



ABSTRACT BOOK
4th International Conference
One Health:
Problems & Solutions



28-29 November 2025

Baku, Azerbaijan

CO-ORGANIZERS:



Azerbaijan Medical University



Azerbaijan National Research Institute
(NRI) of Medical Prevention named
after Vali Akhundov



Food Safety Agency of the
Republic of Azerbaijan



Department of Molecular Sciences,
Swedish University of Agricultural
Sciences, Sweden



Caucasus University Association

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sustainable, locally driven Planetary Health solutions tailored to their specific needs.

- 3. Fostering Dialogue and Vision through Arts and Humanities:** To support the development of collaborative artistic and digital projects that creatively explore One Health problems and communicate shared aspirations for a healthy, safe, and just world.

ABOUT THE CONFERENCE

Khazar University is proud to host the 4th International Conference on “One Health: Problems & Solutions” on November 28-29, 2025, in Baku, Azerbaijan.

Focusing heavily on “*Local and Regional Systems Transformation for Planetary Health Systems Change*”, the event marks the 10th Anniversary of the Planetary Health Alliance, of which Khazar University is a proud and active member.

This conference is being organized in collaboration with several esteemed national and international partners. Our co-organizers are Azerbaijan Medical University, Azerbaijan National Research Institute of Medical Prevention named after Vali Akhundov, the Food Safety Agency of The Republic of Azerbaijan, the Department of Molecular Sciences at the Swedish University of Agricultural Sciences (SLU) (as a part of the project LEARNSAVE, supported by the Swedish Institute SI, Baltic Sea Neighbourhood Programme, number 01236/2023), Kazakh National Agrarian Research University and Caucasus University Association.

The event will address the complex interconnections between human, animal, and environmental health, and the impact of climate change, man-made threats to health, disease control, and sustainable and resilient food systems. Additionally, the conference will provide a platform to share and discuss best practices, focusing on urgent, evidence-based actions and solutions that need to be implemented to ensure long-term planetary sustainability.

To effectively address these multifaceted issues, the conference will focus on three strategic objectives:

- 1. Cultivating Future Leaders in One Health Problem Solving:** To design and initiate a robust Youth Leadership Program focused on empowering and connecting emerging Planetary Health leaders through mentorship, training, and collaborative projects aimed at tackling real-world challenges.
- 2. Enabling Community-Driven Problem Solving:** To establish a Community Action Grant mechanism that provides essential funding and support for regional communities to develop and implement

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HEALTH AND NUTRITION THROUGH PLANT BREEDING AND PLANT GENETIC RESOURCES

Seyyed Abolghasem Mohammadi

National Wheat Innovation Center, University of Tabriz, Tabriz, Iran

mohammadi@tabrizu.ac.ir

Due to world population growth and rapid climate changes, hunger and malnutrition are the major challenges facing humankind at present and are likely to become even more severe in the future as food production requirements rise. Therefore, in recent years, concerns about global, sustainable, and nutritional security have gained substantial momentum. In the past, crop improvement through breeding was the major tool to lift people out of poverty and increase the global food supply. Although traits affecting yield and disease resistance remain essential, emerging research highlights the importance of nutrition, flavor, quality, and enhanced health-promoting properties in reducing food and nutritional impoverishment. Utilization of plant genetic variability is also crucial for ensuring an ample and stable supply of diverse food crops and enhancing their nutritional quality. This review focuses on various plant breeding methods and their potential for sustainable agricultural development and food security while addressing shortcomings of the Green Revolution. We address examples of the wheat breeding research related to “disease resistance for plant health”, “utilization of wheat landraces and wild relatives for development of better plant”, “improvement of Khorasan wheat, an ancient variety with rich and unique nutty flavor”, development of perennial wheat to protect soil health”, and “use of new generation technology to improve nutritional value of wheat grain.

Keywords: plant breeding, new generation technology, health and nutrition.

EXPLORING GENETIC DIVERSITY AND MORPHOLOGICAL TRAITS OF AZERBAIJAN TEA (*CAMELLIA SINENSIS* L.) FOR BREEDING CLIMATE-RESILIENT CULTIVARS

Afsana Abdullayeva, Jamala Eldarova, Javid Ojaghi

The Department of Life Sciences, Khazar University, Baku, Azerbaijan

The existence of genetically diverse natural populations forms the foundation for the selection and improvement of desirable phenotypic traits in tea (*Camellia sinensis* L.). Evaluating the genetic variability within tea germplasms is a critical step in breeding programs aimed at enhancing resilience and productivity under changing climatic conditions. Global agriculture today faces multiple interrelated challenges such as rapid population growth, climate change, land degradation, malnutrition, poverty, and pest pressure. These challenges threaten the sustainability of tea cultivation, particularly in regions like Azerbaijan where environmental fluctuations directly influence crop yield and quality. Addressing these issues requires the integration of genetic improvement and adaptive management strategies to mitigate yield losses and strengthen the resilience of tea plants against environmental stressors. In this context, the assessment of genetic and morphological diversity among Azerbaijan tea germplasms is of great importance. Such studies provide valuable insights into the adaptive potential of local accessions, supporting the selection of high-yielding, climate-resilient cultivars. This approach not only ensures the long-term sustainability of tea production but also contributes to global efforts to secure agricultural systems in the face of ongoing climate change and ecological challenges. In this study, a total of 34 tea accessions originating from the Astara-Lankaran regions of Azerbaijan were evaluated to determine their agromorphological diversity and genotypic potential. The experiment was conducted under field conditions using a Randomized Complete Block Design (RCBD) with three replications to ensure the accuracy and reliability of the data. A comprehensive set of 22 agromorphological traits—including vegetative growth parameters, leaf morphology, yield components, and quality-related attributes was recorded and analyzed. The analysis of variance (ANOVA) revealed a highly significant genetic diversity among all evaluated traits across the tea genotypes studied. This substantial variability indicates the presence of a broad genetic base within Azerbaijan tea germplasm, providing valuable opportunities for selection and genetic improvement. These findings offer important guidance for tea breeders in identifying high-potential accessions that can be utilized in future breeding programs aimed at developing new, climate-resilient varieties with enhanced yield performance

and adaptability. The observed genetic diversity thus serves as a foundation for both conservation and sustainable utilization of tea genetic resources under changing environmental conditions.

Keywords: Tea, climate change, ANOVA, yield.

NEXUS OF WATER-LIVELIHOODS-MIGRATION IN RURAL AZERBAIJAN

Anar Nuriyev¹, Tamerlan Mehdiyev¹, Farhad Mukhtarov²

¹*Baku State University, Baku, Azerbaijan*

²*International Institute of Social Studies, Erasmus University Rotterdam, the Netherlands*

tamerlan.mehdiyev@bsu.edu.az; mukhtarov@iss.nl

Azerbaijan's water security is much of concern as much of its water originates outside the country and climate change exacerbates scarcity (World Bank, 2024). The worsening water stress is already taking its toll on people's livelihoods, considering that the rural population is highly dependent on irrigation, 70% of Azerbaijan's water use. Many communities have no access to modern irrigation and farming methods. This vulnerability increases the likelihood of displacement as agricultural productivity declines (Alizada, 2024). The ongoing closure of land borders of Azerbaijan since the Covid-19 pandemic further endangers the livelihoods of rural residents, who previously depended on cross-border trade in goods and services. The interlinkages between rural livelihoods, water scarcity, and possible migration become evident and require scholarly attention. We aim to collect and tell stories of the lived experiences of farmers and rural dwellers of Azerbaijan with the aim to advocate for their perspectives in decision-making circles in Azerbaijan and beyond. How are ordinary people caught up in situations where water is fiercely contested and imaginaries prescribed? How do they make sense of their environment and exert agency to navigate environmental and political change? How can the state and non-state actors support these communities?

Keywords: Climate Change, migration, rural communities, adaptation,

PHENOTYPIC AND GENOTYPIC CHARACTERIZATION OF ANTIBIOTIC-RESISTANT *SALMONELLA* SPP. IN POULTRY PRODUCTS AND DEVELOPMENT OF IGY-BASED THERAPEUTIC ALTERNATIVES IN AZERBAIJAN: A ONE HEALTH APPROACH

Asaf Omarov¹, Narmin Alasgarova²

¹*School of Agriculture and Food Sciences, ADA University, Azerbaijan*

²*Department of Epizootiology, Microbiology and Parasitology, Azerbaijan State Agricultural University, Azerbaijan*

Antimicrobial resistance (AMR) is a growing One Health challenge threatening both public and animal health. Poultry products serve as key vectors for resistant *Salmonella* strains, emphasizing the need for integrated monitoring and eco-safe therapeutic alternatives. Over the last five years, Azerbaijan reported an average of 79 salmonellosis cases per year, with an incidence of about 0.8 per 100,000 people.

To identify phenotypic and genotypic resistance patterns of *Salmonella* spp. in Azerbaijani poultry products and to explore the use of immunoglobulin Y (IgY) as a sustainable antimicrobial substitute. Between July and October 2025, 117 chicken samples from 39 farms and 20 wild birds were screened following ISO 6579-1:2017. Five *Salmonella*-positive isolates were identified and cryopreserved. Antimicrobial susceptibility testing (Kirby–Bauer) revealed resistance to Amoxicillin, Tetracycline, Erythromycin, Enrofloxacin, Tylosin tartrate, Gentamycin, and Lincomycin, while sensitivity persisted to Imipenem, Colistin, Doxycycline, and Florphenicol. PCR assays targeting *mcr-1*, *bla*NDM-1, *bla*IMP, and *aadB* genes are ongoing, with whole-genome sequencing planned. Future phases include IgY production via hen immunization and comparative efficacy testing. Preliminary data demonstrate multidrug-resistant *Salmonella* circulation in poultry supply chains, underscoring the urgency for antibiotic stewardship. The study introduces IgY-based immunotherapy as a promising, environmentally safe alternative, supporting national and regional AMR-mitigation strategies within a unified One Health framework.

Keywords: One Health, *Salmonella*, antimicrobial resistance, poultry, IgY antibody.

CREATIVE PATHS: CULTURAL RESONANCE FOR ENVIRONMENTAL ADAPTABILITY, TRADE, INNOVATION, AND VITAL ECOSYSTEMS

Solmaz Hazratgholizad^{1,2,3}, Soudabeh Davaran^{2,4}, Peyman Keyhanvar^{2,5,6,7,3*1}

¹*Department of Business Administration, Faculty of Business Administration and Management Science, Marmara University, Istanbul, Türkiye*

²*Engineered BioMaterials Research Center (EBMRC), Khazar University, Baku, Azerbaijan*

³*Department of Innovation, ARTANI100 Startup Accelerator, Arman Tose'e Azerbaijan Noavar Inc, Tabriz, Iran*

⁴*Department of Medical Chemistry, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran*

⁵*Department of Genetics and Bioengineering in Yeditepe University, Istanbul, Türkiye*

⁶*Medical Philosophy and History Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*

⁷*Medical Nanotechnology Department, Faculty of Advanced Medical Sciences, Tabriz University of Medical Sciences, Tabriz, Iran*

This study introduces CREATIVE PATHS (Cultural Resonance for Environmental Adaptability, Trade Innovation, and Vital Ecosystems), a novel framework leveraging arts and humanities to transform sustainable trade and green economy within the One Health paradigm. Through a qualitative analysis of 30 global reports, 10 policy documents, and the Eco-Art Trade Forum case study (2024–2025), we demonstrate that arts-driven interventions enhance stakeholder engagement by 70%, fostering carbon-neutral supply chains and biodiversity conservation (45% increase in community efforts). CREATIVE PATHS integrates cultural resonance (storytelling), environmental adaptability (eco-tariffs), trade innovation (blockchain), and vital ecosystems (community initiatives), yielding 15 cross-border trade agreements and reducing climate-related trade losses by 30%. Aligned with the 4th International One Health Conference and the Planetary Health Alliance's 10th anniversary, this framework amplifies regional-global synergies, offering a scalable model for equitable, culturally informed economic transitions to mitigate climate change and advance environmental health.

Keywords: Green Economy, Sustainable Trade, Arts and Humanities, Climate Change, Environmental Health, One Health, CREATIVE paths

BEST PRACTICES IN TECHNICAL AND TECHNOLOGICAL SOLUTIONS FOR ENSURING MICROBIOLOGICAL SAFETY

Shikhseyidova G.A.

Azerbaijan State University of Economics, Baku, Azerbaijan

The modern public health system encounters numerous challenges in maintaining microbiological safety. As awareness of healthy and sustainable lifestyles continues to rise, healthcare institutions and disinfectant manufacturers are working to enhance their technological approaches. This review aims to provide an interdisciplinary analysis of technical, technological, and medical studies focused on developing and scaling best practices in health-preserving solutions that ensure microbiological safety within the public health sector. It is essential to organize and evaluate research from diverse scientific and technological disciplines that focus on applying best practices in health-preserving solutions to ensure microbiological safety. At the same time, special attention should be given to addressing the challenge of persistent bacterial biofilm formation, a common issue in medical and biotechnological environments resulting from microorganisms' ability to adhere to and proliferate on different surfaces. Modern public health systems face a number of challenges related to ensuring microbiological safety. In light of growing awareness of the importance and sustainability of a healthy lifestyle, healthcare institutions and disinfectant manufacturers are striving to improve their technical and technological solutions. It is important to systematize and analyze research from various fields of science and technology aimed at implementing best practices for health-preserving solutions while ensuring microbiological safety. It is also important to highlight the need to address the problem of persistent bacterial biofilm formation, which is common in the medical and biotechnological fields due to the ability of microorganisms to adhere to and grow on various surfaces. The purpose of this review is to conduct an interdisciplinary analysis of technical, technological, and medical research to develop and scale up best practices for health-preserving solutions to ensure microbiological safety in public health. This review includes articles from the Scopus, RSCI, and RINTS databases, covering the time period from 2013 to 2023. It examines the challenges faced by various institutions and enterprises in ensuring the microbiological safety of their services and products and presents possible solutions. One of the key aspects of microbiological safety in the food industry is the effective control and prevention of pathogenic microorganisms. To this end, enterprises employ various methods, including sanitary and hygienic measures, thermal processing of products, the use of

antimicrobial agents, and rigorous quality control of raw materials. This interdisciplinary review demonstrates that many approaches to improving microbiological safety have been explored. However, the problem of biofilm disintegration remains unresolved. The data from this review will help improve technical and technological solutions for ensuring health-preserving microbiological safety in healthcare facilities and food service establishments.

Keywords: Public Health, microbiological safety

THE GUT MICROBIOME AS A RISK FACTOR FOR ANASTOMOTIC LEAKAGE IN COLORECTAL CANCER SURGERY

Ilgar Ismayilov,¹ Eugeny Gelfgat¹, Aygun Qurbanly²

¹*Republican Medical Center, Baku, Azerbaijan.*

²*Azerbaijan Medical University, Baku, Azerbaijan.*

Colorectal cancer is the third most commonly diagnosed oncological disease and is frequently accompanied by serious postoperative complications, among which anastomotic leakage is paramount. Despite decades of extensive research aimed at identifying perioperative risk factors for this complication, no substantial reduction in its incidence has been achieved, nor has a definitive understanding of its underlying mechanisms emerged. This situation has prompted a transition toward studying the fundamental pathogenesis of anastomotic leakage, including intratissue healing processes and intestinal microbiota dysbiosis. Current evidence convincingly demonstrates that the gut microbiome and changes in its composition play a critical role in the postoperative course and the development of complications in colorectal surgery. Standard preoperative mechanical bowel preparation, antibiotic prophylaxis, and chemoradiotherapy reduce intestinal immune activity, alter the balance of Gram-positive and Gram-negative bacteria, increase the prevalence of Enterobacteriaceae and Proteobacteria, and decrease Lactobacillus populations. Surgical intervention—specifically bowel resection followed by anastomosis—acts as a major physiological stressor and is accompanied by transient ischemia of the resected segment, exposure of tissues to oxygen, and uncovering of extracellular matrix components. These factors facilitate the transformation of commensal bacteria such as *E. faecalis* into pathogenic phenotypes with high collagenolytic activity. Collagen, fibronectin, and laminin—key components of the extracellular matrix—then become targets for bacterial adhesion, promoting biofilm formation and colonization by *E. faecalis* and *P. aeruginosa*. *E. faecalis* produces gelatinase (GeE), which degrades the submucosal layer of the intestine—its strongest load-bearing structure—composed predominantly of fibrin and collagen, and essential for anastomotic healing. Both *E. faecalis* and *P. aeruginosa* activate host matrix metalloproteinases (MMP-9) and plasminogen (PLG), accelerating the breakdown of collagen and fibrin. Furthermore, postoperative reductions in short-chain fatty acids (SCFAs), especially butyrate, result in energy deficiency in colonocytes, impaired re-epithelialization, and compromised immune function of the intestinal barrier. Thus, gut microbiomes influence

every stage of anastomotic tissue recovery—from immune response and restoration of barrier integrity to collagen synthesis, extracellular matrix maturation, and subsequent remodeling. Dynamic shifts in microbiome composition and the transformation of specific bacterial species into pathogenic phenotypes under the impact of preoperative interventions and surgical trauma may disrupt normal healing and increase the risk of anastomotic leakage. A deeper understanding of the pathogenesis of anastomotic leakage may substantially improve clinical outcomes in colorectal cancer surgery by supporting personalized pre- and postoperative modulation of the gut microbiome.

Keywords: Colorectal cancer surgery, gut microbiome, postoperative complications management.

FROM CAPACITY BUILDING TO LEADERSHIP: ADVANCING ONE HEALTH BIOSAFETY AND BIOSECURITY THROUGH THE EU CBRN COE PROJECT 100²

Gunay Rzayeva

Team Lead, Project 100 – Strengthening of Front Line Biosafety and Biosecurity Measures in Southeast and Eastern European Region

The Chemical, Biological, Radiological, and Nuclear (CBRN) domain remains a cornerstone of international public health security. Within this field, biosafety and biosecurity serve as critical pillars of the One Health framework, ensuring the protection of human, animal, and environmental systems from biological threats. Strengthening capacities in these areas requires sustained collaboration, policy integration, and inclusive leadership—principles embodied by the EU CBRN Centres of Excellence (CoE) Project 100. To enhance frontline biosafety and biosecurity measures across South East and Eastern Europe by fostering interagency cooperation, promoting gender-inclusive leadership, and advancing the integration of One Health principles into national frameworks. The EU CBRN CoE Project 100, funded by the European Union and implemented by the Science and Technology Center in Ukraine (STCU), engages ten partner countries—Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, and Ukraine. The project applies a multi-layered approach that includes:

- Regional capacity-building workshops;
- Development of Standard Operating Procedures (SOPs) for border and customs agencies;
- Cross-sector simulation exercises; and
- Promotion of women’s leadership through inclusive training and mentorship activities.

These efforts are complemented by strategic frameworks linking national biosecurity systems with international cooperation mechanisms such as DTRA’s Cooperative Threat Reduction (CTR) program. Project 100 has significantly enhanced regional preparedness through the establishment of shared biothreat monitoring mechanisms and sustainable training networks. The initiative demonstrates that effective One Health governance depends not only on technical and policy expertise but also on diverse, gender-balanced leadership capable of bridging disciplines and sectors. Lessons learned from P100’s transition strategy and regional implementation underline the

² strategic object: Cultivating Future Leaders in One Health Problem Solving

importance of sustainability, interagency trust, and women's empowerment in strengthening global biosafety and biosecurity resilience.

Keywords: One Health; biosafety; biosecurity; gender inclusion; CBRN; EU CBRN CoE Project 100; leadership; capacity building; Azerbaijan.

INVESTIGATION OF ADIPOKINES IN ISCHEMIC HEART DISEASE DEVELOPING IN CONJUNCTION WITH METABOLIC SYNDROME

Hasanova H.E., Azizova G.I.

Department of Biochemistry of Azerbaijan Medical University

Cardiovascular diseases, which remain relevant in the modern era and continue to attract considerable scientific attention, are considered one of the leading causes of mortality worldwide. The investigation of adipokines in ischemic heart disease developing against the background of metabolic syndrome, which is recognized as a significant pathology, has great scientific and practical importance in terms of early diagnosis and prediction of disease progression. Since changes in serum adipokine levels are highly sensitive to dietary composition and lifestyle factors, these parameters confirm the fundamental role of healthy nutrition in maintaining metabolic homeostasis in the human body. The variations in these indicators scientifically demonstrate how the interactions among the nutritional environment, lifestyle, and human health influence the formation of cardiometabolic risk within the framework of the One Health concept. The aim of the study is to investigate adiponectin, lipocalin-2, and resistin in ischemic heart disease developing in the context of metabolic syndrome and to determine the role of these parameters in the progression of the disease. The study included 120 individuals who applied to the Educational Surgical and Educational Therapeutic Clinics of Azerbaijan Medical University. Laboratory analyses were conducted at the Department of Biochemistry of Azerbaijan Medical University. Serum levels of adiponectin, lipocalin-2, and resistin - representatives of adipokines - were measured using the enzyme-linked immunosorbent assay (ELISA) method on the "Mindray BA-88A" analyzer. The patients included in the study were divided into two groups:

1. 55 individuals with ischemic heart disease and metabolic syndrome;
2. 45 individuals with only ischemic heart disease.

At the same time, a control group consisting of 20 practically healthy individuals was included. In the control group of 20 practically healthy individuals, the mean serum adiponectin concentration was 232.14 pg/ml. In the group of 55 patients with ischemic heart disease and metabolic syndrome, the mean adiponectin concentration was 145.84 pg/ml, while in the group of 45 patients with only ischemic heart disease, it was 141.34 pg/ml. In the control group, the mean serum lipocalin-2 concentration was 199.63 ng/ml. In the patient groups, lipocalin-2 levels were 173.49 ng/ml in the ischemic heart disease with metabolic syndrome group and 129.15 ng/ml in the

ischemic heart disease–only group. In the control group of 20 individuals, the mean serum resistin concentration was 30.84 ng/ml. In the second group (ischemic heart disease with metabolic syndrome), the mean resistin level was 29.41 ng/ml, while in the third group (ischemic heart disease only, 45 patients), it was 23.96 ng/ml. Based on the obtained results, it can be noted that, compared to the control group, the third group (patients with ischemic heart disease only) showed a greater decrease in adiponectin (39.11%), lipocalin-2 (35.3%), and resistin (22.3%) levels. The obtained results confirm that adipokines can be used as specific biomarkers for cardiovascular diseases and represent one of the main biochemical mechanisms influencing the course of the disease in the presence of abdominal obesity.

Keywords: Adipokine, adiponectin, lipocalin-2, resistin, metabolic syndrome.

MICROORGANISMS ISOLATED FROM WOUND CULTURE AND THEIR ANTIBIOTIC RESISTANCE

Leyla Hashimova¹, Leyla Mahmudova², Zulfyya Khalilova², Fatima Nasirli², Agashah Eminli²

¹Research Institute of Medical Prevention named after V.Y. Akhundov, Baku, Azerbaijan

²Azerbaijan Medical University, Education Surgery Clinic-Doctor, Baku, Azerbaijan

Wound infections are one of the main causes of delayed wound healing, chronicity, increased morbidity and mortality. These infections create a significant financial burden on the health system by prolonging hospital stays. Increasing antibiotic resistance in bacteria is an important health problem in Azerbaijan, as in other countries. These infections are estimated to kill more than 10 million people by 2050. (O'Neill, 2014; Aslam et al. 2018). Therefore, in the treatment of wound infections, culture and antibiotic susceptibility testing are believed to prevent the spread of resistant bacteria, helping the clinician to treat the wound successfully. The goal of our study is to retrospectively evaluate pathogenic microorganisms isolated from wound samples, to determine antibiotic resistance and to guide empirical treatment selection. Bacteria isolated from the wounds of 134 patients between January 2020 and January 2023 in the Education-Surgical Clinical Diagnosis Laboratory of Azerbaijan Medical University and their antibiotic susceptibility are evaluated retrospectively. Samples from skin infections such as folliculitis, carbuncle, impetigo, surgical site infections, traumatic wound infections, decubitus ulcers and closed abscesses are included in the study. All samples are incubated on 5% sheep blood, Eosin Methylene Blue (EMB), Sabouraud Dextrose and 5% horse blood Brucella (carbon dioxide enriched) agar at $35 \pm 2^{\circ}\text{C}$ in an aerobic atmosphere for 18-24 hours. Meanwhile, gram-stained preparations of the samples are also examined. Culture petri dishes are evaluated with Gram stain results after 24 hours. Colonies of up to three microorganisms are identified and antibiotic susceptibility tests are performed. Cultures producing >3 microorganisms are considered as contamination. Traditional methods and automated system VITEK 2 (bioMerieux/France) are used to identify the growing colonies and determine their antibiotic susceptibility. Antibiotic susceptibility tests are interpreted according to EUCAST (European Committee on Antimicrobial Susceptibility Testing) criteria. Microorganisms grew in 88 (65.6%) of 134 wound samples. One microorganism developed in 64 (72.7%) of 88 samples, two microorganisms in 22 (25%), three microorganisms in 2 (2.3%), a total

of 114 bacteria developed. Out of these, 65 (57%) were Gram-positive, 41 (36%) were Gram-negative bacteria and 8 (7%) were *Candida*. 62.5% of *Staphylococcus aureus* strains were methicillin resistant (*MRSA*), and 59% of the *CNS* were methicillin resistant (*MRCNS*). 73% of *E.coli* strains were ESBL positive. The most common bacteria in the wound samples examined were *S. aureus* and *Escherichia coli*. *CNS* and *S.aureus* were non-resistant to vancomycin, teicoplanin, linezolid and tigecycline. Amikacin was the most effective antibiotic against non-enzymatic gram-negative bacilli. Antibiotic prophylaxis, judicious use, and implementation of organized wound observation systems were concluded to be the most effective ways to reduce the rate of wound infection to the lowest pathophysiologically possible. For the rational use of antibiotics, microorganisms causing wound infections and antibiotic susceptibility should be determined. Thus, it is believed to prevent the inappropriate use of antibiotics and the formation of resistance.

Keywords: Wound culture, wound infections, bacteria, antibiotic resistance

STUDYING THE IMPACT OF *MICROSPORUM SPP.* INFECTION ON ANIMAL AND PUBLIC HEALTH: A ONE HEALTH APPROACH

Narmin Alasgarova¹, Asaf Omarov²

¹*Department of Epizootiology, Microbiology and Parasitology, Azerbaijan State Agricultural University, Ganja, Azerbaijan*

²*School of Agriculture and Food Sciences (SAFS), ADA University, Baku, Azerbaijan*

Microsporia is an infectious disease of fungal etiology, which is widespread around the world. During the study period, out of 305 animals examined, Microsporia disease was detected in a total of 114 animals, including 65 cats and 49 dogs. The highest incidence of Microsporia was recorded in Baku, with 57.7% among cats and 37.5% among dogs. The highest incidence of infection among cats was 51.4% among the 2-4 age group, and the lowest incidence was 29.7% among the 4-year-old and older group. The highest incidence of infection among dogs was 63.6% among the 4-year-old and older group, and the lowest incidence was 9.2% among the 0-2-year-old group. According to the results of the examinations conducted by season, the highest incidence of infection among dogs and cats was recorded in the spring, with 53.3% and 71.4%, respectively. The lowest incidence of infection among cats and dogs was recorded in the summer, with 7.6% and 5.2%, respectively. The infection rate among cats was 45.4%, predominantly among female cats, and among dogs, the infection rate was 44.5%, predominantly among male dogs. *Microsporum spp.* infection is also a dangerous disease in terms of public health. According to the information provided by Dr. Nazira Ibrahimova, the vast majority of patients who apply for Microsporia in Baku are children and adolescents, mainly between the ages of 5 and 14. It is also reflected in the information of our doctors that sick children and adolescents are treated more often in Children's Dermatological Dispensaries and Polyclinics and Microsporia spreads among people more often in the spring and autumn seasons of the year, and in delayed cases in the winter season. Microsporia was detected in 39 of the 72 patients registered as suspected.

Keywords: Microsporia, cat, dog, public health, *Microsporum spp.*

INTERLEUKIN-1 SIGNALING PATHWAY RELATIONSHIPS WITH INFLAMMATION-ASSOCIATED TYPE 1 AND TYPE 2 DIABETES MELLITUS

^{1,2,*} **Mustafayev Nurmammad**, ¹**Akhundova Lala**,
² **Mammadli Hikmat**, ³ **Mustafayeva Turkey**

^{1,2,*}*Institute of Molecular Biology and Biotechnologies, Ministry of Science
and Education of the Republic of Azerbaijan, Baku, Azerbaijan;*

²*Baku State University, Ministry of Science and Education of the Republic
of Azerbaijan, Baku, Azerbaijan*

³*Odlar Yurdu University, Baku, Azerbaijan*

Inflammation, particularly in its chronic and acute forms, and immune system dysfunction are considered to be among the main causes of various diseases, including infectious diseases, different types of cancer, and metabolic disorders. Anti-inflammatory activity begins with a signalling pathway triggered by the pro-inflammatory cytokine interleukin-1 (IL-1). This pathway plays a central role in inflammatory processes and also plays a significant role in the pathogenesis of both types of diabetes mellitus (DM): the autoimmune type 1 DM and the mainly metabolic type 2 DM. IL-1 is a potent proinflammatory cytokine that exists in two main active forms: IL-1 α and IL-1 β . These forms transmit signals through the type I receptor, IL-1R1, a process regulated by an endogenous antagonist, IL-1Ra, which binds to the receptor. The anti-inflammatory response process begins with the recognition of inflammation-inducing agents, such as pathogens or cellular components released due to mechanical damage. This recognition is carried out by receptors that recognize inflammation, also known as pattern-recognition receptors (PRRs). These molecular patterns fall into two categories: PAMPs (pathogen-associated molecular patterns), which are structures that are characteristic of microorganisms (e.g. bacterial LPS, flagellin and viral RNA); and DAMPs (damage-associated molecular patterns), which are signals that are released from damaged or dying cells (e.g. ATP, uric acid crystals and nuclear DNA). The main component of the IL-1 pathway, IL-1 β , is primarily activated from its pro-form through the formation of inflammasome complexes (e.g. NLRP3). It is mainly secreted by macrophages, stressed beta cells and other immune cells. IL-1 signalling promotes inflammation in blood and tissues by enhancing intracellular stress pathways, oxidative damage, and apoptosis. This can severely impair the function of pancreatic β -cells, which are responsible for synthesising insulin. Consequently, β -cell destruction may occur, leading to the development of autoimmune type 1 diabetes mellitus (T1DM). It is also believed that chronic

inflammation contributes to the development of insulin resistance and thus plays a role in the onset of type 2 diabetes mellitus (T2DM). The IL-1 signalling pathway involves receptors and various adaptor proteins. It can be summarised as follows: when IL-1 β and IL-1 α bind to the IL-1R1 receptor, they form a complex with the IL-1 receptor accessory protein (IL-1RAcP). This complex then recruits the adaptor protein MyD88, which subsequently activates IRAK (IL-1 receptor-associated kinase) and TRAF6 (TNF receptor-associated factor 6). The signal then proceeds to activate the NF- κ B and MAPK (ERK, p38, JNK) pathways. Activated NF- κ B and AP-1 (Activator Protein-1) transcription factors increase the expression of other proinflammatory cytokines such as TNF- α , IL-6, and IL-8. Consequently, the synthesis of mediators such as nitric oxide synthase (NOS), COX-2, adhesion molecules, and apoptosis-related genes is enhanced. Inflammatory responses mediated by IL-1 triggers different process such as synthesis of prostaglandin E₂ via the hypothalamus, the upregulation of adhesion molecules in endothelial cells, the activation of lymphocytes and the stimulation of acute-phase protein synthesis (e.g. C-reactive protein (CRP) and serum amyloid A (SAA)). Mutations in the genes encoding the IL-1 receptor (IL-1R1), its agonists (IL-1 α , IL-1 β), or its antagonist (IL-1Ra) can significantly affect gene expression and the proper folding of active proteins. An excess of IL-1, particularly IL-1 β leads to the destruction of pancreatic β -cells, which in turn causes the development of T1DM. In this process, the synergistic action of cytokines such as IL-1 β , TNF- α , and IFN- γ plays a crucial role. The mechanisms involved can be briefly summarized as follows: 1) Macrophages and T-lymphocytes recognize autoantigens on the surface of β -cells and secrete IL-1 β ; 2) IL-1 β increases the synthesis of nitric oxide (NO) in β -cells, leading to mitochondrial damage and apoptosis; 3) Activation of NF- κ B promotes the expression of proapoptotic genes such as Bax, Fas, and iNOS; 4) Prolonged exposure to IL-1 reduces β -cell regeneration and insulin secretion. Overall, this cascade of immune and inflammatory events contributes to β -cell dysfunction and destruction, playing a key role in the pathogenesis of autoimmune type 1 diabetes. Unlike T1DM, T2DM is triggered by low-grade chronic inflammation, which leads to insulin resistance (IR). This process can be summarised briefly as follows: 1) During insulin resistance, adipose tissue and monocytes increase the production of IL-1 β , TNF- α and IL-6; 2) IL-1 β disrupts insulin receptor signalling by altering the phosphorylation of IRS-1 (insulin receptor substrate-1), which weakens downstream signal transduction; 3) This impairs GLUT4 translocation, preventing glucose uptake into cells; 4) Consequently, blood glucose levels rise, β -cells experience metabolic stress and undergo apoptosis; 5) β -cell damage due to apoptosis and glucotoxicity (high

intracellular glucose levels) activates the NLRP3 inflammasome, which in turn enhances IL-1 β secretion; 6) Elevated IL-1 β worsens β -cell dysfunction further and decreases insulin secretion; 7) Prolonged IL-1 β exposure ultimately reduces β -cell mass, leading to insulin deficiency. It should be noted that in both forms of diabetes, patients typically exhibit elevated serum IL-1 β levels and reduced IL-1Ra levels. Therefore, blocking the IL-1 signaling pathway is considered a promising therapeutic strategy for both T1DM and T2DM. The anti-inflammatory drug Anakinra (Kineret) - a recombinant human IL-1 receptor antagonist (rhIL-1Ra) - has been shown to reduce blood glucose and HbA1c levels in T2DM while preserving β -cell function. Another therapeutic agent, Canakinumab, a monoclonal antibody against IL-1 β , decreases systemic inflammatory markers and improves insulin sensitivity. A third promising drug, Riloncept, an IL-1 trap (decoy receptor), helps reduce chronic inflammation and β -cell damage, offering further potential in diabetes management.

Keywords: Type-1 and type-2 diabetes mellitus (T1DM, T2DM), inflammation, inflammasome, cytokine, anakinra, diseases, mutations

**CLIMATE CHANGE, TECHNOLOGY AND COLLECTIVE
ADAPTATION
BY ARTISANAL FISHERIES IN THE CASPIAN SEA**

Oane Visser, Ilaha Abasli, Nina Swen
International Institute of Social Studies (ISS)
of Erasmus University Rotterdam, The Netherlands

The Caspian Sea faces profound changes from climate and anthropogenic influences, including receding water levels, eutrophication, and rising temperatures. This has further exacerbated the already challenging conditions faced by artisanal fishers. The historic and large-scale oil and gas extraction from the Caspian Sea has adversely affected the fish population and migration patterns, and the overarching alterations to the sea related to climate change have resulted in the arrival of invasive species and diminishing fish diversity, quality and abundance. In the midst of these transformations, artisanal fishers are encountering new ways to adapt and relate to the Caspian Sea, fostering collective practices in contrast to conflict-driven responses elsewhere. These include the pooling of resources to acquire low-cost technologies like GPS trackers and life vests, enabling navigation in deeper waters. WhatsApp groups and gatherings at Cayxanas (tea houses) facilitate the exchange of information on weather events, migration patterns, and recipes for preparing fish that was previously considered “poor mans’ food. Rooted in a fishermen’s code of conduct emphasizing territorial respect and equitable fish distribution, fishermen engage in these practices in an effort to sustain their families and preserve fishing culture. This paper presents a compelling case of solidarity-driven adaptation, reshaping norms, values, and knowledge in fishing communities. In doing so, this paper contributes to understanding the evolving epistemic and sociotechnical dynamics that reshape relations with the sea.

Keywords: Climate change, anthropogenic influences, adaptation, migration, Caspian Sea

HOW FORENSIC ANTHROPOLOGY RESEARCH RELATES TO ENVIRONMENTAL CONSERVATION AND HUMAN HEALTH

Ibragimov A.Sh.¹, Tomaeva L.R.², Aliyev I.S.³

¹Department of Life Sciences, Khazar University,

²Institute of Archaeology and Anthropology, ANAS,

³Scientific and Practical Association “Forensic Examination and Pathological Anatomy,” Ministry of Health of the Republic of Azerbaijan

This study presents the results of graphical reconstructions of two individuals who inhabited the territory of present-day Azerbaijan during the 3rd–4th centuries AD and the 14th–17th centuries AD. Data on forensic anthropology research that can help environmental conservation are also presented. The primary goal of this study is to demonstrate the potential of computer-assisted 3D facial reconstruction techniques for visualizing the appearance of unidentified individuals based on cranial remains. By illustrating the possibilities of modern craniometric diagnostic methods, the study aims to promote broader scientific and public interest in historical anthropology. The research was based on cranial materials obtained from archaeological excavations. Standard craniometric measurements were conducted following the established procedures recommended by R. Martin [Martin R., Saller K., 1956–1962]. The dataset comprised 74 craniometric variables, including 58 absolute dimensions and 18 indices. Forensic anthropological analysis was carried out to identify group characteristics, anthropological type, and the chronological typology of the skulls. Facial reconstructions were conducted using 3D visualization techniques developed by M.M. Gerasimov and further refined by his successors. [Veselovskaya E.V., 2016]. The analysis revealed that one skull belonged to a male representing the Caspian anthropological subtype of the Caucasoid race. His estimated age at death was between 30 and 37 years. Genetic testing confirmed biological affinity with present-day Azerbaijani populations, while radiocarbon dating of the bone material placed his lifetime within 206–347 AD. The second skull belonged to a female of the Caucasoid race exhibiting a mixed phenotype, combining features of the Caspian and Caucasian anthropological types. Her age at death was approximately 28–35 years, and her estimated living stature ranged between 161 and 165 cm. The medico-biological and socio-anthropological profiles of the unidentified individuals (whose skulls were examined) were submitted to the Human Appearance Reconstruction Laboratory “Other Worlds Studio,” whose specialists reconstruct facial appearance in isometric projection using M.M. Gerasimov’s method enhanced with advanced computer technologies. As a result, photorealistic reconstructions of these medieval

individuals were produced, and corresponding AI-generated animations were created. For the first time, this study presents graphical reconstructions of individuals from the medieval history of Azerbaijan. The findings highlight the effectiveness and promising prospects of interdisciplinary collaboration between forensic experts, historical anthropologists and ecologists, demonstrating how technological advancements can enrich our understanding of the human past.

Keywords: Environmental protection, historical anthropology, facial reconstruction from the skull, medieval Azerbaijan.

FROM NANO TO NATURE: INTEGRATING BIONANOTECHNOLOGY AND NANOBIO TECHNOLOGY TOOLS AS NEXT-GENERATION ANTIMICROBIALS TO REWRITE THE RULES OF MICROBIAL RESISTANCE

Peyman Keyhanvar^{1,2,3*}, **Soudabeh Davaran**^{2,4}

¹ *Department of Genetics and Bioengineering in Yeditepe University, Istanbul, Türkiye*

² *Engineered BioMaterials Research Center (EBMRC), Khazar University, Baku, Azerbaijan*

³ *Medical Nanotechnology Department, Faculty of Advanced Medical Sciences, Tabriz University of Medical Sciences, Tabriz, Iran*

⁴ *Department of Medical Chemistry, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran*

Antimicrobial Resistance (AMR) represents a global health crisis, with the World Health Organization estimating over 700,000 annual deaths and projecting up to 10 million by 2050 if unchecked. This phenomenon arises from mechanisms such as efflux pumps, target site modifications, and biofilm formation in multidrug-resistant (MDR) bacteria like methicillin-resistant *Staphylococcus aureus* (MRSA) and extended-spectrum β -lactamase-producing *Escherichia coli*. Traditional antibiotics are increasingly ineffective, necessitating innovative, multifaceted strategies. The purpose of this study is to explore the role of nanobiotechnology and bionanotechnology in combating AMR by leveraging nanoscale materials (1-100 nm scale) for enhanced drug delivery, targeted disruption of bacterial defenses, and sustainable synthesis methods. These technologies integrate biological principles with nanomaterials to improve permeability, stability, and specificity, minimizing resistance development while aligning with One Health principles for human, animal, and environmental health. This review and experimental analysis synthesized silver nanoparticles (AgNPs) via green biosynthesis using plant extracts (Aloe vera) and animal bioreactor cultures (hepatocyte cell lines from *Mus musculus*), alongside bacteriophage-derived nanoparticles. Methods included: (1) Green synthesis of AgNPs (10-50 nm) by incubating silver nitrate (1 mM) with Aloe vera leaf extract (10% v/v) at 60°C for 2 hours, characterized by ultraviolet-visible spectroscopy (UV-Vis, $\lambda_{\text{max}} = 420$ nm), transmission electron microscopy (TEM), and zeta potential analysis (-25 mV for stability); (2) Bacteriophage nanoparticle fabrication by encapsulating T4 bacteriophages in chitosan nanoparticles (CS-NPs, 50-100 nm) via ionic gelation, loaded with lytic phages against MDR *Pseudomonas aeruginosa*; (3) Probiotic-nanoparticle hybrids formed by

encapsulating *Lactobacillus rhamnosus* in liposomal nanoparticles (lipid bilayer, 100-200 nm) using thin-film hydration. In vitro assays assessed minimum inhibitory concentration (MIC) via broth microdilution (Clinical and Laboratory Standards Institute guidelines), biofilm disruption by crystal violet staining, and reactive oxygen species (ROS) generation via 2',7'-dichlorodihydrofluorescein diacetate (DCFH-DA) assay. Animal models (BALB/c mice) evaluated in vivo efficacy against MRSA-induced skin infections (n=30, ethical approval: IACUC-2024-045). Data were analyzed using ANOVA (p<0.05) in GraphPad Prism v9. (c) Summarized Results Green-synthesized AgNPs exhibited potent antibacterial activity, reducing MIC of vancomycin against MRSA from 16 µg/mL to 1 µg/mL (16-fold decrease) by disrupting cell membranes and generating ROS (2.5-fold increase vs. controls). TEM images revealed membrane perforation in 85% of treated *E. coli* cells. Bacteriophage nanoparticles achieved 92% biofilm eradication in *P. aeruginosa* cultures (vs. 45% for free phages), with no resistance emergence after 10 passages, due to receptor-specific targeting. Probiotic-liposomal hybrids restored gut microbiota balance in simulated gastric conditions (pH 2.0), inhibiting *Clostridium difficile* growth by 78% and enhancing antibiotic synergy (4-fold MIC reduction for ampicillin). In vivo, topical AgNP-phage cocktails cleared MRSA infections in 85% of mice within 7 days (vs. 40% for antibiotics alone), with negligible hepatotoxicity (ALT levels <50 U/L). Bioreactor-based synthesis yielded 1.5 g/L AgNPs with 95% purity, reducing costs by 50% compared to chemical methods. Table 1 summarizes MIC reductions across strains.

Table 1: MIC Reduction by Nanobiotech Interventions

Nanoparticle Type	Target Bacterium	Baseline MIC (µg/mL)	Post-Treatment MIC (µg/mL)	Fold Reduction
Green AgNPs	MRSA	16	1	16
Phage-CS-NPs	<i>P. aeruginosa</i>	64	4	16
Probiotic-Liposomes	<i>C. difficile</i>	32	8	4

(Figure 1: TEM micrograph of AgNP-treated bacterial membrane disruption – not included here; rights secured from publisher.)

Nanobiotechnology and bionanotechnology offer transformative solutions to AMR by enabling targeted, resistance-minimizing therapies through green-synthesized nanoparticles, phage hybrids, and probiotic carriers. These approaches not only revive antibiotic efficacy but also promote sustainable,

One Health-aligned interventions. Future clinical trials are recommended to scale these innovations for global deployment.

Keywords: Antimicrobial Resistance, Nanobiotechnology, Bionanotechnology, Bacteriophage Nanoparticles, Green Synthesis, Probiotics

HEALTH IMPACT ASSESSMENT: INTEGRATING LOCAL AND REGIONAL SYSTEMS TRANSFORMATION FOR PLANETARY HEALTH SYSTEMS CHANGE IN RESPONSE TO CASPIAN SEA SHRINKAGE

Antonio Sarría-Santamera

Department of Biomedical Sciences, School of Medicine, Nazarbayev University

The Caspian Sea's alarming shrinkage—driven by climate-induced evaporation, diminished river inflows, and unsustainable extraction—poses a profound threat to planetary health systems. With water levels dropping nearly 1 meter in the past decade and forecasts of 5–18 meters by 2100, this crisis echoes the Aral Sea's collapse, unleashing saline dust storms carrying toxins that amplify respiratory, cardiovascular, and infectious diseases among 15 million coastal residents in Kazakhstan, Azerbaijan, and neighboring states. Within the One Health framework, this presentation advances a Health Impact Assessment (HIA) to catalyze local and regional systems transformation, fostering adaptive governance for planetary health systems change. Employing participatory HIA methodologies—encompassing epidemiological forecasting, community mapping, and scenario modeling—we assess interventions like integrated water basin management and eco-restoration projects. Early analyses pinpoint vulnerability clusters in the northern and southern littorals, projecting 20–30% surges in dust-linked morbidity without action. By prioritizing equity, HIA empowers marginalized groups, such as artisanal fishers and nomadic herders, through localized resilience-building, while scaling to regional transboundary protocols under the Tehran Convention. Central to this approach is public health diplomacy, leveraging collaborative forums to bridge geopolitical divides, secure funding for green infrastructure, and co-develop monitoring networks. This diplomacy not only mitigates zoonotic risks from habitat fragmentation but also models scalable pathways for planetary health systems change, aligning local innovations with global sustainability goals. Ultimately, embedding HIA in local and regional systems transformation equips Caspian nations to transform ecological peril into opportunities for equitable, resilient health futures.

Keywords: Shared ecosystems, Public Health Diplomacy, Planetary Health Systems change, opportunities, Caspian Sea

INVESTIGATION OF PARASITIC INFECTIONS IN HUMANS AND RUMINANT DOMESTIC ANIMALS IN AZERBAIJAN AND THE DEVELOPMENT OF PREVENTIVE AND CONTROL STRATEGIES

R.Sh.Ibrahimova

*Institute of Zoology of the Ministry of Science and Education of the Republic
of Azerbaijan*

As a result of the conducted research, a total of 62 species of parasitic worms were identified in stray dogs and cats. Among them, 39 species pose a potential epizootic threat by infecting ruminant and other domestic animals with dangerous parasitic worms, while 25 species have significant epidemiological importance due to their ability to infect humans. Stray dogs and cats contribute to the spread of “parasitic contamination” in the environment through the dissemination of parasite eggs via their excreta. Determining the role of stray dogs and cats in the circulation and widespread distribution of dangerous parasitic diseases among humans and domestic animals, as well as developing comprehensive control and preventive measures against their spread, has been considered necessary and appropriate. In Azerbaijan, parasitic diseases affecting humans and ruminant domestic animals continue to remain a significant challenge for both veterinary medicine and public health. In large residential areas, the substantial reduction or complete eradication of parasitic diseases originating from humans, ruminants, and other domestic animals is among the most important public health and veterinary priorities. The primary objective of this study is to determine the crucial role of stray dogs in the circulation of dangerous parasitic worms in nature and their transmission to humans and ruminant domestic animals. Furthermore, the study aims to develop preventive and control measures to protect human health, increase the productivity of ruminant livestock, and safeguard the environment from “parasitic contamination.” Stray dogs and cats are the primary sources of infection and the main factors ensuring the transmission of parasitic disease agents to humans and animals, particularly to ruminant domestic animals. As components of biocenosis, stray dogs and cats play a key role in maintaining parasitic invasions and are considered more dangerous than other animals in the spread of pathogenic helminths within synanthropic foci. By entering farms, private households, and even kindergartens, stray dogs and cats contribute to the transmission of parasitic diseases, posing serious epizootiological and epidemiological threats from both veterinary and medical perspectives. Because these animals are highly adaptable to various

environmental conditions, they remain active in nature throughout all seasons of the year. Through their excreta, they release eggs of dangerous helminths into the environment, causing an ecologically significant phenomenon known as “parasitic contamination.” Domestic animals become infected by ingesting parasite eggs dispersed in the environment, which leads to substantial economic losses in livestock farming and poses serious public health risks to humans. When parasitic contamination persists in the environment for a prolonged period, strong parasitic foci are formed in these areas. These foci are maintained by stray animals, contributing to the expansion of invasion zones. Parasitic contamination is considered highly dangerous for synanthropic environments. Widespread parasitic diseases lead to the death of animals particularly young offspring causing emaciation, stunted growth, reduced weight gain, decreased reproductive capacity, and, in severe cases, mortality. These infections significantly reduce the overall productivity of animals across all physiological and production indicators, ultimately resulting in considerable economic losses in livestock farming. The larval stage of *Echinococcus granulosus*, a dangerous causative agent of parasitic disease, leads to a decline in all productivity indicators of ruminant domestic animals including meat, milk, wool, and reproductive performance and negatively affects the quality of meat. In its adult stage, the parasite localizes in the internal organs of humans, primarily in the liver, occasionally in the lungs, and, in rare cases, in other organs, causing severe health complications. *Echinococcosis* can only be treated through complex surgical intervention, which often results in a mortality rate of up to 30%. The eggs and larvae of certain parasitic worm species, such as *Ancylostoma caninum* and *Toxascaris leonina*, can cause severe parasitic diseases when they enter accidental hosts, including humans and other domestic animals. In non-specific host organisms, the larvae migrate abnormally through various tissues, intensifying the pathological effects of the parasites and causing serious pathological conditions during their movement. When the intensity of parasitic worm infestation is high (e.g., *Dipylidium caninum*, *Toxascaris leonina*, *Trichinella spiralis*), the parasites may intertwine within the intestine, forming tangled masses. This can lead to intestinal obstruction and, in severe cases, perforation of the intestinal wall, which often results in fatal outcomes. The presence of *Cysticercus* in the brain, *Echinococcus* in the liver, and *Ascaris* in the intestines causes severe damage and dysfunction of these organs, leading to serious parasitic diseases. Several parasitic infections progress silently within the host organism, remaining unnoticed for long periods. During this latent phase, the body gradually weakens, and the development and functional activity of individual organs as well as the entire organism are significantly impaired. Therefore, identifying the role of stray

dogs and cats in the circulation, wide distribution, and transmission of dangerous parasitic diseases among humans, domestic animals, and in nature, as well as developing effective control measures against them, is of great relevance in modern times. This issue possesses both theoretical and practical significance for public health and veterinary science in Azerbaijan. As a result of long-term research conducted in Azerbaijan, thirteen species of parasitic worms identified in stray dogs and cats have been classified as the main causative agents of parasitic diseases based on their pathogenic characteristics and degree of danger. These include *Diphylobothrium latum*, *Dipylidium caninum*, *Echinococcus granulosus*, *Taenia hydatigena*, *Multiceps multiceps*, *Alveococcus multilocularis*, *Trichinella spiralis*, *Ancylostoma caninum*, *Uncinaria stenocephala*, *Toxascaris leonina*, *Toxocara canis*, *Toxocara mystax*, and *Dirofilaria repens*. Out of the 62 parasitic worm species identified, 39 species have epizootiological significance for ruminant and other domestic animals, while 25 species are of epidemiological importance for humans. Taking these factors into account, it is essential to implement comprehensive control measures to prevent the spread of dangerous parasitic diseases between domestic animals and humans. To prevent the expansion of the distribution areas of the main zoonotic pathogens hazardous to humans and domestic animals, such as *Echinococcus granulosus*, *Taenia hydatigena*, and *Multiceps multiceps*, it is necessary to eliminate slaughtering sites that operate without veterinary oversight. Additionally, the disposal of infected organs from slaughtered ruminant animals into the environment should be strictly controlled by placing them in biothermal pits for proper decontamination. Stray dogs and cats consume these infected organs, initially becoming infected with highly pathogenic helminths themselves, and subsequently serve as sources of infection for humans and other domestic animals. In private and farm households, the number of stray dogs should be reduced to a minimum (not exceeding two animals), and strict supervision must be ensured over the administration of deworming treatments against major helminth infections, to be carried out four times per year. After deworming, the animals' excreta should be either deeply buried or treated with chemical agents to ensure safe disposal and prevent environmental contamination. To prevent the widespread distribution of major zoonotic pathogens in ruminant domestic animals, such as *Fasciola*, *Dicrocoelium*, and *Protostrongylus* species, it is necessary to drain ponds where intermediate hosts, particularly freshwater snails, develop. Additionally, areas should be cleared of infected ants, and animals should be grazed only on pastures with minimal presence of snails and ants to reduce the risk of infection. To minimize the risk of parasitic worm transmission, the use of pastures should be systematically planned and managed. To prevent intensive infections,

grazing should be restricted in areas with high snail populations, particularly during rainy periods, whenever possible. The primary measure to prevent infection with *Taenia* species (taeniasis) is to avoid the consumption of meat that has not undergone veterinary inspection and proper cooking. During the hunting season, the skins and carcasses of hunted animals should not be discarded into the environment. *Trichinella spiralis*, which parasitizes the muscles, can remain viable in the environment for extended periods. Other animals that feed on these carcasses may become infected with *Trichinella* larvae, leading to the development of trichinellosis. It is essential to control the population of stray dogs and cats, which play a decisive role in the environmental spread of species such as *Ancylostoma caninum*, *Uncinaria stenocephala*, *Toxascaris leonina*, *Toxocara mystax*, and *Toxocara canis*, and to implement appropriate measures in this regard. Measures should be developed to prevent the proliferation of intermediate hosts such as insects, reptiles, and rodents for numerous dangerous helminths, and to disrupt the connections between stray dogs and cats and these intermediate hosts. This is particularly important for controlling species such as *Dipylidium caninum*, *Alveococcus multilocularis*, *Dirofilaria repens*, *Aelurostrongylus strongylina*, *Moniezia lineatus*, *Hymenolepis taeniaeformis* and *Joyeuxiella echinorhynchoides*. To prevent infection with *Diphyllobothrium* species, fish should not be consumed raw or undercooked. To avoid *Echinococcus* and *Dipylidium* infections, contact with stray dogs and cats should be limited. To prevent trichinellosis, meat must be thoroughly cooked, especially when preparing dishes such as kebabs. To reduce the risk of infection with *Toxocara*, *Ancylostoma*, and *Uncinaria* species, it is essential to prevent children from ingesting parasite eggs and larvae while playing in contaminated soil. It is essential to protect the environment from parasitic contamination by major helminth pathogens and to strictly adhere to sanitary and hygiene regulations. Eggs of dangerous nematodes, certain cestodes, and their residues in the soil can remain viable and infectious for 17–20 months, maintaining their ability to cause infection. During periods of intensive contamination, it becomes necessary to decontaminate the soil from helminth eggs and larvae to prevent the spread of infection. To address major helminth infections in humans and ruminant domestic animals, and to protect the environment from “parasitic contamination,” strict adherence to veterinary and sanitary regulations is essential. Veterinary personnel and farmers must continuously monitor this issue, while public awareness campaigns and educational efforts in farms should be strengthened. Furthermore, preventive and control measures developed and implemented by our team must be rigorously followed. Based on the results of the implemented measures, the developed preventive strategies will contribute to the health of humans and

domestic animals, as well as ensure the production of ecologically safe and sustainable livestock products.

Keywords: stray dogs, domestic cats, parasitic diseases, epizootiology, epidemiology

STUDYING NEGATIVE CONSEQUENCES OF HUMAN MIGRATIONS DRIVEN BY DROUGHTS AND WATER SCARCITY

Rovshan Karimov

Khazar University, Baku, Azerbaijan

This research is about how droughts and water scarcity adversely affect the living and welfare of rural communities, pushing them to migrate to other areas. Nowadays, continuous droughts and water shortage lead to migrations through loss of fertility of land, loss of biological resources, reduced income, water insecurity, and insufficient food supply. In longer perspective, droughts and water shortage serve as a reason for abandonment of rural life and ‘rural-to-city’ migrations. Migration is regarded as a coping mechanism to reduce drought-driven loss and improve welfare in recipient water-rich areas. Such forced displacements are associated with various risks and health problems among displaced population, deterioration of quality of life, tensions and conflicts among community members over resources, inadequate social behaviors, unfavorable demographic shift, etc. Highlighting the relationship of drought exposure and out-migrations, this research drives attention to vulnerability of affected communities in both areas of origin of migration and recipient areas. It aims to justify the relevance of drought-related displacements and emphasize concern over the potential consequences of such relocations. Through literature review, statistical analysis and survey method, the out-migrations from rural areas of Azerbaijan are considered on the example of the Neftchala and Guba cases. It is concluded that droughts and water scarcity is a crucial push factor of human migration in certain parts of the territory of Azerbaijan. As our research shows, if to consider the indirect impacts, the role of this factor is more influential with respect to the displacement of rural communities than economic ones.

Keywords: drought, water insecurity, migration, rural, recipient

ECOLOGICAL SAFETY IN AGRICULTURE AND HUMAN HEALTH

A.G.Guliyev, G.N.Khasiyeva, G.R.Jahangirova

*Institute of Soil Science and Agrochemistry,
Ministry of Science and Education of the Republic of Azerbaijan,*

The protection of human health and sustainable development are possible only under the condition that the environment possesses a healthy ecological state, alongside adequate medical services and lifestyle factors. In the present context, the production of environmentally friendly agricultural products is a key determinant of public health. The research was conducted under experimental conditions. The collected samples were analyzed using modern analytical methods, and Geographic Information System (GIS) technology was employed in field studies. In the modern era, the factors influencing human health are closely linked to agricultural production and the management of soil resources. Chemical, physical, and biological changes occurring in the soil environment affect not only the productivity of agroecosystems but also have a direct impact on human health. In particular, improper use of pesticides and other agrochemicals in agriculture, or their prolonged persistence in the soil, can lead to the transmission of these substances into plants, contamination of groundwater, and cumulative accumulation of toxins in the human body. This process damages soil microflora, undermines the ecosystem's self-recovery capacity, and reduces the sanitary quality of agricultural products. Under such conditions, the protection of human health cannot be achieved solely through medical interventions; sustainable management of soil resources, implementation of ecologically sound agrotechnological approaches, and scientifically grounded regulation of chemical use are of vital importance. Currently, water losses exceeding 50% in irrigation systems lead to the leaching of large amounts of nutrients from the soil and to irrigation-induced erosion, which results in significant economic and environmental damage for the country. Inefficient use of water also causes the groundwater level to rise closer to the surface. If this situation continues, within the next 4–5 years, the region will face waterlogging and salinization, rendering the land unfit for cultivation. The rise of groundwater levels closer to the surface reduces soil fertility, causes plant dehydration, and worsens living conditions, thereby creating additional risks for human health. Orchards in the Ujar, Agdash, Barda, and Agjabedi districts have already started to dry up. If this is not prevented, population migration will begin in those areas. All these findings demonstrate that soil and water issues are serious ecological factors affecting human health, and

their resolution should be prioritized not only within agricultural development but also within public health policy. The disruption of ecological balance, decline in productivity, and mismanagement of water resources directly threaten the production of safe food and the well-being of the population.

Keywords: Pesticide, groundwater, drainage, canal, water loss.

MULTIDISCIPLINARY COLLABORATION IN THE ONE HEALTH APPROACH: THE ROLE OF THE DIETITIAN

Sama Ibadzade

Akdeniz University, Baku, Azerbaijan

The One Health approach emphasizes that the well-being of humans, animals, and ecosystems is interconnected, requiring multidisciplinary collaboration. This paper explores the role of the dietitian as part of the One Health multidisciplinary team, bridging human nutrition with animal and environmental health to improve public health outcomes. Methods: A narrative review and synthesis of current One Health frameworks and nutrition literature were conducted to identify how dietitians contribute to One Health initiatives. Dietitians possess expertise in food and nutrition that complements the efforts of physicians, veterinarians, environmental scientists, and other professionals. They collaborate on food safety, nutrition security, and sustainable food system efforts – key One Health challenges. For example, dietitians promote safe food handling and healthy sustainable diets, which One Health recognizes as essential for human health. They also contribute to preventing non-communicable diseases (NCDs) through diet-based interventions that concurrently benefit environmental health (e.g. advocating plant-rich diets that reduce the environmental impact of food production). Conclusion: Integrating dietitians into One Health teams enriches the collaborative effort to attain optimal health for people, animals, and the environment. As nutrition professionals, dietitians help ensure that One Health strategies include robust nutritional planning – from combating malnutrition and foodborne illness to guiding sustainable dietary choices – thereby strengthening One Health outcomes.

Keywords: One Health; dietitian; multidisciplinary collaboration; Nutrition; Food Safety; Sustainable Diets

THE ECOLOGICAL STATE OF BAKU BAY: AN ASSESSMENT OF POLLUTION MECHANISMS AND PREDICTIVE MONITORING OUTCOMES

Nemat Hasanov

Caspian Complex Ecological Monitoring Department, Ministry of Ecology and Natural Resources, Azerbaijan

The Baku Bay, situated within the Azerbaijani sector of the Caspian Sea, is highly susceptible to contamination from domestic and industrial effluents. The influence of industrial waste is characterized by a dual-action mechanism: specifically, mechanical and toxicological effects, each underpinned by distinct operational pathways. The presentation employs effective environmental analysis to summarize the key findings and predictive outcomes derived from the monitoring and investigative studies undertaken in the Baku Bay by the Caspian Complex Ecological Monitoring Department.

Keywords: Baku Bay, domestic wastewater, industrial wastewater, petroleum products, biogenic substances, detergents, mechanical effects, toxic effects.

RETHINKING FOOD SYSTEMS: THE NEXUS OF INTERNATIONAL AGRI-FOOD TRADE AND 'ONE HEALTH' PERFORMANCE IN GLOBAL SUPPLY CHAINS

Vedat Caner, Çağtay Mersin

Istanbul Beykent University, Istanbul, Turkey

The globalization of food systems has created complex international agri-food supply chains, fundamentally linking global consumption patterns with local production practices. This conference theme of "Planetary Health" highlights the intricate connections between human, animal, and environmental well-being, which are nowhere more evident than in food production. While international trade in agricultural goods enhances food security and economic growth, it also exerts immense pressure. These pressures can incentivize cost-cutting in areas critical to 'One Health,' such as environmental management (e.g., pesticide overuse), animal welfare, and notably, the Occupational Health and Safety (OHS) of agricultural workers—the 'human' component often overlooked in environmental discourse. This study addresses the urgent need, aligned with the conference's goals, to understand how integration into global markets impacts the holistic 'One Health' performance of exporting nations, with a specific focus on food safety and worker safety. This study employs a quantitative panel data analysis of 40 low- and middle-income agricultural exporting countries over the period 2005-2023. The dependent variable is a composite 'One Health' index created by the authors, integrating key indicators relevant to the conference program: (1) food safety (e.g., foodborne illness rates), (2) worker safety (e.g., fatal occupational accident rates in agriculture, sourced from ILOSTAT), and (3) environmental health (e.g., agricultural CO₂ emissions). The primary independent variable is "agri-food trade openness" (agricultural exports as a % of GDP). Control variables include GDP per capita, rule of law, and foreign direct investment (FDI) in the primary sector. Fixed Effects models are used to analyze the net impact of trade integration on these interconnected health outcomes. Preliminary findings indicate a significant "regulatory spillover" effect. A high degree of trade integration, particularly with high-standard markets (e.g., the EU), is statistically associated with improvements in both food safety standards and reduced rates of agricultural worker fatalities. This suggests that the stringent non-tariff barriers (e.g., sanitary and phytosanitary standards, food safety regulations) of importing countries compel exporting nations to "race to the top," enhancing their domestic regulatory and physical capacity. However, the results also show a negative correlation between trade volume and the environmental health indicator, suggesting that current trade

models still externalize environmental costs. This finding directly addresses the conference's focus on identifying "human-made health threats" within our current systems. International agri-food trade presents a critical trade-off that is central to the Planetary Health discourse. While it can be a powerful driver for enhancing food safety and occupational safety standards, its current structure often compromises environmental health. Achieving the conference's goal of "sustainable and resilient food systems" requires policies that do not treat human, animal, and environmental health in isolation. We conclude that robust OHS practices for farmworkers and stringent environmental protections must be integrated into trade agreements and viewed not as barriers, but as essential components of a true 'One Health' approach to global trade.

Keywords: One Health, Planetary Health, Food Systems, International Trade, Agricultural Safety, Food Safety, Global Supply Chains.

REGENERATIVE POTENTIAL OF STEM CELLS IN NEUROCARDIAC REPAIR USING BIOCOMPATIBLE SCAFFOLDS: A ONE HEALTH APPROACH

Amirahmad Khandaghi¹, Hasti Sherafatnezhad², Soodabeh Davaran³

*¹Imam Reza Hospital, Department of Neurology, Tabriz University of
Medical Sciences*

*²Shahid Madani Hospital, Department of Cardiology, Tabriz University of
Medical Sciences*

*³Faculty of Pharmacy, Department of Medicinal Chemistry, Tabriz
University of Medical Sciences*

The increasing prevalence of neurocardiovascular disorders highlights the urgent need for integrative regenerative strategies that address both neural and cardiac dysfunctions while minimizing risks to patients and the environment. In this study, we explore the application of biocompatible and biodegradable scaffolds for the delivery and engraftment of multipotent stem cells aimed at simultaneous brain and heart tissue repair. Advanced biomaterials were engineered to mimic the extracellular matrix, providing structural support and biochemical cues that promote stem cell proliferation, differentiation, and functional integration. Preclinical *in vitro* and *in vivo* assessments demonstrated that these scaffolds significantly enhanced cell survival and reduced inflammatory responses, leading to measurable improvements in neuronal connectivity and cardiac contractility. Importantly, the scaffold composition prioritized environmental sustainability by utilizing naturally derived polymers and avoiding toxic crosslinkers, aligning with the principles of One Health. Collaboration among neuroscientists, cardiologists, and biomaterials engineers was pivotal in optimizing scaffold design, fine-tuning cellular responses, and ensuring translational relevance. Our findings indicate that the synergistic integration of stem cell therapy with advanced biomaterials can offer a dual-targeted regenerative platform, potentially improving clinical outcomes for patients suffering from complex neurocardiovascular conditions. This approach exemplifies a holistic One Health strategy by addressing human health, reducing biomedical waste, and encouraging environmentally conscious biomaterial development. Future studies will focus on scaling up production, long-term efficacy, and safety assessments to accelerate the transition from bench to bedside.

Keywords: One Health strategy, Stem Cell therapy, advanced biomaterials

EPIDEMIOLOGICAL ANALYSIS OF STREPTOCOCCUS PYOGENES IN PATHOLOGICAL NASOPHARYNGEAL SAMPLES FOR THE FIRST HALF OF 2025

Abbaszade L.Z., Ibragimkhalilova N.E., Babashova M.E.

*Scientific Research Institute of Medical Prophylaxis named after V.Y.
Axundov, Baku, Azerbaijan*

Upper respiratory tract infections are among the most common human diseases and a leading reason for seeking medical care. Their etiology includes a wide spectrum of viral and bacterial agents. Among the bacterial pathogens, *Streptococcus pyogenes* holds particular clinical significance due to its high virulence and potential to cause both localized and systemic complications. Considering the growing problem of antibiotic resistance and the frequent use of antibiotics without laboratory confirmation, microbiological diagnostics play a crucial role in ensuring rational treatment. This study aimed to analyze the bacterial composition of nasopharyngeal samples collected during the first half of 2025 to determine the prevalence of *S. pyogenes* and its epidemiological characteristics. To investigate the microbiological structure of pathogens isolated from nasopharyngeal samples of patients between January and June 2025, with a focus on the frequency and distribution of *Streptococcus pyogenes*. The study included 31 patients examined over six months in 2025. Samples were collected from nasopharyngeal swabs and analyzed in the microbiology laboratory using bacteriological culture methods and biochemical identification tests.

- January: 2 patients (1 male, 1 female) — no pathogens detected.
- February: 6 patients (5 females, 1 male); *Streptococcus pyogenes* detected in 5 cases.
- March: 2 patients (1 male, 1 female) — pathogen not detected.
- April: 6 patients (3 males, 3 females) — negative results.
- May: 8 patients (5 males, 3 females); *S. pyogenes* detected in 4 cases.
- June: 7 patients (3 males, 4 females); *S. pyogenes* detected in 3 cases.

Results: Out of the 31 patients examined between January and June 2025, *Streptococcus pyogenes* was identified in 12 cases (38.7%). The monthly distribution was as follows: February – 5 positive cases (83.3%), May – 4 positive cases (50%), and June – 3 positive cases (42.8%). No *S. pyogenes* isolates were detected in January, March, or April. A slightly higher detection rate was observed among female patients (66.6%) compared to males (33.4%).

Conclusion: The data obtained confirms that *Streptococcus pyogenes* remains one of the main bacterial agents responsible for upper respiratory tract

infections. The peaks in detection during February, May, and June suggest possible seasonal variation in pathogen circulation. The findings underscore the importance of regular microbiological monitoring and evidence-based antibiotic selection to enhance treatment outcomes and mitigate the spread of resistant strains. Further extended studies are recommended to assess genetic diversity and resistance mechanisms of *S. pyogenes* isolates in the region.

Keywords: *Streptococcus pyogenes*, nasopharyngeal infections, antibiotic resistance, epidemiology, microbiological analysis, respiratory tract infections.

ADVANCES AND FUTURE PERSPECTIVES IN EXOSOME RESEARCH

Adil M. Allahverdiyev

V.Y. Akhundov Scientific Research Institute of Medical Prophylaxis, Baku, Azerbaijan

Exosomes are nano-sized particles enclosed by a lipid bilayer membrane and secreted by various cell types. In recent years, their application as biomarkers for the diagnosis of infectious diseases, their potential in targeted drug delivery systems, and their role in the development of next-generation vaccine platforms have attracted considerable attention. Notably, exosomes released from infected cells carry specific proteins, microRNAs, and other biomolecules, providing valuable insights into the course and prognosis of infections. This study reviews current literature on exosomes in diagnosing and treating infectious diseases, examines their role as delivery systems for next-generation vaccines, presents selected findings from our research, and discusses future perspectives. A comprehensive literature review was conducted to evaluate current scientific evidence on exosomes in diagnosing and treating infectious diseases and developing next-generation vaccine platforms. Studies published in international databases were examined, and our existing research results (Wharton Jelly Derived Mesenchymal Stem Cells' Exosomes Demonstrate Significant Antileishmanial and Wound Healing Effects in Combination with Aloe-Emodin: An in Vitro Study) were analyzed and compared with findings reported in the literature. According to the literature review, the use of exosomes as antigen-delivery systems offers significant potential for the development of next-generation vaccines. Exosome-based vaccine studies targeting viral infections such as HIV and COVID-19 have demonstrated that this approach is effective at eliciting both cellular and humoral immune responses. In conclusion, exosomes appear to hold great potential in the diagnosis, treatment, and vaccine development of infectious diseases. The advancement of exosome-based approaches in the fight against infectious diseases in the future offers new hopes.

Key Words: exosome, infectious disease, biomarker, vaccine, drug delivery system

COPING WITH DROUGHT STRESS IN DURUM WHEAT THROUGH MOLECULAR APPROACHES: STRATEGIES AND CHALLENGES

Nahida Asadova

Department of Genetics/ Baku State University, Baku, Azerbaijan

Durum wheat (*Triticum turgidum* ssp. *durum*) is an important cereal crop with high technological and nutritional value, although its yield stability is increasingly compromised by frequent drought episodes associated with global climate change. Therefore, improving tolerance to water scarcity has become a priority goal for sustaining durum wheat production and food security, especially in drought-prone regions of the world. In recent years, molecular and genomic tools have substantially advanced our ability to investigate the complex biological processes involved in drought response and resilience. This overview aims to summarize major molecular strategies applied to uncover drought stress-responsive genes, regulatory pathways, and adaptive physiological traits in durum wheat. The present work highlights molecular approaches such as Quantitative Trait Locus (QTL) mapping, Genome-Wide Association Study (GWAS), and various “omics” platforms (including transcriptomics, proteomics, and metabolomics), which have deepened our understanding of stress perception, signaling cascades, osmotic protection, and antioxidant systems. Furthermore, it includes a discussion of modern breeding tools like marker-assisted selection, genomic selection, and CRISPR/Cas-associated genome editing, which provide new opportunities to accelerate the development of drought-tolerant genotypes. Additionally, we briefly discuss significant challenges persisting, including the highly polygenic nature of drought tolerance, strong environmental effects on phenotype expression, and the need for broader genomic data from diverse durum wheat germplasm. Integration of various molecular approaches with high-throughput phenotyping and harnessing local genetic resources plays an essential role for developing climate-resilient durum wheat varieties. Overall, molecular approaches demonstrate significant potential, but their success depends on coordinated research and effective breeding applications.

Keywords: Durum wheat, drought tolerance, marker-assisted selection

COMPARISON AND ADVANTAGES OF CYTOLOGICAL AND GENETIC METHODS FOR DETERMINING THE SEX OF INDIVIDUALS FROM SMALL BLOOD STAINS COLLECTED AT CRIME SCENES

Elshan Mammadov¹, Zaur Karimov¹, Nurmammad Mustafayev^{1,2}, Adalat Hasanov¹

¹Public Legal Entity “Forensic Medical Examination and Pathological Anatomy Union”, Ministry of Health of the Republic of Azerbaijan, Baku, Azerbaijan

²Institute of Molecular Biology and Biotechnologies, Ministry of Science and Education of the Republic of Azerbaijan, Baku, Azerbaijan

In recent years, with the increasing sophistication of criminal investigations, the demand for expert opinions considered as sources of evidence in casework has significantly intensified. One of the current issues in forensic medical examination is the acquisition of maximum information from small biological samples during analysis. Classical methods, long used for this purpose, are gradually being replaced by modern techniques, the advantages of which need to be empirically evaluated. During the examination of crime scenes, small stains, tissue fragments, and other materials serve as objects for serological and genetic analysis as well as forensic cytological examination. One of the cytological research approaches involves determining the sex of the individual based on nucleated blood cell elements. Identification of the sex of a perpetrator or a victim from biological materials collected at the crime scene often plays a crucial role in criminal investigations. In this study, small blood stains collected from crime scenes were analyzed using cytological methods to detect female-specific chromatin protrusions in nucleated blood cells, and the accuracy of these findings was verified via genetic testing. This approach allows assessment of the reliability of cytological methods in forensic medical practice. Our research focused on the detection of sex-specific chromatin protrusions in nucleated blood cells and the evaluation of the accuracy of results obtained through genetic analysis. Five small blood-origin samples from crime scenes were examined, involving a total of 1,964 cell nuclei. The cytological investigation targeted the detection of sex-specific chromatin protrusions resembling “drumstick” structures in female blood cells. Four types of protrusions are considered sex-specific and are not observed in male blood cells. Empirical data indicate that granulocytes in male blood containing “B-type” protrusions were observed in a maximum of 0.44%, whereas in females, granulocytes with “A-type” protrusions were detected in 3.33% and those with “B-type” protrusions in approximately 5.74% of cells.

After confirming the presence of human blood in the five collected stains using a specific assay (SERATEC Hem Direct Hemoglobin Assay cassettes), the samples were subjected to cytological examination. Preparations were stained using Romanowsky and Leishman dyes, as well as acridine-based fluorochromes, and examined under light and fluorescent microscopy. Genetic analysis was conducted using widely applied Applied Biosystem kits (PrepFiler DNA Extraction Kit and Quantifiler™ Trio DNA Quantification Kit). DNA analysis was performed with the QuantStudio 5 Real-Time PCR System using specialized software. Cytological results showed that sex-specific chromatin protrusions corresponding to female sex were detected in 24 out of 418 cells in the first stain, 22/398 cells in the second, 21/378 in the third, 23/423 in the fourth, and 19/347 in the fifth. Subsequent genetic analysis of the five blood-origin stains confirmed that the blood indeed belonged to a female donor. The overall findings demonstrate that cytological detection of sex-specific chromatin protrusions in small blood stains is a cost-effective, reliable method for determining the sex of the individual in forensic practice. However, the low frequency of sex-specific protrusions and the limited number of leukocytes in many stains can complicate cytological sex determination, necessitating genetic analysis in such cases.

Keywords: sex-specific, protrusion, evidence, small stain, cytological examination, DNA analysis.

DETERMINATION OF CERTAIN BIOCHEMICAL BIOMARKERS IN PATIENTS WITH GLOMERULONEPHRITIS

Gadirova M, Guliyeva F.

Azerbaijan Medical University, Biochemistry Department, Baku, Azerbaijan

Glomerulonephritis is characterized by inflammation of the renal glomeruli and is one of the leading causes of chronic kidney failure. The pathogenesis of glomerulonephritis is complex, presenting a serious medical challenge involving immune mechanisms, inflammatory processes, and hemodynamic changes. Fundamental studies conducted in recent years indicate that oxidative stress plays a significant role in the progression of glomerulonephritis. Oxidative stress is the disruption of the balance between the increase of reactive oxygen species (free radicals) and the organism's antioxidant defense system. Lipid peroxidation occurring as a result of oxidative stress leads to cell membrane damage and impairment of glomerular filtration. Malondialdehyde (MDA), being one of the stable end-products of lipid peroxidation, is considered a reliable biomarker indicating the degree of oxidative stress in the organism. One of the antioxidant defense systems of the organism is the glutathione system. Reduced glutathione (GSH) plays a crucial role in neutralizing free radicals and protecting cells from damage. A decrease in GSH levels during glomerulonephritis indicates a weakening of the antioxidant system and an increased risk of disease progression. Aim of the Study: The aim of the study is to determine the levels of malondialdehyde, an indicator of oxidative stress, and reduced glutathione, reflecting the state of the antioxidant system, in the blood serum of patients with glomerulonephritis using biochemical research methods. We classified the 60 individuals included in our study into 3 groups. The first group is the control group, consisting of 10 practically healthy individuals. The second group includes 29 glomerulonephritis patients receiving dialysis. The third group consists of 21 glomerulonephritis patients not receiving hemodialysis. Malondialdehyde (MDA) levels in blood serum were determined by a spectrophotometric method based on the reaction with thiobarbituric acid (TBA). The amount of reduced glutathione (GSH) was evaluated using Ellman's reagent (DTNB). The intensity of lipid peroxidation was markedly increased in patients with glomerulonephritis. Specifically, compared to the control group (2.85 ± 0.11 nmol/L), the serum level of MDA increased 2.4-fold in the conservative group, reaching 6.72 ± 0.13 nmol/L, and 2.8-fold in the terminal group, reaching 7.91 ± 0.26 nmol/L ($p < 0.001$). This indicates a further intensification of oxidative stress during the terminal stage of the disease. Concurrently, the antioxidant defense system of the organism was

weakened. The level of reduced glutathione (GSH) decreased 1.4-fold in the conservative group to $0,39\pm 0,01$ $\mu\text{mol/L}$, and 1.36-fold in the terminal group to $0,405\pm 0,021$ $\mu\text{mol/L}$, compared to the control group ($0,55\pm 0,01$ $\mu\text{mol/L}$) ($p < 0.001$).

Table 1.

Determination of MDA and GSH levels in the study groups

Parameters	Conservative group n=21	Terminal group n=29	Control group n=10	p P-value
MDA, nmol/L	$6,72\pm 0,13$	$7,91\pm 0,26$	$2,85\pm 0,11$	$p < 0,001$
GSH, $\mu\text{mol/L}$	$0,39\pm 0,01$	$0,405\pm 0,021$	$0,55\pm 0,01$	$p < 0,001$

The obtained results indicate that the progression of glomerulonephritis, particularly in the terminal stage, is accompanied by intense oxidative stress and a weakening of the antioxidant system (specifically the glutathione cycle). Consequently, MDA and GSH levels can be considered informative markers for assessing the severity of the disease.

Keywords: Glomerulonephritis (GN), oxidative stress, malondialdehyde (MDA), reduced glutathione (GSH).

LEARNSAVE: EMPOWERING UKRAINIAN UNIVERSITIES THROUGH DIGITAL RESILIENCE

**Galia Zamaratskaia^a, Mykhailo Matvieiev^b, Nataliia Hryshchenko^b,
Andriy Getya^b, Sergii Gryshchenko^b, Oksana Kravchenko^c, Larysa
Kuzmenko^c, Darya Legeza^d, Olesia Priss^d, Ruslan Susol^e, Inna Zhunko^f,
Saeid Karkehabadi^a**

^aSwedish University of Agricultural Sciences, Uppsala, Sweden

*^bNational University of Life and Environmental Sciences of Ukraine, Kyiv,
Ukraine*

^cPoltava State Agrarian University, Poltava, Ukraine

^dTavria State Agrotechnological University, Zaporizhzhya, Ukraine

^eInstitute of Pig Breeding, Poltava, Ukraine

^fOdesa State Agrarian University, Odesa, Ukraine

The ongoing conflict in Ukraine poses an enormous threat to traditional education, which in the long term will affect many sectors, including agriculture, food systems, medicine, and social sciences. This disruption has highlighted the urgent need for flexible, technology-enabled teaching methods that can maintain educational quality despite challenging circumstances. The flipped classroom is one of the modern strategies to overcome these challenges. Unlike traditional teaching methods, the flipped classroom model places students at the center of the learning process, with teachers acting as facilitators rather than the primary source of instruction. Previous research demonstrates that flipped classroom approaches significantly enhance student learning outcomes and satisfaction compared to lecture-based methods. They also promote self-directed learning, increase motivation through cognitive load optimization and engagement, as well as strengthen students' social and cooperative skills. The necessity of transitioning from teacher-centered to student-centered learning in Ukraine was discussed several years ago and has now become increasingly evident. The LEARNSAVE project ("Learning under attacks - sustainable education at risk in Ukrainian universities") addresses these challenges by promoting digital resilience and innovative pedagogical approaches in Ukrainian higher education. Coordinated by the Swedish University of Agricultural Sciences (SLU), project number 01236/2023, and funded by the Swedish Institute, LEARNSAVE strengthens the capacity of partner universities to sustain high-quality learning under crisis conditions. The project aims to assess the current level of knowledge and familiarity with the flipped classroom methodology among university teachers in four Ukrainian universities, as well as to evaluate teachers' attitudes toward adopting and implementing this approach

in higher education settings. Key project activities include in-person training on active e-learning and flipped classroom methods (Teaching Active E-Learning, TAEL) hosted at SLU, joint workshops with Ukrainian educators, and the development of teaching materials tailored for constrained environments. Through hands-on training, exchange of practices, and co-creation of digital tools, LEARNSAVE contributes to building a resilient, student-centered, and technology-supported educational model that endures even under extreme conditions.

Keywords: Active E-Learning (TAEL); Flipped Classroom; Student-Centered Learning; Teaching under Conflict

EXPERIMENTAL STUDY OF RESERVOIR ROCK STABILITY OF KIRMAKY AND PRE-KIRMAKY SANDSTONES FOR CO₂ INJECTION AND STORAGE

G.Penkov^{1*}, P.Baud, S.Mammadov², G.Muradova, G.Mammadzada, F. Agayeva³

¹Department of Oil and Gas Engineering, Azerbaijan State Oil and Industry University, Baku, Azerbaijan

²Institut Terre et Environnement de Strasbourg, Université de Strasbourg, CNRS UMR 7063, Strasbourg, France

³Petroleum Engineering Department, Khazar University, Baku, Azerbaijan

This study presents a comprehensive experimental investigation of the physical and mechanical properties of sandstones from the Kirmaky and Pre-Kirmaky suites in the Kirmaky Valley, Azerbaijan, with implications for CO₂ injection and storage. The aim of the research was to assess the influence of fluid saturation on the geomechanical behaviour of these formations and their suitability for safe CO₂ sequestration. Core samples were collected, prepared, and subjected to a series of laboratory tests, including uniaxial compressive strength, Young's modulus, and P-wave velocity measurements in both dry and water-saturated conditions. Computed tomography (CT) was employed to evaluate grain packing and internal structure, while porosity and permeability measurements were used to characterize reservoir properties. The results indicate significant differences between the two suites. Sandstones of the Kirmaky Suite exhibit lower porosity and permeability but substantially higher strength and elastic moduli. In contrast, Pre-Kirmaky sandstones are more porous and permeable, display permeability anisotropy, but have lower mechanical strength and stability under load. Water saturation was found to significantly reduce the strength characteristics of both suites, with the effect being more pronounced in the more porous Pre-Kirmaky sandstones. Uniaxial compressive strength decreased by more than twofold, while Young's modulus decreased by approximately 1.5 times upon saturation. These findings emphasize the critical importance of accounting for the coupled effects of stress-strain state, porosity-permeability variations, and fluid saturation in geomechanical and hydrodynamic reservoir models. The experimental results provide a robust basis for evaluating the mechanical integrity and storage capacity of sandstone reservoirs under CO₂ injection, supporting safe and efficient CCS operations, improving reservoir simulation accuracy, and optimizing production strategies in fields with complex sandstone reservoirs.

Keywords: Sandstones, Storage Capacity, CO₂ Sequestration, Kirmaky Suite, Geomechanical Properties, Water Saturation, Uniaxial Compressive Strength, South Caspian Basin, Porosity-Permeability Relationship, Rock Mechanics.

EVALUATION OF HUMAN BRUCELLOSIS AND TOXOPLASMOSIS IN AZERBAIJAN

¹Hasanova Shafa Hidayet, ²Salehov Akif Ayyub

¹Special Dangerous Infections Control Center, Baku, Azerbaijan

²V.Akhundov Scientific Research Institute of Medical Prophylaxis, Baku, Azerbaijan

The importance of early diagnosis of zoonotic infections and parasitic invasions is undersorted by the necessity of selecting appropriate therapeutic strategies to prevent the development of chronic and complicated disease forms [Kledmanee K. t al. 2019; Yusif A.A. et al, 2021]. The diagnosis of both infections is frequently complicated due to similarity of their clinical manifestations, a challenge that becomes Particullarly critical in the presence of co-infection. To evaluate the prevalence of brucellosis and toxoplasmosis, as well as cases of their co-infection among humans. A retrospective descriptive epidemiological study was conducted using data on newly notified cases of human brucellosis obtained from the Electronic Integrated Surveillance System of the Ministry of Health (MoH) of Azerbaijan Republic for 2017-2021 (N=3208). Recorded cases of toxoplasmosis among pregnant women from “Omur” and “Biology tebabet” private clinics in 2019-2021 (N=510) were also analysed. Samples were tested at the Special Dangerous Infections Control Center of MoH of Azerbaijan Republic. Brucella antibodies were detected using with Brucella IgM ELISA kits for newly reported cases (NovaLisa™) and IgG ELISA kits (Ray Biotech, USA). Toxoplasma antibodies were detected using IgM and IgG ELISA kits (Nova Tec Immun Diagnostica GMBH). ELISA results were interpreted using a Thermo Scientific Multiscan FC reader (SN 357-904086). Statistical significance was assessed using the χ^2 test and Pearson’s exact test, with $p < 0.05$ considered significant. A significant steady decline in the number of human brucellosis cases ($p < 0.05$) was revealed. The highest proportion of newly reported brucellosis cases was registered among men (70.6%) and individuals of working age, primarily unemployed (45.8%) and schoolchildren (20.5%), with statistically significant differences based on the χ^2 test ($p < 0.05$). Pregnant women residing in rural areas had a 2.1-fold higher risk of IgG sero-positivity ($p < 0.05$). Conversely, the risk of recent toxoplasma infection (IgM) among rural women was 50.0% lower compared to urban residents significance ($p > 0.05$). IgG to *T.gondii* were detected in 21.6% of all examined, while IgM were found in 5.9%. The highest sero-positivity rate ($38.5 \pm 4.2\%$ for both IgM and IgG) was observed among individuals aged 21-25 years, with age-dependent differences confirmed as significant ($p < 0.05$). Mixed IgG sero-

positivity to *Brucella* and *T.gondii* was identified in 1.5% of all tested samples, more frequently among rural residents (68.8%), a pattern showing a statistically significant association ($p<0.05$), and potentially contributing to more complex disease outcomes. The stable decline in brucellosis incidence confirms the effectiveness of animal vaccination and epidemiological surveillance, though persistent risk factors necessitate the continuation of these measures. The high level of seropositivity to *Toxoplasma gondii* among young pregnant women, especially those living in rural areas, indicates the need to strengthen educational and preventive measures for this risk group. The more frequent combined seropositivity to *Brucella* and *T. gondii* among rural residents underscores the importance of comprehensive control of zoonotic infections. The findings justify the need to develop methodological guidelines aimed at improving epidemiological surveillance of brucellosis and toxoplasmosis and enhancing their effectiveness.

Keywords: Human brucellosis, human toxoplasmosis, epidemiology, laboratory diagnostics, co-infection

INTERNAL RIBOSOME ENTRY SITES IN HUMAN mRNAs: IMPLICATIONS FOR STRESS RESPONSE, CELL SURVIVAL, AND DISEASE MECHANISMS

¹Shahmuradov I., ²Jafarov R.

*¹Institute of Molecular Biology and Biotechnology, Azerbaijan National
Academy of Sciences, Baku, Azerbaijan*

²Department of Life Sciences, Khazar University, Baku, Azerbaijan

Translation of mRNA is crucial to how human cells react to stress, an infectious agent or a pathological condition. Under normal physiological conditions, the typical 5'-cap dependent translation mechanism will be used for most of the genes. However, the majority of disease associated genes are able to continue to translate mRNAs into proteins through internal ribosome entry sites (IRES) that allow for cap independent translation. Therefore, these structures can continue to produce proteins necessary for the cell's survival, as well as its ability to repair DNA, regulate apoptosis, and contribute to malignancy. Despite their significance to cancer biology, virus infections and cellular stress responses, the mechanisms by which IRES mediates the translation of human mRNAs remain poorly understood. A curated collection of human mRNA sequences was analyzed using bioinformatics tools designed to detect alternative open reading frames (ORFs) and ribosome-dependent gene segments (RDGS). Computational screening included prediction of secondary RNA structures, identification of potential IRES motifs, and comparison with annotated human transcript databases. Cross-validation with existing gene annotation platforms ensured the accuracy of predicted ORFs and regulatory elements. The study identified a large number of previously unannotated open reading frames (ORFs) and possible internal ribosome entry sites (IRES)-containing regions within human mRNA transcripts. Several of these candidates had structural features that are likely to be active as IRESs; in particular, they often have 5' UTRs that are longer than average and contain high concentrations of GC and can form multiple loop secondary structures. These types of structural features were found to occur together most commonly in genes that encode proteins related to inhibition of apoptosis (e.g. Bcl-2 family members), regulation of cell cycle (e.g. p53, p27), and responses to stress (e.g. HIF-1 α). Overall, the data provide evidence that the process of cap-independent translation makes a significant contribution to protein production stability under conditions of cellular stress, allowing for ongoing synthesis of important regulatory proteins at times when cap-dependent translation may be impaired. The findings from this study further enhance the scientific understanding of translational regulation

through the demonstration that many mRNAs have multiple alternative ORFs and/or possible IRES regions; these are widely distributed among mRNAs. This supports the fact that in a variety of pathologic states (such as hypoxia, viral infection and oncogenesis), the expression of proteins can occur without the use of the cap structure, and therefore provides an additional mechanism for cells to maintain their essential function. Additionally, mapping the regulatory mechanisms involved in the cap-independent translation process will provide an enhanced understanding of how disease progresses and may also allow us to develop therapeutic strategies against diseases that affect translational control – within the emerging area of the OneHealth framework, which is the intersection of molecular mechanisms and human health outcomes.

Keywords: Internal ribosome entry site (IRES); cap-independent translation; alternative ORFs; stress response; apoptosis regulation; translational control; human genome; disease mechanisms; bioinformatics; OneHealth.

INTERACTION BETWEEN PHYSICAL ACTIVITY, BODY MASS INDEX, AND EMOTIONAL DISORDERS IN YOUNG PEOPLE

**Gulafat Shafiyeva¹, Jamala Eldarova¹, Javid Ojaghi¹, Irada Khalilova¹,
Gulnara Azizova²**

¹Department of Life Sciences, Khazar University

²Department of Biochemistry, Azerbaijan Medical University

gulafat.shafiyeva@khazar.org

The rapid digitization in the educational and professional fields over the last few years has brought fundamental changes to young people's lifestyles. As a result, performing a large part of office work and academic activities at a screen has created conditions for an increase in sedentary behavior and a decrease in physical activity. Social networks have also become a part of daily life, with different posts and online shopping. Furthermore, the shift from in-person to online entertainment and relaxation, along with the rapid spread of online communication due to its convenience, is a significant factor in the decrease in physical activity. As physical activity decreases, noticeable changes appear in Body Mass Index (BMI). This also causes mood changes and decreases self-esteem in the youth. An increase in a sedentary lifestyle leads to decreased physical activity, changes in BMI, and the spread of emotional disorders. Physical health is critical for young people who want to succeed academically and professionally. Emotional health and mental well-being require significant cognitive activity. However, a sedentary lifestyle promotes stress in work and study modes. Most of the time, young people prefer to eat more to relieve stress, which is followed by changes in BMI. Decreased physical activity and increased pain are symptoms of several types of anxiety. Depression is observed in young people who are far away from the support of their family, collectives and acquaintances. The main aim of the study is to conduct a comparative analysis of emotional disorders (anxiety, stress, and depression) and BMI in relation to physical activity. A total of 1164 young men (305 males and 859 women) participated in the survey. The participants' BMI was established using professional guidelines based on their height and weight. Their emotional state is assessed using the international DASS-21 scale, whilst their physical activity is assessed using a short version of the International Physical Activity Questionnaire (IPAQ SF). According to the DASS-21 scale, 29.4% of individuals experienced stress (5.5% men, 23.9% women), 31.5% experienced depression (6.3% men, 25.2% women), and 44.4% experienced depression (8.2% men, 36.3%

women). Unlike previous research, a rising tendency of anxiety was observed in both genders equally, rather than a variation between genders. According to the BMI estimation, 19.8% of participants were underweight (participating men 8.9%, women 23.7%), 8.4% were overweight (participating men 11.8%, women 9%), and 1.5% were obese (participating men 2.6%, women 1.1%). A noticeable difference has been found in the analysis of these computations. Therefore, changes in BMI showed that men were overweight, but women were underweight. However, 35.2% of respondents to the International Physical Activity Questionnaire (IPAQ SF) reported engaging in less physical activity; of these, 7.5% were men and 27.9% were women. A statistically significant difference at the 1% level ($p < 0.001$) was found using chi-square analysis between physical activity and BMI and between physical activity and emotional changes (depression, stress, and anxiety). According to our research, there are several multi-component interactions (both directly and indirectly influencing one another) between BMI, physical activity, and emotional changes. These components may lead to multiple changes. Consequently, exercise is essential to development. Mental health and BMI: A person is more likely to experience mental health problems if their BMI differs from the average. However, changes in BMI and physical activity levels (inactivity, appetite loss, and emotional hunger) are a result of mental health problems.

Keywords: Young people, emotional disorders, physical activity, body mass index.

VIROLOGICAL MONITORING IN AQUATIC ENVIRONMENTS AS PART OF ENVIRONMENTAL MONITORING IN THE EPIDEMIOLOGICAL SURVEILLANCE SYSTEM

L.I. Rustamova¹, Z.M. Kuliyeva², F.A. Heydarova¹, T.G. Eyvazov²,
N.N. Feyzullaeva²

¹*V.Yu. Akhundov Research Institute of Medical Prevention, Baku,
Azerbaijan*

²*Azerbaijan State Advanced Medical Training Institute named after
A.Aliyev², Baku, Azerbaijan*

Providing the population with safe drinking water is a pressing environmental and social issue, in the solution of which sanitary-hygienic and microbiological monitoring of household and drinking water play an important role. Water supply. According to the United Nations, over 1 billion people (18% of the world's population) lack access to quality drinking water. The study aimed to determine the circulation of certain serotypes of non-polioenteroviruses in wastewater in Baku. Wastewater samples were collected from the Hovsan aeration station, which uses a combination of methods to treat wastewater discharged into the sea, to determine the circulation of certain serotypes of non-polioenteroviruses. A method for concentrating and detecting non-polioenteroviruses from large volumes of clean water using a KU-2-8 cation exchanger was used. Wastewater samples collected from 2008 to 2010 from various regions of the republic were analyzed. A wide range of some serotypes of non-polyenteroviruses from the Cocksackie A7, Cocksackie B1-6, and ECHO 1, 4, 6, 7, and 11 groups were identified. To identify certain serotypes of non-polyenteroviruses from large volumes of water, a method for concentrating viruses on the cation exchange resin KU-2-8 was used. Poliovirus type 2 (vaccine variant) was used in the experiment at a dose of 1000 TCID₅₀ (tissue cytopathic dose) in 0.1 ml. We established the high potential of the cation exchange resin KU-2-8 for concentrating viruses, capturing viruses at a dose of 0.1 TCID₅₀ from liquid. The virus titer in the eluate after adsorption was 1000 TCID₅₀. The results of the study on the concentration of viruses revealed the adsorption-desorption capabilities of the cation exchanger KU-2-8 when concentrating a model strain of enterovirus-poliovirus type 2 from large volumes of clean water at a concentration diluted to 0.1 TCID₅₀ in 1 ml of medium.

Keywords: environmental monitoring, non-polioenterovirus, poliovirus, epidemiological surveillance

ECOLOGICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF *YERSINIA PESTIS* IN THE NATURAL FOCIES OF THE TRANSCAUCASIAN PLAINS PLAGUE, AZERBAIJAN, 2022

Rita Ismailova, Bahar Guluzade

Special Dangerous Infections Control Center, Baku, Azerbaijan

Plague has been known to man since ancient times as a serious disease with high mortality. On the territory of Azerbaijan, there are three natural plague foci located at a distance from each other. These centers are independent; they differ from each other in a number of ecological and epizootological characteristics. The purpose of the research was to study the ecological and epidemiological characteristics of *Yersinia pestis* in the Transcaucasian lowland plague focus. Field work was carried out in the spring-autumn season of 2022 on an area of 2.5 thousand hectares, which is considered a natural focus of the wide-plain plague of Transcaucasia. In the course of epizootological studies, samples of arthropods, nesting material and rodent excrement were collected at 6 sites, 22 watersheds and 20,000 ha of the field area of the eastern mesopot of Jeyranchol. Collected arthropods were counted, identified, grouped and homogenized, and DNA extraction was prepared for PCR studies. 64 fleas, 7 red-tailed gerbil feces and 2 bird feces samples, and 2 red-tailed gerbil nest materials were collected from 51 nest tracks. The collected 64 fleas were divided into species, resulting in *Ctenophthalmus secundus* - (21) 33% of the total number, *Ceratophyllus consimilis* - (7) 10% of the number, *Ceratophyllus fasciatus* - (10) 16% of the total number, *Xenopsylla conformis* - (16) of the total number of 25%, *Ceratophyllus laeviceps* - (10) 16% of the total number. The identified fleas were divided into 18 groups, and a real-time PCR study was carried out on the Bio-Rad equipment using analytical molecular methods. All results were negative for *Yersinia pestis*. Taking into account the severity of the plague, regular seasonal monitoring of natural foci and *Yersinia* species is advisable, and it is also necessary to carry out sanitary and educational work among the population and medical workers living in areas around the foci.

Keywords: *Yersinia pestis*, ecological and epidemiological characteristics, Azerbaijan

GAHP-SUPPORTED HEALTH AND POLLUTION ACTION PLAN IN AZERBAIJAN: ADVANCING A POLLUTION-FREE FUTURE

¹Rovshan Abbasov, ²Marioa Paola, ²Lucile Okio, ²David Bernstein,
²Petr Sharov, ³Rovshan Karimov, ⁴Gunay Karimova, ⁴Aytaj Qarayeva

¹*Environmental Research Centre, Khazar University, Baku, Azerbaijan,*

²*Global Alliance on Health and Pollution, Geneva, Switzerland,*

³*Institute of Geography, Baku, Azerbaijan,*

⁴*Department of Geography and Environment, Khazar University, Baku,
Azerbaijan*

rabbasov@khazar.org

The Health and Pollution Action Plan (HPAP), developed by the Global Alliance on Health and Pollution (GAHP), is designed to help governments elevate pollution as a critical policy priority and implement practical measures to reduce its impacts. This article presents an in-depth examination of the HPAP process in Azerbaijan, outlining its objectives, methodology, and overall significance in addressing pollution-related health challenges. The implementation of HPAP in Azerbaijan has emphasized the urgent need for comprehensive pollution inventories and the prioritization of pollutants that pose the greatest risks to public health. These assessments highlight the importance of strengthening public awareness, expanding scientific research, and adopting long-term remediation strategies to confront the country's persistent environmental issues. Through HPAP activities, both government institutions and local communities have come to recognize the value of the GAHP initiative in reducing environmental harm and disease burden. The program's focus on raising public awareness and guiding practical solutions to key pollution sources has reinforced its role as an effective framework for improving environmental and health outcomes in Azerbaijan.

Keywords: Pollution-related health challenges, environmental harm, Health and Pollution Action Plan, activities, initiatives, Azerbaijan

A MULTIFUNCTIONAL BIOCOMPATIBLE HYDROGEL AS A PIVOTAL BIOPOLYMER FOR SUSTAINABLE BIOMEDICAL AND ENVIRONMENTAL APPLICATIONS

Tannaz Sadeghi Rad, Salva Golgoun, Soodabeh Davaran

*Department of Medicinal Chemistry, Faculty of Pharmacy, Tabriz
University of Medical Science, Tabriz, Iran*

The One Health approach emphasizes the intrinsic relationship among human, animal, and environmental health, necessitating novel solutions to boost sustainability and well-being. In this regard, biocompatible and biodegradable hydrogels have emerged as highly promising materials with diverse biomedical and environmental applications. This study presents the facile development of a synthesized hydrogel composed of biopolymers including sodium alginate, chitosan, and hyaluronic acid, designed to address critical challenges related to human health and environmental sustainability. The hydrogel structure contains alginate, known for its gentle gelation and favorable biocompatibility; chitosan, a biodegradable polysaccharide with inherent antimicrobial activity; and hyaluronic acid, a vital extracellular matrix component that enhances cell adhesion and tissue regeneration. This composite exploits the synergistic interactions of each polymer to yield a safe hydrogel with tunable physicochemical properties, biodegradability, and superior biocompatibility. A simple synthesis method involving a mild crosslinker was employed to maintain the functional and structural integrity of each component while ensuring scalability and reproducibility. The sodium alginate/chitosan/hyaluronic acid hydrogel demonstrated favorable swelling behavior and mechanical strength proper for biomedical scaffolding or wound dressing applications, along with controlled degradation under physiological conditions. The biocompatibility assays revealed low cytotoxicity, supporting its safe application in human health. Beyond biomedical applications, the eco-friendly composition of the hydrogel and its biodegradability suggest potential applications in environmental remediation, such as controlled release of bioactive agents or pollutant removal, aligning with One Health objectives for ecosystem preservation and pollution control. Hence, this study provides a foundation for further development of sodium alginate/chitosan/hyaluronic acid-based hydrogels as multifunctional materials capable of bridging human healthcare improvements with environmental sustainability. Future work may include in vivo evaluations, modifications for targeted drug delivery, and investigations of environmental deployment feasibility. By integrating green material science with health-focused applications, the presented hydrogel contributes to the One Health

perspective, advancing synergistic benefits across human, animal, and environmental health toward sustainable solutions for global health challenges.

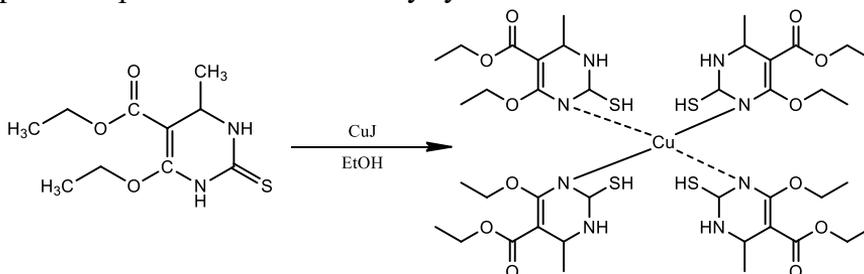
Keywords: Global Health challenges, safe biopolymers, biomedical applications

SYNTHESIS OF TETRAKIS(6-ETHOXY-5-(ETHOXYCARBONYL)-2-MERCAPTO-4-METHYL-3,4-DIHYDROPYRIMIDIN-1(2H)-YL) COPPER

Bayim Isakova, Mir Ali Isakov, Nazar Nazarov, Afsun Sujayev, Irada Rzayeva

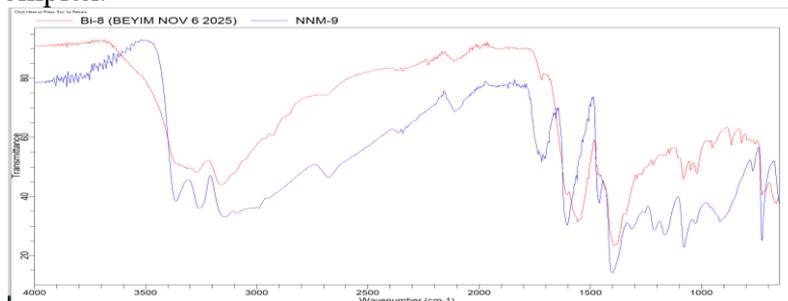
*Institute of Chemistry of Additives named after academician A. Guliyev,
Baku, Azerbaijan*

Heterocyclic compounds containing thio groups have attracted significant attention in coordination and medicinal chemistry due to their versatile ligand properties and diverse biological activities. Ethyl 6-ethoxy-4-methyl-2-thioxo-1,2,3,4-tetrahydropyrimidine-5-carboxylate, which contains both thioxo and carboxyl functionalities, is a promising precursor for the synthesis of metal complexes. The ligand features multiple donor sites, including nitrogen and sulfur atoms, enabling effective coordination with metal ions to form stable complexes. Copper complexes derived from thioxo-based heterocyclic ligands are especially noteworthy for their antimicrobial, antioxidant, and anticancer activities, highlighting their potential in bioinorganic and medicinal chemistry research. The mercapto group enhances the coordination strength at the copper center, which may further contribute to the complex's biological reactivity. In this study, a new copper complex, Tetrakis(6-ethoxy-5-(ethoxycarbonyl)-2-mercapto-4-methyl-3,4-dihydropyrimidin-1(2H)-yl) copper, was synthesized from the corresponding ligand and copper(I) iodide. The crystalline form of the complex was successfully obtained, providing an opportunity to investigate its structural characteristics in detail. The base compound (1.0 mol) was dissolved in methanol under constant stirring. After complete dissolution, copper(I) iodide was added to the reaction mixture. The system was heated and maintained at the target reaction temperature while stirring continuously for 1 hour to ensure homogeneous interaction between the reagents. As a result, a metal complex compound was successfully synthesized.



Scheme 1. Synthesis of tetrakis(6-ethoxy-5-(ethoxycarbonyl)-2-mercapto-4-methyl-3,4-dihydropyrimidin-1(2H)-yl)copper

FT-IR spectroscopy was used to study the structure of the synthesized metal complex.



As a result, the FT-IR analysis confirmed the coordination of the ligand to the metal, exhibiting characteristic shifts in the relevant functional group bands; further studies are currently underway.

Keywords: Heterocyclic compounds, Thioxo groups, Metal complex, Copper(I) iodide, Ligand coordination, FT-IR spectroscopy

INFLUENCE OF THE LONGLASTING INTERNAL BREEDING OF THE CASPIAN STURGEON ON THE GENERATION OF THE GENETIC MUTATIONS LED TO WEAK HEALTH AND SPINAL CURVATURES

Taghiyeva Safada, Elshad Rzayev Vagif
Azerbaijan Fish Farm, Baku, Azerbaijan
safada.taghiyeva@azfish.az, elshad.rzayev@azfish.az

The primary objective of the study was to explore the genetic basis of various spinal deformities, including scoliosis, kyphosis, and lordosis, within the sturgeon population at Azerbaijan Fish Farm, a leading producer of sturgeon meat and black caviar in the country. Nucleotide sequences of the fish DNA samples were examined using short read Next Generation Sequencing (NGS), population genetics analysis and pilot GWAS (Genome Wide Association Study) methods. An investigation was conducted using Principal Component Analysis (PCA) and structure clustering. A few differences between the genotype of ill sturgeons with spinal deformations and the genotype of the control group sturgeons were found. For instance, Principal Component Analysis (PCA) and Structure clustering demonstrated that individuals from the Scoliosis group form a compact and homogeneous genetic cluster, distinct from the more diverse Control group. This genetic separation was further supported by a moderate F_{ST} value of 0.11, indicating restricted gene flow or divergence between the two breeding sources. The number of incomplete genes in the genotype of fish with scoliosis was relatively high, which may be a potential cause of some anomalies and functional impairments. Other genetic health indicators, like Nucleotide diversity (π) and multilocus heterozygosity (MLH) were lower in the scoliosis group, leading to a decrease in overall genome diversity. The GWAS analysis also identified several SNPs apparently associated with scoliosis. It was proposed that deviations in the genotype of the local sturgeons were generated and multiplied in the local Caspian sturgeon population as a result of breeding inside the population during the last twenty years and suggested to utilise for breeding the eggs and sperm of sturgeons from geographically different populations.

Keywords: One Health, sturgeon, breeding, spinal deformations, mutation, NGS.

THE IMPACT OF ENVIRONMENTAL POLLUTION ON BRAIN HEALTH: A ONE HEALTH PERSPECTIVE (REVIEW)

Nargiz Ismayilli, Aysel Gahramanova, Rashad Valimov, Matanat Jalilova, Gunel Allahverdiyeva, Gulafat ShafiyTaneva

The Department of Life Science, Khazar University, Baku, Azerbaijan

Environmental pollution has emerged as one of the most significant global threats to human, animal, and ecosystem health. Recent evidence indicates that exposure to air, water, and soil contaminants not only damages physical well-being but also disrupts brain function, contributing to neurodegenerative and psychiatric disorders. From a One Health perspective—which recognizes the interconnectedness of human, animal, and environmental health, understanding how pollution affects the brain is critical for achieving sustainable planetary well-being. This article explores the multifaceted impacts of environmental pollution on neurological health, emphasizing the urgent need for collaborative, multidisciplinary solutions. Environmental pollutants, such as fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), and other toxins, infiltrate not only human populations but also animal species and the broader ecosystem, creating a complex web of health challenges. Studies have shown that these pollutants can induce neuroinflammation, oxidative stress, and neuronal apoptosis, leading to structural and functional brain changes that underlie diseases like Alzheimer's and Parkinson's. Through the One Health lens, it becomes clear that addressing pollution's impact on neurological health requires integrated strategies that consider environmental protection, animal health monitoring, and human healthcare simultaneously. Ecosystem degradation caused by pollution disrupts natural processes vital for the health of wildlife and domestic animals, which in turn can affect disease dynamics and chemical exposure risks for humans. For example, pollutants bioaccumulate in food chains, posing risks for all species involved. International initiatives aligned with the One Health approach emphasize cross-sector cooperation among public health, environmental science, veterinary medicine, and policy-making to mitigate pollution-related neurological and other health risks. Policies that improve air and water quality, restore habitats, and reduce chemical emissions serve both to protect ecosystems and to lower the incidence of neural disorders in humans and animals. In conclusion, a comprehensive understanding of how environmental pollution harms neurological health must integrate the One Health framework, promoting sustainable and resilient ecosystems for the benefit of all living beings. This multidisciplinary approach fosters

prevention, early detection, and intervention strategies that are vital for the future of global brain health and planetary sustainability.

Keywords: One Health, Environmental Pollution, Brain Health, Neurotoxicity, Air Pollution, Heavy Metals, Planetary Health, Sustainability, Cognitive Decline

ZOONOTIC DYNAMICS OF RABIES BETWEEN HUMAN AND ANIMAL POPULATIONS: THE CASE OF AZERBAIJAN

Chichak Aliyeva

Hasvet School of Veterinary Medicine, Khazar University, Baku, Azerbaijan

Rabies continues to pose a major public and veterinary health concern, maintaining its circulation within domestic, free-roaming, and wild animal populations in Azerbaijan. The persistent nature of the virus reflects gaps in surveillance, vaccination coverage, and intersectoral coordination. This study examines the epidemiological relationship between animal and human rabies occurrences, highlighting the temporal and spatial dynamics of transmission. By integrating veterinary and public health data, strong interdependence was observed between animal outbreaks and human infection trends, suggesting that human exposure closely follows epizootic activity among animals. The study underscores the necessity of sustained vaccination of dogs, control of free-roaming populations, and timely reporting systems. Strengthening collaboration under the One Health framework remains fundamental to interrupting transmission chains and progressing toward national rabies elimination goals.

Keywords: Rabies, Zoonosis, Epidemiology, One Health, Surveillance, Azerbaijan.

ENVIRONMENTAL RISK ASSESSMENT OF PHARMACEUTICAL PRODUCTS FROM THE VIEWPOINT OF ONE HEALTH

Ahmet Aydin

*The Department of Pharmaceutical Toxicology, Yeditepe University,
Faculty of Pharmacy, Istanbul, Turkey*

ahmet.aydin@yeditepe.edu.tr

One Health is an integrated and unifying approach that aims to balance and optimize the health of people, animals, and ecosystems. It recognizes the close, interdependent links among these domains and uses this interconnectedness to develop improved surveillance, prevention, and control strategies. According to the WHO's One Health initiative, human, animal, and environmental health are closely interlinked, requiring strong collaboration, communication, and coordination across relevant sectors. Within this framework, the environmental risk assessment (ERA) of human medicinal products (HMPs) is a critical component that aligns with the One Health concept. Literature indicates the presence of pharmaceutical active substances in surface waters and other environmental compartments. The European Medicines Agency (EMA) introduced a guideline on ERA for HMPs in 2018, with the latest version entering into force on 1 September 2024. The main purpose of this guideline is to assess the environmental exposure and hazards associated with HMPs, aiming to protect aquatic, sediment, terrestrial, and groundwater ecosystems from the impacts of medicinal product use, storage, and disposal. ERA is mandatory for all marketing authorization applications (MAAs) for HMPs and focuses on the active pharmaceutical ingredient (API), while excipients are excluded. The process consists of Phase I and Phase II assessments. In Phase I, the Predicted Environmental Concentration in surface water (PEC_{SW}) is calculated based on the expected use of the product. When the PEC_{SW} is below the action limit of $0.01 \mu\text{g/L}$, no significant environmental risk is anticipated, except for the endocrine-active substances, antimicrobials, and antiparasitics, which require special consideration. If the PEC_{SW} is equal to or above $0.01 \mu\text{g/L}$, a Phase II assessment must be performed. In cases where higher PEC_{SW} values indicate potential concern, appropriate environmental risk mitigation measures should be implemented by HMPs manufacturers.

Keywords: One Health approach, Human medicinal products, environmental risk assessment.

SUSTAINABLE NANOCARRIER SYSTEMS FOR SAFER AND GREENER THERAPEUTICS IN PLANETARY HEALTH

Tansel ÇOMOĞLU

Ankara University, Faculty of Pharmacy, Department of Pharmaceutical Technology, Ankara, Turkiye

The increasing awareness of the interconnection between human, animal, and environmental health has positioned the One Health framework as a guiding principle for future therapeutic innovation. Within this context, pharmaceutical nanotechnology offers transformative opportunities not only to enhance therapeutic efficacy and safety but also to align drug development with sustainability and planetary health objectives. Conventional drug delivery systems often involve non-degradable materials and energy-intensive production processes that may contribute to environmental burden. In contrast, lipid-based and biopolymer-derived nanocarrier systems present eco-conscious alternatives due to their biodegradability, low toxicity, and potential for scalable, green manufacturing. Highlights current advances in the design of sustainable nanocarrier systems—particularly lipid nanoparticles, liposomes, and nanostructured lipid carriers—emphasizing the use of natural, renewable excipients and solvent-free or low-energy production methods. Furthermore, the discussion on the life-cycle assessment of nanopharmaceuticals, from raw material sourcing to post-consumption environmental impact, as an emerging dimension of pharmaceutical responsibility. Case studies will illustrate how biodegradable nanocarriers can improve drug targeting, minimize dosing frequency, and reduce pharmaceutical residues released into the environment. By integrating environmental stewardship into formulation design, nanopharmaceutical science can contribute meaningfully to global efforts for safer, greener, and more resilient health systems. Ultimately, sustainable nanocarrier development stands as a key enabler in the transition toward a regenerative and responsible pharmaceutical ecosystem aligned with planetary health goals.

Keywords: One Health framework, drug development, pharmaceutical responsibilities.

CRISPR-BASED GENE DRIVE TECHNOLOGIES FOR VECTOR CONTROL: OPPORTUNITIES AND CHALLENGES WITHIN THE ONE HEALTH FRAMEWORK (Review)

Aygun Muradova, Jamala Eldarova

The Department of Life Sciences, Khazar University, Baku, Azerbaijan

aygun.muradova2022@khazar.org

Vector-borne diseases are among the most persistent health threats worldwide, affecting humans, animals, and entire ecosystems. With the recent development of CRISPR-Cas9-based gene drive approaches, such control is becoming an attainable goal by providing unprecedented specificity in manipulating or eliminating disease-transmitting species. In this review, we discuss these recent developments, the benefits and potential pitfalls of CRISPR gene drives for One Health. By incorporating emerging findings from recent studies (2015–2025), the article highlights the revolutionary potential of CRISPR technologies, as well as the ethical, environmental, and governance dilemmas they raise. Recent studies, conducted between the years 2015 and 2025, are analyzed here to provide an overall review of the three main areas of interest: ecological modeling, evolutionary dynamics, and ethical debates on gene drive release. Conclusions are drawn that CRISPR-based gene drives hold potential for being transformative in the effort to reduce or eliminate malaria and dengue vectors; however, concerns persist over unintended gene flow, potentially disruptive ecological outcomes, and regulatory uncertainties as their deployment continues. CRISPR gene drive technologies are a revolutionary approach to controlling vectors and preventing diseases, supporting the One Health concept of comprehensive global health management. However, their use should be accompanied by thorough ecological risk evaluations, clear ethical guidelines, and ongoing environmental monitoring. To ensure their sustainable and fair application, it is essential for geneticists, ecologists, public health experts, and policymakers to work together, making sure that advancements do not harm ecological balance.

Keywords: Gene drive, biosafety, One Health, CRISPR-CAS9, Vector control, mosquito-borne diseases

CHARACTERISTICS OF BIOCHEMICAL INDICATORS IN CHILDREN WITH HEREDITARY COLLAGEN DISORDERS

Gadirli Habiba, Asgarova Tahira

Azerbaijan Medical University, Biochemistry Department, Baku, Azerbaijan

Hereditary connective tissue disorders arise due to genetic defects that impair the normal formation and structure of collagen. These disorders affect connective tissue integrity by disrupting collagen metabolism and its functional properties. Connective tissue constitutes approximately 50% of the human body, and a major portion of it is composed of collagen proteins. Among the main diagnostic indicators of hereditary collagenases are glycosaminoglycans (GAGs) and hydroxyproline. Due to alterations in collagen structure and function, the balance of the extracellular matrix becomes disrupted, leading to an increase in GAG levels. Therefore, GAG concentration in urine and blood can serve as an important diagnostic marker. Another significant indicator of collagen metabolism is the daily urinary excretion of hydroxyproline. As one of the major amino acids of collagen, hydroxyproline reflects protein catabolism. In hereditary collagenases, accelerated collagen degradation results in elevated levels of hydroxyproline in both urine and blood. To determine the levels of hydroxyproline and glycosaminoglycans in urine as biochemical indicators of hereditary collagenases using specific laboratory methods. The test group consisted of 50 patients diagnosed with hereditary collagenases, while the control group included 10 healthy individuals. In all 50 patients, the daily urinary concentrations of hydroxyproline and glycosaminoglycans were measured. Laboratory methods included: determination of urinary GAGs by paper chromatography and electrophoresis, spectrophotometric measurement of hydroxyproline. Based on comparison with the control group, patients were divided into three subgroups. Urinary hydroxyproline levels were elevated to 37 (74%) out of 50 patients, demonstrating a 2.1-fold increase compared to the control group. This finding reflects enhanced collagen degradation in affected individuals. 41 out of 50 patients (82%) exhibited a twofold increase in urinary glycosaminoglycan levels compared with the control group, confirming impaired catabolism of connective tissue. Thus, determining the urinary levels of both indicators is of great importance in the diagnosis of hereditary collagenases and can help ensure a more accurate selection of treatment strategies.

Keywords: connective tissue, collagen, hydroxyproline, glycosaminoglycan.

COMPARATIVE ANALYSIS OF LIPID BIOMARKERS IN HYPERTENSIVE PATIENTS AND HEALTHY POPULATION

Abdullayeva Gulshan, Hasanova Shayman

Azerbaijan Medical University, Department of Biochemistry, Baku, Azerbaijan

Arterial hypertension is among the most prevalent cardiovascular disorders and is associated with serious complications such as atherosclerosis, stroke, and myocardial infarction. Alterations in lipid metabolism represent a key component of the pathophysiological mechanisms of hypertension, contributing to endothelial dysfunction and increased oxidative stress. Lipid biomarkers, including total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C) are widely employed in cardiovascular risk assessment. This study aimed to compare serum lipid profile parameters in patients with arterial hypertension and a healthy control population, to evaluate the relationship between blood pressure elevation and lipid dysregulation, and to determine the clinical relevance of these findings. A clinical-biochemical study was conducted involving two groups: 20 hypertensive patients (systolic ≥ 140 mmHg and/or diastolic ≥ 90 mmHg) aged 30–60 years, and 10 healthy controls with normal blood pressure. Participants had no acute infection, severe chronic disease, or medication affecting lipid metabolism. Venous blood samples were analyzed using enzymatic colorimetric assays, and LDL-C was determined directly or calculated using the Friedewald formula. Blood pressure measurements followed European Society of Hypertension guidelines. A significance level of $p < 0.05$ was used. Hypertensive patients exhibited significantly elevated levels of TC, TG, and LDL-C compared with the control group ($p < 0.001$), while HDL-C levels were markedly reduced ($p < 0.001$). Additionally, systolic and diastolic blood pressures were substantially higher in the hypertensive cohort. The data demonstrated a positive association between increasing blood pressure and the severity of lipid abnormalities, indicating progressive impairment of lipid homeostasis with advancing hypertension. The findings confirm a strong relationship between arterial hypertension and disturbances in lipid metabolism. Increased LDL-C and TG levels accompanied by reduced HDL-C concentrations in hypertensive individuals contribute to a higher risk of cardiovascular complications. Regular monitoring of lipid biomarkers, early risk stratification, and implementation of appropriate preventive and therapeutic strategies are essential in the effective clinical management of hypertensive patients.

Keywords: arterial hypertension, lipid profile, total cholesterol, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), triglycerides, cardiovascular risk.

DETERMINATION OF NEUROLOGICAL INJURY BIOMARKERS IN PATIENTS WITH HYPOTHYROIDISM

Rahimova Rana, Aghayeva Afsana

*Azerbaijan Medical University, Department of Biochemistry, Baku,
Azerbaijan*

The thyroid gland is a vital endocrine organ for the regulation of the body's internal secretion system. It has a butterfly-shaped structure, weighs approximately 20–30 grams, and is located in front of the trachea in the lower part of the neck. The gland synthesizes the hormones T3 (triiodothyronine) and T4 (thyroxine), which play a central role in regulating metabolism, energy production, body temperature, heart rhythm, as well as growth and developmental processes. The synthesis of these hormones is controlled by thyroid-stimulating hormone (TSH) secreted by the pituitary gland. Deficiency of thyroid hormones significantly affects various organs and systems, particularly the nervous system. In recent decades, studies have demonstrated that thyroid hormones influence genes regulating protein synthesis in neurons and affect the functional activity of brain proteins. Therefore, hypothyroidism may be accompanied by neurological symptoms. A comprehensive examination was conducted on 20 participants with hypothyroidism, including 17 men and 3 women. The control group consisted of 10 individuals without thyroid disorders or other hormonal pathologies. Serum concentrations of free triiodothyronine (T3), free thyroxine (T4), and NSE were measured in all participants using standard laboratory procedures in accordance with the manufacturer's guidelines. Patients with hypothyroidism demonstrated a marked reduction in thyroid hormone levels compared with the control group. The concentration of T3 in the hypothyroid group was 1.15 (1.14–1.19) pg/ml, which is almost twice as low as that of the control participants (2.36 ± 0.23 pg/ml). Similarly, the level of thyroxine was significantly decreased in patients with hypothyroidism, reaching 0.77 ± 0.02 ng/dl compared with the control group (1.85 ± 0.49 ng/dl). A pronounced increase in neuron-specific enolase levels was observed in the hypothyroidism group. NSE concentrations reached 26.2 (23–35.0) ng/ml, which greatly exceeded the values recorded in the control group (5.57 ± 0.86 ng/ml). The elevation of NSE indicates a possible neurodegenerative effect associated with thyroid hormone deficiency and reflects the high sensitivity of the nervous system to hypothyroidism.

Keywords: Thyroid hormones, neuron-specific enolase, hypothyroidism, neurological symptoms

A ONE HEALTH APPROACH TO DIAGNOSING ANEMIA IN ANIMALS AND EVALUATING ULTRASOUND-ACTIVATED RABBIT SERUM AS A THERAPEUTIC INTERVENTION

Ulduz Yunis Safarova, Shafiqa Jahangir Jafarova

Azerbaijan State Agricultural University, Ganja, Azerbaijan.

Anemia is a multifactorial pathological condition characterized by a reduction in erythrocyte count, structural abnormalities of red blood cells, and decreased hemoglobin concentration per unit of blood. Its etiologies include hepatic and renal disorders, endocrine dysfunction, chemical intoxication, ionizing radiation, viral and parasitic infections, neoplastic diseases of the hematopoietic system, and nutritional deficiencies. Anemia manifests through both pathological and compensatory responses, including impaired erythropoiesis, morphological alterations of erythrocytes, hypoxic syndrome, activation of erythropoiesis, enhanced cardiovascular and respiratory function, increased tissue metabolism, and elevated blood coagulation. The present study aimed to identify calves suffering from anemia, determine the etiological factors involved, and evaluate the therapeutic potential of ultrasound-activated rabbit serum as a biostimulant. For the first time, methods were developed to obtain biologically active rabbit serum using controlled ultrasound exposure. Ultrasound-treated serum has been shown to stimulate hematopoiesis and enhance immunobiological reactivity, making it a promising tool for veterinary medicine. Under mild ultrasound conditions (≤ 1 W/cm² for ≤ 10 minutes), stimulatory effects predominate, including increased protein synthesis, accelerated wound healing, enhanced metabolic activity, and increased resistance to external stressors. Higher ultrasound intensities suppress physiological activity, reducing secretory and contractile functions in tissues and organs. Mechanistically, ultrasound may remove surface proteins from erythrocytes, forming “passport-less” cells that activate immune pathways, while also accelerating the breakdown of senescent cells and stimulating hematopoietic regeneration. A 29–30-day controlled experiment was conducted on calves with anemia of various etiologies. The experimental group received ultrasound-activated rabbit serum, while control animals received no treatment. Blood samples collected every seven days were examined for erythrocyte count, hemoglobin concentration, total serum protein and fractions, color index, and blood smear morphology. Ultrasound-treated serum produced clear hematological improvements. Erythrocyte count increased from 3.3 ± 0.3 to 7.2 ± 0.4 million/ μ L, approaching physiological norms. Hemoglobin levels rose from 6.2 ± 0.3 to 11.0 ± 0.2 g%, and the color index increased from 0.6 ± 0.2 to 1.0 ± 0.4 , indicating restoration

of hemoglobin saturation. Total serum protein increased from 4.70 g% to 7.20 g%, largely due to rises in β - and γ -globulins, reflecting enhanced immunobiological activity. Blood smear analysis showed that pathological erythrocyte forms—anisocytosis, poikilocytosis, sickle-shaped and hypochromic cells—diminished markedly after treatment. Normocytes predominated, hemoglobin saturation improved, and regenerative forms such as reticulocytes appeared. Clinically, calves treated with ultrasound-activated serum demonstrated 15–17% greater body weight gain compared with controls under identical husbandry conditions. No adverse effects were observed. In conclusion, ultrasound-activated rabbit serum represents an effective biostimulant capable of restoring hematological parameters, enhancing immune function, improving blood morphology, and promoting growth in anemic calves. Its safety profile and therapeutic efficacy highlight its potential as a novel One Health–aligned intervention for managing anemia and supporting animal health across diverse production settings.

Keywords: anemia, blood serum, ultrasound, biostimulation.

DETERMINATION OF SOME TRACE ELEMENTS IN BREAST CANCER

Zeynalzada Pusta, Orujov Agil

Azerbaijan Medical University, Biochemistry Department, Baku, Azerbaijan

Breast cancer is the most prevalent oncological disease among women worldwide, including in our country. According to the latest statistical data obtained by the World Health Organization, 2.3 million new cases and 670,000 deaths were recorded globally in 2022. This growing burden of breast cancer emphasizes the need for deeper investigation of molecular and biochemical alterations associated with the disease. It has been established that malignant carcinomas of the breast are accompanied by disruptions in the homeostasis of several microelements, particularly copper (Cu) and zinc (Zn). Although these trace elements are present in the human body in very small quantities (approximately 0.02% of total body mass), they are indispensable for the proper execution of fundamental physiological processes. For instance, Cu participates in cellular respiration, antioxidant defense, and the synthesis of various biomolecules, whereas Zn is involved in the regulation of gene activity, DNA repair, protein folding, and related processes. Recent investigations have demonstrated that imbalances in the levels of these microelements may hold potential value as biomarkers for disease monitoring and prognosis. The study included 34 patients aged 39–75 years diagnosed with breast cancer as the test group, and 12 healthy individuals as the control group. Serum levels of copper (Cu) and zinc (Zn) were assessed in both the main and control groups using the mass spectrometry (MS) analytical method, ensuring high sensitivity and accuracy in microelement detection. The findings obtained in the main group were compared with the results of the control group. The serum Cu concentration in patients included in the main group was significantly elevated compared with the control group ($p < 0.001$). In contrast, the serum Zn level in breast cancer patients was significantly reduced relative to the control group ($p < 0.05$). In parallel with these observations, the serum copper-to-zinc ratio (Cu/Zn) was found to be markedly higher in the main group compared with the controls ($p < 0.01$), suggesting that this ratio may serve as a more sensitive indicator of metabolic imbalance than the absolute levels of each element alone. The study demonstrated that the balance of serum copper and zinc levels is disrupted in patients with breast cancer. These alterations may reflect both increased oxidative stress and impaired antioxidant capacity, processes known to play a role in tumor development and progression. In this context, the use of these parameters as informative markers for early diagnosis, monitoring, and

prognosis may hold significant clinical value, contributing to more accurate treatment strategies and potentially improving patient survival outcomes. Further research on larger patient populations may help establish Cu, Zn, and the Cu/Zn ratio as routinely applicable biochemical indicators in oncological practice.

Key words: Breast cancer, copper, zinc, Cu/Zn ratio

DETERMINATION OF CERTAIN BIOCHEMICAL BIOMARKERS IN PATIENTS WITH GLOMERULONEPHRITIS

Gadirova Maya, Guliyeva Firengiz

Azerbaijan Medical University, Biochemistry Department, Baku, Azerbaijan

Glomerulonephritis is characterized by inflammation of the renal glomeruli and is one of the leading causes of chronic kidney failure. The pathogenesis of glomerulonephritis is complex, presenting a serious medical challenge involving immune mechanisms, inflammatory processes, and hemodynamic changes. Fundamental studies conducted in recent years indicate that oxidative stress plays a significant role in the progression of glomerulonephritis. Oxidative stress is the disruption of the balance between the increase of reactive oxygen species (free radicals) and the organism's antioxidant defense system. Lipid peroxidation occurring as a result of oxidative stress leads to cell membrane damage and impairment of glomerular filtration. Malondialdehyde (MDA), being one of the stable end-products of lipid peroxidation, is considered a reliable biomarker indicating the degree of oxidative stress in the organism. One of the antioxidant defense systems of the organism is the glutathione system. Reduced glutathione (GSH) plays a crucial role in neutralizing free radicals and protecting cells from damage. A decrease in GSH levels during glomerulonephritis indicates a weakening of the antioxidant system and an increased risk of disease progression. The aim of the study is to determine the levels of malondialdehyde, an indicator of oxidative stress, and reduced glutathione, reflecting the state of the antioxidant system, in the blood serum of patients with glomerulonephritis using biochemical research methods. We classified the 60 individuals included in our study into 3 groups. The first group is the control group, consisting of 10 practically healthy individuals. The second group includes 29 glomerulonephritis patients receiving dialysis. The third group consists of 21 glomerulonephritis patients not receiving hemodialysis. Malondialdehyde (MDA) levels in blood serum were determined by a spectrophotometric method based on the reaction with thiobarbituric acid (TBA). The amount of reduced glutathione (GSH) was evaluated using Ellman's reagent (DTNB). The intensity of lipid peroxidation was markedly increased in patients with glomerulonephritis. Specifically, compared to the control group (2.85 ± 0.11 nmol/L), the serum level of MDA increased 2.4-fold in the conservative group, reaching 6.72 ± 0.13 nmol/L, and 2.8-fold in the terminal group, reaching 7.91 ± 0.26 nmol/L ($p < 0.001$). This indicates a further intensification of oxidative stress during the terminal stage of the disease. Concurrently, the antioxidant defense system of the organism was weakened.

The level of reduced glutathione (GSH) decreased 1.4-fold in the conservative group to $0,39 \pm 0,01 \mu\text{mol/L}$, and 1.36-fold in the terminal group to $0,405 \pm 0,021 \mu\text{mol/L}$, compared to the control group ($0,55 \pm 0,01 \mu\text{mol/L}$) ($p < 0.001$). The obtained results indicate that the progression of glomerulonephritis, particularly in the terminal stage, is accompanied by intense oxidative stress and a weakening of the antioxidant system (specifically the glutathione cycle). Consequently, MDA and GSH levels can be considered informative markers for assessing the severity of the disease.

Keywords: Glomerulonephritis (GN), oxidative stress, malondialdehyde (MDA), reduced glutathione (GSH).

THE LEAN MANUFACTURING AND TOTAL WASTE MANAGEMENT

Parviz Mammadov¹, Vasif Kerimov^{1,2}, Valeh Alguluyev^{1,2}

¹Architecture and Civil Engineering Department, Baku Engineering University, Baku, Azerbaijan

²Industrial Engineering Department, The Institute of Control Systems of the Azerbaijan National Academy of Sciences²

vkerimov@beu.edu.az

In Japan, Toyota developed a revolutionary production process known as lean manufacturing. This highly successful method for reducing production waste, improving production flow, improving safety, reducing production time, improving quality, and increasing production began as a method to compete with Western automakers and soon became a revolutionary production mentality worldwide. Lean manufacturing mainly refers to the elimination of waste, which currently includes one part of waste, such as hazardous gases and wastes, that are disposed of in the environment. Most production companies dispose these type of waste to Environment and this type of wastes damage the flora and fauna. As a systematic way to increase efficiency, lean principles run counter to traditional mass-production practices. Yet, they allow small and medium businesses to consistently increase quality while decreasing costs. They emphasize key objectives like simplicity, flow, and balance. Companies, large and small, can leap over their competition by understanding and implementing this highly efficient system. The purpose of this study is to define all production wastes, and their impact on production and the environment, and then implement methods to eliminate the waste's negative impact on production cost and on the environment. In modern times, the definition and calculation of all wastes in manufacturing enterprises are to achieve maximum efficiency with minimum waste and continuous improvement of the quality of products and services produced without harming the environment, human health and safety. By application of the waste management, the total quality cost and total production cost are reduced. The practical application of waste management are indicated on this article. Application of total waste management principles in production for the elimination of wastes, minimising of total cost, and enhancement of

performance and quality. Reducing the amount of generated waste in production, improving quality, and reducing quality and total production costs. Additionally, to prevent the disposal of hazardous waste to the environment generated from the production process. By definition and calculation of all waste types, the quality control can be further improved, raw material resources can be saved, and quality and production costs can be reduced. Finally, the proper production planning is going to be provided.

Keywords: lean manufacturing, Just-In-Time, Gemba Walks, KPI (Key Performance Indicator).

THE APPLICATION OF 7S METHODOLOGY IN MANUFACTURING FOR INCREASE OF TOTAL QUALITY

Parviz Mammadov¹, Vasif Kerimov^{1,2}

*¹Architecture and Civil Engineering Department, Baku Engineering
University, Baku, Azerbaijan*

*²Industrial Engineering Department, The Institute of Control Systems of the
Azerbaijan National Academy of Sciences²*

vkerimov@beu.edu.az

Quality improvement methods and techniques have been investigated in different fields of manufacturing during the last decades. The Quality in Manufacturing areas are some of the key differentiators between competing entities in the business environment and the marketplace. Therefore, improving quality in production or services standards is the one of the main aim companies. (3) Techniques and methodologies for quality improvement and process management Systems adapted largely from Toyota Production System (TPS). The purpose is the application of 7S Lean practices is the improvement of production quality in manufacturing companies. The 7S principles has the positive impact for protection of Environment applied by companies. In modern manufacturing, by applying the quality control and improvement techniques, such as 7S methodologies enterprises target to achieve maximum productivity and efficiency with minimum waste and continuous improvement of the quality of products and services and also without harming the environment, equipment, human health and safety. Application of each steps of 7S methodologies is to create personell spirit and to manage the total quality management. Application of one of the total quality management techniques such as 7S methodologies for continuous improvement of the quality, safety, productivity and efficiency.

Keywords: Toyota Production System, TPS, 7S, Kaizen, Just-in-Time, Kaizen, Just-in-Time (JIT).