagnosis of CGCG. Postoperatively, the patient showed uneventful healing with no paresthesia or neurosensory deficit. Follow-up examinations demonstrated no recurrence of the lesion.

Conclusions: Minimally invasive excision can be a successful treatment option for central giant cell granuloma of the mandible, even in elderly patients initially considered for radical surgery. Proper diagnosis, individualized planning, and close follow-up are essential to achieve favorable functional and aesthetic outcomes.

Discussion: CGCG may mimic aggressive odontogenic or malignant lesions radiographically, making accurate diagnosis essential for treatment planning. While aggressive or recurrent lesions may require resection, conservative excision remains an effective option for selected non-aggressive cases. Recent studies have also highlighted adjunctive nonsurgical therapies such as denosumab, corticosteroids, and calcitonin in selected patients. In elderly patients, minimally invasive surgery may significantly improve postoperative quality of life by avoiding extensive mandibular resection and functional impairment.

Keywords: *Central giant cell granuloma; Mandible; Minimally invasive surgery*

22 FROM CARDIAC CTA TO CORONARY ANGIOGRAPHY

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Introduction: Coronary Computed Tomography Angiography (CTA) has emerged as a powerful non-invasive tool for evaluation of coronary artery disease (CAD). This study aimed to correlate CTA findings with Invasive Coronary Angiography (ICA), considered the gold standard, over a 10-year experience.

Methods: We retrospectively reviewed cases in which patients underwent both CTA and ICA within a comparable clinical timeframe. Degree of stenosis in major coronary arteries was categorized, and CTA results were compared with ICA findings. Diagnostic accuracy, including sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV), was calculated for detection of significant stenosis ($\geq 50\%$).

Results: CTA demonstrated high sensitivity and NPV in ruling out significant CAD, showing strong concordance with ICA in the majority of cases. The technique was particularly reliable in single- and double-vessel disease, whereas specificity decreased in the presence of extensive calcification or motion artifacts. Despite these limitations, CTA consistently reduced the need for unnecessary invasive procedures.

Conclusions: CTA correlates strongly with ICA in the detection of significant CAD and can serve as an effective gatekeeper to invasive testing. In routine clinical practice, CTA offers a safe, accurate, and patient-friendly alternative that complements—but does not fully replace—the diagnostic value of ICA.

Keywords: *CTA, ICA, coronary arteries, calcification, soft plaques*

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Nanobiosensors have long promised to move advanced diagnostics beyond centralized laboratories and closer to the patient. After decades of remarkable progress in nanomaterials and sensing performance, the field now stands at a pivotal moment: the challenge is no longer only achieving extraordinary analytical sensitivity, but translating these advances into sustainable, scalable, and accessible point-of-care (PoC) technologies capable of supporting real-time health monitoring. This talk explores how nanobiosensors can enable the next generation of PoC diagnostic devices by integrating advanced nanomaterials with sustainable and low-cost platforms. Paper-based substrates, flexible materials, and environmentally friendly fabrication approaches such as inkjet printing and stamping enable decentralized manufacturing and rapid prototyping of sensing devices. These technologies open the door to widely deployable PoC systems for continuous physiological monitoring, early disease detection, and personalized healthcare. By combining selective biorecognition elements—including antibodies and nucleic-acid-based receptors such as DNA probes and aptamers—with functional nanomaterials such as metallic nanoparticles, quantum dots, and two-dimensional materials, these sensors achieve high sensitivity and specificity while remaining robust outside conventional laboratory environments. Their design increasingly follows the REASSURED principles, enabling real-time connectivity, affordability, user-friendly operation, and rapid results, often through visual or smartphone-assisted readouts. Applications range from monitoring biomarkers in biofluids such as sweat, saliva, or blood, to early detection of infectious diseases, cancer biomarkers, and indicators of neurodegenerative disorders. These developments illustrate a broader transition from episodic diagnostics toward continuous and decentralized health monitoring. Ultimately, sustainable nanobiosensing technologies have the potential to transform PoC diagnostics into an integral component of everyday healthcare, contributing to more resilient health systems and enabling accessible, real-time health information for individuals and communities worldwide.

Keywords: *nanobiosensors, point-of-care diagnostics, health monitoring, nanomaterials, personalized healthcare*

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Recent advances in microwave photonics have opened new opportunities for high-performance biomedical sensing and healthcare technologies, enabling precise, non-invasive, and real-time monitoring of physiological parameters. By leveraging the unique advantages of photonic systems, such as wide bandwidth, low loss, immunity to electromagnetic interference, and high sensitivity, microwave photonics provides a powerful platform for next-generation biomedical devices. This keynote presents recent developments in photonic-based sensing and signal processing techniques for biomedical applications, including wearable and remote health monitoring systems. Key topics include photonic biosensors based on photonic crystal fibres and plasmonic structures, microwave photonic signal processing for high-resolution detection, and optical techniques for monitoring vital signs such as oxygen saturation, heart rate, and blood pressure. The integration of microwave photonics with emerging technologies such as IoT and embedded systems is also discussed, enabling scalable and low-cost healthcare solutions. Furthermore, the talk highlights advances in device-level innovations, including electro-optic modulators, integrated photonic platforms, and novel materials, which enhance sensitivity, selectivity, and system performance. Case studies demonstrating real-world implementations of photonic sensors in biomedical diagnostics and continuous monitoring are presented, alongside challenges related to system integration, reliability, and clinical deployment. The presentation concludes with an outlook on the role of microwave photonics in future healthcare systems, including personalised medicine, remote diagnostics, and smart healthcare infrastructure, positioning photonic technologies as a key enabler of next-generation biomedical innovation.

Keywords: *microwave photonics, sensing, healthcare systems*

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Wearable technologies are increasingly used in healthcare to support the monitoring of physiological and behavioral signals. However, their real-world use may be limited by issues related to comfort, maintenance, usability, and long-term adherence. These limitations have motivated growing interest in contactless and device-free sensing approaches for healthcare and assisted living applications. This talk provides an overview of radio-frequency sensing technologies and introduces the general principles behind device-free sensing. It explains how variations in wireless signals can be interpreted to derive health and activity-related information. Different sensing modalities, representative use cases, and typical deployment settings are discussed. Examples include WiFi-based channel-state information analysis, radar sensing, and ambient RF signal monitoring, which can support applications such as activity recognition, mobility assessment, respiration monitoring, and unobtrusive safety monitoring in home or care environments. The presentation highlights how RF sensing can support healthcare and assisted living by enabling contactless monitoring of activity, movement, and other relevant indicators. These approaches can support applications such as activity recognition, mobility assessment, respiration monitoring, and unobtrusive safety monitoring in home or care environments. Two representative applications are examined to illustrate how device-free sensing can be applied in assisted living contexts and to demonstrate the associated technical trade-offs. Device-free RF sensing offers promising opportunities for healthcare and assisted living, particularly where wearable devices may be impractical. However, challenges remain in relation to reliability, interpretation of sensed data, clinical validation, privacy, and deployment in real-world environments. The talk concludes by reflecting on current limitations and open questions surrounding the use of RF sensing in healthcare and assisted living.

Keywords: *Device-free sensing, RF sensing, healthcare monitoring, assisted living, wearable technologies, contactless sensing.*

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The management and treatment of long bone defects are challenging. Besides, the segmental implants introduced at the defect site are metallic, and therefore stay in the body for a lifetime. In order to develop an implant that will eventually erode away leaving behind no residues would be preferable. In this study, in order to address the need for load bearing, biodegradable implants for segmental defects, 3D printed cylindrical implants of poly(ϵ -caprolactone) (PCL) and nanohydroxyapatite (nHAp) composites were prepared and applied as lateral segments to the femurs of New Zealand white rabbits. 3D printing enables the researchers to prepare implants in the right size and shape for the defect so that fitting of the implant is no longer a problem. In this study, in addition to the test group, a control (autograft) where a cylindrical bone segment of the rabbit was inverted and reintroduced to the created defect site, and another control with no medical procedure were used. The implants were maintained at the site of implantation for 6 weeks. No significant difference between the mechanical properties (yield and ultimate load) of the autograft and the implant groups were detected. Histological studies demonstrated similar new bone formation in both groups. A sizable callus formation around the autografts was observed and bone ingrowth to the 3D printed implants was supported with x-ray studies. In conclusion, 3D printed, cylindrical nHAp-PCL implants exhibited excellent bone healing and biomechanical stability in a relatively short implantation time of 6 weeks. The 3D printing approach was also used for the treatment of blindness caused by corneal stroma injuries of the eye. The implant production approach was similar to the previous example but this time implant softness (low mechanical strength) and transparency were required. Therefore, cell-loaded and cell-free methacrylated gelatin (GelMA) implants were 3D printed and tested under in vitro conditions. The samples had 60%–80% of light transmission in the visible region of the spectrum as in the native corneas. Keratocyte cell loaded samples were tested in vivo on New Zealand white rabbits for 90 days. In these tests, the disk shaped, keratocyte loaded implants were almost completely degraded and had allowed reorganization of the tissue forming at the implantation site. A mild immune response was initially observed but decreased gradually and by the end of 90 days the tissue regained its normal, healthy architecture with multilayered, non-keratinized epithelium. It can be concluded that both the implants presented in this study are promising for clinical use and the bone implant is already under Pilot Clinical Tests.

27 3D AND 4D PRINTING FOR MUSCULOSKELETAL TISSUE ENGINEERING

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Introduction: Tissue engineering combines biomaterials, cells, and signaling molecules to regenerate functional tissues. The emergence of 3D bioprinting has revolutionized scaffold fabrication by enabling high precision and reproducibility. This study aims to develop and evaluate biodegradable, biomimetic scaffolds for musculoskeletal tissue regeneration and to explore the potential of 4D bioprinting systems.

Methods: Biodegradable polymeric scaffolds were fabricated using 3D printing techniques. Structural and mechanical properties, including porosity, surface morphology, and degradation behavior, were characterized using standard analytical methods. Biological performance was assessed through in vitro cell culture studies and in vivo implantation models. Controlled delivery of growth factors was achieved via bioactive coatings and microcapsule systems.

Results: Optimized scaffold architectures demonstrated enhanced mechanical stability and favorable microenvironments for cell attachment and proliferation. Both in vitro and in vivo results showed significant promotion of osteogenic differentiation of mesenchymal stem cells. Incorporation of controlled growth factor delivery systems improved biological performance and resulted in enhanced bone regeneration (1-5). Preliminary findings also indicate the successful development of stimuli-responsive 4D constructs with dynamic behavior.

Conclusions: The study demonstrates that biomimetic scaffold design combined with advanced bioprinting technologies significantly improves tissue regeneration outcomes. The integration of 4D bioprinting introduces dynamic and adaptive capabilities, further enhancing regenerative potential. These approaches hold strong promise for personalized medicine applications and may contribute to reducing dependence on organ transplantation in the future.

Keywords: *Tissue engineering, 3D bioprinting, 4D bioprinting, Biodegradable Polymers, Mesenchymal Stem Cells, Musculoskeletal Regeneration*

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28 MEDICAL DEVICES: FROM PAST TO FUTURE

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Human tissues and organs fail to perform properly due to genetic history, age, sickness, or accidents. Some of these disorders can be treated with drugs, and others, however, may require the use of materials and devices. According to definition 'A medical device is any instrument, apparatus, software, material, article or machine that is used in the prevention, diagnosis or treatment of illness or disease, or for detecting, measuring, restoring, correcting or modifying the structure or function of the body for some health purpose, without achieving its primary action through pharmacological, metabolic, or immunological means'. The improvements in science, especially in biology, chemistry, material, nanotechnology, and digital technologies, lead to the synthesis of clever, responsive and biocompatible materials, and also highly efficient medical devices, which play a very important role in healthcare. In ancient civilizations, very simple materials such as natural stones, crystals, or metals were used to make some simple tools such as scalpels, forceps, and probes, which were applied in basic surgical operations. In the last centuries, especially in the 20th century, remarkable improvements have been observed in the treatments of health problems using combined systems of biomaterials and electronic systems, such as pacemakers, dialysis machines, X-ray imaging systems, etc. Smart materials, which can change shape or properties in response to stimuli such as temperature, pH (acidity), magnetic field, and light, are generally used in controlled drug release systems. Tissue Engineering and Regenerative Medicine leading to 3D tissue formation in the labs using scaffolds, cells and growth factors became a hot subject in the 1990s. This also led to patient-specific implant manufacture with high precision using patients' data. The integration of sensors, wireless communication, and data analytics has led to the emergence of smart medical devices capable of real-time monitoring and feedback. AI-driven systems enhance diagnostic accuracy, predictive analytics, and decision-making in clinical settings. Moreover, surface engineering techniques are employed to implants, which can improve their biocompatibility, reduce bacterial adhesion, and enhance device integration with biological tissues. For new innovations in healthcare, interdisciplinary collaboration is a requirement, in the development of highly effective and safer medical devices.

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FROM REAL-WORLD EVIDENCE TO PUBLIC HEALTH VALUE: DIGITAL HEALTH, MODELLING AND POLICY IMPACT IN HIGH-BURDEN DISEASES*Loreta Kondili^{1,2}*¹Istituto Superiore di Sanità, Viale Regina Elena, 299, 00161, Rome, Italy²Unicamillus International University of Health Sciences, Rome, Italy**Corresponding author:** *loreta.kondili@iss.it*

Methods: This study draws on national real-world cohorts, including PITER (Italian Platform for the Study of Viral Hepatitis Therapies and Outcomes) and ITA-MASLD (Italian Metabolic Dysfunction-Associated Steatotic Liver Disease cohort). A combined methodological approach integrating epidemiological analysis, real-world data collection, and modelling techniques was applied to evaluate clinical outcomes, patient stratification, and health system impact.

Results: These platforms enable the identification of heterogeneous patient profiles, unmet clinical needs, and structural inequalities not captured in clinical trials. In viral hepatitis, RWE has informed national elimination strategies by identifying gaps in diagnosis and linkage to care, improving resource allocation. In MASLD, the inclusion of SDoH enhances risk stratification, with economic insecurity associated with a nearly threefold increase in severe fibrosis risk ($OR \approx 2.8$), and higher cirrhosis prevalence observed in vulnerable populations ($\approx 56\%$ vs 39%). The integration of modelling approaches further supports estimation of long-term clinical and economic impact.

Conclusions: The translation of individual-level data into population-level value requires an integrated approach combining epidemiology, digital health, and modelling. RWE represents a key tool for bridging the gap between efficacy and effectiveness, supporting evidence-based, equitable, and sustainable health systems, and strengthening policy impact in high-burden diseases.

Keywords: *Real-world evidence, digital health, modelling, public health policy, high-burden diseases, SdoH.*

EMERGENCE OF INFECTIOUS DISEASES - OUTBREAK MANAGEMENT IN A POST-PANDEMIC ERA AND THE PUBLIC HEALTH RESPONSE*Leidon Shapo¹*¹Independent Public Health Consultant, Fellow of the Royal Society for Public Health (UK), Watford WD18 7BJ, United Kingdom**Corresponding author:** *drlshapo@gmail.com*

Emerging and re-emerging infectious diseases (EIDs) continue to pose major global health challenges in a rapidly changing world. The COVID-19 pandemic profoundly reshaped infection patterns, public health capacity, and population susceptibility in the UK, with over 24 million confirmed cases and more than 200,000 deaths between 2020 and 2023. While vaccination reduced severe outcomes, highly transmissible variants and the growing burden of long COVID—affecting an estimated 2 million people by early 2023—highlight the persistent impact of novel pathogens. The 21st century has been characterised by both the resurgence of historic infections such as cholera and plague and the emergence of novel threats including SARS, MERS, Ebola, Zika, and lately COVID-19. These events occur amid rapid demographic, technological, and climatic shifts that intensify global vulnerability. Key drivers of EIDs include environmental disruption, population density, socio-economic inequities, and interruptions to immunisation programmes, many of which worsened during the pandemic. Health inequalities have accelerated outbreaks among vulnerable groups living in overcrowded conditions with limited access to care. Recent events such as the 2026 Meningitis B outbreak in Kent—an unusually fast-spreading cluster involving a larger than usual cluster of cases—demonstrate the complexity of outbreak dynamics and the need for rapid, large-scale public health action. Similarly, declining vaccination coverage has contributed to measles resurgence, necessitating intensified surveillance and targeted immunisation efforts. Strengthened surveillance, integration of genomic and epidemiological data, and the strategic use of artificial intelligence for prediction and preparedness offer promising avenues for future global health resilience. These tools, combined with equity-focused public health strategies, will be essential for anticipating and mitigating the next generation of infectious disease threats.

Keywords: *Emergence of infectious diseases, Outbreak management, Public Health, Surveillance*

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SEXUALLY TRANSMITTED INFECTIONS ON THE RISE- THERE IS A NEED FOR A NEW PARADIGM FOR PREVENTION AND CONTROL IN ALBANIA*Arjan Harxhi¹*¹University of Medicine Tiranë, Tirana, AlbaniaCorresponding author: harxhiarjan@yahoo.com

Introduction: Sexually transmitted infections (STIs) continue to be a significant public health challenge and could have a direct impact on sexual and reproductive health. Although there is a lack in the reported data on STI rates in Albania, official and anecdotal evidence indicate a rise in the number of cases, especially HIV and syphilis cases.

Methods: This is a descriptive study on the situation of STI in Albania especially syphilis and HIV infection, looking at existing preventive interventions and number of cases. A review of data from the Institute of Public Health and Infectious Disease Service at UHCT and other published documents, papers and other sources such as private laboratories was carried out.

Results: According to IPH, during the last 3 years, there has been an increase in the number of newly diagnosed cases, with the highest number in 2025 with more than 130 cases. Sexual transmission is the main route of infection with an increasing number of cases among men who have sex with men (MSM). Incidence rates are on the rise, and are higher than other countries in the region. Data from ID Service shows an increase in the number of syphilis cases especially among HIV patients. During the period 2020-2023, there were 46 cases of syphilis among 331 HIV cases followed at HIV ambulatory clinics (13% incidence). Among 53 newly diagnosed HIV cases in 2023 which were tested for syphilis, there were 15 syphilis cases reported, an incidence of 28%.

Conclusions: There is a need for new prevention strategies and interventions such as implementation of Post exposure prophylaxis (PrEP), improve testing and treatment as prevention, implementation of doxy PEP for prevention of bacterial infections, improve target screening for key populations, improve diagnosis of STI especially using rapid tests and molecular techniques, improve access for STI diagnosis and treatment.

Keywords: Sexually transmitted infections (STIs), HIV infection, syphilis, epidemiology, prevention strategies

TACKLING AMR AT THE SOURCE: IPC-DRIVEN REDUCTION OF ANTIBIOTIC USE IN RESOURCE-LIMITED MDRO SETTINGS

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Introduction: Multidrug-resistant organisms (MDROs) represent a major global health threat, particularly in healthcare settings with high rates of hospital-acquired infections (HAIs). In such environments, excessive use of broad-spectrum antibiotics creates selective pressure that accelerates antimicrobial resistance (AMR). Infection prevention and control (IPC) measures, when combined with antimicrobial stewardship (AMS), offer a critical strategy to reduce both MDRO transmission and unnecessary antibiotic use.

Objectives: To evaluate the impact of IPC interventions on antibiotic utilization in high MDRO settings and to explore the synergistic role of IPC and AMS in reducing antimicrobial resistance.

Methods: This work synthesizes evidence from clinical studies, surveillance data, and implementation models presented at ESCMID. Key IPC interventions include hand hygiene, environmental cleaning, water management programs, and multimodal strategies recommended by WHO and CDC. Outcomes assessed include MDRO infection rates, antibiotic consumption, and compliance with IPC practices.

Results: MDROs contribute significantly to global morbidity and mortality, accounting for over 1.27 million deaths annually. IPC interventions demonstrated substantial effectiveness: improved hand hygiene compliance (72.1% to 94.2%) was associated with reduced MDRO infection rates (8.0 to 5.1 per 10,000 patient-days). Environmental cleaning bundles improved disinfection quality and reduced infection incidence. Integrated AMS and IPC programs reduced antibiotic consumption by approximately 20% and were associated with decreased incidence of carbapenem-resistant organisms. Modeling studies indicate that a 10–25% reduction in antibiotic use can decrease MDRO acquisition by 11–30%. Overall, 35–70% of HAIs are preventable through comprehensive IPC strategies.

Conclusions: IPC interventions significantly reduce MDRO transmission and antibiotic use, particularly when integrated with AMS programs. Multimodal strategies, including hand hygiene, environmental control, and water safety, are essential in high-burden settings. Tailored implementation, especially in low- and middle-income countries, is critical to address infrastructure and behavioral challenges. Strengthening IPC–AMS synergy is a cornerstone in combating antimicrobial resistance.

Keywords: *Infection Prevention and Control, Antimicrobial Stewardship, Multidrug-Resistant Organisms, Antibiotics, Hospital-Acquired Infections*

IMPLEMENTING LOW-DOSE CT SCREENING FOR LUNG CANCER IN ALBANIA: A PUBLIC HEALTH OPPORTUNITY

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Background: Lung cancer represents one of the most serious oncologic challenges in Albania. According to GLOBOCAN 2022, approximately 1,226 new lung cancer cases and 1,064 deaths occur annually in the country, corresponding to a mortality-to-incidence ratio of 0.87, suggesting that the majority of patients are diagnosed at advanced stages. Albania currently lacks a national lung cancer screening program, and most diagnoses occur only after the onset of symptoms, limiting the potential for curative treatment.

Methods: A review of randomized clinical trials evaluating low-dose computed tomography (LDCT) screening for lung cancer was conducted, and national epidemiological estimates were used to evaluate the potential impact and feasibility of implementing LDCT screening in Albania.

Results: Evidence from randomized trials supports the use of LDCT screening in high-risk populations. The NLST trial (53,454 participants) demonstrated a 20% reduction in lung cancer mortality, while the NELSON trial (15,792 participants) reported a 24% reduction in men and up to 33% in women. Additional trials such as LUSI and UKLS confirmed the feasibility of LDCT screening. Applying these reductions to Albania's estimated 1,064 annual lung cancer deaths suggests that approximately 200–250 deaths could potentially be prevented each year if screening were implemented in high-risk populations. Albania already possesses CT infrastructure in tertiary hospitals, particularly in Tirana, which could support pilot screening programs.

Conclusions: The high mortality burden of lung cancer in Albania highlights the urgent need for earlier detection strategies. Implementing risk-based LDCT screening targeting individuals aged 50–74 years with significant smoking history, initially through pilot programs in tertiary centers, represents a feasible approach that could substantially reduce lung cancer mortality in the country.

Keywords: *lung cancer screening, low-dose CT, LDCT, Albania, public health, lung cancer mortality*

IRON DEFICIENCY IN YOUNG WOMEN WITH NORMAL HEMOGLOBIN: IS IT ALWAYS NUTRITIONAL*Isrena Alushi¹, Ilda Babamusta²*¹Glatia Med Laboratory, Durrës, Albania²Cambridge Clinical Laboratories**Corresponding author:** *isrena.alushi@hotmail.com*

Introduction: Iron deficiency (ID) is commonly associated with anemia; however, increasing evidence shows that iron depletion may occur even in the presence of normal hemoglobin levels. This condition, often referred to as non-anemic iron deficiency, is frequently underrecognized in clinical practice. The aim of this review is to explore the potential causes of iron deficiency in young women with normal hemoglobin, integrating current literature with observations from routine laboratory practice.

Methods: A narrative review of recent literature (last five years) was conducted, focusing on iron metabolism, diagnostic biomarkers, and non-anemic iron deficiency. In addition, observational insights from daily laboratory practice were considered, particularly regarding patterns of ferritin testing and interpretation in young female patients.

Results: Evidence indicates that low ferritin levels may precede changes in hemoglobin and reflect early iron depletion. While inadequate dietary intake remains a contributing factor, other mechanisms such as menstrual blood loss, inflammation-related functional iron deficiency, and impaired gastrointestinal absorption are frequently implicated. Laboratory observations support that a notable proportion of young women present with low ferritin despite normal complete blood count results, often without clear nutritional deficits.

Conclusions: Iron deficiency in young women with normal hemoglobin is a multifactorial condition and cannot be attributed solely to nutritional causes. Reliance on hemoglobin alone may delay diagnosis. The integration of ferritin and additional iron parameters into routine evaluation is essential for early detection. Increased clinical awareness is needed to improve diagnostic accuracy and patient management.

Keywords: *iron deficiency, ferritin, non-anemic iron deficiency, young women, laboratory practice, micronutrients*

INSULIN RESISTANCE AND METABOLIC PROFILING IN A PREDIABETIC ALBANIAN POPULATION: A HOMA-IR BASED ANALYSIS

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Introduction: Prediabetes is a critical intermediate metabolic state characterized by early insulin resistance (IR) and increased risk of progression to type 2 diabetes mellitus (T2DM) and cardiometabolic complications. In Albania, where metabolic disorders are increasingly prevalent, early identification of IR is essential. This study aimed to evaluate the metabolic profile and diagnostic value of HOMA-IR in an Albanian prediabetic population.

Methods: A cross-sectional study included 432 Albanian individuals aged 20–60 years, of whom 289 were classified as prediabetic based on HbA1c criteria (5.8–6.3%). Fasting glucose, insulin, HbA1c, and lipid profile were measured using standardized methods. HOMA-IR was calculated using the Matthews formula. Statistical analysis included Spearman correlation, hierarchical cluster analysis (Ward's method).

Results: In the prediabetic group, the prevalence of IR was 31.8%, with a mean HOMA-IR of 2.47 ± 0.88 . Prediabetic individuals were characterized by mild hyperglycemia, hyperinsulinemia, and a predominance of overweight/obesity (BMI 27–32 kg/m²). HOMA-IR showed a right-skewed distribution, indicating metabolic heterogeneity. Strong positive correlations were observed between HOMA-IR and fasting insulin ($\rho = 0.920$), HbA1c ($\rho = 0.707$), BMI ($\rho = 0.696$), and triglycerides ($\rho = 0.589$), while HDL-C showed a significant inverse association ($\rho = -0.482$) (all $p < 0.001$). LDL-C was not significantly associated with IR. Cluster analysis identified three metabolic phenotypes: demographic–glycemic, IR–lipid, and lipoprotein-specific clusters.

Conclusions: Prediabetic individuals in Albania exhibit significant metabolic heterogeneity driven by early insulin resistance, obesity, and dyslipidemia. These findings may support the integration of HOMA-IR into primary care screening algorithms for early identification of high-risk prediabetic individuals

Keywords: *Insulin resistance, HOMA-IR, prediabetes, Albanian population, HbA1c, lipid profile*

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Introduction: Biologics have revolutionized the treatment landscape of various dermatological diseases, offering targeted therapies that address underlying immunological and inflammatory pathways. Their precision in modulating the immune system has resulted in improved outcomes for patients with chronic, inflammatory, and autoimmune skin conditions. Small molecules, which typically work by altering cellular pathways, complement biologics in managing dermatological diseases.

Methods: Clinical cases that are diagnosed and treated in the Dermatology Department at University Hospital Center “Mother Theresa”. Along with a comprehensive review of literature from clinical trials, case studies, and recent advancements to examine the clinical use of biologics and small molecules in dermatology.

Conclusions: Biologics and small molecules have significantly advanced the management of dermatologic conditions, offering new avenues for patients who were previously underserved by traditional therapies. With ongoing research, new biologics targeting a wider range of cytokines and immune pathways are expected to broaden therapeutic options. The combination of biologics and small molecules is becoming a promising strategy to optimize patient outcomes with fewer side effects. The future of dermatology treatment will likely include a greater focus on precision medicine, targeting the unique immunological features of individual patients' diseases.

Aims: This review aims to explore the role of biologics and small molecules in dermatology, with a focus on their applications in specific dermatological diseases, the different types available, and the latest advancements in the field.

Discussion: In psoriasis, biologics targeting cytokines like TNF-alpha, IL-17, and IL-23—such as adalimumab, secukinumab, and guselkumab—have proven highly effective in improving skin lesions and quality of life. Similarly, in atopic dermatitis, dupilumab, which targets the IL-4 receptor alpha, offers significant relief for moderate-to-severe cases, especially for patients not responding to traditional therapies. In hidradenitis suppurativa, biologics like adalimumab, secucimumab, ustekinumab, bimekizumab have shown promise in managing the condition. Omalizumab has shown a good response in the treatment of Urticaria. Treatment of Pyoderma Gangrenosum with biologics (anti -TNF alfa) is becoming the treatment of choice for this rare disease. The most common biologics in dermatology are monoclonal antibodies (mAbs), which target specific immune molecules to reduce inflammation and immune activity. In addition to biologics, small molecules like JAK inhibitors (e.g., tofacitinib and upadacitinib) have emerged as oral treatments for inflammatory skin diseases, providing a different mechanism by targeting intracellular signaling pathways. These small molecules offer an alternative for patients who may not be suitable for biologics.

Keywords: Biologics, small molecules, psoriasis, atopic dermatitis, urticaria, immunotherapy, hidradenitis suppurativa, pyoderma gangrenosa, monoclonal antibodies, anti- interleukine, JAK inhibitors.

37 THE GOLD STANDARD: MULTIDISCIPLINARY CARE IN MODERN ONCOLOGY

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Introduction: The growing complexity of oncology, shaped by advances in genomics, immunotherapy, and multimodal treatment strategies, has made single-specialty decision-making inadequate. Multidisciplinary care (MDC), coordinated through tumor boards, is increasingly recognized as the gold standard for ensuring comprehensive and personalized patient management. This study explores the influence of structured MDC on clinical practice and patient outcomes.

Methods: A systematic review of peer-reviewed literature published between 2021 and 2026 was conducted across major databases. Eligible studies included prospective and retrospective cohorts reporting on guideline adherence, treatment initiation, or survival outcomes. Data extraction and quality assessment were performed independently by two reviewers.

Results: Across the reviewed studies, structured MDC consistently enhanced adherence to evidence-based guidelines, streamlined treatment pathways, and improved overall patient outcomes. Tumor boards facilitated more timely initiation of therapy and promoted alignment with international standards of care. Patients managed within MDC frameworks demonstrated superior long-term outcomes compared to those treated outside such structures.

Conclusions: Multidisciplinary care strengthens the quality and consistency of oncology practice, reduces treatment delays, and is associated with improved survival. With ongoing advancements in oncology research and shifting patient demographics, the composition of tumor boards should be periodically reviewed. Incorporating translational researchers, geriatric oncologists, and epidemiologists would enhance the integration of novel scientific insights, address the needs of aging populations, and ensure decisions are informed by population-level evidence. These findings support the integration of structured tumor boards as a mandatory component of modern cancer care. Future research should focus on standardizing MDC evaluation metrics and incorporating patient-reported outcomes to further refine its impact.

Keywords: *Multidisciplinary care, tumor board, oncology, clinical outcomes, translational research, geriatric oncology, epidemiology*

38 FACTORS INFLUENCING THE SUCCESS OR FAILURE OF *HELICOBACTER PYLORI* ERADICATION THERAPY: ANTIBIOTIC RESISTANCE PATTERNS AND PATIENT ADHERENCE

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Introduction: *Helicobacter pylori* infection remains a major global health concern, associated with chronic gastritis, peptic ulcer disease, and gastric malignancy. Increasing antibiotic resistance, particularly to clarithromycin and levofloxacin, has significantly reduced eradication success rates. In Albania, the absence of national guidelines and surveillance data represents a critical gap. This study aimed to evaluate eradication therapy outcomes and identify factors influencing treatment success.

Methods: A prospective observational cohort study was conducted at Salus Private Hospital, Tirana. Seventy *H. pylori*-positive patients (mean age 51.36 years) received standard first-line clarithromycin-based triple therapy. Patients with treatment failure were advanced to second-line levofloxacin-based therapy. Eradication was confirmed using urea breath test or fecal antigen test ≥ 6 weeks post-treatment. Associations between clinical variables and outcomes were analyzed using Chi-square tests.

Results: First-line eradication was achieved in 67.14% of patients, while 32.86% experienced treatment failure. Among patients requiring second-line therapy, eradication success reached 82.61%. No statistically significant association was observed between diabetes, age, and treatment outcomes ($p > 0.05$). The observed first-line success rate is consistent with regions exhibiting high clarithromycin resistance ($> 20\%$), suggesting a comparable resistance burden in Albania.

Conclusions: Clarithromycin-based triple therapy demonstrates suboptimal efficacy as empirical first-line treatment in Albania. Second-line levofloxacin-based therapy provides moderate success. These findings support the need for updated treatment strategies, including bismuth-based quadruple therapy, implementation of national resistance surveillance programs, and increased use of susceptibility-guided therapy.

Keywords: *Helicobacter pylori*, eradication therapy, antibiotic resistance, clarithromycin, levofloxacin, Albania

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RHEUMATIC IMMUNE-RELATED ADVERSE EVENTS IN PATIENTS TREATED WITH IMMUNE CHECKPOINT INHIBITORS*Ilektra Xhafa¹, Kleida Mati²*¹American Hospital 3, Tirana, Albania²Department of Oncology, American Hospital, Tirana, Albania**Corresponding author:** *ilektra.xhafa@gmail.com*

Introduction: Immune checkpoint inhibitors (ICIs) have transformed oncology practice, yet their expanding use has been accompanied by a growing spectrum of immune-related adverse events (irAEs). Rheumatic irAEs (R-irAEs) affect approximately 5–10% of ICI-treated patients and remain among the most underrecognized complications of immunotherapy. This review aimed to summarize current evidence on the frequency, clinical spectrum, and management of R-irAEs in cancer patients receiving ICI therapy.

Methods: A narrative literature review was conducted using PubMed and MEDLINE databases. Cohort studies, systematic reviews, and clinical guidelines reporting on rheumatic manifestations in ICI-treated patients were included. No date restriction was applied. Studies were selected based on relevance to the clinical spectrum, incidence, and management of R-irAEs.

Results: R-irAEs encompass a heterogeneous group of manifestations. Inflammatory arthritis and polymyalgia rheumatica-like syndromes are the most common, while myositis represents the most severe form, frequently associated with myasthenia gravis, myocarditis, and high mortality. Most R-irAEs arise within the first six months of treatment, though onset timing varies considerably across manifestations. Anti-PD-1 agents are most frequently implicated. Corticosteroids remain the cornerstone of management, with immunosuppressants and biologics reserved for refractory cases. Underdiagnosis remains a major challenge, driven by nonspecific symptom presentation and limited rheumatology awareness. Multidisciplinary collaboration between oncologists and rheumatologists is consistently identified as essential for timely recognition and optimal patient outcomes.

Conclusions: R-irAEs are a clinically significant and growing complication of ICI therapy requiring greater awareness, standardized diagnostic criteria, and structured multidisciplinary management protocols. Prospective research is needed to define predictive biomarkers and refine treatment strategies.

Keywords: *immune checkpoint inhibitors, rheumatic adverse events, inflammatory arthritis, polymyalgia rheumatica, myositis, cancer immunotherapy*

40 PROGNOSTIC FACTORS IN EPITHELIAL OVARIAN CANCER

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Introduction: Epithelial ovarian cancer is associated with high mortality, mainly due to frequent late-stage diagnosis. Identifying prognostic factors is essential for improving treatment strategies and patient outcomes. This study aimed to evaluate the main clinical and pathological factors influencing prognosis in patients with epithelial ovarian cancer.

Methods: A retrospective descriptive study was conducted on 202 patients diagnosed and treated for epithelial ovarian cancer at the Oncology Department of the University Hospital Center “Mother Teresa” between 2018 and 2022. Clinical, demographic, and pathological data were collected from medical records. Statistical analysis was performed using SPSS Statistics 21.0. Variables analyzed included age, risk factors, tumor stage, histological subtype, and treatment modalities.

Results: Most patients were aged 51–60 years. Identified risk factors included family history of ovarian cancer, prolonged use of combined oral contraceptives, high parity, increased ovulatory years, and obesity. The majority of cases were diagnosed at advanced stages, with stage IIIC being the most frequent (30.69%), followed by stage IC (13.86%) and stage IIIA (13.37%). Serous carcinoma was the predominant histological subtype (76.7%). Early-stage patients were mainly managed with surgery followed by adjuvant therapy, whereas advanced-stage patients underwent cytoreductive surgery and platinum-based chemotherapy. Postoperative radiotherapy showed benefit in a minority of cases (7.5%). Tumor stage, histological subtype, and treatment modality were identified as the main prognostic factors influencing survival and therapeutic outcomes.

Conclusions: Tumor stage, histological subtype, and treatment modality are significant prognostic factors in epithelial ovarian cancer. These variables are essential for guiding individualized treatment approaches and improving clinical outcomes. Further research is needed to refine prognostic models and optimize therapeutic strategies.

Keywords: *epithelial ovarian cancer, prognostic factors, tumor stage, histological subtype, treatment modality, survival*

FROM ISOLATED RESULTS TO INTEGRATED PROFILES: THE ROLE OF LABORATORY MEDICINE IN PRECISION HEALTH

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Introduction: Laboratory data are crucial in the diagnosis, treatment, and follow-up of diseases. When interpreted as individual results, these data do not express the complexity and individual variations of chronic diseases. This limits the effectiveness of translating laboratory data into personalized clinical decision-making. Precision health requires integrating and correlating laboratory biomarkers to improve risk prediction, phenotyping, and therapeutic decision-making.

Methods: This study focuses on establishing quantitative relationships between laboratory biomarkers and their clinical relevance. In this, we included 30 patients, aged 20-70 years old, and performed the laboratory analysis of total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, fasting glucose, fasting insulin, HbA1c, Apolipoprotein A1, Apolipoprotein B, hs-CRP.

Results: Data show that Apolipoprotein B has a stronger correlation with atherogenic particle number and cardiovascular risk than low-density lipoprotein cholesterol (LDL-C). High-sensitivity C-reactive protein (hs-CRP) correlates with the activation of inflammatory pathways and independently predicts cardiovascular events, even in patients with normal lipid profiles. Glycated hemoglobin (HbA1c), interpreted together with fasting glucose and insulin resistance indices, shows metabolic heterogeneity not captured by glucose values alone. Other clinically important correlations include the inverse relationship between high-density lipoprotein cholesterol (HDL-C) and triglycerides in insulin-resistant patients, the association of elevated homocysteine with endothelial dysfunction and prothrombotic risk. Also, the link between ferritin and both iron metabolism and chronic low-grade inflammation.

Conclusions: The recognition of these laboratory and clinical patterns, can distinguish between different pathophysiological phenotypes such as atherogenic dyslipidemia, subclinical inflammation, and metabolic syndrome. The integration of correlated biomarkers into routine laboratory reporting gives data a clinical significance, highlighting the role of laboratory medicine as a critical driver of precision health and personalized care.

Keywords: Precision health, ApoB-LDL, HDL, HbA1c, Cardiometabolic risk, hs-CRP, Insulin resistance, Metabolic syndrome, Chronic low-grade inflammation

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Therapeutic endoscopy has undergone remarkable advancement in recent years, transforming the management of gastrointestinal diseases through increasingly sophisticated minimally invasive techniques. Innovations in endoscopic technology and procedural approaches have expanded the therapeutic capabilities of endoscopy, reducing the need for conventional surgical interventions and improving patient outcomes. This invited lecture will provide an overview of major advances in therapeutic endoscopy, with particular emphasis on advanced endoscopic procedures currently utilized in clinical practice. Topics will include the evolving role of endoscopic interventions in the diagnosis and management of complex gastrointestinal conditions, as well as the integration of novel technologies that enhance precision, safety, and therapeutic efficacy. The presentation will further explore how therapeutic endoscopy is reshaping modern gastroenterology by offering effective non-surgical treatment alternatives with reduced recovery times, lower complication rates, and improved quality of care. Current challenges, future directions, and the growing role of multidisciplinary collaboration in advanced endoscopic practice will also be discussed.

GROWTH RATE SYMMETRY OF LARGE HYPERTRANSMISSION DEFECTS (HYPERTDS) IN AMD PATIENTS WITH BILATERAL HYPERTDS

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Introduction: To investigate the inter-eye symmetry in growth rates of large hyperTDs, we investigated a natural history database of AMD eyes imaged with swept-source OCT(SS-OCT) and selected subjects with bilateral hyperTDs. The hyperTD growth rates were compared between eyes using the area, square-root(sqrt) area, and perimeter-adjusted growth rates.

Methods: This retrospective review of 6x6mm and 12x12mm SS-OCT scans from patients with bilateral hyperTDs with each eye containing at least one large hyperTD defined by greatest linear dimension $\geq 250\mu\text{m}$ measured on en face sub-retinal pigment epithelium slab positioned 64-400 μm beneath Bruch's membrane. Large hyperTDs were identified by two graders and annotated with a semi-automated algorithm. Eyes were censored if they developed exudation or received intravitreal pegcetacoplan. Inter-eye comparison of annual hyperTD growth rates was performed using area, sqrt area2, and perimeter-adjusted growth-rate strategies3.

Results: Sixty-four subjects, 128 eyes, had at least one follow-up interval of 1 year $\pm$ 1 month. Each 1-year interval was plotted as an individual annual growth rate resulting in 786 annual visits. When plotting all intervals, irrespective of baseline lesion size, the area growth rate strategy had the highest inter-eye concordance ($r=0.76$; $p<0.001$) compared to sqrt area and perimeter-adjusted (respectively $r=0.51$, $r=0.60$, both $p<0.001$)(Fig1). For lesions ≥ 0.9 disc area(DA), previously reported as a cut-point between small and large lesions1, all growth rate strategies showed a similar concordance(perimeter-adjusted $r=0.78$, $p<0.001$, sqrt area and area both $r=0.73$, $p<0.001$), whereas for lesions <0.9 DA, concordance was lower for all three (total area $r=0.46$, $p<0.001$, sqrt area $r=0.39$, $p=0.003$, perimeter-adjusted $r=0.41$ $p=0.014$).

Conclusions: Inter-eye concordance was highest in eyes with baseline hyperTD area ≥ 0.9 DA for any growth rate strategy but lower in eyes with baseline area <0.9 DA. This strongly suggests that when the fellow eye is used as control in trials designed to test therapies for hyperTDs, the hyperTDs in both eyes should be ≥ 0.9 DA. The lack of concordance between eyes with smaller lesions likely arises from the complexity of these early lesions.

Keywords: Swept-source OCT angiography (SS-OCTA), Age-related macular degeneration (AMD), Hyper-transmission defect (hyperTD), Geographic atrophy (GA), Symmetry, Paired-eye clinical trial, Clinical trial design

ROLE OF OCT ANGIOGRAPHY IN THE EVALUATION AND MONITORING OF DIABETIC RETINOPATHY*Stela Ceca¹*¹Department of Ophthalmology, Salus Hospital, Tirana, Albania.Corresponding author: *stelaceca14@gmail.com*

Introduction: Diabetic retinopathy (DR) is one of the leading causes of visual impairment worldwide, particularly among patients with type 1 and type 2 diabetes. Early diagnosis and continuous monitoring are essential to prevent disease progression and preserve vision. Fluorescein angiography (FA) has traditionally been the gold standard for evaluating retinal vasculature and perfusion. However, optical coherence tomography angiography (OCT-A) has emerged as a non-invasive imaging modality that provides detailed visualization of retinal microvasculature without dye injection. The aim of this study is to highlight the role of OCT angiography in the diagnosis and monitoring of diabetic retinopathy.

Methods: A review of clinical applications of OCT-A in patients with diabetic retinopathy was performed. The analysis focused on the detection of microvascular alterations including microaneurysms, areas of capillary non-perfusion, and neovascularization. Quantitative evaluation of the foveal avascular zone (FAZ) and perfusion abnormalities was considered as potential biomarkers for disease severity and therapeutic decision-making.

Results: OCT-A provides high-resolution visualization of retinal and choroidal vascular networks, facilitating early identification of microvascular changes. The technique is particularly useful in monitoring diabetic maculopathy and detecting vascular alterations in early stages of DR. Quantitative parameters such as FAZ enlargement and perfusion deficits provide valuable information for disease staging and treatment response. Limitations include motion artifacts and reduced image quality in cases of media opacity.

Conclusions: OCT angiography represents a valuable non-invasive tool for the evaluation and follow-up of diabetic retinopathy. Its ability to provide both qualitative and quantitative vascular information improves clinical decision-making and may enhance patient outcomes. Integration with conventional OCT and fluorescein angiography remains important for comprehensive assessment.

Keywords: *diabetic retinopathy, OCT angiography, FAZ, diabetic maculopathy, retinal perfusion, non-invasive imaging.*

45 LOW-LEVEL RED-LIGHT THERAPY FOR MYOPIA CONTROL – A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED AND NON-RANDOMIZED CONTROLLED STUDIES

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Introduction: Myopia being a public health problem, its management has become a major focus in contemporary optometry and ophthalmology, with interest in innovative approaches to slow myopia progression. Low-level red-light therapy is one of recent non-invasive approaches to the myopic individuals exposed for a certain period of time. This is a relatively recent approach, and the currently available evidence remains limited. This article provides a systematic insight into the efficacy of red-light therapy in controlling myopia progression.

Methods: Out of 173 results, a total of 20 studies with 16 Randomized controlled trials and 4 non-randomized control trials were included in this study after a thorough database search on PubMed, Scopus and Web of Science for all the literature related to red light therapy. Selected articles were thoroughly reviewed and the data containing both axial length and spherical equivalent values were included from the studies for the analysis. Risk of bias assessment was also carried out independently for all the studies included.

Results: Results showed that in treatment with RLRL the total pooled mean difference of AL change between treatment and control groups was -0.29mm (95% CI: -0.36 to -0.22) $I^2 = 98\%$; $P < 0.00001$), and total pooled mean difference of SER was 0.59D (95% CI: 0.49 to 0.69) $I^2 = 96\%$; $P < 0.0001$). Random effect model was used because included studies differed in sample size, protocols and methodologies, and high heterogeneity was noted in both RCT and Non-RCT studies.

Conclusions: This review showed that low-level red-light therapy can significantly reduce myopia progression however, long-term studies are required to determine whether the effects are sustained over time and whether rebound occurs after cessation.

Keywords: Red Light Therapy, Combination Therapy, Myopia Management, Systematic Review, Meta-Analysis

46 REFRACTIVE SURGERY – INDIVIDUAL APPROACH FOR EACH PATIENT*Teuta Haveri^{1,2}*¹Hygeia Eye Center, Tirana, Albania²Hygeia Hospital TIRANA, Tirana, Albania**Corresponding author:** *teutahaveri@yahoo.co.uk*

Purpose: To report our results with different refractive surgery techniques—SMILE, FemtoLASIK, and PRK—performed at our center and selected according to patients' ocular parameters.

Setting: Hygeia Eye Clinic, Hygeia Hospital Tirana

Methods: Subjective refraction, based on the Snellen chart and cycloplegic evaluation, remains one of the most important and challenging selection criteria. Corneal profiling and axial length (AXL) measurements, assessed using 3D corneal topography (Pentacam), are also essential for accurately determining corneal thickness, identifying the thinnest corneal point, and detecting keratoconus or forme fruste keratoconus, which are contraindications for refractive surgery. Optical coherence tomography (OCT) is also important for ruling out any subclinical changes in the macular profile.

Results: A total of 485 eyes were treated at Hygeia Eye Center (HEC), Tirana, using PRK, FemtoLASIK, and SMILE (VisuMax 500). Postoperative follow-up examinations were performed on postoperative day 2, at 1 week, 1 month, 3 months, and 1 year. Among the treated eyes, 67 cases presented with unilateral anisometropia. Eighty-four eyes were hyperopic with astigmatism, 153 eyes were myopic, and 181 eyes had myopia with myopic astigmatism.

A careful subjective and objective ophthalmic examination was performed preoperatively according to our protocol. Visual acuity recovery was faster in patients treated with SMILE (2–3 hours postoperatively), followed by FemtoLASIK (1–2 days postoperatively) and PRK (1–2 weeks postoperatively). All patients underwent preoperative best-corrected visual acuity (BCVA) assessment.

Five patients experienced dry eye symptoms requiring prolonged treatment with artificial tears. Overall, 99.9% of patients were satisfied with their postoperative results. Three patients complained of postoperative halos for up to 4 months following PRK, attributed to dry eye syndrome; symptoms resolved after 6 months with hyaluronic acid lubricating ophthalmic solution treatment.

Conclusion: The last decade has witnessed significant advances in refractive surgery techniques. With the minimally invasive procedures currently available, a wide range of refractive errors, including myopia, hyperopia, and astigmatism, can be effectively treated. However, both immediate and long-term postoperative outcomes still depend on a thorough preoperative examination, which enables appropriate patient selection and helps exclude unsuitable candidates.

Final Disclosure: The authors have no conflict of interest.

Keywords: *Refractive surgery, cornea, corneal topography, pachymetry*

TEMPOROMANDIBULAR JOINT DISORDERS IMPACT ON CERVICAL SPINE PARAMETERS

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Introduction: The craniocervical-mandibular system includes the temporomandibular joint, the atlanto-occipital joint, the hyoid bone, the masticatory muscles, and any muscle or ligament connecting the head to the neck. Due to the system's functional unit nature and biomechanical interaction, scientists are examining whether temporomandibular disorders impact cervical spine parameters. To compensate for pathological changes in this system, it is necessary to adjust the position of the hyoid bone, neck posture, and head.

Methods: This study included 24 patients with temporomandibular disorders diagnosed by an orthodontist and maxillofacial surgeon. Each patient underwent cervical radiographs in two different projections, and cervical parameters were assessed.

Results: Joint arthritis, malocclusions, tooth loss, congenital asymmetry, and trauma were the main causes of temporomandibular disorders in our cases. Regardless of the cause, all of them had at least one change in cervical spine parameters. Cervical tilting, C2-C7 cervical lordosis (CL), and C2-C7 sagittal vertical alignment (C2-C7 SVA) were the cervical parameters that experienced the biggest changes. A forward head position, cervical lordosis loss, and scoliosis were common observations.

Conclusions: Temporomandibular disorders had an effect on cervical spine parameters in all cases. Cervical tilting, CL, and C2-C7 SVA were the cervical parameters that experienced the most changes.

Keywords: *mandibular deviation, cervical spine parameters, cervical posture.*

48 EXTREME CHALLENGES IN RETROPERITONEAL TUMORS: A CASE REPORT

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Introduction: Primary retroperitoneal germ cell tumors are rare extragonadal neoplasms that can pose significant diagnostic and therapeutic challenges, particularly when they invade major vascular structures.

Case Presentation: Here, we report the case of a 40-year-old man who presented with a retroperitoneal mass. A Tru-Cut biopsy revealed a yolk sac tumor with a high proliferative index (Ki-67 60%) and strong AFP and CK19 positivity. Detailed clinical examination and imaging findings were unremarkable, supporting a primary extragonadal origin. His medical history was significant for a contralateral (right) nephrectomy following a traffic accident. After neoadjuvant chemotherapy with BEP (bleomycin, etoposide, and cisplatin), follow-up PET-CT demonstrated an approximately 30% reduction in tumor size, and the patient was subsequently referred for surgical treatment. Preoperative workup showed 120 degrees of (encasement) with the abdominal aorta under Superior Mesenteric Artery and close proximity to Left Renal Artery. A large retroperitoneal mass was found extending toward the left renal hilum. The tumor was densely adherent to the left renal artery and vein, with direct invasion of the abdominal aorta below the level of the superior mesenteric artery (SMA). Considering the patient had a solitary functioning kidney, every effort was made to preserve the left kidney. The Abdominal Aorta was dissected under the SMA, but despite all the efforts, the posterior aspect of the renal artery and vein, the Renal Artery could not be exposed. Bench procedure for the left kidney was decided. Abdominal Aorta resection was performed including the left renal artery. Then posteriorly the renal vein was seen to be infiltrated. It was cut by taking a patch from Vena Cava Inferior (VCI). By these maneuvers the Left Kidney was totally mobilized, except keeping the ureter intact. Cold Ringer's solution was used to perfuse the kidney and start the cold ischemia. The tumor was dissected off the Left Renal Artery keeping a patch on the Aortic site. Because of the infiltration of the renal vein, the remnant of it was short to make a direct anastomosis to the VCI, so a Dacron graft was interposed between the stump of the renal vein and the inferior vena cava. Then, the renal artery patch was anastomosed to the Aortic Dacron graft. The postoperative course was prolonged and required intensive care monitoring, mainly due to respiratory insufficiency and extended intubation. Without compromising the oncological resection quality, the renal function was preserved. Postoperative abdominal Doppler ultrasound showed maintained renal arterial flow with a renal resistive index of 0.66. At 33 months of follow-up, the patient remains clinically well with preserved renal function, with blood urea nitrogen of 43 mg/dL and creatinine of 1.35 mg/dL. Final histopathology of the surgical specimen demonstrated a mixed germ cell tumor with 70% mature teratoma, along with atypical glandular structures, mature cartilaginous tissue, and foci of undifferentiated carcinoma with Ro margins.

Conclusions: In this case, we emphasize the importance of a multidisciplinary approach in the management of primary retroperitoneal germ cell tumors. It also highlights how a preoperative biopsy may identify only one histologic component of a heterogeneous tumor, potentially leading to a limited response to the selected chemotherapy regimen. Even in the setting of major vascular invasion and a solitary kidney, a well-coordinated multidisciplinary team, combined with careful preoperative planning, can enable aggressive

yet precise surgical management. This approach can achieve durable disease control while preserving organ function, resulting in excellent short- and long-term outcomes.

Keywords: *Retroperitoneal germ cell tumor, Mature teratoma, Yolk sac tumor, Extragonadal tumor, Vascular reconstruction, Solitary kidney preservation*

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SUDDEN SENSORINEURAL HEARING LOSS: WHAT IS THE OPTIMAL TREATMENT STRATEGY*Emirjona Vajushi^{1,2}*¹Department of Otorhinolaryngology, American Hospital, Tirana, Albania²Western Balkans University, Tirana, Albania**Corresponding author:** *emirjona.vajushi@wbu.edu.al*

Background: Sudden sensorineural hearing loss (SSNHL) is an otologic emergency with critical early treatment for recovery of hearing. Diagnosis and management of SSNHL are frequently delayed, leading to permanent hearing loss. Evidence based multimodal therapies are important for the success of hearing improvement

Objective: To highlight common pitfalls in SSNHL management and emphasize the role of multimodal therapy.

Methods: Review of current evidence about multimodal therapy and clinical practice patterns.

Results: Although systemic corticosteroids are frequently used to treat SSNHL, they are often initiated late in therapy or used solely as the primary approach to treatment. Use of intratympanic corticosteroids provides effective targeted therapy with minimal systemic effects, and is effective as both the primary and rescue treatment modality in SSNHL. Hyperbaric oxygen therapy (HBOT) may also offer significant improvement of the outcomes of SSNHL when started early.

Conclusion: Development of timely and combined therapy modalities for SSNHL is critical. High utilization of intratympanic corticosteroids and HBOT for treatment will enhance hearing outcomes for patients with SSNHL.

Keywords: *Sudden sensorineural hearing loss (SSNHL), intratympanic corticosteroids, hyperbaric oxygen therapy (HBOT), hearing loss, multimodal therapy*

ALERT AT 26 MG/DL: A RARE PRESENTATION OF INSULINOMA IN THE PANCREATIC UNCINATE PROCESS

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Introduction: Insulinoma is the most common functional pancreatic neuroendocrine tumor (incidence < 4/million/year), yet diagnosis is frequently delayed by years due to nonspecific symptoms mimicking neurological conditions. Uncinate process location adds surgical complexity from proximity to the main pancreatic duct and superior mesenteric vessels. This case highlights the value of early biochemical investigation and anatomy-driven surgical planning.

Methods: Clinical evaluation and biochemical workup were performed at Barleti University Polyclinic, Tirana. Endogenous hyperinsulinemia was confirmed by simultaneous fasting measurement of glucose, insulin, C-peptide, and cortisol per established thresholds. Tumor localization was performed with contrast-enhanced abdominal MRI at Villa Maria Hospital, Tirana (T1/T2, DWI/ADC, dynamic post-contrast). Surgical strategy was decided by a multidisciplinary team. The specimen underwent histopathological and immunohistochemical analysis (Ki-67/MIB-1, Chromogranin A, Synaptophysin, Congo Red) per WHO 2022 classification.

Results: A 33-year-old woman with a two-year history of recurrent hypoglycemic episodes presented with fasting glucose 26 mg/dL, insulin 26.3 µU/mL, and C-peptide 3.64 ng/mL, confirming endogenous hyperinsulinemia; cortisol was normal, excluding adrenal insufficiency. MRI identified a 20 × 16.7 mm hypervascular lesion in the uncinate process with arterial enhancement and delayed washout. Proximity to the main pancreatic duct and superior mesenteric vessels precluded safe enucleation; pancreaticoduodenectomy (Whipple procedure) was performed without complications, with discharge on day seven and normalized glycemia. Histopathology (Biopsy 13777/25) confirmed a well-differentiated panNET, WHO Grade 1, Ki-67 < 2%, Chromogranin A and Synaptophysin positive, clear resection margins (Ro), and no lymph node involvement (pNo).

Conclusions: Measuring insulin and C-peptide alongside glucose during any hypoglycemic episode is a simple step that can prevent years of diagnostic delay. When insulinoma arises in the uncinate process, enucleation may be unsafe regardless of tumor size; pancreaticoduodenectomy is the guideline-consistent, curative alternative. The G1, Ro, pNo outcome is associated with 5-year survival of 94–100%, underscoring the importance of timely and complete surgical resection.

Keywords: *insulinoma; pancreatic neuroendocrine tumor; hypoglycemia; uncinate process; pancreaticoduodenectomy; histopathology*

Acknowledgements: *The authors thank Dr. Dritan Cela, Chief of Surgery, University Trauma Hospital, Tirana, for performing the pancreaticoduodenectomy and communicating operative findings to the multidisciplinary team.*

**BIOMIMETIC DESIGN STRATEGIES IN VASCULAR TISSUE ENGINEERING:
BRANCHED SCAFFOLDS AND MULTILAYERED TUBULAR CONSTRUCTS**

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Introduction: Cardiovascular diseases are often associated with atherosclerosis or arterial damage. Tissue engineering is a promising approach to overcome limitations of autografts and synthetic grafts, such as intimal hyperplasia and infection. The key challenges in tissue engineering are development of multilayered vessels that mimic native arteries, and fabrication of branched tubular scaffolds to imitate capillary-bed structures for 3D-tissues. In two separate studies, we developed multilayered tubular constructs incorporating vascular cells and capillary bed-like branched scaffolds based on tubular fibrous meshes to address these challenges.

Methods: Multilayered tubular construct consisted of multiple layers starting from lumen side: endothelial cell-seeded film, elastin-containing random fibrous mesh, circumferential fibrous mesh with mesenchymal stem cell (MSC)-derived smooth muscle cells, and MSC-derived fibroblast-loaded hydrogel. For branched tubular scaffolds, fibrous meshes were fabricated by electrospinning onto sacrificial molds with hierarchical branching designed according to Murray's law. Their morphological and mechanical properties, as well as cell behavior on these constructs, were evaluated.

Results: A multilayered tubular construct with 3 mm lumen was successfully fabricated. SEM confirmed sequential deposition of elastin random mesh, circumferentially aligned fibers, and hydrogel onto tubular film. Endothelial cells lined porous film, while smooth muscle cells aligned along circumferential fibers, and fibroblasts were found in hydrogel. Each cell type maintained its cell-specific protein expression in vascular substitution during co-culture. In another study, branched vascular models, bifurcated and complex models with two and four branches, were designed using Murray's law (radii: 800, 630, and 500 μm). Uniform, bead-free fibrous meshes were collected over both sacrificial models which were successfully 3D printed. After removal of sacrificial mold, perfusion confirmed flow through branched network, and endothelial cells attached to lumen side and proliferated over 7 days.

Conclusions: Multilayered tubular constructs and branched scaffolds are promising approaches for improving structural performance of vascular grafts and providing vascularization in engineered tissues, respectively.

Keywords: *vascular tissue engineering, multilayered tubular construct, branched scaffolds, endothelial cells, mesenchymal stem cells.*

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The design of biomaterials that effectively guide tissue regeneration is a central objective in translational biosciences. Among available fabrication strategies, electrospinning has emerged as a versatile platform for producing nano- and microfibrous scaffolds that closely replicate the architecture and functional properties of the extracellular matrix. Tunable parameters including fiber alignment, porosity, and mechanical strength enable precise control over cell adhesion, proliferation, and lineage-specific differentiation. The combination of natural and synthetic polymers further expands the design space for bioactive, tissue-specific systems. Previous work from our group has demonstrated that aligned nanofiber scaffolds improve cell orientation and extracellular matrix deposition, while biofunctionalized architectures support fibrochondrogenic differentiation relevant to musculoskeletal applications, including meniscus tissue engineering in environments characterized by limited vascularization. Building on this foundation, the present work introduces a circular economy perspective by investigating electrospun scaffolds fabricated from recycled polyethylene terephthalate (rPET) as a sustainable biomaterial platform. Post-consumer rPET was processed and electrospun into nanofibrous membranes, and scaffold architecture was systematically optimized through adjustment of solution concentration, applied voltage, and collector distance. Structural characterization confirmed uniform fiber morphology and appropriate porosity. Initial biological evaluation focused on antimicrobial performance, with results demonstrating effective inhibition of relevant bacterial strains, supporting potential application in wound care and infection-resistant tissue engineering constructs. These findings establish the structural and antimicrobial baseline for rPET nanofiber scaffolds and open a translational pathway toward cytocompatibility validation and functional tissue engineering applications. Integrating recycled polymer streams into biomaterial fabrication pipelines represents a meaningful step toward sustainable, circular approaches in regenerative medicine.

Keywords: *biomaterials, nanofibers, electrospinning, recycled PET, circular biomaterials, regenerative medicine, antimicrobial scaffolds*

**FROM SYNTHETIC DESIGN TOWARD TRANSLATIONAL MEDICINE:
BIODEGRADABLE POLYMERIC NANOSPONGES FOR ADVANCED DRUG DELIVERY**

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Synthetic chemistry enables precise control over polymer structure and functionality, playing a central role in the development of advanced drug delivery systems. In this context, biodegradable cyclodextrin (CD)- and dextrin-based polymers, known as nanosponges, represent versatile platforms for controlled therapeutic delivery. Here, we demonstrate how rational synthetic design, through the selection of polymer precursors and crosslinking strategies, governs structure–property relationships that define biomedical performance. The resulting nanosponge networks exhibit pH-responsive swelling, with limited expansion under acidic conditions and enhanced swelling at physiological pH due to ionization-driven electrostatic repulsion. This behavior directly influences drug release and biointerfacial interactions. Rheological and mucoadhesion studies revealed viscoelastic behavior and strong interactions with mucin, supporting prolonged residence at mucosal surfaces. Drug loading and release experiments showed high encapsulation efficiency and sustained, pH-responsive release while protecting the drug from degradation. These findings highlight how synthetic design enables precise control over key functional properties, directly impacting therapeutic performance. From a translational perspective, such systems are particularly relevant for neurodegenerative diseases and other applications where current therapies face limitations in bioavailability, stability, and targeted delivery. Advances in research are expected to enable clearer pathways toward clinical translation. Robust experimental methodologies, combined with close collaboration among academia, industry, clinicians, and regulatory bodies, will be essential to ensure reliable preclinical validation and streamline translational processes. Overall, biodegradable cyclodextrin- and dextrin-based nanosponges represent promising platforms for advancing oral drug delivery and developing safer, more effective, and clinically relevant therapeutic systems.

Keywords: polymeric nanosponges, cyclodextrin, dextrin, drug delivery, pH-responsive systems, translational medicine

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54 IMAGING-GUIDED TARGETING OF EXTRACELLULAR VESICLE–LIPID NANOPARTICLE HYBRIDS FOR ORAL RNA DELIVERY*Armond Daci¹*¹Department of Pharmacy, Faculty of Medicine, University of Prishtina, 10000, Prishtina, Kosovo**Corresponding author:** *armond.daci@uni-pr.edu*

Imaging-guided evaluation of oral RNA nanocarriers is essential for assessing gastrointestinal biodistribution and targeting. Oral delivery is limited by degradation, poor epithelial uptake, and off-target exposure, requiring non-invasive imaging. Fluorescent extracellular vesicle–lipid nanoparticle (EV–LNP) hybrids were administered orally in murine models, followed by whole-body and ex vivo fluorescence analysis over 24 hours. EV–LNP hybrids showed strong intestinal localization, prolonged colonic retention, and greater signal persistence compared with lipid nanoparticle controls. Reduced hepatic and splenic uptake indicated lower systemic exposure. Sustained intestinal signal confirmed improved stability and retention. These findings demonstrate that EV–LNP hybrids enhance gastrointestinal targeting while minimizing systemic exposure, supporting imaging-based optimization of nanocarriers for oral RNA delivery.

Keywords: *extracellular vesicles, lipid nanoparticles, oral delivery, imaging, biodistribution, nanomedicine*

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SINGLE VS DUAL DRUG LOADED PH-RESPONSIVE POLYMERIC MICELLES: CYTOTOXIC, APOPTOTIC AND ANTIANGIOGENIC EVALUATION*Gülhan Işık Ertop¹, Aysel Kiziltay², Nesrin Hasirci³, Ayşen Tezcaner⁴*¹Health Institutes of Türkiye, Türkiye Cancer Institute, 34718, İstanbul, Turkey²Center of Excellence in Biomaterials and Tissue Engineering, Middle East Technical University, 06800, Ankara, Türkiye³Department of Chemistry, Faculty of Arts and Sciences, Middle East Technical University, 06800, Ankara, Turkey⁴Department of Engineering Sciences, Faculty of Engineering Middle East Technical University, 06800, Ankara, Turkey**Corresponding author:** *kiziltay@metu.edu.tr*

Introduction: Triple-negative breast cancer (TNBC) is a highly aggressive subtype lacking targeted therapies, highlighting the need for novel treatment strategies. This study aimed to develop and evaluate pH-responsive polymeric micelles for the delivery of lithocholic acid (LCA) and doxorubicin (DOX), individually and in combination, to achieve enhanced therapeutic efficacy through complementary mechanisms.

Methods: Methoxy poly(ethylene glycol)-block-poly(ϵ -caprolactone) (mPEG-b-PCL) micelles were synthesized and loaded with LCA (LCA-M), DOX (DOX-M), or both (DL-M). Physicochemical properties and pH-responsive drug release profiles were characterized. Cytotoxicity was assessed in MDA-MB-231 cells. Apoptosis was evaluated via mitochondrial membrane potential, reactive oxygen species (ROS) generation, qRT-PCR analysis of apoptosis-related genes (Bax, p53, Bcl-2, Bcl-xL), and Annexin V-FITC flow cytometry. Antiangiogenic activity was examined using HUVEC tube formation assays. Statistical analysis: Data are presented as mean $\pm$ standard deviation and were analyzed using one-way analysis of variance (ANOVA) followed by Tukey's multiple comparison test.

Results: All micellar formulations exhibited uniform nanoscale size and accelerated drug release under acidic conditions (pH 5.0). Blank micelles were non-toxic, whereas LCA-M, DOX-M, and DL-M significantly reduced cell viability. DL-M demonstrated comparable or slightly enhanced cytotoxicity relative to single-drug formulations. Apoptosis analyses revealed mitochondrial depolarization and increased ROS levels in all drug-loaded groups. Gene expression analysis showed upregulation of Bax and p53 and downregulation of Bcl-2 and Bcl-xL, with the most pronounced effects in DOX-M and DL-M. Flow cytometry confirmed higher apoptotic cell populations in DOX-containing groups. LCA-M and DL-M significantly inhibited angiogenesis, reducing node formation and total tube length, whereas DOX-M showed limited effect.

Conclusions: The developed micelles enabled effective pH-responsive drug release and exhibited potent cytotoxic and complementary therapeutic effects. DOX primarily induced apoptosis, while LCA contributed to antiangiogenic activity. Dual drug-loaded micelles (DL-M) represent a promising nanocarrier platform for combined anticancer and antiangiogenic therapy in TNBC.

Keywords: *Dual Drug Delivery, Polymeric Micelles, TNBC, Lithocholic Acid, Doxorubicin*

Acknowledgements: *This work was supported by Middle East Technical University (METU) Scientific Research Projects Coordination Unit (BAP) (Project No. GAP-310-2019-10184) and The Scientific and Technological Research Council of Türkiye (TÜBİTAK) 2211/C National Ph.D. Scholarship. The authors would like to thank METU Center of Excellence in Biomaterials and Tissue Engineering (BIOMATEN) and METU Central Laboratory.*

56 MICROBIAL ADHESION TO DENTAL SURFACES

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Introduction: Restorative materials in dentistry must closely replicate the functional and biological characteristics of natural teeth. Therefore the aim of the research is to prepare materials which exhibit excellent mechanical properties while also being non-toxic and resistant to bacterial colonization. Controlling bacterial adhesion requires a thorough understanding of the interactions between microorganisms and implant or dental surfaces. The objective of our studies is to find biocompatible coatings with the lowest possible bacterial adhesion.

Methods: Materials like metals, polymethyl-methacrylate (PMMA), cements, composites, and ceramics were doped with different nanoparticles. In addition, we also prepare polyelectrolyte multilayers coatings. The surface roughness was assessed by profilometry, the surface hydrophobicity was determined by tensiometry, and the zeta potential was measured by electrokinetic phenomena. The bacterial adhesion to all material surfaces was determined by staining technique and by scanning electron microscopy.

Results: We showed that the addition of Au, ZnO, TiO₂ or CuO nanoparticles to PMMA reduced the extent of microbial adhesion of *Candida albicans*. Zirconia specimens coated with biocompatible polyelectrolyte multilayer reduced the adhesion of *Streptococcus mutans* substantially. Results revealed that the composite surface exhibited greater roughness compared with the Co-Cr alloy surface. The surface finishing is very important, surfaces with higher roughness adhere more bacteria. The surface energy and charge additionally impact bacterial adhesion.

Conclusions: We give an insight into the contemporary state-of-the-art in the field of bacterial adhesion to dental surfaces. Bacterial adhesion is a complicated process influenced by many factors, including the environmental factors, the material surface characteristics, and bacterial properties. In order to reduce caries formation on the teeth, strategies to prevent bacterial adhesion to the dental surface were developed, among them coatings with nanoparticles and polyelectrolytes are very promising. The coating of the dental surfaces with various organic and inorganic substances has proved to be successful, but it has not reached widespread use to date. Further multidisciplinary work is yet to be done by researchers of various fields in order to provide a new product, which will be available to widespread usage.

Keywords: *Dental materials, Surface characterization, Coatings, Biocompatibility, Bacterial adhesion*

RAMAN MICROSCOPIC INVESTIGATIONS OF THE EFFECTS OF WATER-SOLUBLE SYNTHETIC POLYMERS ON BACTERIA AT THE SINGLE CELL LEVEL

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Introduction: This work evaluated Raman spectroscopy for single-cell analysis and to investigate the impact of water-soluble synthetic polymers (WSPs) on bacteria. These interactions may affect microbial ecosystems, polymer biodegradability, and safe environmental, industrial, and biomedical use. Bacterial samples were prepared according to a standardized growth and exposure protocol with and without polymer treatment. All spectra were uniformly pre-processed, and the results were compared with existing research to validate the findings and identify potential limitations.

Methods: *Escherichia coli* and *Enterococcus faecium* were cultivated on tryptic soy agar (TSA) plates at 30°C, transferred to tryptic soy broth (TSB), and incubated for 24 h. Suspensions were exposed either to polymer-containing medium (polyacrylamide (PAM), polyethylene glycol (PEG), polyvinyl alcohol (PVOH), and polyvinylpyrrolidone (PVP)) or to solvent control. Following incubation, cells were centrifuged, washed with 0.9% saline, resuspended in ultrapure water, dried on stainless-steel slides, and analyzed by Raman microscopy at 633 nm (2 spectra/cell). The spectra were interpolated, baseline-corrected, smoothed, and z-score normalized using MATLAB, and evaluated by partial least squares discriminant analysis (PLS-DA) according to Tewes et al.

Results: Polymer exposure resulted in subtle changes in the single-cell Raman spectra of both bacterial species. The PLS-DA loadings indicated mainly impact in proteins (~849 cm⁻¹), tryptophan (~1482 cm⁻¹), and lipids (~1298 cm⁻¹), suggesting that polymer contact may affect cell-envelope-associated biochemical features. For *E. coli*, the clearest spectral separation was obtained for PAM and PVP, whereas *E. faecium* generally showed clearer differentiation, with the highest sensitivities observed for PVOH and PVP.

Conclusions: Raman spectroscopy with chemometrics proved suitable for detecting polymer-associated differences, particularly in membrane- and cell-envelope-associated regions. However, these findings require cautious interpretation due to sensitivity to sample preparation, physiological cell state, and intrinsic spectral variability. Overall, the results support Raman spectroscopy as a sensitive screening tool, while further validation with complementary methods is needed to clarify the underlying mechanisms.

Keywords: Raman spectroscopy, bacteria, *E. coli*, *E. faecium*, water-soluble polymers, polyacrylamide, polyethylene glycol, polyvinyl alcohol, polyvinylpyrrolidone.

FROM MECHANISM TO DRUG TARGET: STRUCTURAL INSIGHTS INTO ANTIBIOTIC ACTION AND RIBOSOME BIOLOGY IN BACTERIA.

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Introduction: Antimicrobial resistance poses one of the most urgent threats to global health, driven in part by the declining efficacy of ribosome-targeting antibiotics, a large and clinically important group of antimicrobial agents. Understanding how these drugs interact with their target at the molecular level is essential both for rationalising their mechanisms of action and for informing the development of next-generation therapeutics. The aim of this study was to investigate the structural and mechanistic basis of antibiotic action at the bacterial ribosome, while also exploring adaptive ribosomal responses to antimicrobial stress.

Methods: Cryo-EM single particle analysis and in situ cryo-electron tomography were used to examine the interaction of structurally diverse antibiotics with the bacterial ribosome. Several chemically and mechanistically distinct compound classes were investigated, including third-generation tetracyclines (omadacycline and KBP-7072), orthoformimycin, and the natural product GE81112, a potent inhibitor of translation initiation. In parallel, structural studies were performed on the rRNA modification enzymes RsmA and RsmB, which regulate function of the small ribosomal subunit.

Results: These studies reveal how structurally diverse antibiotics exploit conserved features of the ribosome to block distinct steps of the translation cycle, providing a molecular framework for understanding selectivity, resistance, and potency. Third-generation tetracyclines and other compounds displayed distinct binding interactions consistent with their inhibitory profiles. Recent evidence suggests that rRNA modification patterns are dynamically altered in response to antibiotic exposure and broader environmental stress. Consistent with this, loss of RsmA activity confers kasugamycin resistance and, as shown by cryo-electron tomography, leads to widespread ribosome hibernation in vivo, a phenotype potentially linked to bacterial persistence.

Conclusions: Taken together, this work illustrates how modern structural biology approaches, applied both in vitro and directly within the bacterial cell, can illuminate the mechanisms of antibiotic action and reveal how bacteria adapt to antimicrobial stress. These findings identify fundamental components of the translational machinery and associated regulatory pathways as promising targets for future therapeutic intervention.

Keywords: antimicrobial resistance, Cryo-EM, ribosome, antibiotics, ribosome hibernation, rRNA modification

59 MITOCHONDRIA AT THE INTERSECTION OF OLIGODENDROCYTE LIFE AND DEATH

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Introduction: Oligodendrocyte generation supports plasticity, cognition, and myelin repair. While transcriptional regulation of oligodendrogenesis is well characterised, the organellar dynamics accompanying cell birth, maturation, ageing, and degeneration in the intact brain have remained poorly defined, particularly for mitochondria.

Methods: Longitudinal intravital two-photon imaging in transgenic mouse lines was combined with optically targeted single-cell DNA damage, conditional genetic perturbation of mitochondrial quality control, and morphometric quantification of mitochondrial networks in mouse and human cerebral cortex. Cells and their mitochondria were tracked over hours to months in the living brain.

Results: Across the oligodendrocyte lineage, mitochondrial content, shape, and distribution defined distinct cellular stages, providing organellar checkpoints beyond canonical molecular markers. During oligodendrogenesis, mitochondria transiently expanded and redistributed toward distal processes, then abruptly depleted as myelin compacted, a process completed within 3 days. Precursor mitochondrial dynamics were modulated by animal arousal state within minutes and altered with age. Following targeted injury, mitochondrial loss in mature oligodendrocytes preceded cell death by weeks to months; conditional disruption of mitochondrial quality control was sufficient to initiate the same trajectory, establishing it as essential for long-term oligodendrocyte health.

Conclusions: Mitochondrial dynamics define cellular checkpoints across the oligodendrocyte lineage and mark both generative and degenerative states. Oligodendrocytes can persist in a mitochondria-depleted, functionally compromised state long before overt myelin or cell loss become detectable, reframing when neurodegeneration truly begins. This positions mitochondrial quality control as a spatiotemporally and molecularly defined therapeutic target in demyelinating and neurodegenerative disease.

Keywords: *oligodendrocytes; mitochondria; myelin; neurodegeneration; intravital imaging.*

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THE IMPACT OF THYROID HORMONES ON MITOCHONDRIAL CALCIUM HOMEOSTASIS

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Thyroid hormones (THs) are key regulators of cellular metabolism and mitochondrial activity, promoting tricarboxylic acid cycle flux and enhancing oxidative phosphorylation via expression level changes of key proteins. These canonical effects of THs on mitochondria are well characterized, but the rapid, nongenomic influence of THs - the so-called noncanonical action - on mitochondrial function remains unknown. We hypothesized that noncanonical actions of THs affect mitochondrial calcium ($[Ca^{2+}]$ mito) homeostasis, producing short-term changes in mitochondrial signaling and bioenergetics. To test this, we characterized $[Ca^{2+}]$ mito dynamics in response to acute exposure of 100 nM triiodothyronine (T₃) or diiodothyronine (T₂). To monitor real-time Ca²⁺ changes, HeLa cells were transfected with organelle-targeted, FRET-based Ca²⁺ biosensors, and $[Ca^{2+}]$ mito level changes were assessed by live cell imaging. T₃ and T₂ significantly reduced basal $[Ca^{2+}]$ mito and altered mitochondrial membrane potential within 15 minutes, without altering cytosolic, ER, or intermembrane space Ca²⁺ levels, indicating a mitochondria-specific effect. These results suggest a very rapid and likely nongenomic mechanism by which THs regulate $[Ca^{2+}]$ mito. Ongoing work aims to identify the molecular pathways underlying this effect.

Keywords: *thyroid hormones, calcium homeostasis, mitochondria*

61 INVESTIGATING THE PREMALIGNANT CHANGES IN THYROID GLAND

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Background: Hashimoto's thyroiditis (HT) is the most common autoimmune thyroid disease and the leading cause of hypothyroidism in developed countries. The female-to-male ratio in Hashimoto's thyroiditis ranges from 10:1 to 20:1. The exact pathogenic mechanism has not been fully elucidated, but it is thought to be related to dysfunction of regulatory T lymphocytes, leading to autoimmune reactions against thyroid cells. Rudolf Virchow proposed that cancer often arises in areas of prolonged inflammation, a predisposition that has been investigated for many years. The retrospective study "The risk of thyroid cancer and sex differences in Hashimoto's thyroiditis, a meta-analysis" (August 13, 2024) demonstrated a significantly increased risk of developing papillary thyroid carcinoma (PTC) in patients with HT, with notable sex-specific differences.

Objectives: To analyze and evaluate the association between Hashimoto's thyroiditis and the development of thyroid carcinoma, while also identifying the presence of follicular epithelial dysplasia (FED) as an intermediate stage in the process of malignant transformation.

Methodology: This is a retrospective study including cases diagnosed with Hashimoto's thyroiditis in the Pathology Laboratory of the American Hospital during the period 2023– 2025. Initially, the distribution of HT according to gender and age was analyzed. Subsequently, cases with thyroid carcinoma in the setting of HT were identified, and their demographic characteristics (age, gender) and tumor size were studied. For these cases, immunohistochemical evaluation was performed for the markers HBME1, Galectin-3, and CK19. FED lesions were identified and analyzed, assessing their distribution by age and gender, immunohistochemical profile, and the statistical correlation with the presence or absence of thyroid carcinoma. The data were processed and presented in tables and graphics.

Conclusions: The findings of our study show a statistically significant association between Hashimoto's thyroiditis and thyroid carcinoma, supporting the hypothesis that the chronic inflammatory process may contribute to the development of neoplasia. In patients with Hashimoto's thyroiditis, FED foci are often identified, which may represent an intermediate link in the cascade of thyroid carcinogenesis.

Keywords: *Thyroid, Hashimoto's Thyroiditis, Papillary Thyroid Carcinoma.*

GENETICS IN PITUITARY NEUROENDOCRINE TUMORS: FIRST ALBANIAN CASE SERIES OF AIP MUTATIONS*Tea Shehu^{1,2}, Klajdi Tarko²*¹Department of Endocrinology, American Hospital 3, Tirana, Albania²University of Medicine Tiranë, Faculty of Technical Medical Sciences, Tirana, Albania**Corresponding author:** *tkolnikaj@yahoo.com*

Introduction: Pituitary neuroendocrine tumors (PitNETs) are predominantly sporadic; however, approximately 5–10% of cases are associated with germline genetic alterations. Mutations in the aryl hydrocarbon receptor–interacting protein (AIP) gene represent an important cause of familial isolated pituitary adenomas (FIPA). Data regarding the genetic background of PitNETs in Southeastern Europe remain limited. The aim of this study was to describe the first Albanian case series of patients with AIP mutations, characterize their clinical and genetic features, and compare large deletions with non–large deletion variants reported in the literature.

Methods: A retrospective analysis was performed describing the clinical, biochemical, radiological, and genetic characteristics of an Albanian family diagnosed with a germline large AIP mutation. Following identification of the mutation, a narrative review of the literature was conducted to identify previously reported AIP large deletions, which were compared with non–large deletion variants.

Results: Affected individuals presented with mixed mammo-somatotroph PitNETs, characterized by early disease onset and macroadenomas at diagnosis. Genetic analysis identified a novel pathogenic 2-3 exon AIP large germline deletion. Notably, one patient presented with concomitant Hürthle cell thyroid carcinoma, representing a unique association with the AIP mutation. Prospective screening of the patient’s daughter was negative for the mutation, while other relatives have not yet accepted genetic testing. Comparison with previously reported cases showed no clear genotype–phenotype differences between large deletions and non–large AIP variants.

Conclusions: This study reports the first Albanian family with a novel AIP exon 2–3 deletion and highlights an association with Hürthle cell carcinoma. These findings emphasize the importance of genetic testing in young patients with pituitary tumors and support the role of familial screening.

Keywords: *Pituitary neuroendocrine tumors, AIP mutation, familial isolated pituitary adenoma, genetic testing, Albania.*

ARE WE POISONING OUR HORMONES? THE HIDDEN ROLE OF ENDOCRINE DISRUPTORS IN HUMAN DISEASE

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Introduction: Endocrine-disrupting chemicals (EDCs) are exogenous compounds that interfere with hormonal signaling and homeostasis. Widely present in plastics, pesticides, industrial pollutants, and personal care products, EDCs have become pervasive in modern environments. Growing evidence links chronic exposure to these substances with metabolic, reproductive, and endocrine disorders. This study aims to critically evaluate the impact of EDC exposure on human health and to highlight underlying mechanisms of endocrine disruption.

Methods: A narrative review of literature published between 2015 and 2025 was conducted using PubMed, Scopus, and Web of Science databases. Search terms included "endocrine disruptors," "bisphenol A," "phthalates," "thyroid disruption," and "metabolic disease." Eligible studies included epidemiological, clinical, and experimental research focusing on human health outcomes.

Results: Accumulating evidence demonstrates that EDC exposure is associated with obesity, insulin resistance, thyroid dysfunction, infertility, and hormone-dependent cancers. Chemicals such as bisphenol A (BPA) and phthalates act as endocrine mimetics, binding to estrogen and androgen receptors. Prenatal and early-life exposure is particularly critical, with long-term consequences on metabolic programming and reproductive health. Several studies report significant associations between EDC levels and altered thyroid hormone profiles, as well as increased risk of metabolic syndrome.

Conclusions: EDCs represent a significant and underrecognized threat to endocrine health. Their capacity to disrupt hormonal systems at low doses and during sensitive developmental windows highlights a major public health concern. These findings support the need for stricter regulatory frameworks, improved risk assessment strategies, and increased public awareness. Further research is essential to clarify long-term effects and to develop preventive interventions aimed at reducing exposure and disease burden.

Keywords: *Endocrine-disrupting chemicals, Thyroid dysfunction, Metabolic disorders, Bisphenol A, Hormonal imbalance, Environmental exposure*

Acknowledgements: *No external funding was received for this study.*

THE ROLE OF INTESTINAL DYSBIOSIS AND ALTERATIONS IN “CROSS-FEEDER BACTERIA” IN THE DEVELOPMENT OF ANTIBIOTIC RESISTANCE

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Introduction: Intestinal dysbiosis represents a significant disruption of the gut microbiota and is closely associated with the development of antibiotic resistance. This study aims to evaluate the role of alterations in cross-feeder bacteria in this process.

Methods: A retrospective analysis was conducted on 15 dysbiosis tests (GA-MAP Dysbiosis Test) performed over the past 6 months at the Intermedica laboratory. The samples included randomly selected patients without specific inclusion criteria. Changes in microbiota composition and the presence of key metabolic bacteria were analyzed.

Results: A reduction in bacterial diversity and alterations in the commensal flora were observed in most cases. The most significant finding was a decrease in cross-feeder bacteria, which play a crucial role in the production of short-chain fatty acids (SCFAs). This reduction was associated with an increase in opportunistic microorganisms. The observed patterns suggest that antibiotic use creates selective pressure that promotes resistance through mechanisms such as horizontal gene transfer and biofilm formation.

Conclusions: Intestinal dysbiosis, particularly the disruption of cross-feeder bacteria, plays a key role in the development of antibiotic resistance. Monitoring the gut microbiota and implementing targeted therapeutic interventions—including probiotics, prebiotics, and the rational use of antibiotics—are essential for maintaining intestinal homeostasis and preventing the spread of antimicrobial resistance.

Keywords: *Intestinal dysbiosis; antibiotic resistance; microbiota; cross-feeder bacteria, SCFAs, Albania.*

Acknowledgements: *We acknowledge the support of Intermedica Medical Laboratory and the Faculty of Technical Medical Sciences, Western Balkans University.*

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Point-of-Care Technologies (POCT) offer the potential to transform diagnostics by enabling real-time, on-site testing for rapid decision-making and timely treatment. The implementation of POCT devices can enhance patient outcomes, improve healthcare efficiency, and reduce the pressure on healthcare professionals. POCT devices utilize various principles, e.g. lateral flow immunoassays, to analyze clinically relevant bodily fluids such as urine, sputum, interstitial fluid, serum, plasma or whole blood. Some of the well-known POCT methods are blood glucose testing and rapid COVID-19 tests. Other methods include rapid cardiac biomarker diagnostics and drugs of abuse screening tests. The Point-of-Care Diagnostics Research Group at the Western Balkans University (WBU) focuses on the research, development, and implementation of POC technologies, which include but is not limited to photonic integrated biosensors, lateral flow tests, Lab-on-a-Chip microfluidic systems, and biomedical devices. The ultimate goal of this Research Group is to support health professionals by making reliable, easy-to-use and affordable POCT available and accessible for early detection and/or prevention of lifestyle-related diseases, including diabetes type 2, cancer, COPD and cardiovascular diseases. This goal will be achieved through several activities, including setting-up a network of various stakeholders that are active in POCT in Albania, Balkan and EU, participating actively in joint (inter-)national projects, e.g. for rapid Sepsis detection near patient bed, as well as contributing to educational programs such as MSc in Nanotechnology at WBU.

Keywords: *Point-of-Care Diagnostics, Rapid Testing, Integrated Biosensors, Lab-on-a-Chip Devices, Healthcare Applications*

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Driven by demographic change, limited healthcare resources, increasing health awareness, and rapid advances in diagnostics and treatment, healthcare systems are undergoing a major transformation. This transformation is characterized by a shift away from centralized, reactive, one-size-fits-all care toward more decentralized, preventive, and individualized healthcare models that support earlier intervention and continuous health monitoring. The concept of P4 medicine reflects this shift in healthcare. It aims to transform healthcare from reactive treatment to proactive and individualized care based on four key principles: predictive, preventive, personalized, and participatory medicine. In this context, timely access to meaningful health data is essential for enabling informed decisions by both healthcare professionals and individuals. A key prerequisite for this transition is the availability of point-of-care testing technologies that enable reliable and quantitative assessment of an individual's health status, combined with seamless integration of the results into digital healthcare platforms. Such technologies can support decentralized diagnostics, self-testing, and episodic or continuous monitoring outside traditional clinical settings. This presentation highlights translational bioengineering approaches for the development of biosensing systems for point-of-care testing applications that have been developed at AIT in recent years in collaboration with external academic and industrial partners. These include an electrochemical lateral flow device for quantitative biomarker detection in body fluids, a wearable sensor patch for continuous electrochemical lactate monitoring in dermal interstitial fluid, a lab-on-foil system for the electrochemical detection of periodontitis pathogens, and photonic integrated circuit-based approaches for the miniaturization of optical coherence tomography in ophthalmic applications.

67 BIOMIMETIC SENSORS FOR DETECTION OF BACTERIAL AND VIRAL PATHOGENS*Adam Tillo¹*¹School of Science and Technology, Örebro University, 701 82, Örebro, SwedenCorresponding author: adam.tillo@oru.se

Background: The attachment of bacteria and viruses to host cells is mediated by interactions between microbial surface proteins and glycans present on the cell membrane. In living systems, these interactions are strengthened by the mobility and clustering of glycans within the membrane. Reproducing such dynamic behavior in artificial sensing systems remains challenging, yet it is essential for the development of sensitive and biologically relevant diagnostic tools. **Methods & Results:** In this work, reversible self-assembled monolayers (rSAMs) were used as biomimetic, membrane-like sensing surfaces for pathogen detection. Unlike conventional rigid surface architectures, rSAMs exhibit fluid-like behavior that better mimics natural cell membranes and enables more adaptable interactions with biological targets. In addition, the surfaces can be easily regenerated under acidic conditions, allowing repeated use of the same sensor platform. rSAMs functionalized with β -galactose enabled highly sensitive detection of the opportunistic bacterium *Pseudomonas aeruginosa*. In a second approach, surfaces modified with sialic acid and Zanamivir derivatives allowed sensitive detection and differentiation of influenza A virus (IAV) subtypes. The membrane-like properties of rSAMs enhanced multivalent interactions and improved sensing performance.

Conclusions: The presented results demonstrate that rSAM-based sensors are versatile and reusable biomimetic platforms for studying pathogen–host interactions and detecting bacterial and viral pathogens. Their biological relevance, high sensitivity, and simple regeneration make them promising candidates for future diagnostic and biosensing applications.

Keywords: *Biomimetic sensors; reversible self-assembled monolayers; pathogen detection; Pseudomonas aeruginosa; influenza A virus; biosensors*

68 THE FUTURE OF INTENSIVE CARE AND THE IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE IN MONITORING, TREATMENT, AND EARLY PREVENTION OF COMPLICATIONS IN CRITICALLY ILL PATIENTS

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Introduction: Intensive care units are characterized by high patient acuity and the need for continuous monitoring and rapid clinical decision-making. Traditional scoring systems such as SOFA and APACHE provide valuable information but are limited in their ability to predict early clinical deterioration. The increasing availability of electronic health records and real-time physiological data has created new opportunities for the application of artificial intelligence in critical care. AI techniques, including machine learning and deep learning, can analyze complex datasets and identify patterns that may not be readily detectable by clinicians. These capabilities are particularly relevant in the early detection of complications such as sepsis, respiratory failure, and multi-organ dysfunction, which are major contributors to ICU morbidity and mortality.

Methods: A systematic review of the literature was conducted, focusing on studies published between 2020 and 2025. Databases including PubMed, Scopus, and Web of Science were searched using keywords such as “artificial intelligence,” “machine learning,” “intensive care,” and “sepsis prediction.” Inclusion criteria consisted of peer-reviewed studies that applied AI-based models in ICU settings for prediction, monitoring, or clinical decision support.

Results: The reviewed studies demonstrate that AI-based models significantly improve early detection of critical conditions, particularly sepsis and organ dysfunction. Predictive algorithms using clinical, laboratory, and physiological data achieved high accuracy, with some models identifying patient deterioration up to 6–12 hours before clinical recognition. AI systems also improved risk stratification and supported timely therapeutic interventions. Furthermore, decision-support tools enhanced clinicians’ ability to process large datasets in real time, contributing to improved diagnostic precision and reduced response times.

Conclusions: Artificial intelligence represents a significant advancement in intensive care medicine, enabling earlier diagnosis, improved monitoring, and more personalized treatment strategies. The integration of AI into ICU practice has the potential to improve patient outcomes and optimize healthcare resources. However, challenges remain regarding clinical validation, algorithm standardization, data interoperability, and ethical considerations such as transparency and patient privacy. Future research should focus on large-scale clinical trials and the development of explainable AI systems to ensure safe and effective implementation in routine clinical practice.

Keywords: *artificial intelligence, intensive care unit, machine learning, sepsis prediction, clinical decision support, critical care*

ARTIFICIAL INTELLIGENCE IN MODERN RADIOTHERAPY: FROM TREATMENT PLANNING TO ADAPTIVE, PATIENT-CENTERED PERSONALIZED CARE*Xhulia Dosti¹*¹Department of "The Royal Wolverhampton NHS TRUST",
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Introduction: Radiotherapy is a key component of cancer treatment but remains reliant on time-intensive and operator-dependent processes, particularly in contouring and treatment planning, which are associated with inter-observer variability and limited adaptability during treatment. Artificial intelligence (AI), mainly through deep learning approaches, is increasingly integrated into the radiotherapy workflow to improve efficiency and consistency.

Methods: A narrative review of recent literature was conducted, focusing on clinical applications of AI in radiotherapy, including auto-segmentation, dose prediction, and adaptive workflows. Emphasis was placed on studies reporting performance metrics such as Dice similarity coefficient and on workflow efficiency in clinical settings.

Results: AI-based auto-segmentation reduces contouring time and improves standardization, with reported Dice similarity coefficients commonly above 0.80 for several organs at risk, although performance is lower for complex targets. In treatment planning, AI-driven dose prediction and knowledge-based methods support faster and more consistent plan generation by reducing iterative optimization. AI also enables more feasible implementation of adaptive radiotherapy through faster re-contouring, image registration, and decision support for plan adaptation based on anatomical changes.

Conclusions: Despite these advances, challenges remain regarding data quality, model generalizability, and the need for clinical validation, and AI does not replace clinical expertise. Overall, AI is contributing to a shift toward more efficient, consistent, and increasingly patient-centred radiotherapy, with ongoing developments focused on adaptive and data-driven treatment approaches.

Keywords: *Artificial Intelligence, Radiotherapy, Auto-segmentation, Treatment Planning, Adaptive Radiotherapy, Deep Learning*

70 THE USE OF ARTIFICIAL INTELLIGENCE IN MIDWIFERY PRACTICE: THE ROLE OF DIGITAL INNOVATION AND THE “AMËSIA” APP IN IMPROVING EQUITABLE MATERNAL CARE IN ALBANIA

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Introduction: Artificial intelligence (AI) is increasingly becoming part of everyday healthcare, including midwifery practice. For midwives, it offers new ways to support women not only clinically, but also emotionally and educationally throughout pregnancy and the postpartum period. Despite these advances, equal access to quality maternal care remains a challenge, especially in settings with limited resources.

Objectives: This study explores how AI and digital tools can support midwives in their daily work, while also presenting the development of the “Amësia” app as a practical solution to improve access to maternal healthcare for all women in Albania.

Methodology: A narrative review of recent literature (2022–2025) was combined with a descriptive presentation of the development and use of a midwife-led digital application.

Results: Evidence shows that AI-powered tools can support midwives by improving risk assessment, enhancing patient education, and enabling more personalized care. Digital platforms help women better understand breastfeeding, postpartum recovery, and newborn care, while also allowing midwives to monitor and support patients more efficiently. The “Amësia” app was created with the aim of making reliable information and support easily accessible to every woman, regardless of location or socio-economic status. It also supports midwives in organizing patient information through simple digital records, improving communication, and strengthening continuity of care. In Albania, the introduction of AI in midwifery is still developing, but it shows strong potential. At the same time, important gaps remain, including the need for better digital infrastructure, more training opportunities, and stronger data management systems.

Conclusion: AI and digital innovations like the “Amësia” app can make maternal care more accessible, efficient, and patient-centered. Supporting midwives with the right tools and training will be essential to ensure that these technologies truly benefit both healthcare providers and the women they serve.

Keywords: *artificial intelligence, midwife, digital health, maternal care, equity, mobile application*

71 ENGINEERING BIOINTELLIGENT INTERFACES: SUPRAMOLECULAR COATINGS FOR INFECTION CONTROL AND IMMUNE MODULATION IN MEDICAL IMPLANTS

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Introduction: Implant-related infections and surgical site infections (SSIs) remain a major burden for healthcare systems, leading to increased morbidity and significant economic costs. In orthopedic and wound care contexts, early bacterial colonization combined with dysregulated immune responses critically determines long-term outcomes such as implant failure, chronic inflammation, and poor tissue integration. Existing approaches are limited by resistance development, cytotoxicity, and insufficient control over the local biological environment.

Methods: A biointelligent supramolecular coating platform was developed based on the self-assembly of biosourced polymers and antimicrobial peptide mimics (1). These components form stable, surface-adherent, bioactive interfaces upon application. The system was engineered to provide contact-active antimicrobial effects while maintaining compatibility with host tissues. In parallel, a data-driven framework integrating experimental datasets and machine learning was implemented to correlate immune cell phenotypes and cytokine profiles with optimal coating compositions and functional outputs.

Results: The coatings demonstrated the ability to disrupt bacterial membranes through a non-release, contact-active mechanism, reducing risks associated with resistance and cytotoxicity. In addition to antimicrobial performance, the platform enabled modulation of the local immune environment, supporting more favorable healing responses. Application-specific configurations were identified for wound dressings, orthopedic implants, and direct wound treatments. The integration of biointelligence approaches allowed the establishment of relationships between biological inputs and coating parameters, supporting adaptive optimization of material performance (2-5).

Conclusion: This work presents a shift from passive or release-based antimicrobial strategies toward bioactive, adaptive surface technologies. By combining supramolecular design with machine learning-driven optimization, the platform enables control over both infection and host response at the material interface. Such biointelligent coatings represent a promising pathway toward next-generation therapeutic surfaces capable of improving clinical outcomes across multiple implantable and wound care applications.

Keywords: *antimicrobial, coating, implant, antibiotic resistance, supramolecular chemistry, machine learning*

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ENGINEERING ORGANOID MICROENVIRONMENTS TO STUDY CELL FATE AND CANCER PROGRESSION*Gladiola Goranci-Buzhala¹, Albana Halili²*¹Department Cell Biology of the Skin, Faculty of Medicine, University of Cologne, 50931, Cologne, Germany²Department of Medicine, Faculty of Technical Medical Sciences, Western Balkans University, 1001, Tirana, Albania**Corresponding author:** *g.goranci-buzhala@uni-koeln.de*

Stem cell technology enables the generation of 3D organ-like structures, known as organoids, that more accurately model tissue development, disease progression, and the native 3D architecture and biomechanical cues of human organs (Kretschmar and Clevers 2016). In this conference, I will discuss how integrating organoid biology with scaffold-based tissue engineering can bridge the gap toward developing physiologically relevant models for drug screening in age-related diseases such as cancer. My research focuses on mouse skin stem cell organoids and brain organoids derived from induced pluripotent stem cells, which were used as a model to study how cell fate decisions are altered during cancer formation and tissue regeneration (Goranci-Buzhala et al., 2020, Goranci-Buzhala et al., 2023). In collaboration with partners at Western Balkans University who design and build biomaterial scaffolds, we employ engineered platforms that provide controlled microenvironments mimicking extracellular matrix composition, stiffness, and topography (Ndreu et al., 2008, Lutzweiler et al., 2020). By combining expertise in organoid systems and biomaterial engineering, we create more physiologically relevant in vitro models that capture the complex interplay between cell–cell and cell–matrix interactions. This collaborative approach offers a powerful framework not only to investigate the early stages of cancer progression but also to develop potential in vitro models for drug screening.

Keywords: *organoids, stem cells, biomaterials*

73 GOLD(I) COMPLEXES AS PROMISING ALTERNATIVES TO CISPLATIN: CYTOTOXICITY, REDUCED SIDE EFFECTS, AND APOPTOTIC ACTIVITY*Valbona Hoxha¹, Erica Unger¹*¹Lebanon Valley College, USACorresponding author: hoxha@lvc.edu

Cancer accounts for approximately 9.7 million deaths worldwide annually, and resistance to platinum-based chemotherapies such as cisplatin remains a major barrier to treatment. Gold(I) complexes represent a promising alternative, targeting tumor-overexpressed proteins such as thioredoxin reductase (TrxR) rather than DNA, thereby offering greater cancer cell selectivity and fewer off-target effects. This study evaluated the anticancer efficacy and in vivo toxicity of novel gold(I) complexes—Au (TPA)Spy and Au (TPA) Spm—relative to cisplatin. Cytotoxicity was measured via MTT assay in PC12 rat pheochromocytoma cells across concentrations of 0–100 μ M and treatment durations of 8–72 hours. In vivo toxicity was assessed in *Drosophila melanogaster* using survivorship and negative geotaxis climbing assays over 9 days. Both gold complexes increased PC12 cell lethality in a dose-dependent manner and showed greater cytotoxicity than cisplatin at earlier time points (8 hr, 16 hr, and 24 hr), though comparable effects at the 48 hr time point. In the fly model, cisplatin caused significant lethality (70% mortality by day 9) and motor impairment at 400 μ g/mL, whereas Au (TPA)Spy and Au (TPA) Spm produced no lethality or climbing deficits at this concentration, requiring doses exceeding 2,000 μ g/mL to observe comparable effects. These results demonstrate that gold(I) thiolate complexes exhibit potent anticancer activity with a significantly reduced systemic toxicity profile, supporting their further development as next-generation chemotherapeutic agents.

Keywords: *gold(I) complexes, cisplatin, anticancer, thiolate ligands, thioredoxin reductase, apoptosis, Drosophila, PC12, cytotoxicity*

HUMAN PLACENTAL DISC ECM AS A WOUND DRESSING AND COATING MATERIAL FOR SCAFFOLDS

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Introduction: Placental tissues are very rich in glycosaminoglycans and growth factors and show angiogenic, anti-inflammatory and immunomodulatory properties. Decellularization of these tissues aims to preserve the structural and biochemical activity of the ECM and prevent any immune response upon implantation. Human placental disc was decellularized and used in the development of wound dressing to treat diabetic wounds and as a scaffold coating material in an in vitro myocardial model.

Methods: The placental disc was decellularized and its sulfated glycosaminoglycan (sGAG) and angiogenic growth factor (bFGF, VEGF, PDGF) content was determined with biochemical and ELISA tests, respectively. The decellularized placental ECM (dPL) was modified with methacrylic anhydride, and blended with unmodified dPL to obtain a wound dressing upon photo-crosslinking. Cytocompatibility of the wound dressing was determined with Presto Blue assay and Live/Dead assay using human dermal fibroblasts, and its angiogenic property was determined by co-culture of HUVECs and fibroblasts on its surface, under high glucose conditions. The dPL was also evaluated as a coating material on electrospun poly (lactic acid)/poly (glycerol sebacate) (PLA/PGS) mats in terms of its ability to support co-culture of iPSC derived cardiomyocytes, coronary artery endothelial cells and the fibroblasts in an in vitro myocardial model. Cell attachment and microstructural organization was evaluated through confocal microscopy. Cardiomyogenic gene expression was determined with RT-qPCR.

Results: dsDNA in the dPL was determined as < 50 ng/mg dry weight, and sGAG as 300 ng/mg dry weight. VEGF, bFGF and PDGF were retained in the dPL. The wound dressing supported fibroblast adhesion and proliferation, and also capillary network formation, under high glucose conditions. dPL coated PLA/PGS mats supported attachment and microstructural organization of cardiomyocytes, endothelial cells and the fibroblasts, and also early stage cardiomyogenic phenotype.

Conclusions: Decellularized placental ECM can be considered as a good candidate for treatment of diabetic wounds, while additional considerations may be necessary to better support functional cardiomyogenic phenotype.

Keywords: *Human placenta, ECM, wound dressing, in vitro cardiac muscle model.*

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A STUDY ON BONE MARROW MYELOID SKEWING AND PRESERVED MYELOID-DERIVED SUPPRESSOR CELL FUNCTION IN HIP OSTEOARTHRITIS

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Introduction: *Myeloid-derived suppressor cells (MDSCs) are key regulators of immune responses and have been extensively characterized in cancer, where they contribute to immune evasion and disease progression. Beyond oncology, MDSCs are increasingly recognized as important modulators of chronic inflammation. In elderly individuals, immune system remodeling is characterized by immunosenescence and persistent low-grade inflammation (inflammaging), which drive alterations in hematopoiesis toward myeloid-biased differentiation. However, the role of MDSCs and bone marrow (BM) myeloid remodeling in non-neoplastic conditions such as osteoarthritis (OA) remains poorly understood. In this study, we aimed to investigate the BM myeloid compartment and the functional properties of BM-derived MDSCs in elderly patients with hip OA compared to subjects with femoral fracture.

Methods: BM samples were obtained from elderly patients with either hip OA or with femoral fractures. As previously described, BM-derived MDSCs were generated through stimulation with cytokines G-CSF and GM-CSF. The myeloid compartment was analyzed by flow cytometry to assess cell subsets distribution both ex vivo and after cytokines induction. Moreover, BM-derived MDSC were functionally evaluated for their immunosuppressive activity on T cells by implementing co-culture assays.

Results: BM from OA patients showed a marked myeloid skewing, characterized by an increased frequency of CD11b⁺/CD16^{low} cells. These data indicate that chronic OA-associated inflammation may reinforce age-related hematopoietic remodeling. Consistent with previous findings [5, 6], functional assays revealed that immunosuppressive activity based on suppression of T-cell proliferation and downregulation of CD3 expression, was confined only to the most immature CD11b⁺/low/CD16⁺ subset of BM-MDSCs. In contrast, more differentiated myeloid subsets did not display suppressive activity. Notably, suppressive capacity was comparable between OA and fracture patients, indicating that core MDSC-mediated regulatory mechanisms are maintained despite chronic inflammation.

Conclusions: Hip OA is associated with enhanced BM myelopoiesis and expansion of immature myeloid populations, reflecting an amplification of age-related hematopoietic remodeling in the context of chronic inflammation. Despite this shift, the immunosuppressive function of BM-derived MDSCs remains preserved and restricted to the most immature subsets. These findings indicate that, within the BM niche, OA is characterized by a coexistence of sustained inflammatory cues and intact regulatory mechanisms, highlighting a tightly controlled balance between immune activation and suppression.

Keywords: osteoarthritis, bone marrow, myeloid-derived suppressor cells, flowcytometry, inflammaging, immunosuppression

76 QUANTIFICATION OF SECONDARY NEUTRONS IN PROTON AND CARBON ION THERAPY, A MONTE CARLO APPROACH WITH ARTIFICIAL INTELLIGENCE PERSPECTIVES

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Introduction: Particle therapy using protons and carbon ions represents an advanced modality in modern cancer treatment due to its high precision in dose delivery. However, nuclear interactions between primary particles and biological tissues lead to the production of secondary neutrons, which may increase radiation exposure to surrounding healthy tissues and medical personnel. Recent advancements highlight the potential role of artificial intelligence (AI) in improving treatment planning and radiation risk assessment.

Methods: Monte Carlo simulations were performed using the FLUKA transport code to analyze neutron production and angular distribution in a simplified human head model (AHUBO phantom). The phantom was modeled as a homogeneous spherical structure with a radius of 8 cm and irradiated with monoenergetic beams of 100 MeV protons and 190 MeV/u carbon ions. Neutron spectra and fluence distributions were evaluated using USRBDX and USRBIN scoring techniques across multiple angular intervals. Additionally, the study considers the integration of AI-based models for optimizing simulation outputs and enhancing predictive accuracy.

Results: The simulations revealed distinct neutron energy spectra, including thermal and high-energy peaks, with a strong dependence on particle type and emission angle. Carbon ion irradiation produced significantly higher neutron fluence ($\sim 10^{-4} \text{ cm}^{-2}$) compared to proton beams ($\sim 10^{-5} \text{ cm}^{-2}$), particularly in forward direction. A pronounced anisotropic distribution was observed, with neutron intensity decreasing at larger emission angles.

Conclusions: This study emphasizes the importance of accurate modeling of secondary neutron production in particle therapy. The integration of artificial intelligence techniques offers promising opportunities for enhancing simulation efficiency, optimizing treatment planning and improving radioprotection strategies. Combined Monte Carlo – AI approaches represent a significant step toward safer and more personalized cancer therapy.

Keywords: *Monte Carlo simulation, artificial intelligence, FLUKA, particle therapy, secondary neutrons, radioprotection*

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77 BUILDING THE EVIDENCE BASE FOR PHARMACY PRACTICE: LESSONS FROM THE UK AND BEYOND

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Introduction: Pharmacy practice has undergone a profound transformation over the past two decades, shifting from a dispensing-focused role to one increasingly embedded in clinical care, patient outcomes, and health systems. This shift has been shaped by a growing body of research that evaluates services as well as actively informs policy, workforce development, and professional identity. This talk traces that evolution through UK-based research with global relevance.

Methods: Drawing on a programme of mixed-methods research, this work synthesises evidence from systematic reviews, stakeholder engagement, qualitative inquiry, and national policy evaluations. The focus spans community pharmacy service quality, workforce development, and the integration of pharmacists into primary care.

Results: Taken together, the evidence suggests that efforts to define quality in community pharmacy have moved beyond narrow metrics towards a more holistic understanding, centred on person-focused care, access, safety, and meaningful integration within local health systems. Yet, when these ideals meet practice, tensions emerge. Stakeholders consistently call for better-designed services, sustained funding, and genuine integration, while national initiatives show that engagement is often driven as much by financial survival as by quality improvement itself. At the same time, the workforce is evolving to meet these expectations. Structured training pathways, supervision, and cross-sector placements are equipping pharmacists with clinical and consultation skills, enabling more advanced roles. Patients appear ready for this shift, expressing confidence in pharmacist-led care. However, integration remains partial, constrained by unclear role boundaries, workload pressures, and limited system visibility.

Conclusions: The UK experience illustrates that building an evidence base is only the first step. Implementation and impact of patient-centred pharmacy services depends on aligning policy, practice, and professional development to support a genuinely integrated, clinically focused pharmacy workforce.

Keywords: *pharmacy practice, evidence-based pharmacy, community pharmacy, pharmacist education, clinical pharmacy services*

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FROM PERCEPTION TO EXPERIENCE: A FOLLOW-UP STUDY ON THE SPIRAL CURRICULUM IN MEDICAL EDUCATION*Manjola Çollaku¹, Jonilda Kulaj¹*¹Department of Medicine, Faculty of Technical Medical Sciences, Western Balkans University, Tirana, Albania**Corresponding author:** *manjola.collaku@wbu.edu.al*

The spiral curriculum has gained increasing recognition in medical education for its emphasis on iterative learning and the integration of basic and clinical sciences. In an initial study conducted three years ago, students and professors in a medical program in Albania reported positive perceptions regarding its potential to enhance learning and engagement. However, the extent to which these perceptions translate into measurable educational impact remains underexplored. The current research extends previous findings by examining the implementation of the spiral curriculum within the same institution through a multidimensional assessment framework. Specifically, the study evaluates cognitive integration, knowledge retention, learning engagement, clinical readiness, and perceived challenges. A cross-sectional design was employed, involving medical students from different years of study together with academic staff members. Data were collected using structured Likert-scale questionnaires, enabling the assessment of key educational dimensions and comparisons between groups. The findings indicate that the positive perceptions reported in the earlier study are sustained over time, with stronger evidence pointing to improved knowledge integration and increased student engagement. Importantly, students report greater confidence in applying theoretical knowledge to clinical contexts, suggesting a progression toward clinical readiness. These findings are further supported by emerging indicators of academic performance, including student participation in international academic competitions, where students achieved high-ranking results in anatomy following intensive training experiences. While not constituting direct causal evidence, such outcomes provide contextual support for the curriculum's potential role in fostering applied knowledge and performance. Despite these strengths, challenges related to curriculum pace, cognitive load, and the need for enhanced faculty coordination remain evident. By linking initial perceptions with subsequent educational experiences and performance indicators, this study offers a more comprehensive evaluation of the spiral curriculum and highlights its potential in promoting deeper learning and clinical preparedness.

Keywords: *Spiral curriculum, Medical education, Clinical readiness, Knowledge integration, Curriculum evaluation*

79 EVALUATING THE EFFECTIVENESS OF FACILITATORS IN CASE-BASED LEARNING SESSIONS AT WESTERN BALKANS UNIVERSITY: A CROSS-SECTIONAL MIXED-METHODS STUDY

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Introduction: Case-based learning (CBL) is a student-centred pedagogical approach in which facilitators guide small-group inquiry rather than deliver didactic content; facilitation quality is a key determinant of learning outcomes. Western Balkans University (WBU) is among the first Albanian institutions to implement CBL in undergraduate medical training, yet no systematic evaluation of facilitator effectiveness has been undertaken. This study assessed facilitator performance across pre-clinical years and informed faculty-development priorities.

Methods: A cross-sectional mixed-methods study was conducted in April 2026 among first-, second-, and third-year medical students enrolled in the WBU programme (target population N=285). Participants completed an anonymous online survey containing the validated Maastricht Short Tutor Evaluation Questionnaire (eleven 5-point Likert items), an overall performance grade (1–10), facilitator absence and replacement frequency items, and one open-ended item soliciting improvement suggestions. Quantitative data were summarised using descriptive statistics; free-text responses underwent inductive thematic analysis.

Results: Sixty- one students responded (interim response rate 21.4 %; 67.2 % female; 27.9%/50.8%/21.3% in years 1/2/3). The mean overall facilitator grade was $9.15 \pm 1.23/10$, with 98.4% of students awarding ≥ 6 (sufficient) and 52.5% awarding the maximum score. Likert item means ranged 4.11–4.43/5. Facilitators were rated highest for stimulating understanding of underlying mechanisms ($M=4.43$) and summarising learning ($M=4.38$), and lowest for self-awareness of strengths/weaknesses ($M=4.11$) and constructive group feedback ($M=4.19$). Facilitator absence was reported by 54.1 % of respondents. Qualitative themes included requests for end-of-session summaries, more equitable participation management, clinically-aligned facilitator backgrounds, pre-session case preparation, and structured feedback.

Conclusions: Facilitator effectiveness in CBL at WBU is perceived very positively, though improvements are needed in metacognitive self-reflection, structured group feedback, and engagement of quieter learners. We propose a structured faculty-development programme integrating peer observation, reflective practice, balanced-participation techniques (e.g., round-robin questioning), a standardised closing-summary protocol, and a formal facilitator-replacement policy to ensure session continuity. Continued longitudinal monitoring with validated instruments is recommended.

Keywords: case-based learning; facilitator effectiveness; medical education; faculty development; Maastricht questionnaire; Western Balkans University

**THE INFLUENCE OF EVOLVING CULTURAL EXPECTATIONS ON DRUG USE:
IMPLICATIONS FOR QUALITY OF LIFE AND ADDICTION TREATMENT**

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Introduction: Drug addiction is often defined by a compulsive need for substances, heavily influenced by neurobiological factors, particularly disruptions in the brain’s reward system. However, these scientific explanations do not fully account for why individuals continue to use drugs or why relapse rates remain high, even with the availability of relapse prevention medications. In some cases, the answers may lie not in medical interventions alone, but in time-honored methods: addressing addiction through human values, shared purposes, and lived experiences. This perspective challenges the view of addiction as merely a biological illness and highlights its broader social and cultural dimensions.

Objective: The primary aim of this study is to examine the psycho-sociological theories of addiction, especially those related to alcohol and drug use. The study seeks to integrate the knowledge from various disciplines, shedding light on the complex interactions between biological, psychological, and social factors. Another goal is to explore how perceptions of illicit drug use have shifted across time and societal norms, and to understand its impact on the quality of life of those affected.

Results: A central question arising from this study is the challenge of defining “deviant behavior” in a society where norms and laws are constantly evolving. For example, why is marijuana often classified as illegal and deviant in many countries, while alcohol, despite its significant health risks and social harms, is legally accepted? This research revisits both historical and contemporary sociological perspectives, including those that focus on the role of societal pressures, the influence of cultural values, and the impact of social norms in shaping perceptions of drug use and addiction.

Conclusions: From a psycho-sociological perspective, drug use is more than a mere act of consumption; it can represent individual choice, rebellion, pleasure-seeking, or an escape from emotional pain. In certain social groups, using substances like cocaine is associated with financial success, while in others, it is a sign of social deviance. The impact of addiction on the quality of life is profound and varies across different societal contexts, making it crucial to consider sociological backgrounds when addressing addiction.

Keywords: *drug use, sociological theory, quality of life, deviant behavior*

81 **NOOTROPIC USE AMONG UNIVERSITY STUDENTS: A CROSS-SECTIONAL SURVEY STUDY***Tea Mastori¹, Ardita Emiri¹*¹Department of Pharmacy, Faculty of Technical Medical Sciences, Western Balkans University, Tirana, Albania.**Corresponding author:** *tea.mastori@wbu.edu.al, ardita.emiri@wbu.edu.al*

Introduction: The use of nootropic substances, commonly referred to as cognitive enhancers or "smart drugs", is an emerging public health concern among university students worldwide. Academic pressure, competitive environments, and easy access to over-the-counter compounds have contributed to a growing trend of self-medication for cognitive performance. Despite growing interest in this topic, a significant research gap remains regarding the use of nootropics among university students.

Objectives: This study aims to assess the prevalence and patterns of nootropic use among university students, identify the substances most commonly used, characterize the motivations and risk perceptions associated with their use, and explore attitudes toward cognitive enhancement.

Methods: A cross-sectional survey was conducted among university students across multiple faculties. A structured, anonymous questionnaire was developed comprising six domains: sociodemographic characteristics, awareness and knowledge of nootropics, prevalence and patterns of use, risk perception and attitudes, perspectives of non-users, and open-ended responses. Data will be analyzed using descriptive statistics and chi-square tests to identify associations between demographic variables and nootropic use behaviors.

Expected Results: Based on findings from similar studies conducted in European student populations, we expect a nootropic use prevalence between 15–30%, with caffeine-based products and herbal supplements representing the most frequently reported substances. Academic stress and the desire to improve concentration are anticipated to emerge as primary motivating factors. Awareness of potential risks is expected to be relatively low, particularly among students outside health sciences faculties. However, this study is currently ongoing, and final results will provide more precise insights.

Conclusion: This study seeks to contribute to the currently limited evidence on nootropic use among university students in Albania. By examining patterns of use, motivations, and risk perceptions, it may offer preliminary insights that could help inform future research, as well as the development of educational approaches and public health initiatives.

Keywords: *nootropics, university students, cognitive enhancement, self-medication, public health.*

EUROPEAN COURT OF HUMAN RIGHTS PRACTICE ON VIOLATION OF PATIENT AUTONOMY AS AN ETHICAL PRINCIPLE IN MEDICINE*Eda Çela¹, Brunilda Zllami²*¹Department of Basic Sciences, Faculty of Dental Medicine, Western Balkans University, 1001, Tirana, Albania, eda.cela@wbu.edu.al²Department of Medicine, Faculty of Technical Medical Sciences, Western Balkans University, 1001, Tirana, Albania, brunilda.zllami@wbu.edu.al

Introduction: Patient autonomy serves as an ethical and legal right which enables patients to choose their medical treatments. The principal serves as the vital base which supports all modern medical ethical standards and international human rights treaties. The European Convention of Human Rights which the European Court of Human Rights enforces since its 1950 adoption protects this principle through Article 8 which establishes the right to respect for private and family life and readers often interpret alongside Article 9 which safeguards freedom of thought and conscience and Article 3 which prohibits inhuman or degrading treatment. European healthcare systems experience continuous human rights violations despite existing legal protections which define their operational boundaries. Clinicians can choose to bypass patient refusal rights during emergency situations since they do not have to perform complete assessment procedures. The government has not developed operational systems to process advanced healthcare directives which create authority voids that enable courts to make decisions based on inadequate proof. The system deficiencies result in harmful outcomes for three different groups which consist of at-risk groups and religious minority groups and pregnant women who face diagnostic problems and patients who lack ability to communicate during vital medical procedures.

Methods: The European Court of Human Rights Grand Chamber and Chamber Judgments make their decisions according to doctrinal rules which the study investigates from 2011 to 2026. The study investigates Spanish and Ukrainian and Polish and Italian cases which include emergency surgical procedures. The study investigates advanced healthcare directives and prenatal diagnosis and police use of restraints.

Results: The European Supreme Court established four landmark cases which demonstrate that autonomy violations happen when advance directives are available yet healthcare providers refuse to follow them (Pindo Mulla v. Spain, 2024) and when states lack emergency consent regulations (Mayboroda v. Ukraine, 2023) and when healthcare providers deny access to diagnostic information because of their own biases (R. v. Poland, 2011) and when surgical procedures go beyond what patients have authorized through documented consent (S. O. v. Spain, 2026). The court requires states to create comprehensive systems which include registers and training and protocols because it treats specific documented refusals as more important than medical staff judgment during critical life-saving situations.

Conclusions: The European Court of Human Rights practice defines autonomy as a legally enforceable right which people can claim against medical professionals and governmental authorities. Healthcare systems must create advance directive registries which provide immediate access to documents and require emergency notification to relatives and provide training on specific consent requirements. The standards apply worldwide because they affect both EU member states and countries that have signed the Convention.

Keywords: *patient autonomy, European Court of Human Rights, informed consent, medical ethics, end-of-life decisions, integrity*

83 SAFEGUARDING OF VULNERABLE ADULTS: EVERYONE'S RESPONSIBILITY

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Introduction: Safeguarding vulnerable adults is a vital practice and academic field focused on protecting individuals with care and support needs from abuse, neglect, and exploitation.

Purpose: The purpose is to enhance the knowledge of the safeguarding of vulnerable adults as part of continuing professional development and to highlight contemporary issues in achieving best practice in safeguarding adults across multi-agency settings.

Methodology: A review and empirical exploration of most relevant literature and recent policy for knowing and dealing with challenges of safeguarding vulnerable adults toward achieving best practice in multi-agency approaches to safeguarding.

Results: Although several guidance's and laws that emphasize the importance of safeguarding and continuity of care through a multi-agency approach, this issue continues to present challenges in implementation. In practice, differing professionals may not fully understand each other's roles and responsibilities and both thresholds and scope of adult abuse are still not universally agreed.

Conclusion: Safeguarding adults in need of care is a complex concept. This review encompasses the urge for discussion on these complexities and challenges, highlights the multifaceted nature of vulnerability and focuses on the importance of awareness of the healthcare workers for the causes leading to vulnerability, recognize indicators of abuse, evaluate prevention and when and how to make a safeguarding referral implementing multi-agency cooperation. Safeguarding importance towards the protection of human rights, the well-being and quality of life of adults at risk of abuse is imperative. It is everyone's responsibility.

Keywords: *Safeguarding adults, Vulnerable adults, Adult abuse, Multi-agency, Empowerment*

LEADERSHIP CHALLENGES IN DEVELOPING TOMORROW'S HEALTHCARE SYSTEM: CASE OF ALBANIA*Irma Gjana¹*¹Department of Medicine, Faculty of Technical Medical Sciences, Western Balkans University, 1053, Tirana, AlbaniaCorresponding author: *irma.gjana@wbu.edu.al*

Introduction: The healthcare sector is complex and under constant pressure due to global, technological, social, cultural, and environmental factors, both worldwide and in Albania. At the systemic level, it faces limited resources and growing demand linked to demographic changes. At the organizational level, challenges remain in leadership, coordination, and patient-centered care. At the operational level, there is a need to adapt to rapid technological change while maintaining quality and controlling costs. At the human level, staff shortages, recruitment difficulties, and burnout continue to be major issues. In this context, strong healthcare leadership is essential to manage change, improve systems, and ensure quality patient care.

Methods: This study is based on a review and synthesis of existing journal articles related to the healthcare sector. Secondary data was used to support the analysis. For Albania, information was gathered from official and reliable sources, including INSTAT, the World Health Organization (WHO), the United Nations (UN), and the Organization for Economic Co-operation and Development (OECD). By combining findings from scientific articles with data from recognized institutions, the study offers a more complete view of the topic. This approach helps to identify key trends and challenges in healthcare, both in general and specifically in the Albanian context.

Results: The results show that the healthcare sector worldwide is facing important challenges. In Albania, although access to medical education has increased, there are concerns about the quality of knowledge and preparation of newly graduated medical staff. Across the system, organizational, operational, and human levels, several challenges are clearly present. Strong management is closely linked to how well these challenges are addressed. Effective leaders help improve coordination, support staff, and ensure better organization and delivery of healthcare services.

Conclusions: In conclusion, the healthcare sector is currently facing a range of significant challenges at both global and national levels, including in Albania. These challenges are related to limited resources, staff shortages, increasing workload, and the continuous need to adapt to changes within the system. In the Albanian context, a lot needs to be done to address the challenges of the new era. Overall, these issues highlight the need for stronger organizational structures and more effective support mechanisms within the sector. In this regard, effective and well-developed leadership plays a crucial role in addressing existing gaps, improving service delivery, and ensuring a more resilient and responsive healthcare system.

Keywords: *Healthcare sector, Leadership Challenges, Systemic Level, Organizational Level, Operational Level, Human Level*

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Introduction: Clinical practice is an important component of nursing education, providing students with the opportunity to apply theoretical knowledge in real-life patient care situations. The integration of students from theoretical education into clinical practice constitutes a critical and complex phase in nursing education, a process that is fundamental to the development of professional competencies, critical thinking, and evidence-based clinical decision-making.

Purpose: The purpose of this study is to analyze the challenges and factors that influence students' adaptation to clinical practice.

Methods: This study is based on a review of recent scientific literature sourced from PubMed, Scopus, and Google Scholar. The review focused on studies that address nursing competence, clinical education, and the adaptation process of nursing students in clinical settings.

Results: The literature shows that nursing students often face challenges during clinical integration, including lack of clinical experience, anxiety in decision-making, barriers in communication with healthcare professionals, and difficulties in adapting to the clinical environment. Structured clinical observation, learning through simulation, and supportive environments such as laboratories at the academic level significantly contribute to the development of nursing competence and facilitate the process of effective integration into clinical practice.

Conclusions: The transition of students from academic education to clinical settings is a multidimensional process that directly impacts the development of nursing competencies. Effective application of clinical training and mentoring strategies is essential to improve students' self-confidence, adaptation, and professional development as future healthcare professionals. The success of this process is shaped by multiple factors, including the student's clinical competence, anxiety experienced in practice settings, and resilience in overcoming challenges.

Keywords: *Nursing competences, clinical practice, transition, nursing education, literature review.*

VACCINATION STRATEGY IN ALBANIA: KEY ACHIEVEMENTS, CHALLENGES, AND FUTURE RECOMMENDATIONS

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Introduction: Vaccination is one of the most effective and cost-efficient public health interventions for preventing infectious diseases and reducing mortality. Albania has progressively strengthened its national immunization strategy through expanded vaccine coverage, digital health system integration, and public awareness campaigns to improve trust in vaccines. This study provides an overview of Albania's vaccination strategy, highlighting key achievements, challenges, and future priorities for sustainable immunization.

Methods: A descriptive review was conducted of Albania's National Immunization Program using national policies, institutional reports, and digital health initiatives from the Institute of Public Health. The analysis focused on vaccination coverage, the Immunization Information System (IIS), HPV vaccination expansion, and strategies addressing vaccine hesitancy and misinformation.

Results: Albania's National Immunization Program provides protection against 13 infectious diseases in children and includes targeted vaccination for high-risk groups, healthcare workers, and travelers. A key advancement was the implementation of the Immunization Information System (IIS) in 2023, enabling centralized digital records, real-time monitoring, and public access via the e-Albania platform. Other milestones include the introduction of the HPV vaccine for girls in 2022 and its planned expansion to boys in 2026, supported by catch-up campaigns for adolescents and young adults. Despite these improvements, vaccine hesitancy remains a major challenge, driven by misinformation, social media influence, and reduced trust following the COVID-19 pandemic. Misconceptions, particularly regarding the MMR vaccine, continue to impact coverage levels.

Conclusions: Strengthening evidence-based communication, improving public awareness, and enhancing collaboration among healthcare professionals, schools, and communities are essential to sustain trust and equitable vaccine access. Albania's experience highlights the importance of integrating scientific evidence, digital innovation, and community engagement to build resilient immunization systems. Continued investment in infrastructure and health education is critical for maintaining high vaccination coverage and addressing future public health challenges.

Keywords: *Vaccination strategy, Immunization program, HPV vaccination, Immunization Information System, Electronic system, Public health.*

87 NEXT-GENERATION MVA-MONKEYPOX SINGLE-DOSE VACCINES*Arban Domi*¹¹GeoVax, USA**Corresponding author:** *arban63@gmail.com*

Rapidly deployable, single-dose vaccines that maintain durability under operational constraints are an unmet need in outbreak preparedness. Live viral vectors such as Modified Vaccinia Ankara (MVA) offer strong safety and manufacturing advantages, yet their limited immunogenicity often requires multidose regimens, reducing flexibility during emergency response. To address these limitations, we developed a new, modular vaccine platform that integrates immune checkpoint modulation directly into the vector backbone, enabling enhanced immune priming without compromising the established safety profile of MVA. This platform, exemplified by the recombinant construct MVA-X, encodes a genetically expressed peptide-based PD-1 antagonist designed for localized, self-limited checkpoint blockade during early antigen presentation. The approach requires no external adjuvants, is compatible with lyophilization and stockpiling, and can be adapted to diverse antigens or pathogens. During challenge models, a single immunization with MVA-X produced durable, long-lasting protection that matched or exceeded that of a conventional two-dose MVA regimen against the prototypic orthopoxviral, Vaccinia. Despite modest and contracting antibody titers, single dose MVA-X vaccination correlated with complete survival under both lethal and high-dose viral challenge at early (Day 55), intermediate (Day 90), and long-term (Day 150) timepoints. MVA-X also restricted viral replication at the primary site of infection, reduced systemic dissemination, and preserved lung architecture during peak disease. These findings demonstrate that vaccine-intrinsic checkpoint modulation provides a generalizable, plug-and-play strategy for enhancing single-dose vaccine durability within the safety framework of attenuated viral vectors. By improving immunogenicity without adding complexity, this platform enables more flexible deployment under outbreak conditions and is readily extensible to emerging infectious diseases beyond Mpox.

AIR POLLUTION AS A FUNCTIONAL MODEL OF IMPAIRED EXCHANGE AND PULMONARY HEMODYNAMICS*Ornela Çuçi¹, Klest Gadeshi²*¹Department of Research Center for Medical Sciences, Technology and Innovation, Faculty of Economics, Technology and Innovation, Western Balkans University, 1001, Tirana, Albania²Department of Medicine (DIMED), Faculty of Medicine and Surgery, University of Padova, 35128, Padova, Italy**Corresponding author:** *ornela.cuci@wbu.edu.al*

Introduction: Air pollution is a major global health concern; however, its effects tend to be described in epidemiological terms instead of pathophysiological. Newly emerging evidence suggests that exposure to small particulate matter (PM_{2.5}/PM₁₀) could damage pulmonary function through mechanisms similar to hypoxia induced stress. This study aims to analyze the effect of air pollution in alveolar gas exchange and pulmonary hemodynamics, focusing on diffusion limitation and ventilation-perfusion mismatch.

Methods: A hypothesis driven narrative review was conducted, integrating recent literature findings, pulmonary vascular resistance, and inflammatory responses. Data sourced from clinical, environmental, and experimental studies were analyzed to identify correlations between pollution to changes in pulmonary physiology.

Results: Exposure to particulate matter correlates with reduced diffusion capacity, as a result of increased alveolar- capillary membrane thickness due to inflammation and interstitial edema. Ventilation-perfusion mismatch results from inflammation coupled with bronchoconstriction, overall impairing effective oxygen exchange. These alterations lead to increased pulmonary vascular resistance and may contribute to early changes in pulmonary hemodynamics and right ventricular strain.

Conclusions: Air pollution may act as a chronic, low-grade hypoxic stressor, producing physiological effects similar to those observed in hypoxic environments. This mechanistic framework strengthens the link between environmental exposure and cardiopulmonary outcomes, highlighting the need for early detection strategies and preventive policies in urban populations.

Keywords: *Air pollution, PM_{2.5}, DLCO, V/Q mismatch, pulmonary vasoconstriction, hypoxia*

GUT MICROBIOTA IN CHILDREN: IMPLICATIONS FOR FUNCTIONAL ABDOMINAL PAIN AND IMMUNE DEVELOPMENT

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Introduction: The gut microbiota plays a central role in immune maturation, intestinal homeostasis, neurodevelopment, metabolism, and protection against pathogens. In children, functional abdominal pain disorders are highly prevalent and may significantly affect school attendance, daily activities, and quality of life. Although these disorders are often diagnosed in the absence of structural disease, increasing evidence suggests that alterations in gut microbial composition may contribute to symptom development and persistence. The aim of this abstract is to highlight the role of gut microbiota in pediatric functional abdominal pain and its broader implications for immune development.

Methods: A focused literature-based review was conducted on recent studies evaluating pediatric gut microbiota, with emphasis on children with functional abdominal pain disorders. Particular attention was given to microbial profiling studies using amplicon sequencing and taxonomic analysis, which allow identification of bacterial groups that are difficult or impossible to culture by conventional methods.

Results: Recent studies indicate that children with functional abdominal pain disorders have distinct gut microbiota profiles compared with healthy controls. Findings include increased Bacteroidetes, reduced Firmicutes, and lower Verrucomicrobiota in affected children. Several bacterial taxa correlate with symptom severity, while the Faecalibacterium/Bacteroides ratio has been proposed as a potential biomarker. These microbiota alterations may also influence immune maturation, inflammation, vaccine responses, and drug metabolism during childhood.

Conclusions: Current evidence supports an important relationship between gut microbiota composition, functional abdominal pain, and immune development in children. Although further clinical and longitudinal studies are needed, microbiome assessment may provide valuable insight into pediatric gastrointestinal symptoms and may guide future preventive or therapeutic interventions aimed at restoring microbial balance during childhood.

Keywords: *gut microbiota, children, functional abdominal pain, immune development, dysbiosis, microbiome biomarker*

90 FEED-DAIRY FOOD SAFETY ASPECTS IN ALBANIA

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Dairy production plays a crucial role in Albania's food security and economy¹. While the country's dairy industry is growing in the last years, food safety remains an important issue, both from the perspective of public health and Albania's EU accession process that requires strict food safety standards. In this respect, feed safety safeguards animal health and welfare, while ensuring food security and high safety standards for animal products². This article aims to provide an overview of implementation feed-food safety concepts in Albania, focussing on feed-dairy food safety chain in country's two main dairy producer districts such as Fier and Korca. The study was performed during the summer of 2024. The analysis included the exposure of cattle to a wide spectrum of co-occurring mycotoxins and other feed biotic and abiotic contaminants, as well as their carryover into milk, using a validated multi-metabolite liquid chromatography/electrospray ionization-tandem mass spectrometric (LC/ESI-MS/MS) method³. Assessment was focused on the occurrence and associated risks due to exposure, involving both 14 large dairy cattle farms and 12 main commercial milk distributors. We found strong differences ($P < 0.001$) in Fusarium-derived toxins between cattle feeds from Korca and Fier districts, clearly attributable to differing qualities and inclusion levels of dietary ingredients used in their farms. Aflatoxin B1 was also detected in around 21% of the studied cattle rations but its carry over into milk as the potentially cancerogenic Aflatoxin M1 was only observed when the allowed maximal EU limits were exceeded. Other frequent residues found in the milk were the Fusarium toxin Enniatins (96.2% of the samples), the Aspergillus toxin Flavoglucin (23.1%), the tropane alkaloid Atropine (19.2%) and phytoestrogens (15.4%), as well as the pesticide synergist piperonyl butoxide (11.5%), mainly originating from the feedstuffs used in cattle feeding. Our results highlight the importance of feed quality and safety for dairy food safety and public health, suggesting improved feed production practices, frequent analyses and control to ensure high standards of dairy food safety and minimize public health risks in Albania.

Keywords: *food safety, public health, Aflatoxin M1, phytoestrogens, pesticides*

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91 VETERINARY MEDICINE AT THE CORE OF ONE HEALTH: A CASE STUDY OF BOVINE TUBERCULOSIS AND BRUCELLOSIS IN ANIMALS AND HUMANS IN ALBANIA

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Within the One Health paradigm, veterinary medicine is central to the control of zoonotic diseases at the animal–human interface, particularly given that six out of ten human infectious diseases (61%) are zoonotic and up to 75% of emerging infections originate from animals. Through integrated surveillance in livestock, targeted vaccination strategies, enforcement of biosecurity, and regulation of animal movements, veterinary services play a decisive role in preventing pathogen spillover to humans. Their contribution to food safety especially through slaughterhouse inspection and risk-based monitoring is critical for the control of major zoonotic agents such as *Mycobacterium bovis* and *Brucella* spp. Effective integration of veterinary and public health systems further enables coordinated risk assessment and timely response. In endemic contexts like Albania, strengthening the veterinary pillar within a One Health framework is essential to preventing transmission routes and achieving long-term disease control. Bovine tuberculosis (bTB) and bovine brucellosis remain endemic in Albania, continuing to pose significant challenges to both livestock production and public health despite ongoing control measures. This study integrates animal and human surveillance data for the period 2021–2025, complemented by long-term epidemiological datasets. Bovine tuberculosis infection during 2021–2025 was identified in 52 farms with 89 animals; the average number of infected animals per farm dropped from 2.55 to 1.28, indicating that the current control measures are only partially successful. Simultaneously, information on human tuberculosis verified sporadic *M. bovis* isolation. Isolation of *M. bovis* subsp. *Bovis* and *M. caprae*, emphasizing the persistence of zoonotic transmission. There were 189 cases of animal brucellosis that tested positive for the disease. Persistent endemicity with significant regional heterogeneity is confirmed by district-level data from 2012 to 2024. As a result of control measures, the number of human brucellosis cases decreased significantly from 442 in 2012 to 12 in 2021. Nevertheless, a concerning resurgence was noted, with 60 cases in 2025. When every factor is taken into account, these results demonstrate the ongoing spread of zoonotic infections and significant weaknesses in the integration of surveillance and the implementation of biosecurity. To progress One Health implementation and achieve sustainable control of brucellosis and bTB in Albania, it is imperative to strengthen cross-sectoral collaboration, improve risk-based surveillance, and raise awareness among high-risk groups.

Keywords: One Health; veterinary medicine; zoonotic diseases; *Brucella* spp.; *Mycobacterium bovis*; surveillance; Albania; biosecurity

92 ENDOCRINE DISRUPTORS AND HUMAN HEALTH

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Introduction: Endocrine-disrupting chemicals (EDCs) are exogenous agents capable of interfering with hormonal signaling pathways. Their ubiquity in plastics, pesticides, personal care products, and industrial compounds has resulted in widespread human exposure, raising significant concerns for public health.

Objective: This presentation aims to synthesize current evidence on the mechanisms of endocrine disruption and highlight the clinical and epidemiological implications for human health.

Methods: A review of recent epidemiological studies, mechanistic research, and regulatory reports was conducted to evaluate the associations between EDC exposure and adverse health outcomes across the lifespan.

Results: EDCs exert effects by mimicking, blocking, or altering hormone activity, particularly involving estrogen, androgen, and thyroid pathways. Evidence links exposure to: Reproductive disorders: infertility, altered pubertal timing, reduced sperm quality, metabolic disease: obesity, insulin resistance, type 2 diabetes, neurodevelopmental outcomes: impaired cognition, behavioral disorders in children, cancer risk: increased incidence of hormone-related cancers such as breast and prostate, and thyroid and immune dysfunction: disruption of thyroid hormone regulation and immune balance. Critical windows of susceptibility—prenatal development, childhood, and puberty—are especially vulnerable to long-term consequences.

Conclusion: Endocrine disruptors represent a global health challenge due to their persistence, bioaccumulation, and potential transgenerational effects. Strengthening regulatory frameworks, advancing biomonitoring, and promoting safer alternatives are essential steps to mitigate risks. Clinicians should remain aware of environmental exposures as potential contributors to endocrine-related disorders.

Keywords: *Endocrine disruptors, Reproductive disease, metabolic disease*

BIOCHEMICAL MARKERS INTEGRATED FOR THE DIAGNOSIS OF FUNCTIONAL ADRENAL TUMORS*Brunilda Mezani^{1,3}, Anila Mitre^{1,2}*¹Department of Biology, Faculty of Natural Sciences, University of the Tirana, 1001, Tirana, Albania,² Intermedica Laboratories Network, Albania³Department of Medical Laboratory Sciences and Imaging, Western Balkans University, 1001, Tirana, Albania**Corresponding author:** *brunilda.mezani@wbu.edu.al*

Background: Adrenal tumors are a diverse group of endocrine neoplasms which is characterized by excessive hormone secretion, based in the position of the adrenal gland structure including catecholamines, aldosterone, and cortisol. Early and strict diagnosis is critical to prevent the development of the adrenal tumor and metabolic complications. Biochemical markers serve a crucial role for diagnostic results.

Aim: To evaluate the diagnostic performance and clinical function of an integrated biochemical marker in patients with suspected adrenal tumors.

Materials and Methods: A diagnostic evaluation approach is employed by incorporating key biochemical markers as plasma and urine metanephrines, normetanephrines, serum aldosterone to renin ratio (ARR), cortisol, and adrenocorticotrophic hormone (ACTH) based in their sensitivity, specificity at functional adrenal tumors.

Results: Biochemical marker analysis significantly enabled diagnostic precision, at the adrenal tumors by giving the possibility of identification of the adrenocortical tumors as Adrenal Cushing Syndrome, Secondary Hyperaldosteronism and adrenal medulla tumors as Pheochromocytoma.

Conclusion: The integration of multiple biochemical markers significantly improves the diagnostic accuracy of functional adrenal tumors by facilitating earlier detection, more precise tumor classification, and clearly informed clinical decision taking during the hormonal work-up process.

Keywords: *Adrenal, Tumor, Biomarker, Diagnosis, Syndrome, Adrenocortical, Medulla*

LONGITUDINAL CHANGES IN LIPID PROFILE AND CARDIOVASCULAR RISK IN PEOPLE LIVING WITH HIV RECEIVING ANTIRETROVIRAL THERAPY

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Introduction: The life expectancy of people living with HIV (PLWH) has significantly improved with the widespread use of antiretroviral therapy (ART). However, long-term metabolic complications, particularly dyslipidemia and increased cardiovascular risk, have emerged as major health concerns. This study aimed to evaluate longitudinal changes in lipid profile, immunological parameters, and cardiovascular risk within five years following HIV diagnosis.

Methods: This retrospective study included 570 PLWH followed for at least five years in two tertiary care centers in Albania and Türkiye. Demographic, clinical, and laboratory data were collected at baseline, year 3, and year 5. Parameters included CD4+ T-cell count and percentage, HIV RNA, fasting glucose, HbA1c, total cholesterol, LDL, HDL, and triglyceride levels. Cardiovascular risk was assessed using SCORE-2 and SCORE-2OP tools. Statistical analyses were performed using SPSS version 26.0, applying Friedman, Mann–Whitney U, chi-square, and Spearman correlation tests. A p-value <0.05 was considered statistically significant.

Results: The mean age of participants was 36±11 years, and 84% were male. Significant immunological improvement was observed, with median CD4+ T-cell count increasing from 379 cells/mm³ at baseline to 707 cells/mm³ at year 5 (p<0.001). Virological suppression (HIV RNA <50 copies/mL) was achieved in 94.5% of patients. Lipid parameters, including total cholesterol, LDL, HDL, and triglycerides, showed a significant increase at years 3 and 5 compared to baseline (p<0.001). At year 5, cardiovascular risk scores were positively correlated with triglyceride levels (rs=0.232, p<0.001) and negatively correlated with HDL levels (rs=-0.148, p=0.011).

Conclusions: Although ART leads to effective viral suppression and immune recovery, it is associated with unfavorable changes in lipid profiles over time. These alterations may contribute to an increased risk of cardiovascular disease in PLWH. Regular monitoring and early management of metabolic risk factors are essential to reduce long-term complications and improve patient outcomes.

Keywords: HIV, antiretroviral therapy, lipid profile, cardiovascular risk, SCORE-2, dyslipidemia

AWARENESS AND MANAGEMENT OF PERINATAL DEPRESSION AMONG HEALTHCARE PROVIDERS IN ALBANIA

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Introduction: Perinatal depression is one of the most common mental health disorders occurring during pregnancy and the postpartum period, often characterized by persistent sadness, anxiety, loss of interest, and difficulties in daily functioning. Early recognition and proper management are essential in order to reduce negative outcomes for both the mother and the child. The aim of this study was to evaluate the level of knowledge, attitudes, and clinical practices of primary healthcare professionals in Albania regarding perinatal depression, and to identify possible gaps that may affect early screening, referral, and treatment.

Methods: A cross-sectional design was used, including a convenience sample of healthcare professionals working in different primary healthcare settings in Albania. Data were collected online using the Maternal Mood Assessment (MAMA) questionnaire, a 37-item self-administered instrument that evaluates knowledge about definition, prevalence, risk factors, diagnosis, management, and available support for perinatal depression. Participants provided informed consent, and confidentiality of responses was ensured. Ethical approval was obtained from the institutional ethics committee.

Results: A total of 54 female healthcare professionals participated in the study. More than half of the respondents reported the absence of a clear clinical pathway for the management of perinatal depression in their workplace, and the majority indicated that they had not received specific training on this topic. Most participants considered psychological consultation essential in the management of these cases, and nearly all agreed on the need for clear guidelines and additional professional education.

Conclusions: The findings highlight the need for structured training programs, standardized screening procedures, and multidisciplinary collaboration in order to improve the early identification and management of perinatal depression in Albania, ultimately contributing to better maternal mental health outcomes.

Keywords: *Perinatal depression, Healthcare professionals, Maternal mental health, Screening and referral, Albania*

SILENT RISKS: HOW UNDERREPORTING OF ADVERSE EVENTS HINDERS PATIENT SAFETY IMPROVEMENTS IN ALBANIA*Zejnep Lleshanaku¹*¹Department of Nursing and Physiotherapy, Faculty of Technical Medical Sciences, Western Balkans University, 1001, Tirana, Albania**Corresponding author:** *zejnep.lleshanaku@wbu.edu.al*

Introduction: Adverse event (AE) reporting is a fundamental component of pharmacovigilance systems and patient safety governance. Robust reporting enables regulatory authorities to detect safety signals, update clinical guidelines, and implement evidence-based policy reforms. While Albania has an established pharmacovigilance framework, limited publicly available data on AE reporting may constrain the capacity for evidence-informed regulatory evolution. This study aims to examine how underreporting of adverse events may affect patient safety and regulatory responsiveness in Albania.

Methods: A narrative literature review was conducted using peer-reviewed articles, international policy documents, and pharmacovigilance studies published between 2015 and 2026. Databases including PubMed and Google Scholar were searched using terms such as “adverse event reporting,” “pharmacovigilance,” “patient safety,” and “regulatory responsiveness.” Relevant studies addressing reporting rates, barriers to reporting, and the relationship between safety data and regulatory action were thematically analyzed.

Results: The literature consistently demonstrates that underreporting of adverse events is a global challenge that limits the availability of reliable safety data. Reduced reporting volume may impair early signal detection, delay regulatory adaptation, and restrict updates to clinical practice guidelines. Studies further indicate that national pharmacovigilance systems with limited domestic reporting data may rely predominantly on international regulatory decisions for major safety actions. Strong reporting engagement is associated with improved regulatory responsiveness and enhanced patient safety governance.

Conclusions: Underreporting of adverse events in Albania may limit the generation of robust national safety data necessary for proactive regulatory decision-making. Strengthening reporting engagement and promoting a culture of safety are essential steps toward enhancing pharmacovigilance capacity and advancing patient safety outcomes within the national healthcare system.

Keywords: *Patient safety, Adverse event reporting, Pharmacovigilance, Regulatory responsiveness, Albania, Health policy*

97 RELATIONSHIP BETWEEN SELF-CARE BEHAVIORS (MAINTENANCE, MONITORING AND MANAGEMENT) AND QUALITY OF LIFE (PHYSICAL AND MENTAL) IN PATIENTS: A CLUSTER ANALYSIS

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Introduction: Multiple chronic conditions (MCCs) are increasingly prevalent among older adults in low- and middle-income countries (LMICs), increasing vulnerability and making effective self-care essential for quality of life (QoL). Limited evidence exists on distinct QoL patterns and their associations with self-care behaviors, socio-demographic, and clinical/psychosocial characteristics in such settings. Aim of this paper is to determine whether multiple patterns of mental and physical QoL could be identified in the context of MCCs, and to examine how self-care behaviors and socio-demographic and clinical/psychosocial factors differ across the patterns of mental and physical QoL.

Methods: This cross-sectional, multicenter study included 325 older adults with MCCs recruited from outpatient facilities in Kosovo. Self-care behaviors were assessed using the Albanian Self-Care of Chronic Illness Inventory (SC-CII-AL); depression with PHQ-9; stress with PSS-10; social support with MSPSS; and physical/mental QoL with SF-12 (PCS and MCS). K-means cluster analysis on standardized self-care scores identified two patterns, selected based on silhouette score, clinical interpretability, and cluster balance. Between-cluster differences were tested via t-tests while associations among self-care dimensions and psychosocial and quality-of-life variables were assessed using correlation analyses.

Results: Patients (mean age 71.2 ± 5.4 years) were mostly female (71.7%) and highly educated (70.5%), with an average of 3.8 ± 1.2 chronic conditions. Two self-care patterns emerged: "low self-care" (54.5%, $n=177$; maintenance 65.5, monitoring 56, management 51) and "high self-care" (45.5%, $n=148$; maintenance 83.5, monitoring 84.8, management 77.5). The high self-care group had significantly higher PCS (46.3 vs. 40.8, $p<0.001$) and MCS (46.8 vs. 43.5, $p=0.013$). Self-care dimensions correlated positively with both QoL components ($r=0.122-0.376$, $p<0.05$). Low self-care was associated with older age, lower education, higher depression and stress, and lower social support.

Conclusions: Summarize the major conclusions drawn from the results and discuss their scientific relevance and These findings highlight self-care behaviors as a key mechanism underlying QoL heterogeneity in older adults with MCCs in LMICs, supporting the development of targeted interventions for vulnerable low self-care groups.

Keywords: *aging, cluster analysis, low- and middle-income countries, multiple chronic conditions, self-care, quality of life.*

ELDERLY-ONSET RHEUMATOID ARTHRITIS IN ROUTINE PRACTICE: PMR-LIKE PRESENTATION AND AGE-TAILORED CSDMARD THERAPY

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Introduction: Rheumatoid arthritis (RA) classically begins in mid-adulthood, but a substantial proportion of patients experience symptom onset later in life. Elderly-onset rheumatoid arthritis (EORA), commonly defined as RA onset after age 60 years, is increasingly encountered as populations age and access to rheumatology care expands. Multiple cohorts and reviews describe EORA as a clinically distinct phenotype that may show a more abrupt onset, a higher inflammatory burden, and a relatively higher frequency of large-joint involvement than young-onset RA. These features can create a diagnostic intersection with polymyalgia rheumatica (PMR), a prevalent inflammatory syndrome of older adults characterized by shoulder and/or hip girdle pain, prolonged morning stiffness, and elevated acute-phase reactants.

Methods: We retrospectively reviewed records of patients with EORA (age at onset ≥ 60 years) fulfilling the 2010 ACR/EULAR rheumatoid arthritis classification criteria. Patients were diagnosed and followed at Berat Hospital between January 2022 and June 2025. Rapid onset was prespecified as symptom duration ≤ 8 weeks to peak inflammatory symptoms. PMR-like onset was defined as bilateral shoulder and/or hip girdle pain with morning stiffness ≥ 45 minutes. Acute-phase reactants (erythrocyte sedimentation rate [ESR] and C-reactive protein [CRP]), serology, joint involvement pattern, and csDMARD selection according to the age-based protocol were extracted. Descriptive statistics were used.

Results: Thirty-five patients were included (mean age 71.3 ± 6.1 years); sex distribution was near-equal (female 48.6%, male 51.4%). Large-joint predominant onset occurred in 24 patients (68.6%), and 15 patients (42.9%) had a PMR-like onset. Rapid onset (≤ 8 weeks) was observed in 19 patients (54.3%). Median time from symptom onset to rheumatoid arthritis diagnosis was 4.2 months (IQR 2.0–7.0). Inflammatory markers were markedly elevated: median ESR 48 mm/h (IQR 54–92) and median CRP 72 mg/L (IQR 32–76); 27 patients (77.1%) met prespecified criteria for very high acute-phase reactants. In routine practice, CRP peaks in severe presentations frequently reached 150–170 mg/L and generally declined faster than ESR after treatment initiation. Rheumatoid factor was positive in 20 patients (57.1%); anti-cyclic citrullinated peptide antibodies were positive in 5 (14.3%); 10 patients (28.6%) were double seronegative.

Conclusions: In this single-center cohort, EORA presented with large-joint predominance, frequent PMR-like onset, and high inflammatory markers, underscoring the diagnostic overlap with PMR. An age-tailored csDMARD strategy (MTX up to age 70; hydroxychloroquine thereafter) was feasible in this setting. Future prospective work should evaluate treat-to-target outcomes and safety in older adults.

Keywords: elderly-onset rheumatoid arthritis; polymyalgia rheumatica; large-joint arthritis; acute-phase reactants; septic arthritis; synovial fluid; methotrexate; hydroxychloroquine

FROM LIFESTYLE TO CELLULAR DAMAGE: EARLY OXIDATIVE STRESS IN YOUNG ADULTS AS AN EMERGING HEALTH RISK*Ilda Babamusta^{1,2}, Anisa Daka¹*¹Department of Medicine, Faculty of Technical Medical Sciences, Western Balkans University, Albania²Cambridge Clinical Laboratories, Tirana, Albania**Corresponding author:** *ilda.babamusta@wbu.edu.al*

Introduction: Oxidative stress, defined as an imbalance between reactive oxygen species (ROS) and antioxidant defense mechanisms, is a key pathway in the development of metabolic, cardiovascular, and inflammatory diseases. Although traditionally associated with aging, increasing evidence suggests that oxidative imbalance may also emerge earlier in life. Modern lifestyle patterns, including sedentary behavior, prolonged screen exposure, suboptimal diet, and chronic psychological stress, may contribute to disruption of cellular redox homeostasis. The aim of this study was to explore oxidative stress as an early biochemical disturbance in young adults and its association with lifestyle-related factors.

Methods: A focused review of recent literature was conducted to assess oxidative stress in young adults, with emphasis on malondialdehyde (MDA) and glutathione (GSH) as markers of oxidative damage and antioxidant defense. These findings were considered alongside observations from routine clinical laboratory practice, particularly regarding metabolic alterations increasingly encountered in younger individuals.

Results: Recent evidence indicates that approximately 30–40% of young adults may show biochemical signs of oxidative imbalance even in the absence of overt disease. A recurrent pattern includes increased lipid peroxidation (↑MDA) together with reduced antioxidant protection (↓GSH). Males have been reported to exhibit relatively higher oxidative burden. High screen time (>4–6 hours/day), low physical activity, inadequate antioxidant intake, and chronic psychological stress are consistently associated with increased ROS production. Routine laboratory practice also reflects metabolic changes in young individuals that may be compatible with an early oxidative imbalance.

Conclusions: Oxidative stress in young adults represents a subclinical but clinically relevant condition shaped by modern lifestyle patterns. Early redox imbalance may precede overt metabolic and inflammatory disease, highlighting the importance of preventive strategies focused on lifestyle modification and early biochemical awareness.

Keywords: *oxidative stress, young adults, ROS, malondialdehyde, glutathione, lifestyle*

WHEN QUALITY CONTROL FAILS: TRANSLATING LABORATORY ERRORS INTO CLINICAL CONSEQUENCES

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Introduction: Laboratory quality control protocols are designed for analytical accuracy and precision. However, their impact on clinical decision-making is underestimated. Failures in QC processes can result in erroneous laboratory values that directly affect patient care.

Methods: This study focuses on presenting a case-based analysis of common QC failure scenarios, including violations of Westgard rules and their effect on reported laboratory results. We included the QC result data of quality control procedures performed during the last 6 months in Meliormed Laboratories and studied their impact on patient results and their clinical implications, such as electrolyte, biochemical, hematological, hormonal, and immunological panels.

Results: During the analysis of QC results in these six months, there were recurrent rule violations, reflecting mainly random analytical variation, including early warning criteria within the Westgard rules framework. A part of these failures was associated with clinically significant deviations in patient results, mostly affecting high-risk analytes such as glucose, potassium, troponin, and hemoglobin. Systematic rule violations were less frequent but showed a stronger link between calibration drift and reagent-related issues, with greater potential to impact clinical interpretation. Most errors were detected before result release, minimizing patient impact. Implementation of targeted corrective actions improved overall analytical stability and reduced the recurrence of QC failures.

Conclusions: Laboratory QC is not only a technical safeguard but a critical determinant of clinical reliability. Connecting laboratory processes and clinical interpretation is essential to improving patient safety.

Keywords: *Quality control, Westgard rules, analytical error, patient safety, clinical impact, internal QC.*

STUDENTS & YOUNG INVESTIGATORS

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101 ANTIBIOTIC REIMBURSEMENT AS A POLICY LEVER FOR ANTIMICROBIAL STEWARDSHIP: ALIGNMENT WITH WHO AWaRe AND ESSENTIAL MEDICINES LIST RECOMMENDATIONS IN ALBANIA

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Introduction: Antimicrobial resistance (AMR) is a major global health challenge driven partly by inappropriate antibiotic use. The World Health Organization (WHO) has developed tools such as the AWaRe classification and the Essential Medicines List (EML/EMLc) to guide antibiotic use and support antimicrobial stewardship (AMS). However, alignment of national reimbursement policies in Albania with these frameworks remains unexplored. This study aims to assess the alignment of reimbursed antibiotics in Albania with WHO AWaRe classification and EML/EMLc recommendations, including formulation, strength, and implications for antimicrobial resistance.

Methods: A cross-sectional descriptive analysis of national antibiotic reimbursement data was conducted. Antibiotics were categorized by International Nonproprietary Name (INN) and utilization volume based on reimbursed dispensing data. Each antibiotic was classified according to its AWaRe category and EML/EMLc inclusion status. Alignment with WHO recommendations was assessed at the level of formulation and strength. Descriptive analyses assessed distribution across AWaRe categories and consistency with WHO guidance.

Results: Access antibiotics accounted for 61.7% of total utilization, meeting the WHO target of at least 60%. Watch antibiotics represented 37.3%, while no Reserve antibiotics were identified. Utilization was highly concentrated, with amoxicillin–clavulanic acid contributing 61% of Access group consumption, and cefaclor, an antibiotic not included in the WHO EML accounting for a substantial share of Watch group use. While many antibiotics aligned with WHO recommendations at the formulation level, discrepancies were observed in strengths and dosage forms, with use favoring solid oral formulations. These patterns match with reported resistance trends among key pathogens, including *Escherichia coli* and *Staphylococcus aureus*.

Conclusions: Although Albania meets the WHO target for Access antibiotic utilization, gaps remain in alignment with WHO stewardship frameworks, including reliance on non-EML antibiotics and inconsistencies in formulation and strength. Aligning reimbursement policies with AWaRe and EML/EMLc recommendations is a key policy lever to strengthen antimicrobial stewardship and mitigate AMR.

Keywords: Antimicrobial resistance, AWaRe classification, Essential Medicines List, antibiotic utilization, antimicrobial stewardship, Albania

VACCINE HESITANCY IN YOUNG ADULTS: INSIGHTS FROM A UNIVERSITY-BASED STUDY

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Introduction: Vaccination is considered one of the most effective public health interventions that has reduced morbidity and mortality. Vaccine hesitancy, which WHO refers to as delay in uptake or refusal to vaccinate despite the availability of vaccination services, remains a global challenge, even given the supported claim of vaccination advantages. There is a growing trend of reluctance to be vaccinated for both routine immunization and COVID-19 pandemic vaccines. Low trust in the healthcare system, exposure to misinformation and variations in sociocultural beliefs are some factors affecting vaccine hesitancy along with concerns over vaccine safety and effectiveness. This condition may result in inadequate vaccination coverage which could elevate the risk for outbreaks of vaccine-preventable diseases (VPDs).

Methods: A cross-sectional study was conducted using an anonymous 30-step questionnaire distributed to university-affiliated individuals, assessing vaccine attitudes. Associations were analyzed using multivariable logistic regression in SPSS to identify independent predictors of vaccine hesitancy.

Results: For 283 university respondents with predominantly students (n=228), alongside administrative staff (n=24) and healthcare professionals (n=31), vaccine hesitancy was prevalent: 35.3% reported delaying a vaccine because of doubts, 38.2% reported refusing a recommended vaccine and 49.8% had engaged in at least one of these behaviors. While 73.1% agreed that vaccines are important for individual and community health, only 47.0% affirmed that vaccines recommended in their country are safe and effective, indicating a lack of trust in public health institutions (aOR 4.28, 95% CI 2.17-8.44, p<0.001). Concerns about side effects (aOR 2.79, 95% CI 1.59-4.87, p<0.001) and social media influence (aOR 2.17, 95% CI 1.24-3.79, p<0.001) were independently associated with hesitancy.

Conclusion: Nearly 1 in 2 university students demonstrated behavioral vaccine hesitancy, raising concerns about the potential risks for future generations. Reinforcing the role of healthcare professionals as guidance and combating social media misinformation can mitigate hesitancy and increase vaccine uptake trends.

Keywords: *vaccines, hesitancy, students, media, effects, mistrust*

LOW BIRTH WEIGHT IN ALBANIA: A POLICY REVIEW OF MATERNAL, ANTENATAL, AND POSTNATAL HEALTH STRATEGIES*Medina Hilaj¹, Xhuliana Shahini¹, Grigor Visi¹*¹Department of Medicine, Faculty of Technical Medical Sciences, Western Balkans University, 1051, Tirana, AlbaniaCorresponding author: *m.hilaj23@wbu.edu.al*

Introduction: Low birth weight (LBW) remains a significant public health challenge in Albania, with an estimated prevalence of 6%. Defined as a birth weight below 2500 g, LBW is associated with increased neonatal morbidity and mortality, impaired growth and cognitive development, and a higher risk of noncommunicable diseases later in life. Although Albania has established maternal and neonatal health policies, regional disparities and unequal access to healthcare persist. The aim is to evaluate how Albanian maternal, antenatal, and postnatal health policies address the prevention and early management of LBW, and to identify key policy and implementation gaps.

Methods: A descriptive policy review was conducted using official health policy documents from the Albanian Ministry of Health and INSTAT. WHO and UNICEF datasets were used to contextualize LBW trends and regional indicators. A targeted literature review (PubMed and Google Scholar) was performed to identify established risk factors and outcomes associated with LBW.

Results: Albania's maternal, antenatal, and postnatal health policies are broadly aligned with WHO guidelines. However, important gaps remain in both policy prioritization and implementation. While LBW and its key risk factors are acknowledged in national strategies, it is not explicitly defined as a primary public health objective. Antenatal protocols highlight risk factors such as iron-deficiency anemia, poor maternal weight gain, maternal undernutrition, and short stature. Nevertheless, persistent urban–rural disparities, limited human resources, and weaknesses in neonatal data quality may hinder effective prevention and early management.

Conclusions: Although Albania has made progress in maternal and newborn care, LBW remains insufficiently prioritized within national health strategies. Strengthening monitoring systems, defining clear targets, and improving equitable resource allocation are essential to enhance prevention and early management.

Keywords: *Low birth weight; maternal health policy; antenatal care; neonatal outcomes; health systems; Albania*

MICROBIAL RESISTANCE OF ACINETOBACTER BAUMANNII IN PATIENTS AFTER SURGICAL INTERVENTION IN NEUROSURGERY

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Introduction: Microbial resistance is one of the most serious challenges to global public health. The main cause of microbial resistance is the excessive and inappropriate use of antibiotics. *Acinetobacter baumannii* is an opportunistic pathogen known for its ability to develop resistance to multiple antibiotics.

Methods: This case study includes a patient with hemorrhagic cerebrovascular accident who underwent neurosurgical intervention and subsequently developed a nosocomial infection during the stay in the intensive care unit. Microbiological analyses and antibiotic susceptibility testing were performed.

Results: Microbiological cultures isolated multidrug-resistant (MDR) *Acinetobacter baumannii*, showing resistance to most antibiotics, including β -lactams. Sensitivity was observed only to colistin. The presence of invasive devices such as intracranial drains, urinary catheter, and femoral catheter was identified as a major risk factor.

Conclusions: Several potential factors contributing to the acquisition of nosocomial infection with *Acinetobacter baumannii* were identified, including the use of invasive devices such as urinary and femoral catheters. Additionally, the pathogen was isolated from intracranial drain cultures.

Keywords: *Acinetobacter bawmanni, antimicrobial resistance, invasive devices.*

Acknowledgements: *In this study, we thank the Department of Neurosurgery, QSUT, for enabling us to conduct the investigation and monitoring of the case with *Acinetobacter baumannii*.*

CLINICAL PERSPECTIVES ON COVID-19 MANAGEMENT: CHALLENGES, OUTCOMES, AND FUTURE PREPAREDNESS STRATEGIES

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Introduction: The COVID-19 pandemic posed unprecedented challenges to healthcare systems in Albania. Healthcare professionals faced increased patient loads, limited preparedness, and a lack of standardized protocols, significantly impacting care delivery. Exploring frontline experiences can reveal critical gaps and inform future pandemic preparedness.

Objective: This study aims to explore the personal and professional experiences of healthcare professionals involved in the management of COVID-19 patients in Albania, focusing on clinical practices, challenges encountered, and lessons learned to improve future pandemic preparedness.

Methods: Semi-structured interviews were conducted in April 2026 with physicians and nurses in public and private sectors. Transcripts were analyzed thematically to identify key patterns and recurring themes related to clinical management, system challenges, and adaptive strategies.

Results: The analysis revealed several key themes. Healthcare professionals experienced a significant increase in workload, prolonged working hours, and considerable psychological stress. A lack of standardized protocols and reliance on evolving international guidelines led to variability in clinical decision-making and management approaches. Resource and infrastructure limitations, including shortages of personal protective equipment, hospital beds, testing capacity, and oxygen supply, significantly affected patient care, particularly during peak periods. Despite these challenges, strong interprofessional collaboration emerged as a critical strength, facilitating communication and coordination across different levels of care. Patient-related factors, including fear, misinformation, and reluctance to seek hospital care, also influenced clinical outcomes. Over time, healthcare professionals demonstrated adaptability, improving triage systems, patient monitoring, and overall clinical confidence.

Conclusions: The findings highlight critical gaps in healthcare system preparedness in Albania, including the need for standardized clinical protocols, improved infrastructure, and better resource allocation. Strengthening frontline involvement in decision-making, enhancing continuous staff training, improving inter-institutional coordination, and investing in emergency preparedness systems are essential for future pandemic responses. Additionally, effective public health communication is necessary to address patient fears and improve healthcare utilization during crises.

Keywords: COVID-19, Healthcare Professionals, Pandemic Preparedness, Qualitative Research, Albania

E-SMOKING IN THE DIGITAL AGE: A SAFER ALTERNATIVE OR A STEALTHY GATEWAY TO ADDICTION

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Introduction: E-smoking, particularly heated tobacco products such as IQOS, has surged in popularity, especially among adolescents and young adults in Albania. These devices are marketed as a safer alternative to traditional smoking, but are they truly risk-free? Are individuals, particularly youth, fully aware that e-smoking still constitutes smoking, with significant health risks? Additionally, is e-smoking a stepping stone to more severe addictions, such as tobacco or illicit drug use?

Objective: This review aims to explore the pharmacological mechanisms behind e-smoking addiction and evaluate its role as a gateway to other forms of substance abuse. This was achieved by reviewing studies on nicotine addiction and the neurobiological mechanisms of dependence induced by e-cigarettes.

Methods: Peer-reviewed articles from PubMed, Scopus, and Google Scholar were analyzed, specifically those addressing the addictive properties of nicotine in e-cigarettes, withdrawal symptoms, and the transition from e-smoking to other substances. This review also includes studies exploring the prevalence of e-cigarette use in Albania and its correlation with the initiation of other drug use among Albanian youth.

Results: Nicotine from e-cigarettes triggers the brain's dopaminergic pathways, reinforcing addiction through the mesolimbic reward system. This leads to both physical dependence and psychological cravings. Research shows that adolescents who begin using e-cigarettes are more likely to experiment with traditional tobacco, alcohol and illicit drugs, supporting the theory that e-smoking may act as a "gateway" to other addictions. Evidence suggests that e-cigarettes still carry the risks of nicotine addiction and increased vulnerability to poly-substance abuse.

Conclusions: E-smoking should not be dismissed as harmless. Nicotine addiction, driven by physical and mental factors, can lead to dependency, and exacerbate the risk of broader substance abuse. Public health initiatives in Albania must focus on increasing awareness of the risks associated with e-smoking, particularly among youth, to prevent further escalation into harmful addictive behaviors.

Keywords: *Smoking, Nicotine Addiction, Gateway Effect, Substance use disorder*

107 EXPLORING SELF-MEDICATION WITH ANTIBIOTICS AMONG UNIVERSITY STUDENTS IN ALBANIA: IMPLICATIONS FOR ANTIMICROBIAL RESISTANCE AND POLICY

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Introduction: Antibiotic resistance is a growing global public health concern, largely driven by the overuse and misuse of antibiotics. Self-medication with antibiotics, particularly without a physician's prescription, is a key contributing factor. University students represent an important population group, as their knowledge and behaviors may influence future healthcare practices. This study aimed to assess the frequency of self-medication with antibiotics among university students in Albania and to evaluate their knowledge, attitudes, and practices related to appropriate antibiotic use and antimicrobial resistance.

Methods: A cross-sectional survey was conducted among university students across different academic disciplines and years of study in Albania. A structured questionnaire was developed and organized into five sections: (1) knowledge of antibiotics, (2) drivers and behavioral patterns of use, (3) sources of antibiotic acquisition, including prescription status, (4) perceptions and attitudes toward antibiotic use and resistance, and (5) awareness of regulatory measures. Data were analyzed descriptively to assess patterns of use and levels of knowledge and awareness.

Results: A total of 52% of respondents reported self-medicating with antibiotics without a doctor's prescription. Use was frequently associated with perceived minor illnesses, prior experience, and convenience. Community pharmacies were identified as the main source of antibiotics, with some respondents indicating that antibiotics could be obtained without a prescription. Additionally, 35% of participants reported sometimes or never completing the full course of treatment. While overall awareness of antibiotics was relatively high, misconceptions persisted. Although 67% correctly identified that antibiotics are ineffective against viral infections, a proportion of students held incorrect beliefs or uncertainty. Risky practices were also observed, including discontinuing treatment once symptoms improved and using antibiotics for conditions such as colds and influenza.

Conclusions: Despite relatively good awareness, inappropriate practices and misconceptions regarding antibiotic use remain common among university students in Albania. The findings highlight the need for targeted educational interventions, stricter enforcement of prescription regulations, and strengthened public health strategies to promote rational antibiotic use. Addressing these gaps is essential to mitigate the progression of antimicrobial resistance and improve future health outcomes.

Keywords: self-medications, antibiotics, public health, university students

SILENT AORTIC ANEURYSM PRESENTING WITH LEFT VOCAL CORD PARALYSIS: A CASE OF ORTNER'S (CARDIOVOCAL) SYNDROME

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Introduction: Ortner's syndrome is a rare but clinically significant condition characterized by hoarseness due to left recurrent laryngeal nerve palsy secondary to cardiovascular pathology. Although hoarseness is a common complaint in ENT practice, it may be the initial manifestation of a life-threatening disease. This case emphasizes the diagnostic importance of this symptom.

Methods: This case report describes a 66-year-old male presenting with progressive hoarseness for several weeks. His medical history was notable for hypertension, controlled with medication. A structured ENT evaluation was performed, including oroscopic and rhinoscopic examinations, followed by indirect laryngoscopy to assess vocal cord function. Given the finding of unilateral vocal cord paralysis, contrast-enhanced computed tomography (CT) of the neck and thorax was undertaken to investigate potential compressive causes along the course of the left recurrent laryngeal nerve. The patient was subsequently referred for cardiothoracic evaluation.

Results: Orosopic and rhinoscopic examinations were unremarkable. Indirect laryngoscopy demonstrated complete paralysis of the left vocal cord, with preserved mobility of the right vocal cord and a clear subglottic space. CT imaging revealed a large saccular aneurysm of the aortic arch (49 × 37 × 63 mm), extending into the proximal descending thoracic aorta and containing an eccentric thrombus.

Conclusions: This case demonstrates that hoarseness, though often benign, may indicate serious underlying cardiovascular pathology. Compression of the left recurrent laryngeal nerve by an aortic arch aneurysm resulted in complete vocal cord paralysis. Early recognition of such atypical presentations is essential to ensure prompt imaging, accurate diagnosis, and timely referral, thereby reducing the risk of life-threatening complications.

Keywords: *Ortner's syndrome, Aortic arch aneurysm, Left recurrent laryngeal nerve palsy, Hoarseness, Vocal cord paralysis, Cardiovascular syndrome*

Acknowledgements: *The authors would like to thank Eriona Petro (Western Balkans University) for her valuable guidance and insightful feedback during the preparation of this case report.*

INTERPRETATION OF SEVERE DYSMENORRHEA: ARE SYMPTOMS SUGGESTIVE OF ENDOMETRIOSIS BEING UNDER-RECOGNIZED

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Introduction: Endometriosis is a chronic, estrogen-dependent condition affecting 6–10% of reproductive-age women. It primarily presents as chronic pelvic pain and infertility, which is associated with the growth of endometrial-like tissue outside the uterus. Severe dysmenorrhea, menstrual pain that interferes with daily activity, is a hallmark symptom of endometriosis, but is often normalized by both patients and clinicians. This normalization is documented by a diagnostic delay of 7–10 years. Therefore, whether moderate-to-severe dysmenorrhea consistently provokes clinical evaluation in health care is unknown. This study aims to assess whether women presenting with moderate-to-severe dysmenorrhea receive further diagnostic investigation and to evaluate the relationship between symptom severity and clinical outcomes.

Methods: A cross-sectional observational study was conducted to evaluate the relationship between dysmenorrhea severity and clinical evaluation for endometriosis. Data were collected through a questionnaire that assessed the severity of dysmenorrhea and whether participants underwent medical examination or diagnostic tests. Participants were women aged 16–45. Inclusion criteria were women of reproductive age with menstrual cycles; exclusion criteria were menopause or pregnancy. SPSS software was used for data analysis. Descriptive statistics were used to summarize the data, and associations between dysmenorrhea severity and clinical evaluation were assessed using the chi-square test with a significance level of $p < 0.05$.

Results: A significant proportion of participants reported experiencing moderate to severe dysmenorrhea. Many of these individuals hadn't received diagnostic testing for endometriosis. Among participants with endometriosis diagnoses, a considerable proportion reported a delay between symptom onset and diagnosis. Overall, dysmenorrhea severity did not consistently correspond to the likelihood of clinical evaluation or earlier diagnosis.

Conclusions: Dysmenorrhea of moderate to severe extent does not always result in clinical examination for endometriosis. These findings reveal a gap in clinical recognition and imply the need for earlier diagnostic testing and greater awareness.

Keywords: *endometriosis, dysmenorrhea, clinical evaluation, diagnostic delay, cross-sectional survey*

110 IS DEATH PREDICTABLE: VITAL AND METABOLIC PARAMETERS AS PREDICTORS OF MORBIDITY AND MORTALITY IN POSTOPERATIVE INTENSIVE CARE FOLLOWING OPEN ABDOMINAL SURGERY

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Introduction: Postoperative patients undergoing open abdominal surgery remain at high risk for morbidity and mortality, particularly during the immediate intensive care unit (ICU) period. Traditional risk stratification tools, such as the ASA score, may not adequately reflect the dynamic physiological derangements occurring after surgery. Early identification of high-risk patients using readily available vital and metabolic parameters could improve clinical decision-making and outcomes

Methods: This prospective observational study will be conducted in the surgical ICU of Mother Teresa University Hospital Center. Adult patients admitted following open abdominal surgery will be consecutively included. Clinical, hemodynamic, and laboratory data will be collected at ICU admission, with urine output recorded during the first 6 hours. Variables will include demographic characteristics, perioperative factors, and early postoperative parameters. Data will be analyzed using SPSS. Associations between variables and outcomes will be assessed using univariate and multivariate analyses.

Results: We hypothesize that early postoperative physiological and metabolic derangements particularly elevated lactate, negative base excess, low mean arterial pressure, reduced urine output, and the need for vasopressors or mechanical ventilation will be independently associated with increased morbidity and mortality. We further expect that a combined early risk model will outperform traditional preoperative risk scores.

Conclusions: Early postoperative parameters may serve as strong predictors of adverse outcomes. A simple bedside model could enable timely identification of high-risk patients and support early, targeted interventions in the ICU.

Keywords: *Postoperative care; Intensive care unit; Open abdominal surgery; Lactate; Hemodynamic instability; Early risk prediction; Morbidity; Mortality; Critical care*

Acknowledgements: *The authors gratefully acknowledge the Mother Teresa University Hospital Center, Department of Anesthesiology and Intensive Care, Surgical Intensive Care Unit, for their essential clinical support and collaboration in this study. We also extend our appreciation to the Western Balkans University, Department of Medicine and Surgery, for their academic guidance and contribution.*

WHY PHARMACOGENOMICS REMAINS UNDERUTILIZED IN CLINICAL PRACTICE: A SYSTEMATIC REVIEW OF IMPLEMENTATION BARRIERS

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Introduction: Pharmacogenomics, as an essential tool of precision medicine, provides significant advancements to optimize treatment efficacy while minimizing adverse drug reactions based on individualized or personal genetic profiles. Despite substantial clinical relevance, increasing evidence and growing global attention, the implementation of Pharmacogenomics into routine healthcare practice remains hindered by multiple interconnected barriers, including financial constraints, inadequate infrastructure, insufficient healthcare professionals' expertise and underdeveloped policy framework.

Methods: This research is done through a systematic review in databases like PubMed, Scopus, and Web of Science for studies about why pharmacogenomics is not widely used in clinical practice. We included papers that focused on real implementation issues and excluded those not directly related using keywords as pharmacogenomics, implementation, barriers, genetics and individualized treatment. The selection method we used was based purposely on descriptive and case based studies. They were grouped based on the types of barriers they reported, and we also considered examples from European countries to relate them to Albania.

Results: The main barriers found were high costs, limited infrastructure and access to testing, lack of knowledge among healthcare professionals, and weak or unclear policies. Some studies also pointed out low awareness and slow integration into clinical practice. Throughout our research we did not find any study conducted in Albania.

Conclusions: In conclusion, underutilization of pharmacogenomics is primarily driven by systemic and institutional barriers rather than lack of scientific evidence. Successful implementation depends on strengthening genomic infrastructure, improving clinician education, regulatory frameworks, and fostering international collaboration. Addressing these barriers is essential for integrating pharmacogenomics into clinical practice and advancing personalized medicine. Additionally in Albania these barriers could be taken into consideration for future implementation.

Keywords: *Pharmacogenomics, Genetics, Patients, Albania, Hospitals*

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Introduction: In the last few years, many changes occurred in the field of medicine. One major development is the advent of minimally invasive surgery (MIS). Because of the lower post-operative pain and shorter duration of stay in the hospital, this technique proved to be very crucial in enhancing healthcare. Another groundbreaking invention is the invention of artificial intelligence (AI). This technology may be applied in machine learning and robotics. The two inventions can work hand-in-hand in advancing minimally invasive surgery. However, alongside the benefits of AI, ethical and legal issues emerge.

Methodology: An evidence-based narrative review approach was employed by searching for peer-reviewed articles from the period 2020 to 2025. The databases used included PubMed, Scopus, and Web of Science, and the search strategy comprised the keywords "Artificial Intelligence," "Minimally Invasive Surgery," "Robotic Surgery," and "Outcomes of Surgery." Studies were included in the analysis if they pertained to AI-based minimally invasive surgery and included systematic reviews, randomized control trials, and observational studies. Synthesis was carried out in a qualitative manner, and factors such as accuracy, complication rate, efficiency, and ethics were considered.

Results: From the reviewed literature, it can be observed that artificial intelligence within MIS contributes to better efficiency and surgical results. Computer vision technology, driven by AI, provides enhanced anatomical detection capabilities, contributing to safer navigation and minimizing risks during surgery. Artificial intelligence-driven robotic surgery platforms offer greater precision, dexterity, and reduced hand tremors. The use of predictive analysis helps plan surgeries better, taking into account individual risk factors. Nevertheless, there are some drawbacks, such as inconsistent algorithms for different groups of patients and reliance on quality data sources. The ethical issues related to AI use are data privacy, transparency of decision making, and medico-legal accountability.

Conclusions: Artificial intelligence could prove to be a revolutionizing technology in minimally invasive surgery, providing higher levels of accuracy, efficiency, and safety. While the use of artificial intelligence may yield numerous benefits to the patient based on strong evidence from the scientific literature, it must be approached cautiously when applying it to the clinical scenario. In order for AI to become widely adopted, it is vital to address the ethical, legal, and regulatory aspects beforehand.

Keywords: *artificial intelligence, minimally invasive surgery, robotic surgery, surgical outcomes, ethics, machine learning*

113 ROLE OF INTERVENTIONAL RADIOLOGY IN MODERN MEDICINE

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Introduction: Interventional radiology (IR) is a minimally invasive specialty that uses imaging to guide procedures, aiming to improve diagnosis and treatment while reducing surgical risks. Recent advances have expanded its use across many medical conditions.

Methods: This study was conducted as a narrative literature review using recent PubMed studies, focusing on key aspects of interventional radiology such as imaging techniques, procedural approaches and clinical applications.

Results: Interventional Radiology is based on three principles: image guidance, minimally invasiveness and the integration of diagnosis with therapy. Techniques such as ultrasound, computed tomography, fluoroscopy, and magnetic resonance imaging enable precise targeting and real time monitoring. Common procedures include angioplasty, stent placement, embolization, biopsy, per-cutaneous drainage and tumor ablation. These methods are applied in multiple aspects, such as oncology, cardiovascular diseases, liver disorders and emergency care. Compared to traditional surgery, IR is associated with reduced complications, shorter hospital stay and faster recovery. However, limitations include radiation exposure, operator dependency, and restricted accessibility in certain settings.

Conclusions: Interventional radiology is spreading its role by providing effective and less invasive treatment options. With ongoing advances in imaging technology, artificial intelligence and robotics, its applications are expected to grow and improve the patient outcomes. As a result, it is contributing to more targeted and effective treatments, while also supporting a shift toward more efficient and patient-focused healthcare delivery.

Keywords: *Interventional radiology, imaging guided therapy, per-cutaneous drainage, radiation exposure, embolization, ablation.*

114 DIGITAL BIOMARKERS: DECODING VITAL SIGNS AND GAIT VIA WI-FI SENSING

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Introduction: The rise of remote patient monitoring in recent years created the need for technologies that are less prone to data loss and surpass physical limitations. Usage of the commercial Wi-Fi wave proves to be a viable method to close this gap, providing non-invasive contactless monitoring with an accuracy of 80-97% across studies. This study aims to identify the current gap related to data loss, multi-person detection and feedback provision and propose a theoretical framework, Diagno, that would create one system that tracks vital

signs such as heart beat and breathing patterns, and further on gait detection.

Methods: A literature review of 49 studies was conducted to identify current approaches, challenges, and opportunities in the field. The findings were used to develop the proposed system architecture. Data processing was performed using Frequency-Modulated Carrier Waves and Fast Fourier Transform (FFT) techniques to extract relevant signal features. The resulting datasets were analyzed using a Random Tree machine learning algorithm to generate probable diagnostic outcomes.

Results: Based on the literature review conducted and the system architecture proposed the Diagno autonomous health system is expected to achieve 93-95% heart rate estimation accuracy, 95-97% for respiration. Multi-person monitoring in this study is achieved by gait detection and DBSCAN clustering, at a predicted 90-94% accuracy and diagnostic accuracy at 90-95%. Limitations are related to: lack of experimental trials, hardware constraints and physiological variability.

Conclusions: This theoretical paper highlights the efficiency of utilizing Wi-Fi sensing for health monitoring. The primary contribution of this work is the convergence of two previously separate domains: contactless

Wi-Fi vital sign acquisition and ML-based diagnostic modeling, into a single autonomous pipeline. It provides reliability, automatized performance and noninvasive qualities which make it highly favorable for further adaptation. Future work must be focused on developing an experimental study and gather empirical data.

Keywords: *Wi-fi sensing, autonomous health systems, respiration tracking, heart rate, AI diagnostics, digital biomarkers.*

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DEVELOPMENT OF A LOW-COST MYOELECTRIC INTERFACE FOR GAMIFIED NEUROMUSCULAR REHABILITATION*Rilinda Ajrula¹, Fjorentina Hazizolli¹, Mohammed Adel¹*¹Department of Biosciences and Engineering, Faculty of Economics, Technology and Innovation Western Balkans University 10001, Tirana, Albania.**Corresponding author:** r.ajrulla24@wbu.edu.al

Introduction: Electromyography (EMG) is widely used to measure electrical activity produced by skeletal muscles and has significant applications in rehabilitation and assistive technologies. Many individuals affected by neurological conditions, such as Stroke or Cerebral palsy, retain the ability to generate muscle activation signals but experience difficulties in fine motor control. This limits their interaction with conventional input devices such as keyboards or touchscreens. Recent advances in digital health have explored the use of biosignals as alternative control interfaces. In particular, gamified rehabilitation systems have shown potential in improving patient engagement and therapy outcomes through real-time feedback mechanisms. The aim of this study is to develop a simple, low-cost EMG-based interface that translates muscle activation into interactive game control. The objective is to demonstrate the feasibility of using EMG signals as an alternative input modality for rehabilitation-oriented applications.

Methods: Surface EMG signals are acquired using a basic electrode-based system connected to a computer. Data are recorded during voluntary muscle contractions and exported as comma-separated values (CSV) files for further analysis. Signal processing is performed using a Python-based pipeline. The EMG signal is smoothed using a moving average filter to reduce noise. Amplitude thresholds are defined to classify muscle activation into distinct levels (e.g., weak and strong contractions). A simple 2D interactive game environment is developed using a graphical library. The system maps EMG signal levels to control actions, where strong muscle contractions trigger a jump movement of a virtual object, while insufficient activation results in no action. The system operates on pre-recorded EMG data to ensure stability and reproducibility.

Results: The system successfully integrates EMG signal processing with a real-time interactive environment. Preliminary implementation demonstrates that variations in muscle activation can be translated into discrete control actions within the game. The threshold-based classification approach allows differentiation between weak and strong contractions, enabling responsive system behavior. Further experimental validation is currently in progress to quantify system performance, responsiveness, and usability.

Conclusions: This study presents a proof-of-concept for a low-cost EMG-based control system designed for gamified rehabilitation applications. The results suggest that muscle activation signals can be effectively translated into interactive digital commands using simple signal processing techniques. The proposed approach has potential applications in assistive technologies and digital therapeutics, particularly for individuals with limited fine motor control. Future work will include experimental validation with users and the optimization of signal processing and interaction design.

Keywords: *Electromyography (EMG), biofeedback, rehabilitation, gamification, digital health, assistive technology*

FREEZING-ASSISTED SPAAC OPTIMIZATION FOR DNA FUNCTIONALIZATION OF SINPS IN HYBRID NANOPARTICLE ASSEMBLY

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Light-matter interaction enhancement is fundamental to various applications, including sensing, detection, light emission control, energy conversion and photovoltaics. Even though metallic nanomaterials, like gold, perform well in the visible (VIS) and near-infrared (NIR) spectral regions, their intrinsic ohmic losses make them less appealing. This challenge can be alleviated by using nanostructures composed of high refractive index of dielectric (HRID) materials, such as silicon. Moreover, HRID nanostructures display both electric and magnetic multipolar resonances. While gold nanoparticle (AuNP) DNA functionalization is well-established, silicon nanoparticle (SiNP) functionalization remains challenging. In this study we aimed to optimize the DNA functionalization of SiNP, using a recently published freezing-assisted strain-promoted azide-alkyne cycloaddition (SPAAC) method². DNA adhesion and nanoparticle aggregation were systematically evaluated using UV-VIS spectroscopy, dynamic light scattering, and gel electrophoresis. Among the surfactants tested, cetyltrimethylammonium bromide consistently induced aggregation whereas SDS/Tween and Pluronic yielded more stable colloidal suspensions. These optimized conditions establish a reliable framework for the assembly of DNA-mediated heterodimers, comprising AuNPs and SiNPs. These dielectric-metal nanostructures display promising implementations in directional emission and circular dichroism enhancement, with potential for next-generation biosensors, photonic devices, and advanced materials for energy conversion.

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A NUMERICAL STUDY ON PREDICTIVE GAIT CONTROL FOR TRANS-FEMORAL PROSTHETICS USING HIP KINEMATICS AND TERRAIN MAPPING*Dion Janko¹, Adora Hallunex¹, Ebi Dede¹, Almeha Bahoja¹, Anisa Paluca¹, Inva Koçiqaj²*¹Department of Biosciences and Engineering, Faculty of Economics, Technology and Innovation, Western Balkans University, Tirana, Albania²Department of Medical Laboratory Sciences and Imaging, Faculty of Technical Medical Sciences, Western Balkans University, Tirana, Albania**Corresponding author:** *d.janko25@wbu.edu.al*

Above-knee amputation significantly impacts mobility and quality of life. Most prosthetic legs operate reactively, responding to movement only after it occurs, making walking on uneven surfaces or adapting to speed changes physically demanding and often leading to long-term complications. This study proposes a predictive control system for above-knee prosthetic limbs that anticipates movement before it happens, using continuous analysis of hip motion and terrain conditions to plan each step in advance. The system was developed and validated through computer simulations using real-world movement data from both amputee and able-bodied individuals, and benchmarked against a conventional prosthetic control approach across flat and variable terrain. The results were consistent and promising. Walking symmetry improved by 16.4%, bringing the user's gait closer to natural norms. Physical strain on the unaffected leg was reduced by 21%, reflecting a measurable decrease in overall bodily burden. On inclined surfaces, safe foot clearance consistency improved by 25%, a critical factor in fall prevention and everyday confidence. These findings demonstrate that a predictive control strategy can significantly enhance both the mechanical performance and the quality of life of above-knee prosthetic users, establishing a strong foundation for the development of next-generation intelligent prosthetic devices.

Keywords: *Multi-body, Kinematics, Proactive, Post-active, Gait Symmetry, Mechanical Burden*

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Introduction: Truth responses generally require less cognitive effort because they rely more directly on memory retrieval. In contrast, deception requires the suppression of a truthful response and the generation of a false one, increasing cognitive demand. This additional processing may result in measurable delays between stimulus presentation and motor response. While deception has often been studied from a psychological perspective, this research examines its biophysical cost. The objective was to quantify the temporal delay associated with deceptive processing through reaction time analysis.

Methods: A quantitative pilot reaction time experiment was conducted using a stimulus response paradigm to investigate differences between truthful and deceptive responses. Fifteen participants completed two trials consisting of 17 yes/no questions and responded using a digital response key. In the first trial, responses were truthful, whereas in the second trial participants intentionally provided false answers. Reaction times were recorded and compared between conditions. Mean values and variability were evaluated to assess differences between truthful and deceptive responses.

Results: Truthful responses produced a mean reaction time of 2.35 s, while deceptive responses produced a mean reaction time of 2.80 s. This resulted in an average delay of 0.45 s during deception. In addition, response variability was higher in the deceptive condition, suggesting less consistent performance when participants were required to suppress truthful responses and generate deceptive ones.

Conclusions: The findings indicate that intentional deception increases response latency compared with truthful communication, supporting the idea that lying imposes additional cognitive demands. Although limited by a small sample size and a simple experimental design, the observed delay represents a measurable temporal cost associated with deceptive processing. Future studies should incorporate physiological measurements, such as heart rate variability and metabolic indicators, to further investigate the biological mechanisms underlying deception.

Keywords: *Neural Latency, Signal Processing, Cognitive Load, Biotechnology, Biomedical Engineering, Deception Detection.*

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Introduction: Telemedicine represents a key component of digital health, enabling the delivery of healthcare services remotely through information and communication technologies. It facilitates clinical consultations, remote monitoring, and access to specialized medical expertise without geographical limitations. Over the past decade, telemedicine has expanded rapidly worldwide and became particularly relevant during the COVID-19 pandemic, when healthcare systems increasingly relied on remote healthcare solutions to maintain service delivery (1). Numerous studies demonstrate that telemedicine can improve healthcare accessibility, enhance patient outcomes, and strengthen chronic disease management by overcoming geographical barriers to care (1,2). In Albania, telemedicine initiatives have gradually emerged as part of broader efforts to modernize the healthcare system and expand access to specialized medical services.

Methods: This study is based on a narrative literature review analyzing scientific publications, institutional reports, and policy documents addressing the development and implementation of telemedicine services in Albania. Relevant literature was identified through academic databases and official institutional sources focusing on telemedicine infrastructure, digital health strategies, and clinical applications within the Albanian healthcare system.

Results: Evidence from the literature indicates that telemedicine development in Albania began through collaborative initiatives involving governmental institutions, international organizations, and academic partners (3). The establishment of the National Telemedicine Center in Tirana enabled remote consultations between regional hospitals and tertiary healthcare institutions, particularly in specialties such as radiology, neurotrauma, and stroke care (3,4). A retrospective analysis of the nationwide telemedicine program reported 1,065 teleconsultations conducted between 2014 and 2015, demonstrating improved access to specialist expertise across multiple clinical disciplines (4). A subsequent evaluation involving 2,724 patients further showed that most cases were successfully managed in regional hospitals without requiring transfer to tertiary centers, highlighting the role of telemedicine in improving healthcare access and reducing unnecessary referrals (5). In parallel, national digital health initiatives, including electronic prescription systems and the National Health Strategy 2021–2030, have contributed to strengthening the institutional framework for telemedicine expansion (6). Nevertheless, important barriers remain, including technological infrastructure limitations, disparities in internet connectivity, digital literacy gaps, and the absence of comprehensive reimbursement and regulatory mechanisms (1,2,7).

Conclusions: Telemedicine represents a promising tool for strengthening healthcare accessibility, efficiency, and patient-centered care within the Albanian healthcare system. Although important progress has been made through digital health policies and telemedicine infrastructure development, further investments in technological capacity, healthcare workforce training, and regulatory frameworks are required to ensure sustainable integration. Addressing these challenges will be essential for maximizing the potential of telemedicine to improve healthcare delivery and reduce disparities in access to specialized medical services.

Keywords: *telemedicine, digital health, healthcare accessibility, Albania, telehealth, healthcare systems*

INTEGRATING ARTIFICIAL INTELLIGENCE IN PEDIATRIC FRACTURE DETECTION THROUGH X-RAYS: A MEDICAL IMAGING APPROACH*Polikseni Memo¹*¹Department of Medical Imaging, Faculty of Medical Sciences, European University of Tirana, 1001, TiranaCorresponding author: *polimemo07@gmail.com*

Introduction: Artificial intelligence (AI), particularly deep learning techniques such as Convolutional Neural Networks (CNNs), has significantly advanced medical imaging. Pediatric fracture detection remains challenging due to the anatomical and physiological characteristics of growing bones, where fractures are often subtle or incomplete. This study aims to evaluate the role of AI in improving the accuracy and efficiency of pediatric fracture detection using X-ray imaging, with emphasis on recent advancements and clinical applications.

Methods: A structured literature review was conducted using predefined inclusion criteria, focusing on peer-reviewed studies published within the last five years. Databases were screened for research evaluating AI-based fracture detection systems, particularly CNN-based models. Diagnostic performance metrics, including sensitivity, specificity, and accuracy, were analyzed. Additionally, observational insights were incorporated from clinical exposure during an internship at LKH-Univ. Klinikum Graz, with particular reference to the GRAZPEDWRI-DX dataset and its application in pediatric wrist trauma assessment.

Results: AI-based models demonstrated high diagnostic performance, with sensitivity and specificity frequently reported between 85–95%. Algorithms trained on datasets such as GRAZPEDWRI-DX showed strong capability in detecting subtle fracture types, including greenstick and incomplete fractures, which are often challenging for conventional assessment. Integration of AI into clinical workflows was associated with reduced diagnostic errors, improved reporting efficiency, and enhanced support in high-volume radiological settings.

Conclusions: AI represents a reliable and effective adjunct in pediatric radiology, enhancing fracture detection and supporting clinical decision-making. While current systems demonstrate strong performance, further validation, standardization, and improved explainability are necessary for broader clinical implementation. The findings underscore the potential of AI to become an integral component of future radiological practice.

Keywords: *Artificial intelligence, pediatric fractures, medical imaging, deep learning, convolutional neural networks, X-ray*

Acknowledgements: *The author acknowledges the support and professional environment provided by LKH-Univ. Klinikum Graz during the internship period, which enabled valuable clinical exposure to pediatric radiology and the application of artificial intelligence in medical imaging. The contribution of the GRAZPEDWRI-DX dataset developers and the broader research community in advancing AI-based fracture detection is also gratefully recognized.*

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Introduction: Periodontitis has been redefined as a systemic inflammatory condition with significant extraoral implications. Emerging evidence demonstrates its involvement in multiple organ systems through shared inflammatory and oxidative pathways. This study aims to evaluate current mechanistic and epidemiological data and to clarify the causal role of periodontitis in systemic diseases.

Methods: A structured review of peer-reviewed literature (2020–2026) was conducted using PubMed, Scopus, Web of Science, and the Cochrane Library. Priority was given to Mendelian randomization studies, umbrella reviews, and consensus reports from leading organizations, including the European Federation of Periodontology, American Heart Association, American Academy of Periodontology, and World Heart Federation. Comparative analysis was performed to distinguish associative findings from causal and mechanistic evidence.

Results: Periodontitis shows strong, independently validated associations across multiple systemic diseases, with several demonstrating mechanistic causality. In cardiovascular disease, consensus reports confirm links with atherosclerosis, myocardial infarction, atrial fibrillation, and heart failure, mediated by endothelial dysfunction, bacteremia, and elevated CRP and fibrinogen. A bidirectional relationship exists with diabetes mellitus: hyperglycemia increases periodontal susceptibility via AGE accumulation, while periodontitis impairs insulin signaling through TNF- α pathways. Periodontal therapy yields a 0.43% reduction in HbA1c. Periodontitis is associated with a hazard ratio of 3.1 for chronic kidney disease progression. It contributes to non-alcoholic fatty liver disease via LPS translocation and TGF- β /SMAD signaling. Respiratory outcomes include increased risk of COPD exacerbations and pneumonia. In oncology, oxidative stress markers link periodontitis with breast cancer. Additionally, periodontal pathogen-derived LPS contributes to neuroinflammation and amyloid aggregation, accelerating cognitive decline.

Conclusions: Periodontitis is a mechanistically integrated contributor to systemic disease across multiple domains. The evidence supports its inclusion in broader medical frameworks, particularly in endocrinology, cardiology, nephrology, and oncology. These findings underscore the need for interdisciplinary clinical integration and highlight periodontal management as essential for improving systemic health outcomes.

Keywords: *periodontitis, systemic disease, inflammation, diabetes mellitus, cardiovascular disease, oxidative stress*

POSTER PRESENTATIONS

Poster Session & Networking | Day 2, 16:30–17:00 | Abstracts 123–154

122 TRANSFORMING THE LANDSCAPE OF HFPEF: NOVEL PHARMACOLOGICAL THERAPIES AND EVIDENCE FROM RECENT CLINICAL TRIALS

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Background: Heart failure with preserved ejection fraction (HFpEF) accounts for approximately 50% of heart failure cases and is associated with substantial morbidity and healthcare burden. Historically, treatment has been limited to symptom control and management of comorbidities, with no therapies consistently demonstrating a reduction in major cardiovascular outcomes.

Objective: To review and synthesize the clinical impact of emerging pharmacological therapies for HFpEF, with a focus on evidence from recent randomized controlled trials and their implications for clinical practice.

Key studies included EMPEROR-Preserved, DELIVER, PARAGON-HF, and TOPCAT, with additional consideration of emerging data on metabolic and anti-inflammatory therapies. Outcomes of interest included cardiovascular death, heart failure hospitalization, functional capacity, and quality of life.

Results: SGLT2 inhibitors have demonstrated consistent and clinically meaningful benefits in HFpEF populations. In EMPEROR-Preserved, empagliflozin reduced the composite of cardiovascular death or heart failure hospitalization by 21%, primarily driven by a reduction in hospitalizations. Similarly, the DELIVER trial showed that dapagliflozin reduced the risk of worsening heart failure or cardiovascular death by 18%, confirming a class effect across a broad spectrum of ejection fractions. Sacubitril/valsartan, evaluated in PARAGON-HF, showed a non-significant reduction in the primary endpoint but suggested benefit in selected subgroups, particularly women and patients with ejection fraction closer to 50%. Emerging therapies targeting inflammation, fibrosis, and metabolic dysfunction—including GLP-1 receptor agonists—have shown promising results in improving symptoms, exercise capacity, and weight reduction, particularly in obese HFpEF phenotypes.

Conclusion: Recent advances have redefined the therapeutic approach to HFpEF, with SGLT2 inhibitors representing the first class of drugs to provide consistent outcome benefits. While other pharmacological strategies offer more selective or phenotype-specific advantages, the future of HFpEF management lies in a personalized, multidimensional approach integrating disease-modifying therapies and targeted treatment of comorbidities.

Keywords: *Heart failure, SGLT2 inhibitors, dapagliflozin*

123 ELECTROCHEMICAL NANOSENSORS FOR EARLY DETECTION OF CA19-9: TRANSLATIONAL PERSPECTIVES IN PANCREATIC CANCER DIAGNOSTICS

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Pancreatic cancer is one of the most lethal malignancies worldwide, largely due to its late clinical presentation and the absence of reliable methods for early detection. A significant number of patients are diagnosed in the later stages of the condition, where available treatment options are limited and survival rates are generally low. Therefore, the identification of sensitive biomarkers capable of supporting early diagnosis has become a critical priority in translational oncology. Carbohydrate antigen 19-9 (CA19-9) is currently the most widely used serum biomarker associated with pancreatic cancer and plays an important role in clinical practice for disease monitoring and prognostic evaluation. However, traditional analytical methods for detecting CA19-9, such as immunoassays, frequently lack the necessary sensitivity in the early stages of disease and can yield false-positive results in various non-cancerous pancreatic or hepatobiliary conditions. Electrochemical nanosensors are emerging as advanced analytical tools for cancer biomarker detection, leveraging recent biosensor technology advancements. These platforms often integrate nanostructured materials, gold nanoparticles, graphene derivatives, carbon nanotubes, and metal-organic frameworks to enhance electrode surface area, electron transfer kinetics, and signal amplification. Thus, electrochemical nanosensors are endowed with superior analytical proficiency, marked by greater sensitivity, minimized detection thresholds, and quicker response times in contrast to established laboratory approaches. This literature review investigates the recent innovations in electrochemical nanosensor technologies for the identification of CA19-9 and evaluates their possible impact on the diagnosis of pancreatic cancer. The focus encompasses nanomaterial-based sensor design, electrochemical signal transduction mechanisms, and critical analytical parameters including sensitivity, selectivity, and limit of detection. The integration of biosensor-based methodologies with conventional pathological and clinical diagnostic techniques is also addressed. Electrochemical nanosensors offer a promising avenue for enhanced early detection of pancreatic cancer biomarkers. Continued advances in nanotechnology, biosensor engineering, and analytical chemistry may facilitate the development of highly sensitive diagnostic tools capable of supporting early clinical intervention and improving patient outcomes.

Keywords: *CA19-9, pancreatic cancer, electrochemical nanosensors, cancer biomarkers, translational diagnostic*

124 ACUTE MYELOID LEUKEMIA (AML) AFTER BREAST CANCER: CASE REPORT*Juliana Cuni¹, Valbona Isufaj¹, Ilda Babamusta²*¹Regional Hospital of Vlora, Vlora, Albania²Cambridge Clinical Laboratories, Tirana, Albania**Corresponding author:** *julianacuni@gmail.com*

Introduction: Breast cancer is the most common malignancy among women with high incidence but fortunately low mortality rate in cases of early diagnosis. Patients treated with chemotherapy with DNA-targeted antiproliferative drugs and radiotherapy are at increased risk of side effects. Many studies have found the risk of developing secondary non-breast cancers such as therapy-related myeloid neoplasms. Therapy-related acute myeloid leukemia (AML) is more resistant to conventional therapies used for AML. The risk appears to be high even in patients treated with surgery alone, known as individuals with cancer susceptibility.

Methods: A 65-year-old female was evaluated at the oncologic clinic of Vlora in April 2021 with a mass in her left breast. The patient after the exams had surgery (mastectomy) with left axillary dissection; biopsy and immunohistochemistry (IHC). The diagnosis was ductal carcinoma stage II pT1NoMx. She had regular follow-ups every 3 months with the oncologist and the following endocrine therapy was with LETROZOLE (an aromatase enzyme inhibitor to reduce the amount of estrogen). In November 2022 she presented with hemorrhagic spots (abdomen and lower extremities) with no use of anticoagulants or antiplatelets. She was urgently referred to the ICU of a tertiary hospital in Tirana for further examinations and intensive treatment.

Results: The complete blood count at first showed pancytopenia with WBC = $0.70/\mu\text{L}$, RBC = $3.95 \times 10^6/\mu\text{L}$, PLT = $12/\mu\text{L}$. Other tests were performed: low fibrinogen levels (43 mg/dL), low prothrombin time (PT = 34%), high lactate dehydrogenase levels (LDH = 3263 U/L), high D-dimer levels ($>20 \mu\text{g/mL}$), etc. Blood smear and bone marrow smear were performed demonstrating several blast elements with characteristics of promyelocytes; some of them with bundles of Auer rods. The first treatments were with therapy for hematopoietic recovery and supportive care with fluids, but she had severe complications before establishing a specific treatment and died within a week.

Conclusions: Acute myeloid leukemia (AML) or acute lymphocytic leukemia (ALL), which is less common, is an important concern for clinicians and breast cancer survivors. AML is associated with poor prognosis. It is of precious value the approach between the clinical laboratory service, hematologists and oncologists for the best treatment and early intervention.

Keywords: *Acute myeloid leukemia, breast cancer, secondary neoplasms, pancytopenia, Auer rods.*

THE IMPACT OF ANIMAL WELFARE STANDARDS ON THE MITIGATION OF ANTIMICROBIAL RESISTANCE: A ONE HEALTH PERSPECTIVE

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Introduction: Antimicrobial resistance (AMR) is a preeminent threat to global health security, necessitating a comprehensive "One Health" approach. While much research focuses on clinical stewardship, the physiological state of the host—specifically animal welfare—is a critical but often overlooked determinant of resistance dynamics. Suboptimal welfare conditions, characterized by high stocking densities and environmental stressors, induce chronic activation of the hypothalamic-pituitary-adrenal (HPA) axis. This study aims to evaluate the mechanistic link between welfare-induced immunosuppression and the escalation of antimicrobial use (AMU), providing a rationale for welfare-centric mitigation strategies.

Methods: A systematic meta-analytical approach was employed, synthesizing data from 45 peer-reviewed studies published between 2020 and 2025. The methodology involved comparing AMR prevalence and AMU volume across varying production systems (intensive vs. high-welfare). Key metrics included the quantification of cortisol levels as a proxy for stress and the identification of multi-drug resistant (MDR) phenotypes in *Escherichia coli* and *Campylobacter* isolates using disk diffusion and whole-genome sequencing data.

Results: The analysis demonstrated a significant positive correlation ($r = 0.68$, $p < 0.01$) between physiological stress markers and the shedding of resistant pathogens. Livestock in intensive systems exhibited a 35% higher incidence of opportunistic infections, leading to a proportional increase in metaphylactic antimicrobial administration. Notably, farms implementing environmental enrichment and improved air quality reported a 22% reduction in total AMU. Genetic analysis indicated that stress-compromised hosts act as significant reservoirs for horizontal gene transfer of resistance determinants.

Conclusions: The study concludes that high animal welfare standards are a fundamental, non-pharmacological tool for reducing the global burden of AMR. Improving biological living conditions directly attenuates the need for chemical intervention. These findings suggest that future veterinary policies must prioritize welfare-driven biosecurity to ensure the long-term efficacy of existing antimicrobials.

Keywords: *antimicrobial resistance, animal welfare, One Health, stress-induced immunosuppression, livestock management, biosecurity.*

THE GLOBAL BURDEN OF ANTIMICROBIAL RESISTANCE: A COMPREHENSIVE ANALYSIS OF HUMAN HEALTH IMPACTS AND CLINICAL CHALLENGES

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Introduction: Antimicrobial resistance (AMR) is one of the preeminent public health crises of the 21st century, fundamentally undermining the efficacy of modern medical interventions. The rapid emergence of multidrug-resistant (MDR) pathogens is primarily driven by the systemic misuse of antimicrobials in clinical settings and the stagnation of the pharmaceutical pipeline. This study aims to evaluate the current global burden of AMR on human health, specifically focusing on its impact on mortality rates and the safety of routine surgical procedures.

Methods: This study utilized a comprehensive systematic review of clinical surveillance data reported between 2020 and 2025. Data were extracted from the World Health Organization (WHO) Global Antimicrobial Resistance Surveillance System (GLASS) and the Global Burden of Disease (GBD) studies. Statistical analysis involved evaluating the prevalence of resistance in priority pathogens, such as *Klebsiella pneumoniae* and *Staphylococcus aureus*, and calculating the disability-adjusted life years (DALYs) attributable to resistant infections.

Results: The findings indicate that bacterial AMR was directly responsible for approximately 1.14 to 1.27 million annual deaths globally, with an associated contribution to nearly 5 million total deaths. Resistance to third-generation cephalosporins in *Escherichia coli* exceeded 40% in several regions, significantly complicating the treatment of urinary tract and bloodstream infections. Furthermore, hospital-onset infections showed a 20% increase in resistance during the 2020–2022 period, largely exacerbated by clinical shifts during the COVID-19 pandemic.

Conclusions: AMR represents a severe threat to human life, potentially causing 39 million direct deaths by 2050 if current trends persist. The results underscore an urgent need for enhanced diagnostic precision and the development of alternative therapies, such as bacteriophage enzymes. Future public health policies must prioritize antimicrobial stewardship and equitable access to novel antibiotics to prevent a return to the "pre-antibiotic era."

Keywords: *antimicrobial resistance, public health, infectious diseases, clinical stewardship, multidrug-resistant pathogens, global mortality.*

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MODELING OXYGEN DISTRIBUTION IN 3D BIOPRINTED UTERINE TUMOROIDS: A COMPLEX SYSTEMS APPROACH*Inva Kociaj¹, Ebi Dede²*¹Department of Medical Laboratory Sciences and Imaging, Faculty of Technical Medical Sciences, Western Balkans University, Tirana, Albania²Department of Biosciences and Engineering, Faculty of Economics, Technology and Innovation, Western Balkans University, Tirana, Albania**Corresponding author:** *inva.kociaj@wbu.edu.al*

Introduction: Conventional in vitro tumor models do not adequately reproduce the dynamic conditions of the tumor microenvironment, particularly oxygen transport and the development of hypoxic and necrotic regions. Recent advances in 3D bioprinting have enabled the development of structured tumor models incorporating internal channels, but the influence of structural organization on oxygen distribution remains insufficiently explored. This study investigates how internal channels influence oxygen distribution in uterine tumoroids using a simplified computational model that captures the interaction between transport processes and structural organization.

Methods: A literature review informed the development of a simplified diffusion-consumption model of oxygen transport. A one-dimensional computational simulation was implemented to evaluate oxygen transport in tumoroids configurations containing between 0 and 10 internal channels. Oxygen distribution was evaluated using mean oxygen concentration, spatial standard deviation, and hypoxic fraction.

Results: The simulation showed that oxygen distribution improved progressively as the number of channels increased. The introduction of internal channels substantially improved oxygen transport, increasing the mean oxygen level from 0.703 to 0.999 and reducing spatial standard deviation from 0.137 to 0.001 between the channel-free and ten-channel configurations. The largest improvement was observed after the introduction of the first channels, while additional channels produced progressively smaller changes.

Conclusions: This study demonstrates that structural configuration plays a key role in shaping oxygen transport in uterine tumoroids. The results also suggest a saturation-like behavior, where the greatest improvement occurs after the introduction of the first channels and additional channels provide smaller incremental benefits. Despite its simplified one-dimensional representation, normalized parameters, and lack of experimental validation, the model provides a useful framework for analyzing oxygen transport behavior in structured tumoroid models. Future work should include three-dimensional geometries, experimentally calibrated parameters, and heterogeneous cellular consumption.

Keywords: 3D bioprinting, uterine tumoroids, oxygen transport, diffusion modeling, complex systems, tumor microenvironment

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**SLEEP, TECHNOLOGY AND ACADEMIC PERFORMANCE IN UNIVERSITY STUDENTS:
A CROSS-SECTIONAL STUDY***Holta Sulaj¹*

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Introduction: Sleep quality and lifestyle behaviors play a crucial role in cognitive function and academic performance among university students. Increased use of digital devices, irregular sleep schedules, and unhealthy habits may negatively impact sleep patterns and daytime functioning. This study aimed to evaluate the relationship between sleep quality, technology use, lifestyle factors, and academic performance in university students.

Methods: A cross-sectional study was conducted using a structured questionnaire distributed to university students aged 18 years and older. Data included sleep duration, sleep quality, screen time, physical activity, dietary habits, and self-reported academic performance. Statistical analysis included descriptive statistics, correlation, and regression models.

Results: Shorter sleep duration and increased evening screen time were associated with poorer sleep quality and higher daytime fatigue ($p < 0.001$). Increased fatigue was associated with reduced concentration and lower academic performance. Regression analysis identified screen exposure and sleep duration as key predictors.

Conclusions: Sleep and lifestyle factors significantly influence academic performance in university students. Excessive technology use represents a modifiable risk factor. These findings highlight the need for targeted interventions promoting healthy sleep habits.

Keywords: *Sleep, university students, academic performance, screen time, fatigue, lifestyle*

Acknowledgements: *Dr. Holta Sulaj is a PhD candidate in the Program in Tissue Engineering and Remodeling Biotechnologies for Body Functions at the University of Rome "Tor Vergata".*

DETERMINANTS OF INSULIN RESISTANCE IN AN ALBANIAN POPULATION: AN INTEGRATED ANALYSIS OF BMI, HOMA-IR, AND LIFESTYLE FACTORS

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Introduction: Insulin resistance (IR) is a metabolic disorder influenced by several factors, such as excessive accumulated body fat known as adiposity, lifestyle behaviours, and family genetic inheritance. IR plays a central role in the progression from normoglycaemia to prediabetes and type 2 diabetes mellitus.

Methods: This study included 2,670 individuals undergoing routine metabolic testing in Tirana, Albania. A subgroup of 235 participants meeting predefined inclusion criteria was selected for in-depth phenotypic analysis. IR was quantified using the Homeostatic Model Assessment for Insulin Resistance (HOMA-IR). The data were analysed using Pearson correlation with 95% confidence intervals, followed by exploratory factor analysis (EFA) and hierarchical clustering.

Results: Body mass index (BMI) demonstrated the strongest correlation with HOMA-IR ($r = 0.557$, $p < 0.001$), accounting for 31% of the variance in HOMA-IR, followed by age ($r = 0.269$, $p < 0.001$). Physical activity, dietary habits, and sleep quality were inversely related to IR. EFA identified four latent components explaining 56.8% of total variance, representing metabolic risk, lifestyle-related behaviour, age-related variation, and genetic susceptibility.

Conclusions: These findings characterise insulin resistance as a multidimensional phenotype dominated by adiposity and influenced by lifestyle behaviours. HOMA-IR and BMI represent measurable indicators of early metabolic risk in group populations undergoing rapid lifestyle changes.

Keywords: *Insulin resistance, HOMA-IR, BMI, lifestyle, metabolic risk.*

Acknowledgements: *We acknowledge the support of Intermedica Medical Laboratory and the Faculty of Natural Sciences, University of Tirana.*

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SNORING AS A CLINICAL RED FLAG: IMPACT OF SLEEP AND AIRWAY FACTORS ON FATIGUE IN CHILDREN*Holta Sulaj¹, Kris Allkaj²*¹Department of Medicine, Faculty of Technical Medical Sciences, Western Balkans University, Tirana, Albania; Hygeia Hospital Tirana, Albania²Ernest Koliqi School, Tirana, Albania**Corresponding author:** *holta76@yahoo.fr*

Introduction: Sleep disturbances in children are increasingly recognized as important contributors to cognitive, behavioral, and academic outcomes. Snoring may represent an early clinical marker of sleep-disordered breathing and underlying upper airway dysfunction. This study aimed to evaluate the relationship between sleep duration, snoring, and daytime fatigue in school-aged children.

Methods: A cross-sectional school-based study was conducted in Tirana, including children aged 5–18 years. Data were collected using parent-, student-, and teacher-reported questionnaires. Variables included sleep habits, snoring, and daytime symptoms. Statistical analysis involved correlation and regression models.

Results: Shorter sleep duration was significantly associated with higher daytime fatigue ($p < 0.001$). Snoring was associated with increased fatigue ($p = 0.007$) and reduced classroom focus ($p = 0.012$). Regression analysis identified upper airway-related factors as significant predictors of snoring.

Conclusions: Sleep and airway-related factors are key determinants of daytime fatigue in children. Snoring emerges as an important clinical red flag for potential upper airway dysfunction. These findings support early screening and highlight the importance of multidisciplinary evaluation.

Keywords: *Sleep, Snoring, Pediatric OSA, Fatigue, School Health*

Acknowledgements: *Dr. Holta Sulaj is a PhD candidate in the Program in Tissue Engineering and Remodeling Biotechnologies for Body Functions at the University of Rome "Tor Vergata".*

ADVANCING TELEMEDICINE BY INTEGRATION OF AI, IOT, AND SMART DIGITAL MONITORING SYSTEMS

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Introduction: Recent literature offers a clear expansion of telemedicine from being just a simple video consultation towards a more complex, AI-driven healthcare system [1-7]. Especially after COVID-19, when isolation was a constraint for in-person communication and diagnosis, telemedicine facilitated doctor-patient consultations. Now, telemedicine has evolved into a more complex technological ecosystem, offering a smart healthcare environment by leveraging artificial intelligence benefits for more accurate diagnosis and predictions, Internet of Things (IoT) for real-time data gathering, and cloud computing for more advanced data communication networks. Naik et al. [4] AIoT-HealthSense architecture involves all these three components in a better health care diagnosis system.

Methods: This study adopts a literature review methodology to analyze and synthesize recent research on telemedicine technologies by exploring three core components such as: AI- enhanced healthcare systems and leveraging AI benefits, IoT-based remote patient monitoring frameworks and wearable devices, and communication infrastructures such as cloud computing or 5G. The review analyzes peer reviewed scientific work such as journal articles conference proceedings published from 2022 from different sources such as IEEE Xplore, Springer etc. The reviewed works were analyzed according to their proposed framework, technologies used, challenges, and benefits reported.

Results: Through the literature review analysis, a major trend is observed in the increasing adoption of AI-driven analytics and IoT. However, despite many technological benefits, several challenges remain.

Conclusions: This paper tries to review the current technological components of telemedicine systems and explores future directions. Despite these advancements, challenges remain in terms of interoperability, cybersecurity, data privacy, and implementation complexity.

Keywords: *telemedicine, artificial intelligence, internet of things, diagnosis, monitoring, healthcare*

IMPACT OF COMMUNITY-BASED HEALTH EDUCATION ON KNOWLEDGE AND PREVENTIVE PRACTICES REGARDING INFECTIOUS DISEASES*Silvana Gripshi¹*¹Department of Nursing and Physiotherapy, Faculty of Technical Medical Sciences, Western Balkans University, Tirana, 1001, AlbaniaCorresponding author: *silvana.gripshi@wbu.edu.al*

Background: Community-based health education is a key public health strategy for the prevention of infectious diseases through the improvement of knowledge and the promotion of preventive behaviors. Despite its widespread implementation, the effectiveness of such interventions varies across different community settings. This review aims to evaluate the impact of community health education on knowledge and preventive practices related to infectious diseases.

Methods: A structured literature review was conducted using PubMed, CINAHL, and Google Scholar databases, including peer-reviewed studies published within the last five years. Quantitative and qualitative studies evaluating community-based health education interventions and their effects on knowledge, attitudes, and preventive practices were included. The analysis focused on infectious disease prevention strategies, particularly hand hygiene, vaccination uptake, and infection control behaviors.

Results: The evidence demonstrates that community-based health education significantly enhances knowledge and improves preventive practices related to infectious diseases. Interventions characterized by interactive approaches, cultural tailoring, and sustained community engagement show higher effectiveness. The most consistent improvements were observed in hand hygiene compliance, vaccination uptake, and awareness of disease transmission routes. The involvement of healthcare professionals, particularly nurses, was consistently associated with improved program effectiveness and better behavioral outcomes. However, key barriers were identified, including limited health literacy, misinformation, and restricted access to healthcare resources, which may reduce intervention effectiveness.

Conclusions: Community-based health education is an effective public health strategy for improving knowledge and promoting preventive behaviors related to infectious diseases. Strengthening culturally sensitive interventions, increasing community engagement, and integrating health education into national public health policies are essential to maximize impact and sustainability.

Keywords: *community-based health education, infectious diseases, preventive practices, health literacy, infection control, public health interventions*

IMPACT OF PUPIL APERTURE ON AGREEMENT BETWEEN OBJECTIVE AND SUBJECTIVE REFRACTION

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Introduction: Modern technological development now offers several options to get a better visual outcome of subjects undergoing refractive assessments which are affected by different conditions like pupil size / aperture, aberration etc. The purpose of this study was to assess the impact of pupil aperture on agreement between objective and subjective refraction using Zeiss i-Profiler Plus Wavefront based autorefractometer.

Methods: This study included adult participants whose refractive measurements were obtained under two predefined illumination settings corresponding to 3mm and 5mm apertures. Subjective refraction was performed with the Zeiss Visuphor 500 incorporating both 3mm and 5mm objective measurements. Bland-Altman plots were applied to assess the agreement between subjective and objective refraction for both pupil apertures.

Results: In total, 200 participants were evaluated, 60% were females (n=120) with mean age of 33.97 ± 10.16 (range: 18–50) years. The mean spherical equivalent refraction (SER) of 3mm, 5mm objective and subjective refraction were $-0.82 \pm 1.70D$, $-0.98 \pm 1.68D$, and $-0.67 \pm 1.49D$, respectively. Bland-Altman analysis of SER revealed that the 3mm pupil size had slightly narrower limits of agreement (LoA $-0.915D$ to $+0.620D$) compared to the 5mm pupil aperture (LoA $-1.051D$ to $+0.430D$). For cylindrical measurements, the Bland Altman analysis showed a mean difference of $-0.26D$ between the 3mm pupil objective refraction cylinder and the subjective refraction cylinder and limits of agreement were -0.72 to $+0.19$) and for 5mm pupil aperture objective refraction cylinder was -0.24 (95% CI: -0.27 to -0.21) with LoA varied from $-0.67D$ to $+0.18D$.

Conclusions: Objective refraction obtained with Zeiss i-Profiler 3-mm pupil aperture provided slightly closer agreement for spherical error and the 5-mm pupil aperture performed marginally better for cylindrical power, these differences were small and not clinically meaningful. Given the minimal variation across pupil apertures, incorporating measurements at 3mm and 5mm may offer practical advantages in routine clinical workflows.

Keywords: *Pupil, Subjective Refraction, Agreement, Zeiss i-profiler plus*

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PERSISTENT ADHD SYMPTOMS AND THEIR RELATIONSHIP TO AGE AT FIRST OFFENSE AND RECIDIVISM IN ALBANIAN INMATES*Enita Metaj¹, Ariel Como²*¹Community Mental Health Center No. 2, Tirana, Albania²Head of Neuroscience Department, School of Medicine, Tirana Medical University, Tirana, Albania.**Corresponding author:** enitametaj@gmail.com

Introduction: Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that begins in childhood and persists into adulthood, increasing the risk of antisocial behavior. While prevalent in prisons, the mechanisms through which ADHD influences criminal trajectories remain under-researched in populations like Albanian inmates.

Methods: This study examines ADHD symptoms, criminal characteristics, and whether age at first offense mediates the relationship between retrospective ADHD and recidivism among inmates in Albania. A cross-sectional study was conducted with 112 adult inmates (85 males, 27 females; mean age = 35.88 ± 11.86 years) from two penitentiary institutions. To measure ADHD symptoms, the Wender Utah Rating Scale and the Adult ADHD Self-Report Scale were administered. Detailed criminal history data was collected. Spearman correlations, Mann-Whitney U tests, and mediation analysis using PROCESS Macro (Model 4) were performed. All variables showed non-normal distribution (Shapiro-Wilk, $p < .001$), justifying the use of non-parametric and bootstrapped mediation analyses.

Results: Childhood ADHD symptoms (WURS) showed a strong positive correlation with current ADHD symptoms (ASRS, $r = .626$, $p < .001$) and a strong negative correlation with age at first offense ($r = -.480$, $p < .001$). Mediation analysis revealed a significant indirect effect of childhood ADHD on recidivism through age at first offense (Effect = 0.032, 95% BCa CI [0.017, 0.059]). After including the mediator, the direct effect of the WURS score was non-significant ($p = .649$), indicating full mediation.

Conclusions: This study provides some of the first evidence from the Western Balkans on the developmental pathways of ADHD in forensic settings. It suggests that early ADHD symptoms contribute to an earlier onset of criminal behavior, which in turn increases the likelihood of recidivism. From a translational perspective, routine screening for ADHD in at-risk children may represent an important strategy to disrupt antisocial trajectories and improve long-term rehabilitation outcomes.

Keywords: ADHD, age at first offense, recidivism, mediation analysis, inmates, translational neuroscience

135 ERGONOMIC RISK FACTORS FOR MUSCULOSKELETAL DISORDERS IN OFFICE WORKERS: A BIOMECHANICAL APPROACH WITH IMPLICATIONS FOR DIGITAL HEALTH AND FUTURE MEDICINE

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Introduction: Musculoskeletal disorders (MSDs) are among the most common occupational health problems associated with sedentary work, contributing to reduced quality of life, decreased productivity, and increased healthcare burden. Poor workstation design may increase biomechanical strain and contribute to MSDs development. However, many studies rely either on ergonomic guidelines or self-reported discomfort without integrating objective workstation measurements and health outcomes. This study aims to assess ergonomic risk factors in office workstations using a combined biomechanical and observational approach and to provide a basis for future ergonomic risk assessment strategies in digital health and preventive medicine.

Methods: A cross-sectional study design was used to evaluate ergonomic conditions and associated discomfort among 80 office workers, using a questionnaire covering workstation characteristics, ergonomic awareness, and musculoskeletal discomfort. Direct measurements of desks, chairs, and adjustable workstation features were also performed. Descriptive statistical analysis was used to evaluate ergonomic conditions and reported discomfort.

Results: A high prevalence of musculoskeletal discomfort was observed, with lower back and neck pain reported by 61.3% of participants, followed by shoulder discomfort (50%) and upper back pain (35%). Only 51.2% of participants reported having monitors positioned at eye level, while 46.3% of participants had access to adjustable desks. Although 72.5% of participants reported using adjustable chairs, discomfort remained prevalent. Additionally, 67.5% reported not using ergonomic accessories.

Conclusions: The findings indicate that musculoskeletal discomfort remains highly prevalent among office workers despite the presence of some ergonomic features, suggesting that workstation adjustability alone may not ensure adequate biomechanical support. By combining objective workstation measurements with self-reported discomfort, this study provides a more comprehensive view of ergonomic risk. Future work will focus on ergonomic risk profiling using objective and subjective data and on adaptive decision support tools for workplace health improvement.

Keywords: Ergonomics, Musculoskeletal Disorders, Biomechanics, Biomedical Engineering, Digital Health, Preventive Medicine

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THE IMPACT OF ANTIRETROVIRAL DRUGS ON BONE DENSITY IN HIV-POSITIVE PATIENTS*Genti Mulla¹, Teuta Backa², Artur Zoto³, Ervin Rapushi⁴*¹University of Medicine, Tirana, Albania²University Hospital Center "Mother Teresa", Rheumatology Service, Tirana, Albania**Corresponding author:** *drgentimulla@gmail.com*

Introduction: Osteoporosis is a systemic metabolic bone disease characterized by reduced bone mineral density and increased fracture risk. In patients with HIV infection, bone metabolism abnormalities are frequently observed and may result from both the direct effects of the virus and the impact of antiretroviral therapy (ART). Understanding these effects is essential for long-term patient management.

Methods: This study included 55 HIV-positive patients aged 18–50 years (50.9% female, 49.1% male). Patients with early menopause or andropause were excluded. Bone mineral density was assessed using dual-energy X-ray absorptiometry (DXA) at the lumbar spine and femoral neck before initiation of ART and after 12 months of treatment. Changes in T-scores were analyzed to evaluate the impact of therapy.

Results: After 12 months of ART, a decrease in bone mineral density was observed. Lumbar spine T-score declined from –1.44 to –1.67, while femoral neck T-score decreased from –0.76 to –1.10. The reduction was more pronounced at the femoral neck. Statistical analysis demonstrated high significance ($p < 0.0001$), indicating a consistent association between ART and bone density reduction.

Conclusions: Antiretroviral therapy is associated with a significant reduction in bone mineral density over a 12-month period in HIV-positive patients. The effect appears more pronounced in the femoral neck. These findings highlight the need for regular bone health monitoring and preventive strategies in patients receiving ART, including early screening and possible therapeutic interventions.

Keywords: *HIV, antiretroviral therapy, bone density, osteoporosis, DXA, bone metabolism*

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FROM BRAIN TO BONE. A DIGITAL MORPHOMETRIC INSIGHT INTO AGE-RELATED NEUROCRANIAL CHANGES*Emirjona Vajushi¹, Marinela Bregu²*¹Department of Surgery, Faculty of Technical Medical Sciences, Western Balkans University, 1001, Tirana, Albania²Department of Basic Sciences, Faculty of Dental Medicine, Western Balkans University, 1001, Tirana, Albania**Corresponding author:** *emirjona.vajushi@wbu.edu.al*

Introduction: This study using digital dissection technology aims to quantify variations in specific anatomical structures of the brain, including the size of brain ventricles, morphology of cranium bones, volume of paranasal sinuses, and to study the influence of age and gender using real digital cadavers.

Methods: Through the Anatomage table, 7 cadavers will be studied, of which 4 cadavers are male, 3 are female. The age groups of the cadavers range from 26-90 years old. To ensure accuracy in the presentation, standardized anatomical planes such as: axial, coronal, sagittal have been applied. Morphometric parameters include the width of the lateral ventricle, the thickness of the cranial bones: respectively the parietal and frontal bones, as well as the size of the frontal sinus. The parameters have been obtained using measurement tools present in the Anatomage table with high accuracy, and have been analyzed using descriptive statistics and comparative correlations between age and gender.

Results: Analysis of the data suggests an increase in the size of the lateral ventricles with age, followed by a noticeable change in the thickness of the cranial bones and frontal sinuses. An inverse relationship has been observed between the mass of the ventricles and the thickness of the cranial bones, which have been found in different specimens. This suggests an adaptation between the anatomical structures as a result of age. Also, the difference in data between male and female cadavers was present but not significant due to the limited number of samples.

Conclusions: Digital morphometric analysis using the Anatomage table highlights the potential relations between brain aging and cranial morphology, providing a clear picture of the impact that age and gender have on changing anatomical structures. This pilot study also highlights the potential of integrating digital anatomy into research that has an impact on education and clinical implementation.

Keywords: *Digital Anatomy; Morphometry; Brain Aging; Cranial Morphology; Ventricular Enlargement Anatomage Table.*

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EFFECTIVENESS OF HUBER 360 TRAINING ON STATIC AND DYNAMIC BALANCE IN HEALTHY ADULTS: A PILOT STUDY*Imena Ismaili¹*

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Introduction: Postural control and balance are essential components of functional performance and injury prevention. Technological innovations such as the Huber 360 system provide multisensory stimulation combining proprioceptive, visual, and neuromuscular inputs. However, scientific evidence regarding its effectiveness in healthy populations remains limited. This study aimed to evaluate the effects of Huber 360 training on static and dynamic balance in healthy adults.

Methods: A prospective pilot study was conducted on 30 healthy participants (mean age 39.5 years). Subjects completed a structured training protocol consisting of 24 sessions over 8 weeks (3 sessions per week, 25 minutes each). The intervention included exercises targeting flexibility, mobility, posture, and balance using the Huber 360 device. Balance performance was assessed pre- and post-intervention using system-integrated tests inspired by the Romberg and Fukuda Stepping Tests. Statistical analysis was performed using paired t-tests, with significance set at $p < 0.05$.

Results: All participants completed the protocol without adverse events, demonstrating high adherence and good tolerability. Significant improvements were observed in both static and dynamic balance parameters, including postural stability and control during movement. Participants with lower baseline performance showed greater relative improvements. Additionally, a participant with syringomyelia successfully completed the protocol with individualized adjustments.

Conclusions: Huber 360 training appears to be a safe and effective intervention for improving balance in healthy adults. These findings support its use as a complementary tool in physiotherapy practice. Further randomized controlled trials with larger sample sizes and long-term follow-up are recommended.

Keywords: *balance, physiotherapy, postural control, rehabilitation technology, exercise therapy, pilot study*

Acknowledgements: *The author would like to thank Huber House Tirana for clinical support and all participants involved in the study.*

139 ACUTE PYELONEPHRITIS IN PREGNANCY

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Introduction: Acute pyelonephritis (APN) is one of the most common serious bacterial infections during pregnancy and may lead to significant maternal and fetal complications. It is most frequently caused by *Escherichia coli*, while other causative organisms include *Klebsiella* spp. and *Proteus* spp.¹ Pregnancy is a recognized risk factor for APN, and the condition may progress rapidly if not diagnosed and treated promptly. This study aimed to describe the clinical presentation, microbiological profile, treatment, and outcomes of acute pyelonephritis in pregnancy.

Methods: This retrospective study was conducted using the American Hospital 3 database in January 2026. Medical records of pregnant patients diagnosed with acute pyelonephritis were retrieved and reviewed. Patients who fulfilled the clinical and/or laboratory criteria for the diagnosis were included in the study. Diagnostic criteria included flank pain, nausea and/or vomiting, and fever above 38°C on admission.⁴

Results: The mean gestational age at diagnosis was 22 ± 7.8 weeks². The predominant pathogen was *Escherichia coli*, accounting for approximately 75% of cases, followed by *Klebsiella* spp. (15.2%) and *Proteus* spp. (5.1%). *Escherichia coli* showed high sensitivity to intravenous amoxicillin-clavulanate (88.8%). Oral amoxicillin-clavulanate was the most commonly used treatment (76.3%), followed by oral cefuroxime (17.9%). Acute pyelonephritis in pregnancy may rapidly progress to systemic infection and has been associated with sepsis, disseminated intravascular coagulation, acute respiratory distress syndrome, spontaneous preterm birth, low birth weight, chorioamnionitis, and increased cesarean delivery risk. In the reviewed case, initial renal impairment and anemia improved after antibiotic and supportive treatment, with no adverse fetal outcome or negative effect on the course of pregnancy.

Conclusions: Acute pyelonephritis remains an important infectious complication during pregnancy, with potential maternal and fetal risks if not managed appropriately. Early diagnosis, identification of causative organisms, and prompt antibiotic therapy are essential for favorable outcomes. In this cohort, despite the recognized risks, severe maternal complications were infrequent and pregnancy outcome was favorable with appropriate treatment.

Keywords: *acute pyelonephritis, pregnancy, urinary tract infection, Escherichia coli, maternal complications, fetal outcome*

TREATMENT OUTCOMES AND PROGNOSTIC FACTORS IN INFECTIVE ENDOCARDITIS: A RETROSPECTIVE SINGLE-CENTER SERIES*Ermal Likaj¹, Erti Ismahili², Irena Dautaj³, Noelda Dautaj⁴*¹University Hospital Center "Mother Teresa", Department of Morphology (Anatomy Section), University of Medicine Tirana, Albania²Western Balkans University, Tirana, Albania³Regional Hospital Durrës, Albania⁴University of Medicine Tirana, Albania**Corresponding author:** *erti.ismahili@wbu.edu.al*

Introduction: Infective endocarditis (IE) carries substantial morbidity and early mortality despite advances in antimicrobial and surgical therapy. Identifying locally relevant prognostic drivers after cardiac surgery for IE can guide perioperative decision-making and resource allocation in centres with limited prospective registry infrastructure. This study aimed to evaluate short-term outcomes and identify independent predictors of in-hospital mortality in a single-centre surgical IE cohort.

Methods: Retrospective single-centre study including all patients who underwent cardiac surgery for IE at Mother Teresa University Hospital, Tirana, between January 2017 and December 2024 (n = 69). Demographic, clinical, microbiological, intraoperative, and postoperative variables were collected from medical records. The primary endpoint was short-term (in-hospital) mortality. Categorical variables were compared with chi-square or Fisher's exact test; continuous variables with independent-samples t-test. Results are presented as mean $\pm$ SD or n (%). Statistical significance was set at $p < 0.05$. Analyses were performed using IBM SPSS Statistics v.27.

Results: Mean patient age was 55.9 ± 12.5 years; 76.8% were male. Overall short-term mortality was 10/69 (14.5%). Variables significantly associated with mortality included: emergency presentation (8/22, 36.4% vs 2/47, 4.3%; $p < 0.05$), postoperative RBC transfusion (9/24, 37.5% vs 1/45, 2.2%; $p < 0.05$), prolonged mechanical ventilation (9/14, 64.3% vs 1/55, 1.8%; $p < 0.05$), and ICU stay > 72 hours (7/27, 25.9% vs 3/42, 7.1%; $p < 0.05$). Cardiopulmonary bypass time > 100 min showed a borderline association ($p \approx 0.053$). Age > 65 years, valve type, culture status, diabetes, and dialysis were not significant predictors.

Conclusions: Early mortality in this surgical IE cohort was primarily driven by perioperative complications and emergency presentation, rather than baseline demographic or microbiological characteristics. Strategies targeting preoperative stabilization, restrictive transfusion practice, lung-protective ventilation with early extubation, and standardized ICU sepsis management protocols are most likely to improve survival outcomes.

Keywords: *infective endocarditis; cardiac surgery; short-term mortality; prognostic factors; mechanical ventilation; ICU*

Acknowledgements: *This abstract is submitted as part of a General Medicine Master's Thesis supervised by Prof. Asoc. Ermal Likaj, University of Medicine Tirana.*

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THE INFLUENCE OF MUTUALITY ON SELF-CARE BEHAVIORS OVER TIME IN PATIENT–CAREGIVER DYADS WITH MULTIPLE CHRONIC CONDITIONS IN LOW- AND MIDDLE-INCOME COUNTRIES: A LONGITUDINAL STUDY OF THE MEDIATING ROLE OF SELF-EFFICACY

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Introduction: Population aging is rapidly increasing the burden of multiple chronic conditions (MCCs), particularly in low- and middle-income countries. Effective self-care is essential for improving outcomes in this population, yet adherence remains suboptimal. Emerging evidence highlights the importance of relational and psychological factors, including patient–caregiver mutuality and self-efficacy. However, their longitudinal interplay in MCCs remains underexplored.

Methods: This study used a three-wave longitudinal design (baseline, 6 months, 12 months) including 300 patient–caregiver dyads in Albania. Patients were ≥ 65 years with MCCs. Mutuality, self-care, caregiver contribution, and self-efficacy were assessed using validated instruments. Structural equation modeling (SEM) with Full Information Maximum Likelihood estimation examined direct, indirect, and autoregressive relationships over time.

Results: Self-care and self-efficacy demonstrated strong longitudinal stability. Mutuality significantly predicted self-efficacy at all time points ($\beta=0.38$ at T0; $\beta=0.16$ at T2). Self-efficacy was a strong predictor of self-care, though its effect decreased over time ($\beta=0.73$ at T0 to $\beta=0.22$ at T2). Mutuality had both direct and indirect effects on self-care at baseline and 6 months, but its direct effect was no longer significant at 12 months. Mediation analysis showed that self-efficacy partially mediated the relationship at baseline and became the primary pathway over time. Overall, self-care improved modestly across the study period.

Conclusions: Findings support a dynamic, time-dependent model in which mutuality enhances self-care primarily through self-efficacy, particularly in later stages. Strengthening patient–caregiver relationships and targeting self-efficacy may improve long-term self-care in MCCs. This study provides novel longitudinal evidence from a LMIC context, emphasizing the importance of dyadic approaches in chronic illness management.

Keywords: *multiple chronic conditions, self-care, mutuality, self-efficacy, caregivers, longitudinal study*

SINC FUNCTIONS FOR K-SPACE AND Z-SPACE ADAPTIVE FILTERING OF MAGNETIC RESONANCE IMAGING OF THE HUMAN BRAIN*Carlo Ciulla¹*

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Background: The filter is defined in the image space by a sum of Sinc functions and it is sampled in the Radon plane using an unevenly spaced sampling grid. The Sinc functions use two parameters: the adaptive bandwidth and the sampling rate. The adaptive bandwidth is the key signal processing tool that makes the Sinc Filter an adaptive filter, and it is estimated by the measure called pixel-local scaled k-space, which is the normalized and scaled magnitude of the k-space of the image to filter.

Methods: Once the Sinc Filter is calculated, its frequency domain is computed by means of Fourier transform or Z-transform. At this point the use of the Fourier convolution theorem and the extension of the Fourier convolution theorem to Z-space devices the filtering procedure. The Sinc Filter is compared to 6 frequency domain non adaptive filters. They are Bessel, Butterworth and Chebyshev filters, calculated in k-space and Z-space. Hence, the comparison provides an essential means of evaluation of the effect of the Sinc Filter.

Results: This research reports two major findings: 1. The smoothing effect of SF is softer than the smoothing effect of the other 6 frequency domain filters; 2. The behavior of the Sinc Filter is an edge finder when used alone as a high-pass filter.

Conclusions: The pixel-local scaled k-space used to compute the Sinc Filter changes pixel-by-pixel, hence filtering in the frequency domain becomes adaptive. The novelty of this paper is the adaptive frequency domain filtering procedure.

Keywords: *Fourier convolution theorem, sampling theorem, Sinc Filter, pixel-local scaled k-space, smoothing, high-pass filtering.*

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Introduction: Hematological malignancies include a heterogeneous group of cancers such as acute myeloid leukemia (AML), chronic myeloid leukemia (CML), multiple myeloma, and non-Hodgkin lymphoma. These diseases originate from hematopoietic stem and progenitor cells and are characterized by abnormal proliferation, differentiation arrest, and immune dysregulation. The emergence of translational medicine has transformed hematologic oncology by accelerating the application of molecular discoveries into clinical practice.

Methods: Literature review

Results: The development of hematological malignancies is driven by genetic and epigenetic alterations that disrupt normal hematopoiesis. High-throughput sequencing technologies have enabled comprehensive characterization of the genomic landscape of these diseases. The identification of recurrent mutations in genes such as FLT3, NPM1, and TP53 has improved understanding of disease biology and prognosis, particularly in AML. These mutations influence disease progression and therapeutic response, making molecular profiling essential in modern diagnosis. MRD detection using flow cytometry, PCR, and next-generation sequencing allows identification of residual tumor cells below conventional detection thresholds. MRD negativity is strongly associated with improved survival outcomes and is increasingly used to guide treatment strategies. CAR T-cell therapy has demonstrated remarkable efficacy in relapsed or refractory hematologic malignancies. However, challenges remain, including cytokine release syndrome, neurotoxicity, and relapse due to antigen escape or limited CAR-T persistence.

Conclusions: Translational medicine has significantly improved clinical outcomes in hematologic malignancies through advances in molecular diagnostics, targeted therapy, and immunotherapy. Continued integration of emerging technologies and interdisciplinary collaboration will be essential for further progress.

Keywords: translational medicine; hematologic malignancies; precision oncology; targeted therapy; CAR-T cells; minimal residual disease; single-cell sequencing

144 VIRTUAL REALITY LEARNING PRACTICES IN MEDICAL SCIENCES IN ALBANIA

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Introduction: The integration of Virtual Reality (VR) technologies in health and medical education represents an emerging paradigm aimed at enhancing experiential learning and improving clinical skills. Despite the extensive adoption of these technologies globally, the implementation of VR in higher education institutions (HEIs) in Albania remains underexplored. Understanding institutional readiness, user perceptions and barriers is crucial for effective adoption of VR-based learning in medical and health sciences programs. This study aims to evaluate the current practice of Virtual Reality integration in medical education within Albania, focusing mainly on students' awareness, usage, and readiness to adopt VR technologies.

Methods: A cross-sectional quantitative study was conducted as part of Work Package 2 of the Erasmus+ M3DTech project. Data were collected through a self-reported online questionnaire distributed as Google forms. The survey was based on the Technology Acceptance Model (TAM) and UTAUT2 framework. The survey targeted students (N = 102) including n = 62 female and n = 39 male students enrolled in medical and health-related programs (e.g., nursing, medicine, physiotherapy,) in Albania. The instrument assessed several constructs, including perceived usefulness, ease of use, social influence, facilitating conditions, and behavioral intention to use VR.

Results: Preliminary findings indicate moderate awareness but limited practical use of VR technologies among medical and health sciences students. While perceived usefulness and positive approach toward VR usage are relatively high, current implementation remains low due to infrastructural and institutional restrictions. Key barriers identified include lack of funding, limited access to equipment, insufficient technical support, and inadequate training. Facilitating conditions including institutional support and availability of digital infrastructure, were found to significantly influence students' behavioral intention to integrate VR in their learning process.

Conclusions: The study highlights a significant gap between positive attitudes toward VR and its practical implementation in medical education in Albania. The findings provide a foundation for developing a strategic implementation roadmap and contribute to national benchmarking efforts aimed at enhancing digital transformation in medical education.

Keywords: *Virtual Reality (VR), Medical Education, Technology Adoption, Higher Education Institutions (HEIs), User Perception and Behavioral Intention, Digital Health Education*

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Introduction: Management of infections during pregnancy is essential because infections may cause maternal complications, fetal malformations, miscarriage, preterm birth, or neonatal infection. Major Infections in Pregnancy include: Sexually Transmitted Infections (STIs), TORCH, Urinary Infections, Respiratory infections, Hepatitis;

Purpose: Pregnancy-related infections in mothers can have serious consequences for both the mother and the fetus. The purpose of this paper is to enhance knowledge regarding management of these infections that must balance maternal treatment effectiveness and fetal safety.

Methods: Review of current evidence about screening, prevention and multimodal therapy.

Results: Management of them is based on the period of pregnancy (1st, 2nd or 3rd trimester) or delivery. 1. Syphilis treatment-Benzathine penicillin G; to prevent congenital syphilis; Chlamydia-Azithromycin single dose, complications: preterm rupture, neonatal conjunctivitis; Gonorrhea-Ceftriaxone. HIV - immediate antiretroviral therapy (ART), should monitor viral load, cesarean delivery if high viral load, neonatal prophylaxis, avoid breastfeeding if safe alternatives exist. Genital herpes-acyclovir, cesarean if active lesions at delivery. 2. TORCH Infections: Toxoplasmosis treatment-spiramycin (early pregnancy), Pyrimethamine + sulfadiazine after fetal infection confirmed, Rubella-no treatment during pregnancy, prevention by vaccination before pregnancy, CMV-No standard therapy, Varicella-Varicella-zoster immunoglobulin after exposure, Acyclovir for maternal disease, monitor for congenital varicella syndrome. 3. Urinary Tract Infection: Asymptomatic bacteriuria -antibiotics of Class A of safety, Untreated can lead to pyelonephritis or preterm labor. 4. Respiratory Infections: Influenza-Vaccination recommended, Oseltamivir treatment regardless of trimester; COVID-19 -Vaccination recommended, supportive care ± antivirals in high risk. 5. Hepatitis Infections: Hepatitis B -Tenofovir if high viral load, neonate: vaccine + immunoglobulin at birth. Hepatitis C-treatment usually postpartum

Conclusion: Screening and managing infectious syndromes during pregnancy are vital for preventing vertical transmission (mother-to-child) and safeguarding maternal and neonatal health. The Prevention Strategies like Vaccination, hygiene and food safety education, STI screening and treatment after the confirmation of the above infections also addressing some infections requiring urgent treatment like Fever with rash, Pyelonephritis, Sepsis, Malaria exposure; Primary HSV near delivery, are important.

Keywords: *ID, Pregnancy, Management*

146 HELIUM IONS IN HADRON THERAPY: FROM SIMULATION TO BIOLOGY

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Introduction: Helium ion beams are re-entering the focus as a promising treatment modality in hadron therapy, offering a favorable balance between the high lateral precision of protons and the enhanced biological effectiveness of heavier ions. However, uncertainties in radiobiological modelling, particularly regarding relative biological effectiveness (RBE) and its dependence on linear energy transfer (LET), remain a key obstacle to wider clinical use. This review aims to explore helium ion interactions across multiple scales, linking Monte Carlo physics-based simulations with biological response.

Methods: At the microscopic level, Geant4 Monte Carlo simulations were employed to quantify radiation-induced DNA damage in realistic cellular geometries, with emphasis on damage complexity and clustering as a function of LET. These simulations were complemented by recent in vitro studies using radiation-resistant human cancer cell lines, providing experimental insight across a broad LET range. In addition, ongoing Monte Carlo studies in treatment-relevant scenarios were considered to assess depth-dose distributions and biologically effective dose.

Results: Simulation results demonstrated LET-dependent increases in DNA damage complexity and clustering. Experimental observations from in vitro studies showed consistent trends in biological effectiveness across the investigated LET range. A strong compatibility between simulated damage predictions and measured biological outcomes was observed. Furthermore, treatment-scale simulations indicated favorable depth-dose distributions and biologically effective dose profiles for helium ions.

Conclusions: The findings support the high predictive potential of track-structure-based modelling in the radiation biology of helium ions, establishing a coherent link between microscopic damage formation and macroscopic biological response. Helium ions show promising advantages in treatment planning and delivery. In the broader context of high-LET modalities, including alpha-emitter-based approaches and boron neutron capture therapy, the results highlight the need for unified multi-scale modelling frameworks and suggest directions for future research.

Keywords: *Helium ions, hadron therapy, RBE, LET, Monte Carlo, DNA damage.*

147 TARGETING INFLAMMATORY PATHWAYS TO ENHANCE CHEMOTHERAPY AND RADIOTHERAPY RESPONSES: A PRECLINICAL STUDY

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Introduction: Resistance to chemotherapy and radiotherapy remains a major challenge in colorectal cancer treatment. Targeting inflammatory pathways, particularly cyclooxygenase-2 (COX-2) and 5-lipoxygenase (5-LOX), has been proposed as a strategy to enhance therapeutic efficacy. The integration of such inhibitors with established chemotherapeutic regimens and radiotherapy may improve treatment responses through complementary and potentially synergistic mechanisms.

Methods: Cell viability was evaluated using standard colorimetric assays following treatment with individual compounds and their combinations with a chemotherapeutic agent. Interaction effects were assessed across multiple effect levels to identify the most promising candidate. Based on these findings, the compound exhibiting the most consistent beneficial interaction profile was taken for further investigation. Clonogenic assays were performed to assess long-term survival following treatment with the selected compound, alone and in combination with photon irradiation at a clinically relevant dose of 2 Gy.

Results: Viability assays revealed diverse interaction patterns among tested compounds, including COX-2 and 5-LOX inhibitors, ranging from antagonistic to synergistic effects depending on the dose and effect level. One compound demonstrated a favorable interaction profile at moderate effect levels, indicating enhanced efficacy in combination with the chemotherapeutic agent. In clonogenic assays, the combination with photon irradiation resulted in a more pronounced reduction in colony formation compared to single treatments, suggesting a radiosensitizing effect.

Conclusions: Pre-selection based on interaction profiling is essential for identifying effective combination strategies. The selected compound demonstrated promising activity in combination with chemotherapy and photon irradiation at clinically relevant doses. These findings provide a rationale for further investigation using alternative radiation modalities, including hadron therapy, to explore potential improvements in therapeutic outcomes.

Keywords: *COX-2 inhibitors, 5-LOX inhibitors, combination therapy, clonogenic assay, photon irradiation, radiosensitization*

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LIPOPROTEIN(A): THE UNDERESTIMATED EFFECT OF A BIG CONTRIBUTOR TO ATHEROSCLEROSIS*Almenda Zaka¹*¹Department of Cardiology, American Hospital 3, Tirana, Albania,**Corresponding author:** *almenda.zaka@spitaliamerikan.com*

Introduction: Atherosclerosis represents a major global health burden. While conventional risk factors are routinely addressed, residual cardiovascular risk remains significant. In clinical practice, this gap is often observed in patients with premature or unexplained cardiovascular events. This study aims to revisit the role of Lp(a) as a potential contributor to this residual risk and to emphasize its clinical relevance.

Methods: This work is based on a focused review of recent literature (2019–2024), combined with clinical observations from routine cardiology practice. Peer-reviewed articles, clinical trials, and meta-analyses addressing Lp(a)-related cardiovascular risk and therapeutic approaches were evaluated. Emphasis was placed on data with clear clinical applicability.

Results: Evidence consistently shows that elevated Lp(a) levels are associated with increased risk of coronary artery disease, ischemic stroke, and aortic valve calcification, independent of traditional lipid markers. In clinical settings, elevated Lp(a) is frequently observed in patients with cardiovascular events despite otherwise controlled lipid profiles. Standard lipid-lowering therapies have little to no impact on Lp(a) levels. In contrast, emerging therapies, including antisense oligonucleotides and siRNA-based agents, have demonstrated reductions of up to 70–90% in circulating Lp(a) in early-phase studies.

Conclusions: Lp(a) represents an important contributor to residual cardiovascular risk that is often overlooked in routine evaluation. Its assessment may provide additional value, particularly in patients with premature or unexplained ASCVD. Although therapeutic options are still evolving, recent advances suggest that targeted Lp(a) reduction may become a key component of future cardiovascular prevention strategies.

Keywords: *Lipoprotein(a), atherosclerosis, residual risk, cardiovascular disease, thrombosis, novel therapies*

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EVALUATING KAN-AUGMENTED BACKBONES FOR BONE ABNORMALITY DETECTION: A CONTROLLED STUDY AGAINST A DENSENET BASELINE*Ahmed Sallam¹, Ahmet Kaplan²*¹Department of Biomedical Engineering and Bioinformatics, Faculty of Engineering and Natural Sciences, Istanbul Medipol University, 34810, Istanbul, Turkey²Department of Computer Engineering, Faculty of Engineering and Natural Sciences, Istanbul Medipol University, 34810, Istanbul, Turkey**Corresponding author:** *ahmed.sallam@std.medipol.edu.tr*

Introduction: Kolmogorov--Arnold Networks (KANs) have recently emerged as an alternative neural-network architecture based on the Kolmogorov--Arnold theorem, in which learnable functions, often implemented as splines, are placed on network edges instead of fixed activation functions. However, the empirical advantage of KANs over CNNs is still inconclusive.

Methods: Under a leakage-aware experimental protocol, we performed a controlled comparison of KAN-augmented backbones and a strong DenseNet121 baseline on the elbow subset of MURA for binary abnormality detection. We used patient-level splits with explicit leakage checks and evaluated 174 model runs across three preprocessing stacks.

Results: Performance was assessed using AUROC and PR-AUC, together with calibration metrics (Brier score and expected calibration error) and computational efficiency (parameter count and inference latency). Across preprocessing pipelines, KAN produced only marginal validation improvements and no consistent test-set discrimination gains. On CLAHE, KAN matched AUROC (0.878) while reducing parameters by 23.2% and inference time by 6.7%; no runtime advantage was observed on raw stacks.

Conclusions: Under leakage-aware patient-level evaluation, KAN augmentation did not provide a robust performance advantage for elbow abnormality detection. This indicates that radiographic CAD is more dependent on rigorous patient-level benchmarking, calibration, and efficiency analyses rather than on increasing architectural complexity.

Keywords: *Radiography; Musculoskeletal abnormality detection; Elbow X-ray; Kolmogorov-Arnold networks; Model calibration*

150 BIOCOMPATIBILITY OF PTEROSTILBENE-FUNCTIONALIZED TISSUE CONDITIONERS: A TRANSLATIONAL BIOMATERIAL APPROACH FOR ORAL HEALTH APPLICATIONS

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Introduction: The development of multifunctional biomaterials that combine therapeutic activity with preserved biocompatibility is increasingly important in translational oral health research. Tissue conditioners are widely used in prosthetic dentistry but lack intrinsic bioactivity. Pterostilbene (PTE), a natural stilbenoid compound with reported antifungal and pharmacological properties, represents a promising candidate for biomaterial functionalization. This study evaluated the biocompatibility of PTE-incorporated tissue conditioners using mammalian cell viability assays.

Methods: Tissue conditioner formulations containing 1% and 2.5% (w/w) PTE were prepared, and eluates were collected after 24 h, 72 h, and 1-week incubation periods. Mouse embryonic fibroblast (MEF) cells were exposed to conditioned eluates, and cell viability was assessed using MTT assays at 24 h and 48 h. Comparative analyses included tissue conditioner controls, vehicle controls, and ketoconazole-containing formulations. Statistical comparisons were performed using unpaired two-tailed t-tests, with significance set at $p < 0.05$.

Results: PTE-functionalized tissue conditioners maintained cell viability above the ISO 10993-5 threshold for non-cytotoxicity (>70%) across all tested conditions. Both 1% and 2.5% PTE formulations demonstrated cytocompatibility comparable to unmodified tissue conditioners after short and prolonged incubation periods. Sustained exposure to eluates did not substantially reduce viability at either 24 h or 48 h, indicating that released bioactive compounds remained compatible with mammalian cells.

Conclusions: PTE-functionalized tissue conditioners preserved acceptable biocompatibility while incorporating a natural therapeutic component, supporting their potential as multifunctional biomaterials for translational oral applications. These findings provide a basis for future studies investigating long-term tissue responses and clinical applicability in regenerative and preventive dental medicine.

Keywords: Pterostilbene, biomaterials, tissue conditioner, cytocompatibility, translational dental sciences, oral health

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A COMPARATIVE ANALYSIS OF MULTI-AGENT AI FRAMEWORKS IN HEALTHCARE WITH MIMIC-IV EXPERIMENTS*Mirela Sino¹, Hqmet Kamberaj¹*¹Department of Computer Engineering, Faculty of Computer Engineering, International Balkan University, 1000, Skopje, North Macedonia**Corresponding author:** *HKamberaj@ibu.edu.mk*

Introduction: Multi-agent frameworks in healthcare, unlike single-agent systems can coordinate workflows among different agents. Leading frameworks such as CrewAI, AutoGen and LangChain provide architectures for task coordination and workflow automation. MIMIC-IV (public healthcare dataset) combined with PyHealth (machine learning toolkit) assists in evaluating predictive healthcare tasks such as mortality prediction, hospital readmission prediction and length of stay prediction. This study aims to compare the three leading multi-agent frameworks and also evaluate the three predictive tasks using MIMIC-IV dataset with PyHealth toolkit. The objective of the study is to analyze the architectures of the three AI frameworks and demonstrate application in predictive tasks. The study also discusses limitations and future directions for clinical decision-making systems.

Methods: Structured clinical data from MIMIC-IV dataset has been transformed into patient-level sequential records using the PyHealth toolkit. The dataset is divided into standard – training (70%), validation (10%) and testing (20%). Three predictive tasks have been evaluated: mortality prediction, hospital readmission prediction and length-of-stay prediction. The first two tasks have been implemented as binary tasks, whereas the third one has been considered a multiclass classification with short, medium, and long hospital stay categories. Gated Recurrent Unit (GRU) models were applied for mortality and readmission prediction tasks, whereas Recurrent Neural Network was applied in length-of-stay task. Models were trained for 50 epochs using Adam optimizer with a fixed random seed for reproducibility of 42. Statistical evaluation of binary classification tasks was evaluated using ROC-AUC and PR-AUC metrics. The length-of-stay multiclass task was evaluated using classification accuracy. All three experiments were tested in a research environment using the CrewAI framework.

Results: The experimental evaluation was examined using three healthcare prediction tasks based on MIMIC-IV dataset: mortality prediction, hospital readmission prediction and length-of-stay prediction. The mortality prediction performed the highest with a ROC-AUC score of 0.93 and a PR-AUC score of 0.83. The readmission prediction achieved a ROC-AUC score of 0.64 and a PR-AUC score of 0.57. For the length of stay prediction task, RNN model achieved an accuracy of 0.46, precision of 0.58, recall of 0.46 and a F1-score of 0.48. Training loss curves demonstrated progressive reduction of loss values (for all three prediction tasks) across all 50 epochs of training.

Conclusions: The mortality prediction model had the strongest performance, demonstrating that EHR variables such as diagnoses, procedures, and prescriptions are strongly associated with in-hospital mortality risk. The readmission model did not perform as well, demonstrating that this prediction is more difficult, as it depends on factors beyond EHR variables. Length of Stay prediction demonstrates moderate performance, indicating that LOS is more difficult to predict than mortality. That is because it depends on a few clinical and operational factors that are not part of EHRs. The experiments demonstrate early stages of the CrewAI + PyHealth (using MIMIC-IV dataset) integration, which is also the contribution of the study. The prediction tasks are single-agent tasks, whereas the study will evolve to multi-agent collaboration to automate ML

workflows. The research objectives were mainly achieved, however there are a few limitations that need to be addressed such as the study was performed in research settings rather than a real-world environment and the dataset is limited, meaning it may not represent populations in other healthcare environments.

Keywords: *CrewAI, AutoGen, LangChain, Single-Agent, Multi-Agent*

ESTABLISHING FUNCTIONAL PHOSPHO-SIGNALING PROFILING FOR PRECISION THERAPEUTIC ASSESSMENT IN SOUTH AFRICAN LEUKEMIA

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Introduction: Aberrant activation of the phosphorylation signaling pathways contributes to leukemogenesis, disease progression, and therapeutic resistance in chronic lymphocytic leukemia (CLL), acute myeloid leukemia (AML), and acute lymphoblastic leukemia (ALL) (Zwang et al., 2018). Phospho-flow cytometry enables single-cell quantification of intracellular phosphorylation events and provides functional assessment of signaling heterogeneity in primary patient samples (Skånland, 2018). Despite its relevance to precision oncology, implementation in resource constrained settings such as South Africa remains limited due to technical variability, lack of standardized protocols for fresh peripheral blood mononuclear cells (PBMCs), and logistical constraints in clinical workflows. Functional phospho-signaling profiling can bridge this gap by enabling rapid pharmacodynamic assessment and supporting individualized therapeutic decision-making within a precision medicine framework (Hartmann et al., 2021, Hermansen et al., 2024). The current study aimed to establish and optimize a reproducible phospho-flow cytometry platform for phosphorylation signaling analysis in PBMCs from South African patients with CLL, AML, and ALL, and to evaluate ex vivo phosphosignal modulation following exposure to repurposed therapeutic agents as a proof-of-concept for precision therapeutic assessment.

Methods: PBMCs were isolated from peripheral blood samples obtained from 5 healthy donors and 8 patients diagnosed with CLL, AML, or ALL following informed consent and institutional ethical approval. Fixation and permeabilization conditions were optimized to enable intracellular detection of Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) and Phospho-Akt (Ser473). Antibody titration, fluorescence-minus-one (FMO) controls, and appropriate compensation controls were implemented to ensure assay specificity, sensitivity, and reproducibility. Selected samples were exposed ex vivo to repurposed therapeutic agents chosen based on current standard-of-care regimens used in South African hospitals and supported by prior ex vivo drug-response studies conducted within our research group. Phospho-signal changes were quantified before and after treatment using multiparameter flow cytometry.

Results: A robust and reproducible phospho-flow assay was successfully established for freshly isolated PBMCs. Basal ERK1/2 and Akt phosphorylation was detectable in both healthy donor and patient samples, with inter-patient variability observed across disease subtypes. Ex vivo exposure to repurposed agents resulted in measurable modulation of phospho-ERK1/2 and phospho-Akt signaling, demonstrating functional pathway responsiveness and assay sensitivity in limited clinical samples.

Conclusions: This study demonstrates the feasibility of implementing functional phospho-signaling profiling in South African hematological malignancies. The platform supports dynamic assessment of

therapeutic pathway modulation and provides a foundation for integrating single-cell signaling analysis into precision medicine strategies and pharmacodynamic-guided drug repurposing in resource-limited settings.

Keywords: *Phosphorylation, Acute myeloid leukemia, Chronic lymphocytic leukemia, Acute lymphoblastic leukemia*

153 GERIATRIC DYSPHAGIA*Alesia Filipi*

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Introduction: Dysphagia in the elderly is a swallowing disorder associated with physiological aging processes as well as neurological, structural, and systemic diseases. Due to increased life expectancy, geriatric dysphagia has become an important healthcare concern because of complications such as pulmonary aspiration, aspiration pneumonia, malnutrition, dehydration, and reduced quality of life.

Methods: This paper analyzes the etiological factors, pathophysiological mechanisms, diagnostic methods, and therapeutic strategies involved in the management of geriatric dysphagia. The review includes multidisciplinary evaluation approaches, clinical swallowing assessments, and instrumental diagnostic methods such as videofluoroscopy and FEES.

Results: The findings emphasize that early identification and multidisciplinary management are essential in preventing severe complications related to dysphagia in older adults. Therapeutic interventions including dietary modification, compensatory swallowing techniques, rehabilitation exercises, and patient-family education contribute significantly to improving swallowing function and overall quality of life.

Conclusions: Geriatric dysphagia represents a significant and growing health issue among the elderly population. Comprehensive assessment and timely intervention are crucial for reducing complications and improving patient outcomes. A multidisciplinary therapeutic approach remains fundamental for effective management and rehabilitation.

Keywords: *dysphagia, elderly, swallowing, aspiration, rehabilitation, speech therapy*

PUBLIC FUNDS DEDICATED TO SCIENTIFIC RESEARCH IN THE ALBANIAN HEALTH SECTOR: TRENDS, ALLOCATION, AND STRATEGIC CHALLENGES*Marsela Robo*

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Introduction: Scientific research in the Albanian health sector plays an essential role in improving healthcare quality, strengthening public health policies, and supporting medical innovation. In recent years, Albania has increased attention toward the development of research capacity through public financial support and institutional reforms. Among the main institutions responsible for financing scientific research is the National Agency for Scientific Research and Innovation (NASRI), which serves as a key public mechanism for supporting research projects, innovation initiatives, and academic development within the health sector.

Methods: This paper examines public funds dedicated to scientific research in the Albanian health sector, with a particular focus on NASRI funding programs, allocation patterns, and strategic priorities. The study adopts a descriptive and analytical methodology based on the analysis of public budget documents, institutional reports, policy frameworks, and official data related to scientific research financing in Albania. The objective is to evaluate the adequacy and effectiveness of public funding in addressing national healthcare challenges and promoting scientific advancement.

Results: The analysis explores how NASRI funds are distributed among universities, public research institutions, healthcare centers, and research projects in fields such as epidemiology, medical technology, pharmaceuticals, and preventive healthcare. Particular attention is given to the alignment between funding allocation and Albania's national priorities for health and scientific development. The findings indicate that although NASRI has contributed to strengthening research activity, several strategic challenges remain, including limited financial resources, unequal distribution of funding opportunities, insufficient research infrastructure, and weak coordination between institutions.

Conclusions: Improving transparency, increasing investment levels, and strengthening strategic planning are necessary to enhance the effectiveness and long-term impact of NASRI funding on scientific research in the Albanian health sector. Greater institutional collaboration and sustainable public investment are essential for supporting innovation and improving national healthcare outcomes. Future reforms should encourage international partnerships and interdisciplinary research.

Keywords: *Scientific Research; Health Sector; Public Funding; NASRI; Albania; Research Innovation*

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Participants

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