HYBRID INTERNATIONAL CONFERENCES
17-18 May 2025

ICBMS25, ICNFEAS25 (Türkiye)
ICCMM25 (Italy)
ICBM25 (UK)

Conference Abstract Book

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PREFACE

We are delighted to introduce the Conference Abstract Book for the "HYBRID INTERNATIONAL CONFERENCES: ICBMS25, ICNFEAS25 (Türkiye); ICCMM25 (Italy); and ICBM25 (UK)" scheduled for May 17-18, 2025. This conference served as a platform for engaging discussions on recent advancements across a wide spectrum of fields, including biological, medical, biomedical, food and nutrition, environmental, and agricultural sciences.
The conference provided a unique opportunity for participants from Asian, African, and European countries to showcase and discuss their research in their respective domains.
Contained within this Conference Abstract Book are written versions of the majority of the contributions presented during the conference, as well as the refereed abstracts submitted for publication in this volume. These submitted abstracts underwent rigorous blind peer review by experts from the Scientific Committee and editorial board. Acceptance for oral or poster presentations was determined based on originality, context, and clarity, ensuring the quality of the content presented. Please note that this book exclusively contains abstracts, while both abstracts and full-text papers will be published in the International Journal of BioLife Sciences (IJBLS) (ISSN: 2821-1642), which will be available online and accessible to all.
We extend our sincere gratitude to all participants for their invaluable contributions to the Conference program and this Conference Abstract Book. We would also like to express our appreciation to the Conference/Session Chairs and the Technical Support Team for their unwavering support. We are honored to acknowledge the scientific support received from Akdeniz University (Turkey), Avicenna International College (Hungary), Colombian Society for Biological Development, Bulgarian Society of Neurology, Argentina Society of Nutrition, International Scientific Association for Support and Development of Medical Technologies (Poland), and the Fruit Growing Institute (Bulgaria).
Lastly, we wish all participants a fruitful and enjoyable conference experience and extend our best wishes for success in your technical presentations.

With the Best Regards,
Organizing Committee
May 17-18, 2025

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WELCOME MESSAGE

Dr. R. AHMADI

AIC Member, Budapest, Hungary; IAS, AIREC and GREEN Scientific Committee Member

Dear Distinguished Colleagues, Precious Researchers,

As the head of the organizing committee, it is with great pleasure and pride that I extend a warm welcome to all the participants of the 6th International Conference on "HYBRID NTERNATIONAL CONFERENCES: ICBMS25, ICNFEAS25 (Türkiye); ICCMM25 (Italy) and ICBM25 (UK)" taking place on May 17-18, 2025. These hybrid international conferences are made possible through the collaboration and support of Akdeniz University, Avicenna International College (AIC), the International Association of Scientists (IAS), the Global Research, Education and Event Network (GREEN), and the Academy of International Research, Events, and Courses (AIREC). They will delve into significant and intriguing topics in life sciences, medicine, biomedicine, food and nutrition, as well as environmental and agricultural sciences.

I am confident that each of you will find subjects aligned with your interests and derive great value from the numerous enriching discussions that will take place. I am particularly excited about the prospect of this event providing all attendees with the opportunity to engage in exchanges of views and the sharing of experiences with esteemed professors, colleagues, and friends hailing from renowned universities, research institutes, and relevant international organizations. Furthermore, I would be deeply honored if this conference sparks new thoughts and ideas, inspiring scientific research and investigations within your respective fields.

Once again, I extend a heartfelt welcome and convey my best wishes to each and every one of you.

Kind regards,
Dr. Rahim Ahmadi
Organizing Committee (Head)
May 17-18, 2025

WELCOME MESSAGE

Prof. Dr. Bülent TOPCUOĞLU

Plant and Animal Production Department, Technical Sciences Vocational School, Akdeniz University, Antalya, Turkey.

Dear Distinguished Delegates, Colleagues and Guests,

The Organizing Committee warmly welcomes our distinguished delegates and guests to the HYBRID INTERNATIONAL CONFERENCES: ICBMS25, ICNFEAS25 (Türkiye); ICCMM25 (Italy); and ICBM25 (UK) scheduled on May 17-18, 2025. The conferences are being organized with the joint efforts of Akdeniz University (Türkiye), Avicenna International College (Hungary), Colombian Society for Biological Development, Bulgarian Society of Neurology, Argentina Society of Nutrition, International Scientific Association for Support and Development of Medical Technologies (Poland) and Fruit Growing Institute (Bulgaria).

These events are organized to gather members of international community scientists so that researchers from all around the world can present their leading-edge work. The conference has solicited and gathered technical research submissions related to all aspects of major conference themes and tracks. All the submitted papers/abstracts in the proceedings have been peer reviewed by the reviewers drawn from the scientific committee, external reviewers and editorial board depending on the subject matter of the paper/abstract. After the rigorous peer-review process, the submitted papers/abstracts were selected on the basis of originality, significance, and clarity for the purpose of the conference. The conference program is extremely rich, featuring high-impact presentations. The conference will therefore be a unique event, where attendees will be able to appreciate the latest results in their field of expertise, and to acquire additional knowledge in other fields. We would like to thank the organization staff, and the members of the program committees for their work. We are grateful to all those who have contributed to the success of the conferences. We hope that all participants and other interested readers benefit scientifically from the proceedings and also find it stimulating in the process.

With our warmest regards,
Prof. Dr. Bülent TOPCUOĞLU
Conference Chair
May 17-18, 2025

WELCOME MESSAGE

Prof. Dr. Afrim TABAKU

Aldent University, Tirana, Albania.

Dear colleagues,

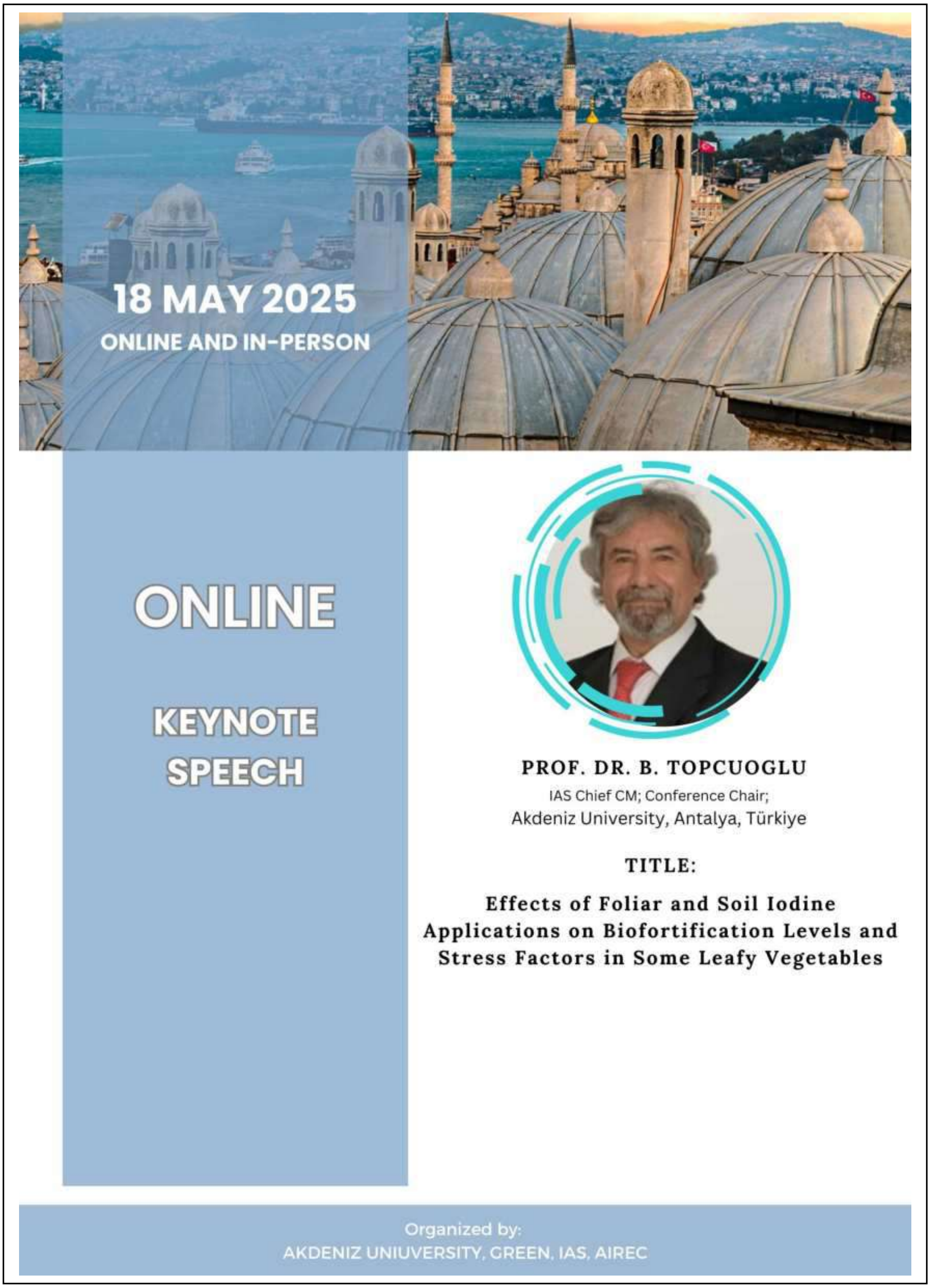
As a IAS, GREEN and AIREC scientific committee chief member and conference chair, it is my great pleasure to warmly welcome you to the International Conferences: ICBMS25, ICNFEAS25, (Türkiye); ICCMM25 (Italy); and ICBM25 (UK). These conferences aim to broaden up the scope with fresh insights towards recent findings in medical, biological, food and nutrition, environmental and agricultural sciences. The topics to be discussed include a variety of sciences including AI, life sciences, biology, biomedical sciences, health sciences, and medicine and pharmaceutical sciences as well as food, environmental and agricultural sciences.

By hosting this event we hope to enhance the scientific exchange and dialogue among young researchers as well as PhD and MSc students. We greatly appreciate your attendance and contribution to the success of the events.

With best wishes,
Prof. Dr. Afrim TABAKU,
Aldent University,
Tirana, Albania.

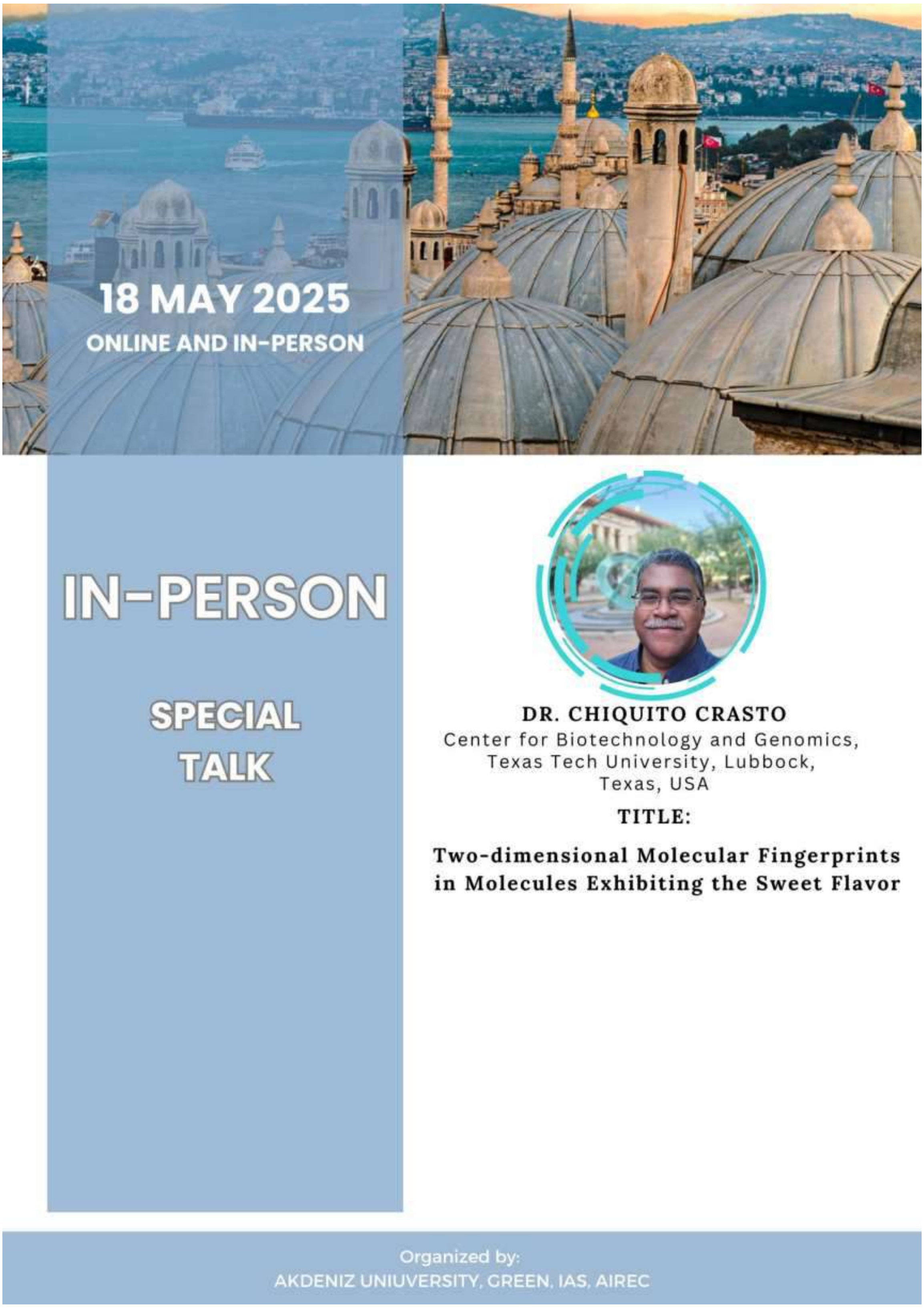
Scientific Committee

Keynote Speech



Keynote Speech

Special Talk



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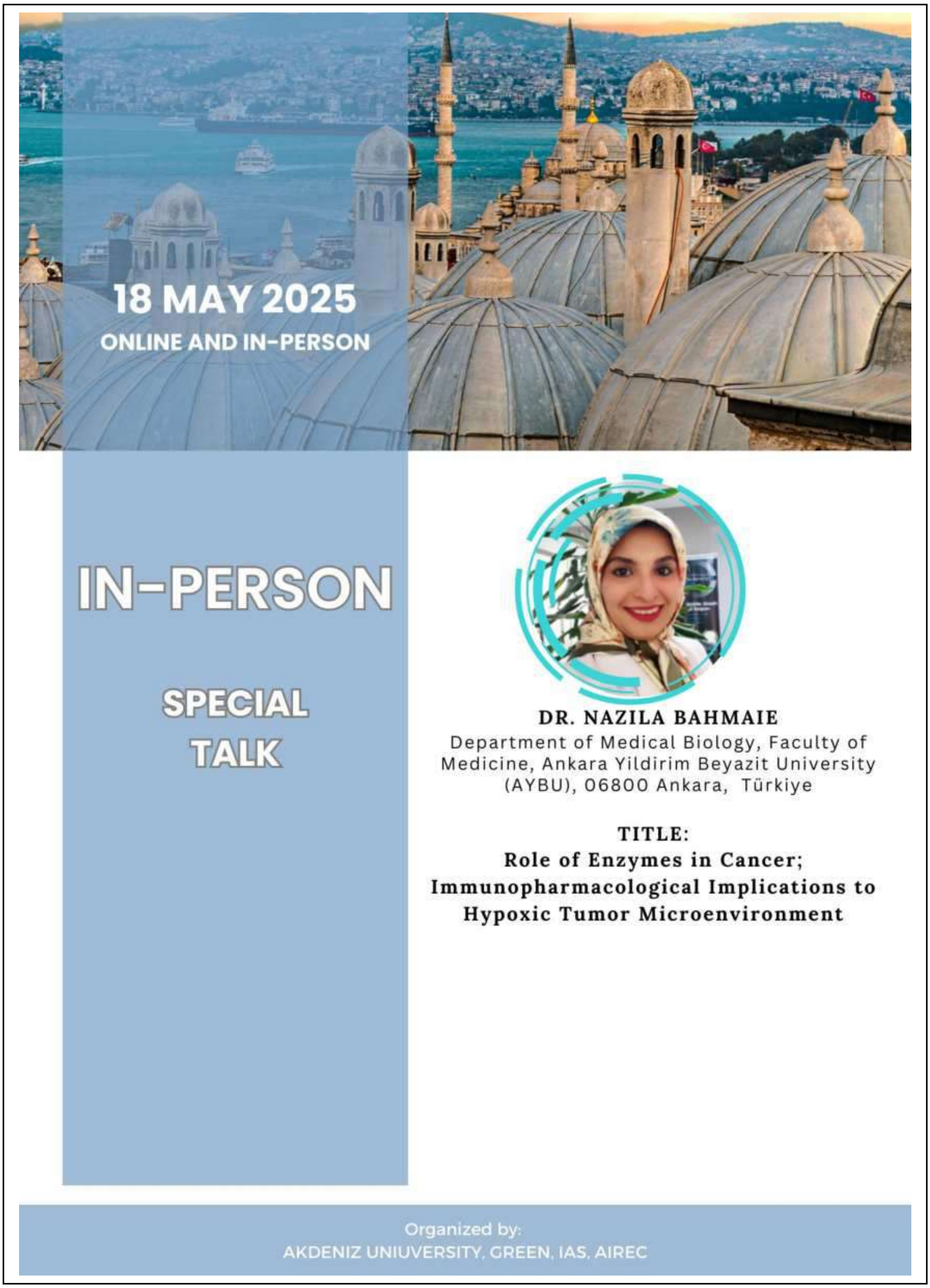

Keynote Speech

Keynote Speech

Keynote Speech

Assessment of the Impact of Heating a Feeding Oil Mixture on Laboratory Rats' Lipid Profiles and Liver Functions

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Background and Aim: Since Egyptians frequently cook with a mixture of heated oils, heated oils are regarded as a common tradition in daily life in the Arab Republic of Egypt. Therefore, it is necessary to investigate the effects of this on lipid indicators and liver functions in laboratory animals in order to determine the extent of its danger or safety to humans.

Methods: 36 albino rats were used in a laboratory experiment, and they were split into six groups: the control group was given a regular diet, the fresh soybean oil group, the fresh sunflower oil group, the fresh olive oil group, the fresh mix oil group, and the mix heated oil group.

Results: Biological experiments revealed that heated oils significantly elevated malondialdehyde (MDA) levels, indicating increased oxidative stress. They also worsened lipid profiles by raising triglycerides, LDL, and VLDL while lowering HDL cholesterol. In contrast, fresh oils, especially olive oil, improved lipid profiles by increasing HDL and reducing other lipid fractions. Heated oils negatively impacted liver function by elevating serum enzyme activities (GPT, GOT, and GGT) and bilirubin levels, reflecting oxidative stress and liver damage. Conversely, fresh oils reduced enzyme activities and bilirubin levels, demonstrating protective effects on liver function. Protein metabolism markers (total protein, albumin, and globulin) also decreased with heated oils but improved significantly with fresh oils.

Conclusion: In conclusion, heated oils exacerbated oxidative stress, impaired lipid metabolism, and damaged liver function, while fresh oils, particularly olive oil, exhibited antioxidant properties, improved lipid and liver function, and supported overall health. These findings highlight the health risks of consuming repeatedly heated oils and the benefits of using fresh oils in diets.

Keywords: *Heated oils, Liver functions, Lipid profile, Fresh oils*

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Water, sanitation, and hygiene practices among mothers and its association with diarrheal infection of their under-5 children in Chattogram, Bangladesh: A Cross-sectional study

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Background and Aim: This study aims to address the association between the practices of water, sanitation & hygiene among mothers and diarrheal infection among their Under-5 Children in Chattogram, Bangladesh.

Methods: This cross-sectional survey study was conducted during summer 2024, among 182 mothers of children under five years of age living in Chattogram City, Bangladesh. The probability proportional sampling (PPS) technique was applied to interview the study participants.

Results: The study found that 37.4% of participants had toilets with ideal sanitary facilities. Mothers' estimates of toilet cleanliness demonstrated a Pearson association with their child's diarrheal count in the previous 12 months ($P<0.007$), whereas variations in toilet usage ($P<0.003$), toilet cleaning frequency each week ($P<0.002$) and availability of sewage channel with toilet ($P<0.01$) evidence significant association with diarrheal infection frequency in the last 12 months. Washing hands after using the toilet ($P<0.002$), washing fruits/vegetables before eating or cooking ($P<0.000$), washing hands before and after food consumption ($P<0.02$) & types of soap uses to wash hands ($P<0.02$) were found significantly associated with diarrheal infection. 41.8 % participants were found, who use no filtration method to purify their drinking water, however, the study found no significant association between water consumption practices with diarrheal infection frequency among respondents' children under five years of age.

Conclusion: The study highlights the significant role mothers play in children's health, highlighting the impact of inadequate water purification, inconsistent toilet use, poor hand washing habits, and limited access to safe drinking water on diarrhea incidence. These findings can guide future public health efforts to reduce diarrhea morbidity and mortality.

Keywords: *Water, Sanitation, Hygiene, Diarrheal diseases, Children Under-5*

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Nanotechnology in Oncology: Therapeutic Breakthroughs and the Risk Landscape

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Background and Aim: To examine recent advances in the application of nanotechnology to oncology, highlighting therapeutic breakthroughs. This review aims to provide a comprehensive overview of the current state of cancer nanotherapeutics while critically evaluating the potential risks and challenges associated with their clinical translation.
Methods: A systematic review of the literature was conducted, focusing on preclinical and clinical studies that assess the efficacy and safety of nanoparticle-based cancer therapies. The analysis included FDA-approved cancer drugs and promising candidates currently in clinical trials.
Results: Nanotechnology has facilitated the development of several FDA-approved cancer drugs, demonstrating improved pharmacokinetic profiles and enhanced drug accumulation in tumors. These advancements have resulted in reduced side effects compared to conventional treatments.
Conclusion: The review addresses potential risks, such as off-target effects and immunogenicity, emphasizing the importance of continued research to optimize the design and development of cancer nanotherapeutics. It highlights the need for rigorous preclinical and clinical evaluation to ensure safe and effective applications in oncology. Overall, while nanotechnology presents significant opportunities for advancing cancer treatment, careful consideration of associated risks is essential for successful clinical translation. Further research and innovation are necessary to harness the full potential of nanotherapeutics, paving the way for more effective and personalized cancer therapies. This synthesis encapsulates the critical aspects of recent developments in nanotechnology for oncology, focusing on breakthroughs while acknowledging challenges that must be addressed for future success.
Keywords: *Nanotechnology, Oncology, Cancer therapy, Drug delivery, Targeting, Nanoparticles, Gene therapy, FDA-approved drugs*

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Renal Gross Morphological Restorative Effects of Curcuma Longa on Sildenafil Induced Nephrotoxicity among Male Albino Rats

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Background: Sildenafil is a phosphodiesterase inhibitor used in the management of erectile dysfunction and management of pulmonary hypertension. *Curcuma longa* is a traditional herbal plant that is commonly used as a diet in Africa and Asian countries. It has a variety of benefits including; antioxidant, anti-cancerous, management of diabetes and respiratory diseases. The objective of this study was to evaluate the renal gross morphological changes in restorative effects of *Curcuma longa* on sildenafil induced nephrotoxicity among male albino rats.

Methods: A total of 25 male albino rats were used and classified control or experimental group. Simple random sampling method was used to allocate them into each group. Animals in group1 were only fed on feeds and water ad libitum, group 2 to 5 received Sildenafil 1mg/gm bwt for 15 days. Animals in group 3,4 and 5 were further subjected to *Curcuma longa* at calculated dose of low, medium and high respectively. Animals in group 2 were sacrificed 4 hours post last dose and the remaining animals were sacrificed 7 days later. On sacrificing gross morphometrics were done.

Results: It was observed that mean weight of rat, weight and volume of kidney increased significantly (p=0.0001) in medium and high dose *Curcuma longa* as compared to Sildenafil induced nephrotoxicity group. The mean length and thickness in medium and high dose *Curcuma longa* increased significantly (p=0.0001) as compared to Sildenafil induced nephrotoxicity group.

Conclusion: Medium and high dose *Curcuma longa* have renal gross morphological effects on sildenafil induced nephrotoxicity among male albino rats.

Keywords: *Antioxidant, Anti-cancerous, Diabetes, Kidney and pulmonary hypertension*

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Optimization of Microplate Aggregometry Method and Screening of Molecules with Antiplatelet Potential

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Background and Aim: Antiplatelet drugs are commonly used to prevent thrombotic events. However, despite the variety of available medications, many are associated with side effects, highlighting the need for safer and more effective alternatives. Developing new molecules requires extensive screening. This study focuses on optimizing the microplate aggregometry technique using the Varioskan and screening a series of compounds to assess their antiplatelet potential.
Methods: To assess microplate aggregometry, we optimized the agonist concentration, temperature, and stirring speed using the Varioskan. The optimal conditions were then applied to screen a series of chemical compounds. The results were validated using the photometric aggregometry method, which remains the gold standard for assessing pro- or anti-aggregant effects.
Results: The optimization of microplate aggregometry conditions using the Varioskan identified the following optimal parameters: an agonist concentration of 40 µM ADP and 1.5 mM of arachidonic acid, shaking at 1000 rpm, and room temperature. Using these conditions, we screened a series of chemical compounds and identified four molecules with aggregation inhibitory effects: esculetin, methyl gallate, naringenin, and trans-ferulic acid. Their inhibition percentages were 62%, 60%, 18.5%, and 47%, respectively, for the arachidonic acid pathway, and 21%, 3%, and 37% for the ADP-induced pathway, while trans-ferulic acid showed no antiaggregant activity in the latter. All results were validated using the photometric aggregometry technique.
Conclusion: This study highlights microplate aggregometry as a reliable, reproducible, and efficient method for screening antiplatelet molecules, requiring less platelet-rich plasma and allowing high-throughput testing. Using this technique, we successfully identified molecules with antiplatelet activity.
Keywords: *Microplate aggregometry, Varioskan, Molecule screening, Antiaggregant potential*

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Cadmium-induced Hepato-renal Toxicity in Rats: Protection by Cinnamic Acid via Antioxidavtive Pathway

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Background and Aim: Cadmium chloride (CdCl2), a highly toxic compound, poses significant risks to human health especially oxidative injury. The use of antioxidants such as Cinnamic acid has been used in the treatment of oxidative stress. Hence, this study investigates the ameliorative effects of Cinnamic acid on Cadmium chloride–induced hepato-renal injury.
Materials and methods: Thirty male Wistar rats, divided into six groups (n=5), were treated with Corn oil (control), $CdCl_2$, $CdCl_2$ + CA (50 mg/kg), $CdCl_2$ + CA (100 mg/kg), CA only (50 mg/kg) and (100 mg/kg). Rats were pretreated with CA (*p.o*) for 7 days and challenged with intraperitoneal injection of two doses of $CdCl_2$ (1.5 mg/kg) at the last 72 hours.
Results: Administration of $CdCl_2$ caused a significant ($p<0.05$) increase in the levels of serum Urea, Creatinine and renal lipid peroxidation (LPO) by 79%, 25% and 29%, respectively when compared with the control. However, the activity of renal superoxide dismutase and the level of renal reduced glutathione were significantly ($p<0.05$) decreased by 50% and 26%, respectively relative to the control. $CdCl_2$ also significantly increased the activities of serum AST and levels of liver LPO by 76% and 71%, respectively while the activity of SOD in the liver was insignificantly ($p>0.05$) decreased. Interestingly, pre-treatment with cadmium chloride significantly reduced the serum indices and restored the antioxidant parameters in the tissues close to normal.
Conclusion: Cinnamic acid ameliorates Cadmium chloride-induced kidney and liver dysfunction via antioxidative pathway.
Keywords: *Cadmium chloride, Cinnamic Acid, Oxidative injury, Antioxidant.*

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The Convergence of AI, CRISPR, and Molecular Genetics in Cancer Diagnosis and Therapeutics

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Background and Aim: Cancer is a major global health issue, with AI, CRISPR, and molecular genetics offering promising advances in diagnosis and treatment. This review explores how these technologies converge to improve diagnostics, personalize treatments, and predict responses, while addressing clinical challenges and opportunities.

Method: This review article was conducted using databases such as PubMed, Scopus, and Google Scholar to identify relevant published articles. Relevant articles from the last 10 years that addressed the use of artificial intelligence, CRISPR, and molecular genetics in cancer diagnosis and treatment were selected. Data were extracted on the applications of the technology, clinical outcomes, and challenges. A qualitative and comparative analysis of the studies was conducted to assess the effectiveness of these technologies when used together.

Results: The use of artificial intelligence, CRISPR, and molecular genetics in cancer diagnosis and treatment has resulted in significant changes. These technologies have improved diagnostic accuracy, personalized treatments, and treatment response predictions. AI analyzes medical data, CRISPR edits genes, and molecular genetics identifies cancer-causing mutations and aids in developing new treatments.

Conclusion: The convergence of AI, CRISPR, and molecular genetics is transforming cancer diagnosis and treatment through increased precision, targeted gene editing, and improved tumor profiling. Despite these advances, challenges such as ethical considerations, off-target effects, and integration into the clinic remain. Future research should focus on optimizing this synergy to advance personalized medicine and improve cancer treatment.

Keywords: *Artificial Intelligence, CRISPR-Cas9, Cancer Diagnosis, Molecular Genetics*

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The Dual Opposing Role of Autophagy in Cancer: From Cancer Promotion to Cancer Suppression: A Mini Review

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Background: Autophagy is a cellular process essential for maintaining homeostasis, yet in cancer, it plays a dual role in both promoting and suppressing tumor growth. This review aims to explore these contradictory roles of autophagy and its potential as a therapeutic target in cancer treatment.
Methods: A literature search was conducted using databases such as PubMed, Scopus, and Google Scholar. Keywords like "autophagy," "cancer," "tumor promotion," and "tumor suppression" were used to identify relevant studies published between 2015 and 2025. English-language articles on experimental models involving autophagy and cancer were included.
Results: Autophagy promotes tumor growth by helping cancer cells survive under stress conditions like nutrient deprivation and oxidative stress. In contrast, autophagy can also suppress tumorigenesis by inducing cell death and preventing genomic instability. Key regulatory factors such as p53 and NRF2 influence autophagy's opposing roles, with autophagy acting as a cytoprotective mechanism in some cases and a tumor-suppressive process in others.
Conclusion: Autophagy has a complex, dual role in cancer, acting both as a promoter and suppressor of tumorigenesis. Understanding the mechanisms behind these opposing roles is essential for developing targeted therapies. Further research is needed to determine how to modulate autophagy effectively for cancer treatment.
Keywords: *Autophagy, Cancer, Tumor promotion, Tumor suppression*

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New Generations of Anti-Cancer Drugs: Bridging Precision Medicine and Drug Discovery

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[2]Faculty of Medicine, Tehran Medical Sciences Islamic Azad University, Tehran, Iran

Background and Aim: Cancer treatment has evolved significantly, moving from broad-spectrum chemotherapies to targeted therapies designed to attack specific genetic mutations. Precision medicine has revolutionized oncology by offering treatments tailored to an individual's genetic profile. However, despite these advancements, challenges such as drug resistance, tumor heterogeneity, and the complexity of cancer genetics continue to limit the effectiveness of current therapies. The next generation of anti-cancer drugs aims to bridge the gap between precision medicine and innovative drug discovery approaches. This review explores the latest advancements in anti-cancer drug development, focusing on next-generation targeted therapies, immunotherapies, and AI-driven drug discovery. It highlights how these innovations are shaping the future of precision oncology while addressing the persistent challenges in treatment efficacy and accessibility.
Methods: A systematic review of recent literature was conducted to assess emerging drug development strategies, including small molecule inhibitors, bispecific antibodies, immune checkpoint inhibitors, and RNA-based therapies. Additionally, advancements in computational drug discovery, such as AI-driven molecule design and virtual screening, were analyzed to evaluate their impact on accelerating drug development.
Results: Next-generation anti-cancer drugs are demonstrating improved specificity and reduced toxicity, with many novel therapies in clinical trials showing promising results. AI and machine learning are expediting the discovery of new drug candidates, optimizing drug-target interactions, and identifying resistance mechanisms more efficiently. However, challenges such as regulatory barriers, high development costs, and the need for comprehensive biomarker-driven patient selection remain significant.
Conclusion: The future of cancer treatment lies in the synergy between precision medicine and advanced drug discovery techniques. By integrating AI, biomarker-driven strategies, and novel therapeutic modalities, the next wave of anti-cancer drugs has the potential to significantly improve patient outcomes. However, continued collaboration among researchers, pharmaceutical companies, and regulatory agencies is crucial to translating these innovations into widely accessible treatments.
Keywords: *Precision medicine, targeted therapy, immunotherapy, AI-driven drug discovery, cancer treatment, next-generation drugs, biomarkers, personalized oncology*

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Exploring the Impact of Samaritan on Infertility: Implications for Spermatogenesis and Hormonal Regulation

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Background and Aim: Sumatriptan, a selective serotonin receptor agonist (5-HT1B/1D), not only affects the nervous system but also plays a role in regulating testicular function by modulating serotonin pathways. However, studies examining the effects of sumatriptan on male reproductive system remain limited. Therefore, this study aims to evaluate the impact of sumatriptan on spermatogenesis and testosterone regulation in male NMRI mice.
Methods: In this experimental study, 24 male NMRI mice, weighing between 25-35 grams, were randomly divided into four groups: control (normal conditions), sham (receiving only the drug solvent), low-dose sumatriptan (1.5 mg/kg), and high-dose sumatriptan (5.5 mg/kg). The drug was administered daily via oral gavage for 22 days, after which samples were collected for biochemical and histological analysis.
Results: Serum testosterone levels showed a significant increase in the sumatriptan-treated groups compared to the control. Moreover, sperm count was significantly higher in the high-dose sumatriptan group when compared to the control group, indicating a dose-dependent effect of sumatriptan on spermatogenesis.
Conclusion: These results suggest that sumatriptan may have a positive effect on male reproductive health by enhancing testosterone levels and sperm production, particularly at higher doses. Given its impact on spermatogenesis, sumatriptan could potentially be explored as a therapeutic option for addressing certain aspects of male infertility, although further studies are needed to fully understand its role in fertility regulation.
Keywords: *Sumatriptan, Testosterone, Spermatogenesis, Male infertility*

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Assessment of Oxidative Potential in Culture Medium Conditioned by MCF7 Cancer Cells via FRAP and MDA Assay

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Background and Aim: In recent years, the use of natural-origin drugs has gained significant attention due to their lower harmful effects compared to conventional chemical drugs. Recently, fungi and yeasts have been studied as rich sources of effective biological compounds. This research aims to investigate the oxidative effects of the cytoplasmic extract of Saccharomyces cerevisiae on the MCF-7 cancer cell line. The objective of this study is to evaluate the antioxidant potential of this extract and analyze the changes in oxidative markers in these cells.
Methods: Yeast cells of Saccharomyces cerevisiae (PTCC 5052) were cultured, harvested, disrupted using sonication, and cytoplasmic fractions were extracted via ultracentrifugation. MCF7 breast cancer cells were cultured and treated with yeast cytoplasmic extract. The antioxidant potential (FRAP) and oxidative marker (MDA) were measured at different concentrations and time points using spectrophotometry. Statistical analyses were performed with SPSS version 28.
Results: The results of the FRAP and MDA tests indicate that, except for cases where the cells were treated for 72 hours, no significant differences were observed in other cases. Additionally, the normal distribution of the data can be observed using the qq.plot chart.
Conclusion: Additionally, in examining the antioxidant marker FRAP and the oxidative marker MDA, it was observed that there were no significant differences in the FRAP test between the control samples and the tested samples. Except for the 48 and 72-hour time points at a concentration of 2000 µg/ml, there was no considerable decrease compared to the control sample, making it impossible to conclusively determine that the reduction in this antioxidant marker caused cell death. Similarly, in the evaluation of the oxidative marker MDA, similar results were concluded.
Keywords: *Saccharomyces cerevisiae, Breast cancer, Antioxidant activity*

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Voxel-wised EQD2 Calculation with Python Programming Language in the Setting of Re-irradiation

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Background and Aim: This study aims to develop a Python-based methodology for voxel-wise calculation of Equivalent Dose in 2 Gy fractions (EQD_2) to support re-irradiation (ReRT) planning. The main objectives are to transform physical dose data from the initial course of radiotherapy (course 1) into EQD_2 and to calculate the remaining safe dose limits for subsequent courses (course 2 or 3) to optimize treatment while ensuring patient safety.

Methods: Patient dose-volume histogram (DVH) data from treatment planning systems (TPS) were imported into Python to calculate EQD_2 voxel-by-voxel. The initial physical dose D was converted using the equation (eq. A1).

$$EQD2 = D \cdot \left(\frac{d + \alpha/\beta}{2 + \alpha/\beta}\right)$$

d is the dose per fraction, and α/β is the tissue-specific sensitivity ratio. An optional adjustment was applied by using (eq. A2) to account for potential tissue recovery between treatments:

$$EQD2\_\{\alpha/\beta, original(with\, recovery)\} = (1 - R) \cdot EQD2\_\{\alpha/\beta, original\}$$

R represents the assumed recovery proportion.

To determine the remaining dose capacity, the calculated EQD_2 from course one was subtracted from cumulative dose constraints set by clinical guidelines (e.g., QUANTEC, RTOG) as per the equation (eq. A3).

$$EQD2\_\{dose\, remaining\} = EQD2\_\{\, cumulative\} - EQD2\_\{original(with\, recovery)\}$$

The remaining safe EQD_2 dose was then translated back into a deliverable physical dose for subsequent courses using the equation (eq. A4).

$$D_n = n/2\left(\sqrt{\left\{\left(\frac{\alpha}{\beta}\right)^2 + 4/n \cdot EQD2_{\{\{dose\ remaining\}\}} \cdot \left(2 + \frac{\alpha}{\beta}\right)\right\}} - \frac{\alpha}{\beta}\right)$$

D_n is the dose per fraction, and n is the number of planned fractions.

Results: The Python script successfully performed voxel-wise EQD_2 calculations, accurately converting physical doses and calculating remaining safe dose limits for subsequent courses. This method ensures the evaluation of re-irradiation feasibility based on radiobiological parameters and existing dose constraints. The tool provided clear dose-response graphs and comparative visualizations for clinical review, improving treatment planning precision.

Conclusion: The developed Python-based program effectively solves EQD_2 calculations in re-irradiation planning. Converting physical doses to EQD_2 and vice versa offers detailed insights into cumulative dose constraints and remaining safe dose limits.

Keywords: *Re-irradiation, Python, EQD2*

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Therapeutic Potential of Garcinia kola: A Fast Review of Pharmacological Benefits and Clinical Applications

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Background and Aim: Bitter kola (Garcinia kola) the wonder plant, a member of the genus Garcinia, is a lesser-known plant food that is chewed not necessarily for its food value but rather for its curative properties has been widely recognized for its pharmacological and therapeutic properties. The aim of this study is to review the therapeutic potential of Garcinia kola and its pharmacological benefits and clinical applications.
Methods: A systematic search was conducted using databases such as PubMed, Google Scholar, ScienceDirect, and Web of Science. Relevant studies were identified using the keywords "*Garrcinia kola*," "pharmacological benefits," "therapeutic potential," and "clinical applications". Inclusion criteria were set to include only published papers after 2015 and those available in the English language.
Results: Rich in bioactive compounds such as flavonoids, bioflavonoids, tannins, alkaloids, and saponins, bitter kola exhibits potent antioxidant, anticancer potential, digestive aid and gut health improvement, anti-inflammatory, antimicrobial, and hepatoprotective effects. Studies indicate the role of its anti-diabetic properties. Additionally, bitter kola's antimicrobial activity extends to bacteria, fungi, and viruses, supporting its use in traditional medicine for treating respiratory infections and gastrointestinal disorders. Moreover, studies indicate that bitter kola may contribute to neuroprotection, potentially mitigating neurodegenerative conditions by inhibiting oxidative damage and neuroinflammation. Its role in improving male reproductive health and enhancing cognitive function further highlights its broad-spectrum benefits.
Conclusion: Despite promising medicinal potential of bitter kola, more clinical studies and pharmacokinetic investigations are required to fully understand its prolonged safety and clinical outcomes.
Keywords: *Bitter kola, Garcinia kola, Antioxidant, Anti-inflammatory, Antimicrobial, Neuroprotection, Diabetes, Phytochemicals*

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The Intersection of Climate Change and Medicine Challenges in Developing Countries

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Background and Aim: Climate change poses a significant and growing threat to global health, disproportionately affecting developing countries due to limited resources, fragile health systems, and high disease burdens. This study aims to explore the multifaceted challenges climate change presents to medical systems in developing countries, with a focus on healthcare delivery, disease patterns, and public health preparedness.
Methods: A comprehensive review of peer-reviewed literature, global health reports, and climate data from 2000 to 2024 was conducted. Thematic analysis identified key intersections between climate change and medical challenges, focusing on Sub-Saharan Africa, South Asia, and parts of Latin America. Case studies were used to illustrate specific health impacts, such as vector-borne diseases, malnutrition, and extreme weather events.
Results: The review highlights an increase in climate-sensitive diseases, including malaria, dengue, and cholera, exacerbated by rising temperatures and erratic rainfall. Health systems face severe strain due to infrastructure damage from floods, heatwaves, and droughts. Additionally, climate-induced displacement has led to overcrowded living conditions and heightened risk of infectious disease outbreaks. Limited access to healthcare and insufficient climate-adaptive policies further hinder response efforts.
Conclusion: Climate change amplifies existing health disparities in developing countries, demanding urgent integration of climate resilience into health planning. Strengthening surveillance, improving healthcare infrastructure, and fostering international support are essential to mitigate these impacts and protect vulnerable populations.
Keywords: *Climate change, Global health, Developing countries, Healthcare systems*

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Revolutionizing Flow Cytometry: AI-Powered Diagnostics for Hematologic Malignancies

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Background and Aim: Flow cytometry through years has revolutionized the diagnosis and the monitoring of hematologic neoplasms, providing in this way a high-throughput method for the analyse of cellular DNA, immunophenotyping, and also for the minimal residual disease (MRD) assessment. Early studies published have already established the prognostic value if Flow Cytometry in leukemia and lymphoma, and have demonstrated a superior sensitivity compairng to the conventional cytology in the detection of small malignant cell populations. Further advances in this field such as laser scanning cytometry and the use of multidimensional gating strategies have refined even more the leukemia and lymphoma characterization, including Acute Leukemia (AL), Chronic Lymphocytic Leukemia (CLL), Multiple Myeloma (MM), and Myelodysplastic Syndromes (MDS). Based in all this, the integration of artificial intelligence (AI) and machine learning (ML) into flow cytometry methodology represents a paradigm shift, offering to us automation, precision, and predictive insights in a better hematologic diagnostics.

Objectives: This study evaluates the clinical role and the impact of AI in flow cytometry-based hematologic diagnostics. It focus on the application of AI-driven in flow cytometry in early leukemia detection, CNS malignancy involvement assessment, MRD monitoring, and in the treatment response prediction.

Methods: A comprehensive literature review was conducted using all the papers published in the databases such as PubMed, Nature, Frontiers in Medicine, and Clinical Chemistry, covering peer-reviewed published articles from 1987 to 2024. The inclusion criteria selected studies on AI-enhanced flow cytometry, leukemia classification models, MRD tracking, and CNS hematologic malignancy diagnostics. The review of the included published papers, assessed automation, accuracy, efficiency, and most of all AI’s ability to integrate with the new emerging cytometry technologies such as mass spectrometry and deep learning models. Data were analyzed based on the methodological rigor, the clinical impact they have, and on the AI model validation challenges.

Results: AI-driven flow cytometry has demonstrated significant advantages in the Hematology malignancies, including a higher diagnostic accuracy, surpassing manual gating techniques in AL, CLL, MM, and MDS classification and an enhanced MRD monitoring, allowing earlier relapse prediction and improved treatment response tracking. Also the studies has demonstrated a superior CNS hematologic malignancy detection, while performing the cytomorphology in cerebrospinal fluid (CSF) analysis.

The integration of AI -driven Flow cytometry with with the recent emerging technologies, such as mass spectrometry and AI-driven multidimensional analysis, has improved real-time data interpretation. However,on the other hand, key challenges still persist, including the data heterogeneity, lacking of the standardization in flow cytometry instrumentation, and also the variability in antibody panels. AI models function as black-box algorithms, so this can cause limitations in the interpretation capability , bringing lack of clinician trust in automated diagnostics. Regulatory validation and clinical standardization of AI-Driven Flow cytometry methods remain so the critical barriers to widespread adoption. AI-driven cytometry demands high computational power, and this may limit accessibility in low-resource countries.

Conclusion: AI-powered flow cytometry is transforming the diagnosis in hematologic malignancies. it is enabling a faster, highly accurate, and reproducible disease detection across all the diagnoses such as in AL, CLL, MM, and MDS. Its role in the detection of the hematological malignancies in early fases , in the monitoring of MRD and in the treatment of these diseases marks a significant advancement in precision hematology. However, standardization need to be ensured , regulatory compliance need to be performed, and clinical validation presents the essential key for AI's integration into daily routine hematology practice. Future research should prioritize the model transparency, create an equitable access for all, and create AI-driven standardization of flow cytometry protocols.

Keywords: *AI in hematology, flow cytometry, acute leukemia, CLL, multiple myeloma, MDS, minimal residual disease, machine learning, cerebrospinal fluid diagnostics*

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Artificial Intelligence in Frailty Assessment for Patients with Acute Coronary Syndrome: A Comprehensive Review of Current Evidence

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Background and Aim: Frailty is a determinant of the outcome of the patients diagnosed with acute coronary syndrome (ACS), but still underutilized in clinical practice. Artificial intelligence (AI) has demonstrated efficacy on risk stratifying and treatment personalising of those patients, but still remains underexplored. This study aims to evaluate the application of AI to improve the risk prediction and clinical decision-making of frail patients.

Methods: A literature review was conducted using PubMed, EMBASE, Google Scholar, Scopus, Web of Science, and Nature, including all the papers published from 2015 to 2025 focusing on frailty assessment in ACS patients and AI applications in ACS management. Key findings were analyzed, and categorized based on frailty prevalence, impact on treatment decisions, and AI-driven methodologies.

Results: The frailty prevalence in ACS patients ranges from 10% to 48%, with higher mortality rates in frail individuals (up to 24.6% at 12 months). Frail patients have been shown to be less likely to receive guideline-directed treatments, including PCI. The use of AI applications in ACS focus on the predictive modeling, risk stratification, and treatment optimization, but still remain limited. Standard frailty assessment tools used, such as the Clinical Frailty Scale and Tilburg Frailty Indicator, demonstrate prognostic value but lack uniform clinical adoption.

Conclusion: Despite its prognostic significance, frailty assessment in ACS is applied inconsistently in the clinical settings, but it holds promise for improving frailty identification and guiding personalized management. Further research needs to be developed to achieve standardized AI-driven assessment models and integrate AI into clinical workflows.

Keywords: *Frailty, Acute Coronary Syndrome, Artificial Intelligence, Risk Stratification, Clinical Outcomes, Geriatric Assessment, Cardiology*

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A review on Development of an Innovative High-throughput Multi-drug Screening Assay at IRST Meldola-Forli: Insights from Zebrafish Models of Cancer

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Background and Aim: Zebrafish (Danio rerio) have emerged as valuable non-mammalian vertebrate models in cancer research due to their evolutionary conservation with humans, cost-effective maintenance, and transparency, which facilitates real-time visualization of tumor growth. This review aims to assess the application of zebrafish models in the development of high-throughput multi-drug screening assays, with a focus on recent advancements at IRST Meldola-Forli.
Methods: A comprehensive literature review was conducted using databases such as Google Scholar, Web of Science, ScienceDirect, and PubMed. The inclusion criteria encompassed English-language peer-reviewed articles published between 2015 and 2025. Keywords used in the search included 'Zebrafish', 'Cancer Models', 'Drug Screening', 'High-throughput', 'Multi-drug Assay', and 'Personalized Medicine'.
Results: The review identified numerous studies highlighting the utility of zebrafish in cancer research, particularly for high-throughput screening and personalized medicine. Zebrafish models demonstrate significant advantages in drug screening due to their scalability and real-time imaging capabilities. IRST Meldola-Forli has contributed significantly to the development of innovative assays using zebrafish.
Conclusion: Despite the numerous benefits, zebrafish models also present challenges, including physiological differences from humans and the limited availability of zebrafish-specific reagents. Integrating zebrafish models with mammalian studies is recommended to enhance translational research.
Keywords: *Zebrafish, Cancer Models, Drug Screening, Multi-drug Assay, High-throughput, IRST Meldola-Forli, Personalized Medicine*

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Unveiling the Role of Malondialdehyde as a Driver of Inflammation: A Dual Computational and Experimental Approach to Assess Neutrophil Activation by Malondialdehyde-Modified Human Serum Albumin

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Background and Aim: Malondialdehyde (MDA) is a highly reactive byproduct of lipid peroxidation, known to form stable adducts with proteins, making them prime targets for immune recognition. While previous studies have demonstrated the activation of adaptive immunity and antibody production against MDA-modified proteins, their role in triggering innate immune responses remains unclear. This study investigates whether human serum albumin (HSA) modified by MDA can activate neutrophils.
Methods: We employed both in silico and in vitro approaches. Computational modeling was used to examine molecular interactions between HSA and MDA, with docking validation performed via MM-GBSA to evaluate binding energy. In vitro, HSA was modified with MDA at varying concentrations, followed by characterization of the modification. Human neutrophils were then isolated and treated with the MDA-HSA complex, and their activation was assessed using fluorescence and chemiluminescence assays.
Results: In silico analysis revealed that MDA stably interacts with HSA us its natural ligands, ibuprofen and warfarin. The increased hydrophobicity observed in MDA-HSA complexes suggests enhanced immunogenic potential. These findings were validated by in vitro study, where MDA-modified HSA triggered dose-dependent neutrophil activation, leading to a significant rise in intracellular and extracellular reactive oxygen species production.

Conclusion: Our findings demonstrate that MDA forms stable adducts with HSA, inducing structural alterations that enhance its immunogenicity. These modifications can activate neutrophils and contribute to inflammatory responses, highlighting a potential role of MDA-modified proteins in innate immunity.

Keywords: *Neutrophils, HSA, Malondialdehyde, MDA-HSA adducts, innate immunity*

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Association between the Genetic Polymorphism of Quinone Oxidoreductase 1 (NQO1) and Colorectal Cancer Incidence: A Case-Control Study and Meta-Analysis

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Background and Aim: Colorectal cancer (CCR), a major public health issue representing about 10% of all cancers, is the third most common cancer in men and the second in women worldwide. The enzyme NQO1 plays a crucial role in metabolizing quinones and detoxifying potentially carcinogenic compounds. The most studied polymorphism in the NQO1 gene is C609T. Due to NQO1's antitumor properties, exploring its association with colorectal cancer risk is crucial. This study investigated the link between the NQO1 C609T polymorphism and occurrence of colorectal cancer in the Tunisian population. A NQO1 C609T meta-analysis was also performed.
Methods: This was a retrospective cross-sectional study of control cases, with a sample of 201 participants, including 102 controls and 99 patients. The meta-analysis included 10 case-control studies with 3498 patients with CRC and 4347 controls taking into account our study.
Results: The CT genotype was associated with a higher risk of CRC with a total Odds Ratio [95%CI] of 1.14 [1.03; 1.26]. The study of the distribution of C609T polymorphism between patients and controls showed no significant difference. The study of the genotype distribution of the NQO1 enzyme showed that this gene was homozygous mutated (CC) in 19.2% of patients and 11.8% of controls. It was heterozygous (CT) in 29.3% and 24.5% in patients and controls, respectively. The T-allelic frequency is 0.240 for controls and 0.338 for patients. The NQO1 PNS was significantly correlated with smoking status and age in controls. The correlation study between NQO1 PNS and the clinical-pathological parameters showed a significant correlation with age, tumor topography, ganglion metastases and distant metastasis.
Conclusion: This study emphasis the link between the NQO1 C609T polymorphism and colorectal cancer (CRC) in Tunisian patients. The CT genotype showed a slightly higher CRC risk. Further research is needed to clarify its role in CRC.

Keywords: *Colorectal Cancer, Genetic Polymorphism, Quinone Oxidoreductase 1 (NQO1), Meta-Analysis*

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A Household-based Survey of Double Burden of Malnutrition in Women of Reproductive Age in Morocco

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Background and Aim: The double burden of malnutrition (DBM) is a major challenge for low- and middle-income countries (LMICs). In Morocco, at individual level, understanding of the phenomenon remains limited. Data from latest national survey indicate that women of reproductive age (WRA) are affected by various forms of malnutrition, 61.3% are overweight/obese (with 30.4% classified as obese), 34.4% are anemic, and 49.7% had iron-deficiency anemia. The objective is to determine the prevalence of DBM, defined as the coexistence, at individual level of undernutrition (iron-deficiency, anemia, and iron-deficiency anemia) and overweight/obesity among WRA in Morocco.

Methods: This study was a nationally representative cross-sectional survey with data collected on individual parameters, anthropometric measurements and blood samples. Biological analyses focused on hemoglobin, ferritin and C-Reactive Protein (CRP). A total sample of 2090 WRA was included in this study.

Results: In Morocco, among WRA, the prevalence of overweight/obesity was 60.2%, iron-deficiency 30.7%, anemia 34.5% and iron-deficiency anemia 50.0%. The coexistence of overweight/obesity and anemia, overweight/obesity and iron-deficiency, in same individual, was observed in 19.4% ($p= 0.03$) and 17.0% ($p= 0.04$) of cases respectively. However, among overweight/obese women, 32.3% ($p= 0.18$) were anemic and 28.4% ($p= 0.84$) were iron deficient. contrastly, 30.8% ($p= 0.01$) of overweight/obese and anemic women were iron-deficient. A comparison of areas of residence showed that urban areas were more affected by DBM.

Conclusion: The DBM among women of reproductive age reveals an emerging reality of interconnectedness and simultaneous coexistence, at individual level, of undernutrition and overnutrition. This phenomenon, observed on a global scale and affecting millions of individuals, has significant implications within households and for the population as a whole, consequences of which include the loss of human capital and a potential impact on slowdown in economic growth.

Keywords: *Malnutrition, Overweight, Obesity, Anemia, Iron-deficiency*

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Leberagin C from Macrovipera lebetina Venom: A Potential Therapeutic Agent for Aggressive Cancers

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Background and Aim: Aggressive cancers, such as Inflammatory Breast Cancer (IBC), Glioblastoma (GBM), and Colorectal Cancer (CRC), pose significant treatment challenges due to their rapid progression and high metastatic potential. Current therapies often cause severe side effects, highlighting the need for novel therapeutic strategies. The venom of the Tunisian viper, *Macrovipera lebetina*, has emerged as a promising source of bioactive molecules with potential anti-cancer properties. This study aimed to isolate and evaluate the anti-tumor effects of Leberagin C, a novel protein derived from *M. lebetina* venom.

Methods: A bio-guided purification approach was employed to isolate Leberagin C from M. lebetina venom. Its pharmacological effects were evaluated using three cancer cell lines: U251 (glioblastoma), Caco-2 (colorectal cancer), and SUM 149 (inflammatory breast cancer). Functional assays assessed the impact of Leberagin C on cell migration, adhesion, and proliferation.

Results: Leberagin C demonstrated significant anti-tumor activity in all tested cell lines. It effectively inhibited cancer cell migration, adhesion, and proliferation, suggesting its potential role in disrupting tumor progression.

Conclusion: Leberagin C holds promise as a potential therapeutic agent for aggressive cancers, either as a standalone treatment or in combination with existing therapies. Further studies are needed to explore its mechanism of action and clinical applications.

Keywords: *Leberagin C, Anti-tumor activity, Inflammatory Breast Cancer (IBC), Glioblastoma (GBM), Colorectal Cancer (CRC), Integrin*

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The Effects of Serum and Follicular Fluid Vitamin D Levels on Assisted Reproductive Techniques: A Prospective Cohort Study

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Background and Aim: Based on studies on animal models, vitamin D plays an essential role in reproduction by controlling Ca and Mg levels. Despite these findings, the effects of vitamin D deficiency and supplementation on the outcome of assisted reproductive techniques (ART) remain controversial. Therefore, the aim of the present study was to assess the relationship between serum and follicular fluid 25-OH vitamin D levels on reproductive outcomes of infertile women.
Methods: This prospective cohort study included 150 infertile women who underwent *in vitro* fertilization (IVF) or intracytoplasmic sperm injection (ICSI). The participants were allocated to one of the three groups according to their serum and follicular fluid 25-OH vitamin D concentrations (less than 10 ng/ml, between 10 and 30 ng/ ml and more than 30 ng/ml), and fertilization, cleavage and biochemical and clinical pregnancy rates were compared among the groups. Data was analyzed by SPSS software and using Chi-square and Spearman correlation coefficient.
Results: Serum and follicular fluid vitamin D levels significantly correlated with biochemical (P=0.008), (P=0.003) and clinical pregnancy (P=0.017), (P=0.001) rates respectively. However, the quality of embryos (P=0.125), (P=0.106) and fertilization rate (P=0.082), (P=0.059) were not associated with the level of serum and follicular fluid vitamin D.
Conclusion: This study found that women with higher levels of vitamin D in their serum and follicular fluid are significantly more likely to achieve pregnancy but without affecting the quality of embryo and fertility rate.
Keywords: *Assisted Reproductive Techniques, Follicular Fluid, Infertility, Serum, Vitamin D*

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Dietary Fatty Acid Intakes and the Outcomes of Assisted Reproductive Technique in Infertile Women

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Background and Aim: The purpose of this study was evaluating the relationship between fatty acid (FA) intakes and the Assisted Reproductive Technique (ART) outcomes in infertile women.
Methods: In this descriptive longitudinal study, a validated food frequency questionnaire (FFQ) was used to measure dietary intakes among 217 women with primary infertility seeking ART treatments at Isfahan Fertility and Infertility Center, Isfahan, Iran. The average number of total and metaphase II (MII) oocytes, the fertilization rate, the ratio of good and bad quality embryo and biochemical and clinical pregnancy were assessed. Analyses were performed using mean, standard deviation, Chi-square test, ANOVA, ANCOVA, logistic regression.
Results: A total of 140 women were finally included in the study. There was a positive relationship between the average number of total and MII oocytes and the amount of total fatty acids (TFAs), saturated fatty acids (SFAs), monounsaturated fatty acids (MUFAs), polyunsaturated fatty acids (PUFAs), linoleic acids, linolenic acids, and oleic acids intakes, while eicosapentaenoic acids (EPAs) and docosahexaenoic acids (DHAs) intakes had an inverse relationship. Consuming more amounts of TFAs, SFAs, PUFAs, MUFAs, linoleic acids, and oleic acids was associated with the lower fertilization rate, whereas the consumption of linolenic acids and EPAs increased the fertilization rate. The ratio of good quality embryo was directly affected by the amount of PUFAs intakes. Additionally, there was a negative correlation between the amount of SFAs intakes and the number of pregnant women.
Conclusion: TFAs, SFA, PUFA, and MUFA intakes could have both beneficial and adverse impacts on ART outcomes.

Keywords: *Assisted reproductive technique, Dietary fats, In vitro fertilization, Infertility, Nutrition assessment*

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Ethnobotanical Survey of Medicinal Plants in El-Kala National Park, Algeria

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Background and Aim: The declining confidence in conventional medications has sparked a resurgence of interest in phytotherapy, with many individuals turning to nature in search of novel therapeutic compounds.
Methods: This study aims to document local knowledge regarding the use of medicinal plants by communities surrounding El-Kala National Park (P.N.E.K.), highlighting their crucial role in the conservation of these natural resources and the preservation of the environment.
Results: A total of sixty-five plant species were identified, belonging to fifty-three genera and thirty-two families, with Lamiaceae, Asteraceae, and Apiaceae being the most dominant families. Among the most commonly used plants, Pistacia lentiscus is utilized for treating respiratory, digestive, and dermatological conditions; Olea europaea is employed to alleviate fever, respiratory issues, and skin ailments; and Verbena officinalis stands out as the most frequently cited plant (33.85%) for providing relief from flu symptoms.
Conclusion: These findings not only shed light on the rich ethnobotanical knowledge of the local communities but also underscore the importance of preserving these plants for future generations.
Keywords: *Medicinal plants, ethnobotany, biodiversity, illnesses, symptoms, El-Kala National Park.*

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In vitro Anticancer Properties of *Ganoderma lucidum*: A Mini-Review

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Background and Aim: *Ganoderma lucidum* (Reishi), a medicinal mushroom used in traditional medicine, has gained scientific attention for its potential anticancer properties. Bioactive compounds such as polysaccharides, triterpenoids, and ganoderic acids have been reported to exhibit cytotoxic effects against various cancer cell lines. This mini-review explores the in vitro anticancer potential of *G. lucidum*, focusing on its mechanisms of action, including apoptosis induction, immune modulation, and inhibition of cancer cell proliferation.
Methods: A systematic review of recent in vitro studies was conducted using databases such as PubMed, Scopus, and Web of Science. Research articles investigating the cytotoxic effects of *G. lucidum* extracts and its bioactive constituents on different cancer cell lines were analyzed.
Results: In vitro studies have demonstrated that *G. lucidum* exhibits significant anticancer activity through multiple pathways, including apoptosis induction via mitochondrial and death receptor pathways, inhibition of angiogenesis and metastasis, and enhancement of immune response against cancer cells. Triterpenoids and polysaccharides have been identified as key contributors to these effects. However, variations in extraction methods, concentrations, and cell line responses highlight the need for standardized studies.
Conclusion: *Ganoderma lucidum* holds promise as a natural anticancer agent, with in vitro evidence supporting its cytotoxic and immunomodulatory effects. Further research, including clinical trials, is necessary to validate its efficacy and therapeutic potential in cancer treatment.
Keywords: *Ganoderma lucidum, anticancer, apoptosis, triterpenoids, polysaccharides, in vitro, immune modulation*

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What We Know about PSORIASIS So Far?

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Background and Aim: Restoration of the dysbiotic gut microbiome has emerged as a promising aid and a better therapeutic approach. New evidences suggest that the microbiome may play a pathogenic role in psoriatic disease. The aim of the present project is to investigate whether a dietary intervention could ameliorate the clinical manifestations and modulate the gut microbiota of individuals with psoriasis.
Methods: Relevant literature from the past decade was reviewed using electronic databases to summarize current evidence on the impact of diet and gut microbiota modulation in the management of psoriasis.
Results: Among environmental factors, diet plays a central role therefore incorrect nutritional habits and excessive body weight can increase clinical symptoms or even trigger the disease. Such diet-based and nutraceutical approaches to targeting the microbiome may produce a milder side effect profile than current systemic medications. Thus, interventions aimed at the microbiome may be a valuable adjunct for preventing or managing psoriatic disease and its comorbidities.
Conclusion: Nutrition plays an important role in the development of psoriasis and its comorbidities. Ultimately, a better understanding of the psoriatic microbiome can lead to the development of new therapeutic modalities that target the shifting microbiota. Thus, interventions aimed at the microbiome may be a valuable adjunct for preventing or managing psoriatic disease and its comorbidities.
Keywords: *Psoriasis, Microbiome, Microbiota, Deniplant nutraceuticals*

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Advanced Therapeutic Approaches for Skin Complications Associated with Polycystic Ovary Syndrome (PCOS): A Decade in Review (2015–2025)

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Background and Aim: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age, often accompanied by a range of skin complications including acne, hirsutism, seborrhea, and acanthosis nigricans. These dermatological manifestations significantly impact patients' quality of life and self-esteem. This review aims to summarize and evaluate the most recent and advanced treatment approaches targeting skin-related complications in PCOS, highlighting both pharmacological and non-pharmacological interventions.
Methods: A comprehensive literature search was conducted using the keywords: "PCOS," "skin complications," "acne," "hirsutism," "treatment," "laser therapy," "hormonal therapy," and "advanced dermatological interventions." Databases searched included PubMed, ScienceDirect, Scopus, and Google Scholar. Only peer-reviewed English-language journals published between 2015 and 2025 were included. Exclusion criteria were non-English articles, studies prior to 2015, and research not directly addressing skin manifestations of PCOS.
Results: Recent advances highlight the efficacy of combination therapies involving hormonal agents (e.g., combined oral contraceptives, anti-androgens), topical treatments (e.g., retinoids, azelaic acid), and cosmetic procedures such as laser hair removal and light-based therapies. Emerging trends include the use of nutraceuticals, low-level laser therapy, and personalized treatment plans based on hormonal profiling and skin type.
Conclusion: Advanced treatment strategies for PCOS-related skin complications are increasingly patient-centered and multidisciplinary. An integrated approach combining medical, dermatological, and lifestyle interventions shows promise in improving clinical outcomes and enhancing patient satisfaction.
Keywords: *PCOS, Skin complications, Acne, Hirsutism, Hormonal therapy, Laser treatment, Women's health*

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A Tale of Extracellular Nucleic Acids in Hypoxia Stress-Induced Myocardial Injury

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Background and Aim: Acute hypoxia (AH), commonly encountered during high-altitude exposure or pathological ischaemia, induces significant myocardial injury through inflammatory and immunological cascades. This study investigates the mechanistic role of extracellular RNA (eRNA) in hypoxia-induced myocardial infarction (MI), focusing on the Toll-like receptor 3 (TLR3)-caspase-3 pathway in a murine model.

Methods: Exposure to hypoxic conditions resulted in a time-dependent elevation of cardiac injury biomarkers, notably cardiac troponin-T (cTrop-T) and myoglobin, indicating progressive myocardial damage. ELISA-based quantification confirmed that RNaseA, an RNA-degrading enzyme, significantly suppressed the hypoxia-induced increase in plasma cTrop-T, while DNase1 and HMGB1-neutralising antibodies showed no effect, underscoring the specific involvement of eRNA.

Results: Further analysis demonstrated that eRNA acts through TLR3 to facilitate cTrop-T release. TLR3 blockade, both through immunoneutralization and siRNA-mediated gene silencing, significantly mitigated this effect, confirming its central role. Histological assessments revealed that AH-induced eRNA contributes to cardiac collagen accumulation and robust leukocyte infiltration, as evidenced by increased expression of α-SMA, CD31, NE, MAC-1, and CD41. These pathological changes were reversed with RNaseA pre-treatment, indicating that eRNA is a critical DAMP responsible for myocardial inflammation and remodelling. Additionally, AH and eRNA stimulation triggered caspase-3 activation, a hallmark of programmed necrosis, which was effectively abrogated by TLR3 inhibition and RNaseA administration. This highlights the caspase-3 pathway as a downstream effector of TLR3-eRNA signalling in myocardial injury.

Conclusion: In conclusion, this study elucidates a novel inflammatory axis involving hypoxia-induced eRNA, TLR3 activation, and caspase-3-mediated myocardial damage. Targeting this pathway using RNaseA or TLR3 inhibitors may offer promising therapeutic strategies for preventing hypoxia-induced acute myocardial infarction and related cardiovascular complications.

Keywords: *Hypoxia, Myocardial Injury, cTrop-T, Extracellular RNA, TLR3, Caspase-3, Inflammation, Acute High Altitude, RNaseA*

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Differential Viability of Ovarian Cancer and Normal Cells Exposed to Green SeNPs

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Background and Aim: Green synthesis of selenium nanoparticles (SeNPs) offers a biocompatible strategy for cancer therapy. This study evaluates the cytotoxicity of green-synthesized SeNPs on ovarian cancer cells (OVCAR-3) compared to normal human embryonic kidney (HEK) cells, aiming to determine their selectivity and potential therapeutic index.
Methods: SeNPs were synthesized using an eco-friendly method and applied to OVCAR-3 and HEK cell lines at concentrations ranging from 15.625 to 500 µg/ml. Cell viability was measured using the MTT assay after 24 hours. Data were analyzed to determine dose-response relationships and relative sensitivity of the cell types.
Results: SeNPs reduced viability in both cell types in a concentration-dependent manner. In OVCAR-3 cells, viability decreased sharply from 97.73% at 15.625 µg/ml to 11.63% at 500 µg/ml. HEK cells also showed reduced viability at high concentrations (12.19% at 500 µg/ml), but maintained over 77% viability at concentrations up to 125 µg/ml. Notably, OVCAR-3 cells were more sensitive at mid-range doses (e.g., 57.06% vs. 77.41% at 125 µg/ml), suggesting selective cytotoxicity.
Conclusion: Green-synthesized SeNPs exhibit potent, dose-dependent cytotoxic effects on ovarian cancer cells, with relatively lower toxicity toward normal HEK cells at moderate concentrations. This selective effect underscores the potential of SeNPs as a targeted agent in ovarian cancer treatment, meriting further mechanistic and in vivo exploration.
Keywords: *Selenium nanoparticles, Green synthesis, OVCAR-3, HEK cells, Cell viability*

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In Silico Vaccine Design and Immunoinformatics in the Era of Personalized Cancer Immunotherapy

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Background and Aim: In silico vaccine design and immunoinformatics have become pivotal in advancing personalized cancer immunotherapy by enabling the identification and optimization of tumor-specific neoantigens and epitopes. This review aims to summarize current computational strategies and AI-driven approaches for designing personalized cancer vaccines that elicit targeted immune responses.
Methods: A systematic literature search was conducted using keywords such as "in silico vaccine design," "immunoinformatics," "personalized cancer immunotherapy," and "neoantigen" across databases including PubMed, PMC, and ScienceDirect. Inclusion criteria focused on peer-reviewed articles published in English from 2015 to 2025, excluding conference proceedings.
Results: Computational pipelines utilize next-generation sequencing data to identify patient-specific tumor neoantigens, which are then analyzed using immunoinformatics tools to predict epitopes with high binding affinity to HLA alleles. AI-enhanced algorithms optimize epitope selection and vaccine formulation, including mRNA and peptide-based vaccines, to maximize immunogenicity and delivery efficiency. In silico trials simulate immune responses, guiding vaccine design and predicting clinical outcomes. Multi-epitope vaccines targeting diverse neoantigens have demonstrated promising preclinical and early clinical efficacy, especially when combined with immune checkpoint inhibitors. AI models such as TRTpred improve personalized T-cell receptor selection, enhancing adoptive cell therapies. Challenges include tumor heterogeneity, accurate neoantigen prediction, and ethical considerations around data privacy and algorithmic bias.
Conclusion: In silico vaccine design and immunoinformatics represent transformative tools in personalized cancer immunotherapy, enabling precise, patient-tailored vaccine development. Continued integration of AI and bioinformatics will enhance vaccine efficacy and clinical translation, offering new avenues for effective cancer treatment.
Keywords: *In silico vaccine design, Immunoinformatics, Personalized cancer immunotherapy*

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Integrating gene Therapy and Immunotherapy in Precision Medicine: Novel Approaches in Targeted Cancer Treatment

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Background and Aim: Integrating gene therapy and immunotherapy represents a cutting-edge approach in precision medicine. This review focuses on novel strategies combining gene-editing technologies, such as CRISPR-Cas9, with immunotherapeutic modalities like CAR-T cells and immune checkpoint inhibitors to enhance efficacy and personalize cancer care.

Methods: A systematic literature search was conducted using keywords including "gene therapy," "immunotherapy," "precision medicine," "cancer," "CAR-T," and "CRISPR" across databases such as PubMed and Frontiers in Medicine. Inclusion criteria were peer-reviewed articles published in English from 2015 to 2025, excluding conference proceedings.

Results: Gene therapy advances enable precise targeting of cancer-driving mutations and enhancement of antitumor immune responses. Combining gene therapy with immune checkpoint inhibitors improves T-cell persistence and overcomes tumor immunosuppression, particularly in solid tumors. CRISPR-edited CAR-T cells with multi-antigen targeting address tumor heterogeneity and antigen escape, showing promising preclinical and early clinical results. Additionally, combination approaches integrating gene therapy, chemotherapy, radiation, and ferroptosis inducers synergistically enhance tumor cell killing and immune activation. Emerging delivery systems, such as lipid nanoparticles and exosomes, improve safety and targeting efficiency. Parallel advances in patient-derived organoids combined with CRISPR screening provide powerful platforms to identify therapeutic targets and optimize personalized immunotherapies.

Conclusion: The integration of gene therapy and immunotherapy in precision oncology offers transformative potential for targeted cancer treatment. Combination strategies leveraging gene editing, CAR-T cells, and immune modulation overcome key challenges such as immune evasion and tumor heterogeneity.

Keywords: *Gene therapy, Immunotherapy, Precision medicine, Cancer*

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Organoid-Based Disease Modeling and Drug Screening Using Stem Cells

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Background and Aim: Organoids derived from stem cells have revolutionized biomedical research by providing physiologically relevant models for studying human diseases and drug responses. Unlike traditional two-dimensional (2D) cell cultures and animal models, organoids better replicate human tissue complexity, making them valuable tools in disease modeling, drug screening, and personalized medicine. This review explores the applications of organoids in cancer research, neurodegenerative diseases, and infectious disease studies. Furthermore, it discusses future advancements, such as CRISPR-based gene editing, high-throughput screening, and AI-driven analytics, that will enhance the effectiveness of organoid-based research.
Methods: We conducted a review using keywords such as " Organoids, Disease Modeling, Drug Screening " including PubMed, Google Scholar, and Web of Science. Relevant studies were selected based on clearly defined inclusion and exclusion criteria. The chosen articles were evaluated by reviewing their titles, abstracts, methodologies, and results. The key findings from these studies are summarized in this review.
Results: The field of organoid research continues to evolve, with several promising advancements on the horizon. These include gene editing technologies such as CRISPR-Cas9, organoid-on-a-chip systems, and the integration of artificial intelligence (AI) for predictive modeling. However, challenges such as vascularization, immune system incorporation, and standardization of culture methods remain critical hurdles.
Conclusion: Organoids have emerged as transformative tools for disease modeling, drug discovery, and personalized medicine. Their ability to closely mimic human tissues makes them superior to traditional models. Despite existing challenges, advances in genetic engineering, biofabrication, and AI-driven automation are expected to enhance the utility of organoids in translational medicine.
Keywords: *Organoids, Disease Modeling, Drug Screening*

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STAb CAR-T Cells: Pioneering Precision in Cancer Immunotherapy

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Background and Aim: Chimeric Antigen Receptor (CAR) T cell therapy has transformed cancer treatment, particularly in hematologic malignancies. Despite this success, its limited efficacy in solid tumors and the issue of antigen escape present significant clinical challenges. To address these limitations, novel strategies such as Synthetic T-cell Activating Bifunctional (STAb) CAR-T cells have been developed. This review explores the design and therapeutic potential of STAb CAR-T cells as a next-generation approach in cancer immunotherapy.

Methods: This review synthesizes and critically examines preclinical and clinical findings on STAb CAR-T cells, including their mechanisms of action, therapeutic advantages, current clinical trial data, and implementation challenges. Relevant literature from peer-reviewed journals and ongoing trial registries were analyzed to provide an integrated perspective.

Results: The reviewed studies collectively demonstrate that STAb CAR-T cells can overcome tumor antigen heterogeneity, improve tumor infiltration, and potentially mitigate antigen escape. Early-phase clinical investigations suggest enhanced efficacy in solid tumors compared to conventional CAR-T therapies, with manageable safety profiles.

Conclusion: STAb CAR-T cells represent a promising evolution of adoptive cell therapy, capable of addressing key limitations of traditional CAR-T approaches. Continued research and clinical validation are essential to fully realize their potential in broad-spectrum cancer treatment.

Keywords: *CAR-T cell therapy, Hematological malignancies, Solid tumors, Immunotherapy, Precision medicine*

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Effects of Sublethal Doses of Lead Acetate, Dopamine, L-NAME, and Verapamil in Rats

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Background and Aim: Lead, a well-known toxicant, affects several neurophysiological systems. In particular, neurotransmitter balance and vascular regulation can be disrupted by exposure to sublethal levels of lead acetate. This study aimed to evaluate the effects of sublethal doses of lead acetate on dopamine levels, calcium channel blocker (verapamil), and nitric oxide synthase inhibitor (L-NAME) levels in rats.
Methods: Forty-four adult male rats were randomly divided into control and lead, verapamil and L-NAME-treated groups. For 14 consecutive days, the lead-treated group received a sublethal intraperitoneal dose of lead acetate, while the control group received saline. At the end of the treatment period, brain tissue and blood samples were collected. Dopamine concentration was assessed using high-performance liquid chromatography (HPLC). Verapamil and L-NAME levels were measured using spectrophotometric analysis and specific immunoassays.
Results: Dopamine levels in lead-exposed rats were significantly lower than in the control group ($p < 0.01$), indicating disrupted neurotransmission. In Addition, there was a potential change in L-NAME concentrations ($p < 0.05$), suggesting enhanced inhibition of nitric oxide production. Verapamil concentrations were also significantly changed ($p < 0.05$), potentially indicating calcium channel dysfunction.
Conclusion: Exposure to even small amounts of lead acetate can significantly alter levels of key neurotransmitters and regulatory molecules. These changes may underlie the neurotoxic and vasoregulatory effects of lead, emphasizing the need for further research into preventive strategies against lead toxicity, even at low exposure levels.
Keywords: *Lead acetate, Dopamine, L-NAME, Verapamil, Rats*

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Impact of Type 2 Diabetes on Surgical Outcomes in Patients with Arterial Disease

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Background and Aim: The course and outcome of arterial disease are strongly influenced by type 2 diabetes mellitus (T2DM), particularly in individuals undergoing vascular surgery. The aim of this study is to improve the understanding of the relationship between type 2 diabetes and the consequences of arterial disease in patients treated at the Department of Vascular Surgery, University Clinical Center of Kosovo. The aim is to improve clinical management and reduce complications in this population.
Methods: This retrospective analysis included patients with type 2 diabetes who underwent vascular surgery between November 2022 and April 2023. Patient data collected from medical records included variables such as age, gender, smoking status, comorbidities, laboratory results, specific procedures, postoperative outcomes, previous surgical interventions, and length of hospital stay. Statistical analysis included descriptive statistics, a one-sample t-test, bivariate correlation, and a nonparametric chi-square test. Ethical approval was obtained, and all participants provided informed consent. Green-synthesized SeNPs exhibit potent, dose-dependent cytotoxic effects on ovarian cancer cells, with relatively lower toxicity toward normal HEK cells at moderate concentrations. This selective effect underscores the potential of SeNPs as a targeted agent in ovarian cancer treatment, meriting further mechanistic and in vivo exploration.
Results: The majority of patients with arterial disease and diabetes were between 68 and 81 years of age (48.15%, $p < 0.05$) and predominantly male (72.69%, $p < 0.05$). The prevalence of insulin therapy was high (89.3%, $p < 0.05$). The most common surgical intervention was ischemic gangrene leading to amputation of a toe (15.93%, $p=0.05$), while arterial thrombosis caused the most problems before surgery (23.33%, $p=0.05$). Most patients (30.74%, $p = 0.05$) spent 7-11 days in the hospital. 71.84% of patients received combination therapy with antiplatelet agents, antidiabetic agents, and antibiotics ($p < 0.05$).
Conclusion: Arterial disease is an endemic burden that continues to increase worldwide. Personalized treatment strategies, ongoing patient education, and interdisciplinary care are essential to improve outcomes and minimize complications in diabetic patients undergoing vascular surgery.
Keywords: *Type 2 diabetes mellitus, peripheral arterial disease, cardiovascular disease, and revascularization*

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Periodontal Disease as a Modifiable Risk Factor for Systemic Health: Mechanisms and Clinical Implications

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Background and Aim: Periodontitis, a chronic inflammatory disease affecting the supporting tissues of the teeth, is increasingly recognized as an important cause of the development and progression of systemic diseases. In addition to local effects in the oral cavity, periodontitis can also affect other organ systems, causing systemic inflammation and transient bacteremia.
Methods: The results of epidemiological randomized controlled, and mechanistic research examining the relationship between systemic diseases—specifically, diabetes mellitus, cardiovascular disease, and unfavorable pregnancy outcomes—and periodontal health are integrated in this narrative review. Molecular processes include the release of pro-inflammatory mediators, immune pathway activation, and the systemic transmission of oral infections is of special interest.
Results: Interleukin-1β (IL-1β), interleukin-6 (IL-6), and C-reactive protein (CRP) are examples of markers of systemic inflammation that, according to one study, are consistently associated with periodontitis. These indicators are associated with a prothrombotic state, insulin resistance, and endothelial dysfunction. In particular, interventional studies have shown that nonsurgical periodontal therapy improves indices of systemic health, for example by reducing hemoglobin A1c (HbA1c) levels in patients with diabetes and improving endothelial function in patients with cardiovascular disease.
Conclusion: The complex relationship between systemic and periodontal health is mediated by well-defined immunological and inflammatory processes. The identification of periodontitis as a modifiable risk factor creates new opportunities for preventive measures that should improve overall health. Integrating periodontal assessment into the overall management of systemic diseases requires effective collaboration between dentists and medical specialists.
Keywords: *Periodontitis, IL-1β, IL-6, CRP, HbA1c, Diabetes mellitus, Cardiovascular disease, Oral-systemic health, Interdisciplinary care*

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Pharmacological Potentials of Nigella Sativa: A Narrative Review on its Medical Applications and Active Compounds

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Background and Aim: Black cumin or Nigella sativa has long been used in many cultures to treat a variety of diseases. Its main bioactive component, thymoquinone, is largely responsible for the wide range of biological activities demonstrated in recent pharmacological studies. The aim of this review is to provide a summary of currently available information on the therapeutic potential and mechanism of action of Nigella sativa in the treatment and prevention of chronic and viral diseases.
Methods: This report includes a thorough analysis of experimental, preclinical, and clinical research published in peer-reviewed journals. We searched databases such as ScienceDirect and PubMed to find research on thymoquinone or Nigella sativa. Studies evaluating antibacterial, hypoglycemic, cardioprotective, anti-inflammatory and antioxidant properties are highlighted.
Results: Nigella sativa has shown significant pharmacological activity in a number of animal models. Neutralization of reactive oxygen species and increase in protective enzymes are associated with its antioxidant properties. Anti-inflammatory effects are observed by inhibiting pro-inflammatory cytokines. Clinical studies have shown favorable modulation of lipid profiles, antibacterial activity against a wide range of microorganisms, improved glycemic control in type 2 diabetes and protective effects on liver and kidney function.
Conclusion: With many health benefits, Nigella sativa is a useful natural medicine. Although further randomized controlled studies are needed to confirm these results and establish uniform dosing procedures, its use in complementary medicine appears promising.
Keywords: *Nigella sativa, Thymoquinone, Antioxidant, Anti-inflammatory, Diabetes, Cardiovascular health, Phytotherapy, Traditional medicine*

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The Effects of Tyrosine Mutation on PTEN by PyMol

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Background and Aim: PTEN is a well-known tumor suppressor protein that plays a crucial role in regulating cell proliferation, survival, and migration through its lipid phosphatase activity. Tyrosine residues within the PTEN structure are essential for maintaining the protein's stability and function. This study aimed to investigate how specific tyrosine mutations affect the structural integrity and potential functionality of PTEN.
Methods: We used PyMOL, a molecular visualization and modeling tool, to simulate and analyze point mutations at selected tyrosine residues within the PTEN protein. The structural consequences of these mutations were examined, particularly in regions near the active site and membrane-interacting domains.
Results: The introduced mutations led to noticeable alterations in PTEN’s three-dimensional conformation. Structural distortions were observed near the active site, and changes in the membrane-binding regions suggested a possible reduction in the protein’s ability to interact with the cell membrane. These modifications may impair PTEN’s enzymatic activity and stability.
Conclusion: Our findings suggest that mutations at specific tyrosine sites can disrupt PTEN’s structural integrity, potentially weakening its tumor-suppressing function. This study underscores the value of in silico structural analysis in revealing how molecular changes might contribute to disease development.
Keywords: *PTEN, Tumor suppressor, Tyrosine mutation, Protein structure, PyMOL*

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Resolution of Ovarian Cysts in Reproductive-Age Women with Hypothyroidism: A Case Series and Review of the Literature

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Background and Aim: Functional ovarian cysts are common in reproductive-age women and are typically benign. The Ovarian-Adnexal Reporting and Data System (O-RADS) provides a standardized approach to classifying adnexal masses. Endocrine dysfunction, particularly hypothyroidism, has been associated with altered ovarian function and cyst formation, though it remains underrecognized in routine gynecologic practice.
Methods: We report a case series of 12 reproductive-age women diagnosed with ovarian cysts classified as O-RADS 2 on transvaginal ultrasound. All had normal CA-125 levels but were newly diagnosed with hypothyroidism. Eight patients presented with menstrual irregularities, while five were initially asymptomatic; among the latter, three reported infertilities. One patient had undergone surgery for thyroid disease six weeks prior to cyst detection. All were managed conservatively with thyroid hormone replacement and were followed with ultrasound at 3 and 6 months.
Results: In 11 of 12 cases, the ovarian cysts resolved completely within 6 months of initiating thyroid hormone therapy. One patient developed ovarian torsion during follow-up and underwent surgical intervention. No cases showed malignant transformation, and thyroid function normalized in all patients.
Conclusion: This series supports a link between hypothyroidism and benign ovarian cysts. Thyroid dysfunction may disrupt the hypothalamic-pituitary-ovarian axis, contributing to cyst formation, menstrual irregularities, and infertility. Previous literature supports spontaneous cyst resolution with thyroid correction. The torsion case underscores the importance of careful monitoring in conservative management. Thyroid evaluation should be considered in women presenting with benign-appearing ovarian cysts. In most cases, treatment of hypothyroidism may lead to cyst resolution and improved reproductive outcomes, though surgical risks such as torsion or rupture must still be considered.
Keywords: *Ovarian cyst, Hypothyroidism, O-RADS, Conservative management, Reproductive Health*

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Two-dimensional Molecular Fingerprints in Molecules Exhibiting the Sweet Flavor

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Background and Aim: Sweet-tasting organic molecules play a significant role in food science and consumer products, yet the precise molecular features responsible for this taste remain largely uncharacterized. This study aimed to identify consistent molecular fingerprints—specifically reproducible electronic and structural patterns—that contribute to the perception of sweetness.
Methods: A total of 120 sweet-tasting organic molecules were selected from TheGoodScentsCompany web resource. Using computational analysis, we examined planar regions within the molecular structures formed by atom triads. The electronic component of each fingerprint was defined by the ^{13}C Nuclear Magnetic Resonance (NMR) chemical shift, while the structural component was described by interatomic distances and angles among atom triads.
Results: Our analysis identified eight recurring atom-triad matches across the studied molecules. These planar regions were associated not only with sweet taste but also with additional flavor notes such as fruity, green, waxy, creamy, floral, oily, and spicy. Interestingly, flavors like green and brown reflect a combination of visual and gustatory perception. The presence of similar planar fingerprints among these molecules supports the existence of consistent structural-electronic patterns linked to specific sensory properties.
Conclusion: This study offers a molecular perspective on the origins of sweet taste and suggests broader applications of such fingerprints in understanding complex flavors. The approach used here is universally applicable to any group of molecules that share a common property, enabling deeper insights into sensory chemistry and guiding both the beneficial and cautious use of sweet-tasting compounds in everyday life.
Keywords: *Molecular Fingerprints, Taste Molecules, NMR Chemical Shifts, Atom-Triads*

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O-RADS US risk stratification for Ovarian Masses

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Background and Aim: The evaluation of ovarian masses poses a diagnostic challenge due to their wide spectrum of benign and malignant etiologies. Ultrasound is the primary imaging modality for initial assessment, yet variability in its diagnostic accuracy persists. While intraoperative findings contribute further insights, histopathology remains the definitive standard for diagnosis.
Methods: We retrospectively analyzed 28 cases of ovarian masses excised via laparoscopy at our institution. Ultrasound characteristics—including lesion size, morphology, presence of septations, vascularity, and solid components—were compared with intraoperative findings such as wall thickness, adhesions, cyst rupture, and ovarian preservation. The O-RADS US classification system was applied and compared with expert subjective assessment. Histopathological diagnosis served as the reference standard.
Results: There was high concordance between ultrasound and surgical findings for multilocularity and cyst wall thickness (Cohen's kappa), with moderate agreement for lesion size and solid components. Endometriotic cysts were more frequently associated with adhesions and rupture. One case of malignancy—a mixed germ cell tumor—was identified. Serous cystadenomas (32%) and endometriomas (21%) were the most prevalent histological types. The sensitivity and specificity of O-RADS US in excluding malignancy were 100% and 93%, respectively, compared to 96% and 49% with expert opinion. Ovarian preservation was achieved in 86% of cases.
Conclusion: Key features such as multilocularity, thick septations, solid elements, and increased Doppler flow are critical in differentiating benign from malignant lesions. While ultrasound is a valuable preoperative tool for risk stratification, intraoperative assessment can guide surgical decision-making. Our findings support the utility of O-RADS US as a user-friendly and accurate classification tool, offering the added benefit of standardized management recommendations.
Keywords: *O-RADS , Ovarian, Malignant, Ultrasound, Laparoscopy*

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Circulating Inflammatory Mediators in COVID-19-Affected Pregnancies: A Retrospective Evaluation of D-dimer, Ferritin and CRP Dynamics

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Background and Aim: The COVID-19 pandemic has posed significant challenges to healthcare systems globally. In particular, the impact of SARS-CoV-2 infection on pregnant individuals remains insufficiently characterized, with considerable uncertainty surrounding the prognostic value of inflammatory biomarkers in this population. This study examined the levels of three biomarkers—D-dimer, C-reactive protein (CRP), and ferritin—measured at the time of hospital admission in pregnant women with COVID-19, and evaluated their association with disease severity and clinical outcomes.
Methods: This retrospective study included pregnant women hospitalized with confirmed SARS-CoV-2 infection between January 2020 and December 2021, and admitted to the hospital due to COVID-19-related complications, such as respiratory distress, preeclampsia, or other severe symptoms. Additional criteria included complete medical and pregnancy outcomes.
Results: The study included 83 pregnant women confirmed with COVID-19. Among them, 42% developed severe illness requiring admission to the intensive care unit (ICU), and 7% required mechanical ventilation. Biomarker analysis revealed significantly elevated concentrations of D-dimer ferritin and CPR with a p value $\leq$ 0.0001), particularly among patients admitted to the ICU, suggesting a correlation between heightened inflammatory response and disease severity.
Conclusion: Our study is based on data collected from the country's main hospitals, including 'Queen Geraldine' Hospital, which manages the highest volume of complicated pregnancy cases, particularly during the COVID-19 pandemic. C-reactive protein (CRP) demonstrated the most significant variation among inflammatory biomarkers during the course of COVID-19 in obstetric patients, supporting its utility as a valuable marker for monitoring disease progression. Additionally, ferritin and D-dimer appeared to serve as important prognostic indicators, particularly in patients requiring intensive care unit (ICU) admission.
Keywords: *COVID-19; pregnant women; Inflammatory biomarkers*

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Enhancing Diabetic Wound Healing: The Therapeutic Potential of Gelatin Hydrogel in Animal Models

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Background and Aim: Chronic wounds, particularly those associated with diabetes mellitus, represent a major global health concern due to their delayed healing and high risk of infection, amputation, and increased healthcare costs. Impaired angiogenesis, neuropathy, and compromised immune response in diabetic patients significantly hinder the natural healing process. Hydrogels have emerged as promising biomaterials in regenerative medicine due to their biocompatibility, moisture-retentive properties, and ability to support cellular activities. Among these, gelatin-based hydrogels—derived from collagen—are notable for their biodegradability, ease of application, and potential to enhance wound repair by mimicking the extracellular matrix. This study investigates the efficacy of a gelatin hydrogel in promoting wound healing in a streptozotocin-induced diabetic rat model.
Methods: Male rats were induced with diabetes using streptozotocin and then assigned to either a control or treatment group. Full-thickness dorsal wounds were created and treated with gelatin hydrogel in the treatment group. Wound healing progression was evaluated visually and quantitatively using ImageJ software on Days 0, 7, 14, and 21.
Results: The gelatin hydrogel-treated group demonstrated significantly faster wound healing compared to the control group, especially in the early and mid-phases. Statistical analysis revealed notable reductions in wound area by Day 7 ($p<0.01$) and Day 14 ($p<0.01$) in the treated group. By Day 21, both groups showed near-complete healing, with the treated group achieving faster closure.
Conclusion: Gelatin hydrogel significantly accelerates diabetic wound healing in animal models and may serve as a promising therapeutic option for managing chronic wounds.
Keywords: *Diabetic wounds, Gelatin hydrogel, Wound healing, Animal model, Tissue regeneration*

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Role of Enzymes in Cancer; Immunopharmacological Implications to Hypoxic Tumor Microenvironment

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Background and Aim: Despite a substantial progress in the development of strategies against cancer, it still remains as a major global health issue due to a high recurrence/metastasis rate, leading basic medical scientists and clinical specialists toward more efficient diagnostics, prognostics, and therapeutics. Therefore, there is an imperative need for a comprehensive understanding on the molecular metabolism and biochemical functionalities of enzymes involved in the tumor microenvironment (TME).
Methods: Pleotropic activities of hepatic vitamin D-25-hydroxylases, as well as renal D 1-hydroxylase, as well as the expression of Vitamin D Receptor (VDR), can play an indispensable role in the revolutionizing cancer management by offering a real-time monitoring of tumor dynamics, evolution of resistance mechanisms, regulating the immune system, enhancing the differentiation of monocytes into macrophages, promoting the production of anti-inflammatory cytokines, and modulating T cell responses, eventually diminishing the tumor progression-associated pro-inflammatory responses. Moreover, the interplay between vitamin Vit D and CA IX, has garnered an attention due to their respective roles in cancer immunobiology, immune responses, as well as potential therapeutic strategies.
Results: Overexpressed CA IX, regulated by hypoxia-inducible factors (HIFs), contributes to a maintained pH balance, facilitates the immune evasion, inhibiting the function of cytotoxic T lymphocytes, inducing angiogenesis, and allowing tumors to escape immune surveillance. Totally, dose-dependent effects of VDR may inhibit or lower the expression of CA IX, leading to a less acidic environment, and restoring the effectiveness of immune responses against tumors.
Conclusion: Understanding the interactions between cofactors in the biochemical structure of metabolic enzymes or coenzymes associated to cancer metabolism rewiring, could be utilized in favor of more effective therapeutics, or prognostics for tumor progression and response to therapy in patients with cancer. It necessitates further investigations and an interdisciplinary collaboration among basic medical scientists and oncologists to address the current gaps in precisely improving patient-care and optimized clinical outcomes.

Keywords: *Tumor Microenvironment (TME), Hypoxia, Vitamin D Receptor (VDR), Carbonic Anhydrase IX (CA IX), Cancer Immunopharmacology*

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Struma Ovarii: A Rare Cause of Hyperthyroidism and Infertility – Case Report and Literature Review

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Background and Aim: Struma ovarii is a rare form of ovarian teratoma, made up mostly of thyroid tissue, and accounts for less than 1% of all ovarian tumors. While usually asymptomatic, in a small number of cases the thyroid tissue is hormonally active, leading to hyperthyroidism. Diagnosis before surgery can be difficult due to vague symptoms and nonspecific imaging features. This work aims to provide a concise review of the literature on struma ovarii and share our experience with an unusual case presenting with both infertility and hyperthyroidism.

Methods: We reviewed the current literature on struma ovarii, with a focus on clinical presentation, diagnostic challenges, imaging features, and treatment approaches. Additionally, we present a case managed at our hospital and compare it with findings from the literature.

Results: A 41-year-old woman undergoing infertility evaluation was found to have biochemical hyperthyroidism. Transvaginal ultrasound identified a 63 mm ovarian cyst with dermoid-like characteristics. Tumor markers were within normal range (CA-125: 6.35 U/mL; HE4: 40.5 pmol/L). Laparoscopic surgery was performed, and histopathological analysis confirmed the diagnosis of struma ovarii. No further treatment was needed postoperatively, and thyroid function normalized by the 6-week follow-up.

Conclusion: Functional struma ovarii is rare and often diagnosed only after histopathology. However, surgical removal is typically curative, resolving both pelvic and thyroid-related symptoms. Clinicians should keep struma ovarii in mind when encountering patients with complex ovarian masses, particularly if associated with unexplained hyperthyroidism or infertility.

Keywords: *Struma ovarii, ovarian teratoma, hyperthyroidism, infertility, thyroid tissue, case report, gynecologic surgery*

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The Role of Nitric Oxide in Cancer Progression and Wound Healing Dynamics

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Background and Aim: Initially characterized as a vasodilator, nitric oxide (NO) is now known to influence a wide range of cellular processes including neurotransmission, angiogenesis, and tissue remodeling. Its diverse functions are mediated by three isoforms of nitric oxide synthase (NOS): neuronal (nNOS), endothelial (eNOS), and inducible (iNOS). However, the biological effects of NO are highly concentration- and context-dependent. In oncology, NO can either support or suppress tumor growth, complicating therapeutic approaches. Conversely, in wound healing, NO is generally beneficial, supporting each phase of tissue repair. This paper aims to delineate the dualistic role of NO in both cancer progression and wound healing dynamics, and to explore how therapeutic modulation of NO might be leveraged in clinical settings.
Methods: A literature review was conducted using peer-reviewed sources focusing on nitric oxide's involvement in immune modulation, angiogenesis, and tissue remodeling in both oncologic and wound healing contexts.
Results: In cancer, NO exhibits both tumor-promoting and tumor-suppressive effects. Low levels of NO can foster angiogenesis, immune evasion, and metastasis, while high levels can induce cytotoxicity and apoptosis. Conversely, in wound healing, NO is essential for initiating vasodilation, coordinating immune responses, and promoting cellular proliferation and matrix remodeling. Therapeutic strategies under investigation include NO donors to accelerate healing and NO inhibitors or high-dose NO applications in oncology.
Conclusion: Nitric oxide functions as a double-edged sword: beneficial for tissue repair yet potentially harmful in tumor environments. A deeper understanding of NO's microenvironmental interactions may enhance therapeutic precision in both cancer and wound management.
Keywords: *Nitric oxide, Cancer progression, Wound healing, Angiogenesis, Immune modulation, Nitric oxide synthase, NO donors, iNOS inhibitors.*

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The Hidden Switch: How RB1 and Epigenetic Mechanisms Turn Lung Cancer Aggressive

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Background and Aim: Small cell lung carcinoma (SCLC) represents one of the most substantial challenges in global health. A subset of lung adenocarcinomas (LUAD) can transdifferentiate into SCLC through epigenetic reprogramming. This study aims to investigate the key epigenetic regulators in this transformation process, and to explore the role of HDAC-YAP signaling in promoting tumor metastasis.
Methods: Analysis of scientific databases, clinical studies and reputable articles from 2020 to 2025 identified distinct progression patterns in lung adenocarcinoma: pre-transformation (LUAD-BT) versus non-transforming (LUAD-NT) cases. Data from reviewed articles were analyzed to compare patterns of histone deacetylation, DNA methylation, and transcriptional changes between LUAD-BT and LUAD-NT groups. Special focus was placed on the Rb1-YAP pathway due to its potential role in promoting cancer metastasis.
Results: Initial immunohistochemical analysis revealed that unlike other lung cancer subtypes, SCLC tumors lacked Yes-Associated protein (YAP) expression. Molecular studies using ChIP-PCR demonstrated that in Retinoblastoma1(RB1)-deficient cells, E2f transcription factor7 (E2F7) binds to the YAP promoter region. Subsequent experiments confirmed that E2F7 recruits the RCOR-HDAC corepressor complex to mediate epigenetic silencing of YAP. Pharmacological intervention with benzamide-class HDAC inhibitors effectively reversed this silencing and restored YAP expression. In vivo validation studies showed that YAP reconstitution significantly reduced metastatic burden and circulating tumor cell counts. Strikingly, only YAP-negative cells retained full metastatic potential, establishing YAP suppression as a critical driver of SCLC progression.
Conclusion: Our work provides new insights into HDAC inhibitors (including vorinostat/SAHA and entinostat/MS-275), reveal their unique inhibitory mechanisms to advance the control of this cancer.
Keywords: *SCLC, Epigenetic, HDAC, YAP- RB1.*

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Navigating the Double-Edged Sword: An Integrative Review of Nanoparticles in Drug Delivery and Their Risks

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Background and Aim: To examine the applications of nanoparticles in drug delivery systems, highlighting both their benefits and risks. To address the challenges in evaluating the safety of nanoparticles, including their potential long-term effects on human health and the environment.

Method: This is an integrative review that explores different types of nanoparticle delivery systems, such as liposomes, micelles, chitosan, and synthetic dendrimers1. It also discusses drug encapsulation mechanisms, release profiles, and tissue-specific delivery capabilities**.**

Results: Nanoparticles offer the potential to improve the efficacy, characteristics, and bioavailability of therapeutic agents1. Their small size, large surface area, and customizable surface properties enable them to overcome biological barriers and target specific cells and tissues. However, these unique characteristics also present potential risks, including toxicity, immunogenicity, and environmental concerns.

Conclusion: This review emphasizes the necessity of rigorous testing, standardization, and the development of regulatory frameworks to mitigate risks while maximizing the therapeutic potential of nanoparticles. This comprehensive analysis underscores the dual nature of nanoparticle technologies and the importance of a balanced risk-benefit assessment in their clinical applications.

Keywords: *Nanoparticles, Drug delivery, Target tissues, Toxicity, Liposomes, Polymeric nanoparticles*

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Mesenchymal Stem Cells and Their Genetic Influence on Wound Healing: A Mini Review

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Background and Aim: Mesenchymal stem cells (MSCs) have gained attention for their regenerative properties in wound healing. They contribute to tissue repair through mechanisms such as cell proliferation, migration, immune modulation, and angiogenesis. Recent studies suggest that MSCs also exert genetic influence on wound healing by regulating key molecular pathways. This mini-review aims to explore the role of MSCs in wound healing, with a focus on their genetic interactions and therapeutic potential.

Methods: A systematic literature search was conducted using PubMed, Scopus, and Google Scholar. Studies published in English from 2015 onward were included, using keywords such as "mesenchymal stem cells," "wound healing," "genetic influence," "angiogenesis," and "immune modulation." Only peer-reviewed studies discussing MSCs' genetic role in wound healing were considered.

Results: MSCs promote wound healing by enhancing fibroblast and keratinocyte proliferation, reducing oxidative stress, and stimulating angiogenesis. Genetic modifications of MSCs, such as overexpression of growth factors, further enhance their regenerative potential. Additionally, environmental factors like hypoxia influence MSC efficacy, altering gene expression patterns that support tissue repair. Advances in MSC-based therapies, including genetic engineering and scaffold-based delivery systems, have shown potential in accelerating wound healing and improving tissue regeneration.

Conclusion: MSCs play a critical role in wound healing by modulating genetic pathways that regulate inflammation, cell migration, and tissue regeneration. Their therapeutic potential can be further enhanced through genetic modifications and optimized delivery methods. Future research should focus on refining MSC-based therapies for clinical applications in regenerative medicine.

Keywords: *Mesenchyme stem cell, Genetic influence, Wound healing*

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Pharmaceutical Strategies for Targeting Genetic Mutations in Rare Diseases: Challenges and Opportunities

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Background and Aim: Rare diseases, often caused by genetic mutations, affect a small percentage of the population but collectively impact millions worldwide. While advances in precision medicine have led to significant progress in treating some genetic disorders, many rare diseases remain without effective therapies due to limited research, high drug development costs, and regulatory challenges. The emergence of novel pharmaceutical strategies, including gene therapy, RNA-based treatments, and targeted small-molecule drugs, offers new hope for addressing these unmet medical needs. This review explores the latest advancements in pharmaceutical strategies aimed at targeting genetic mutations in rare diseases. It examines both the scientific breakthroughs and the challenges that hinder drug development, regulatory approval, and patient access to these treatments.

Methods: A systematic review of recent literature was conducted, focusing on targeted therapies for rare genetic disorders. Key areas examined include small molecule inhibitors, gene-editing technologies such as CRISPR, antisense oligonucleotides (ASOs), and RNA interference (RNAi). Additionally, barriers to drug development—including clinical trial design, market limitations, and regulatory hurdles—were analyzed to assess their impact on treatment availability.

Results: Recent advancements in gene and RNA-based therapies have shown promising results in treating rare genetic disorders. However, challenges such as high development costs, limited patient populations, and ethical considerations regarding gene editing remain significant obstacles. Pharmaceutical companies and researchers are exploring adaptive clinical trial models, orphan drug incentives, and AI-driven drug discovery to overcome these hurdles and accelerate the availability of effective treatments.

Conclusion: The future of rare disease treatment lies in a multidisciplinary approach that integrates genetic research, advanced drug development technologies, and policy-driven incentives to promote innovation. While progress is being made, further collaboration among researchers, biotech companies, regulatory agencies, and patient advocacy groups is essential to ensure that cutting-edge treatments reach those who need them most.

Keywords: *Rare diseases, genetic mutations, precision medicine, gene therapy, RNA-based treatments, orphan drugs, targeted therapy, pharmaceutical innovation, drug development challenges*

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AI-Driven Approaches to Stem Cell Therapy in Cancer: Innovations and Challenges

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Background and Aim: Cancer is a complex disease associated with genetic changes in cancer cells. Stem cells are being explored as a promising treatment option for cancer due to their ability to repair tissues and enhance the body's immune response. Recent advancements in artificial intelligence (AI) hold the potential to improve these treatments, particularly in the selection and monitoring of stem cell therapies. The objective of this article is to examine the role of artificial intelligence in enhancing cancer stem cell therapies.
Method: Scientific articles on artificial intelligence and stem cell therapy in cancer were searched in reputable databases such as PubMed, Google Scholar, Web of Science and Scopus. The selected articles were reviewed from various perspectives, including challenges, innovations, and advances in the use of artificial intelligence in stem cell therapies.
Results: Studies have shown that artificial intelligence, particularly machine learning and deep learning, has been helpful in identifying and characterizing cancer stem cells, and in predicting their behavior. These methods have been effective in optimizing stem cell selection and predicting treatment outcomes, thus helping to better target interventions.
Conclusion: Artificial intelligence holds great promise in revolutionizing stem cell therapies for cancer by enhancing the precision of treatments and improving patient outcomes. Machine learning and deep learning techniques have shown considerable success in identifying cancer stem cells, predicting their behavior, and optimizing stem cell selection for more targeted therapies.
Keywords: *Artificial Intelligence, Stem Cell Therapy, Cancer Treatment*

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The Role of Traditional Medicine in Developing Countries: Challenges of Integration with Modern Healthcare

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Background and Aim: Traditional medicine plays a critical role in healthcare delivery in many developing countries, where it is often the first point of contact for patients due to cultural acceptance, accessibility, and affordability. However, integrating traditional practices with modern healthcare presents numerous challenges. This study aims to examine the role of traditional medicine in developing countries and explore the obstacles to its integration with formal healthcare systems.
Method: A systematic review of academic literature, policy documents, and WHO reports from 2000 to 2024 was conducted. The analysis focused on Sub-Saharan Africa, South Asia, and Southeast Asia. Key themes such as regulatory frameworks, practitioner collaboration, patient safety, and evidence-based validation were identified and analyzed.
Results: Traditional medicine remains widely used, with up to 80% of populations in some regions relying on it for primary care. Despite governmental interest in integration, challenges include lack of standardization, insufficient clinical validation, mistrust between traditional and modern practitioners, and weak regulatory oversight. Inconsistent training and unregulated herbal remedies pose risks to patient safety and complicate efforts toward integration.
Conclusion: While traditional medicine offers valuable cultural and therapeutic resources, its integration into modern healthcare systems requires a balanced approach. This includes establishing regulatory standards, fostering mutual respect between practitioners, and promoting research to validate traditional practices. Strategic integration can enhance healthcare accessibility and outcomes in resource-limited settings.
Keywords: *Traditional medicine, Integration, Modern healthcare, Developing countries*

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Ibogaine's Anti-Addictive Effects: A Review of Animal and Human Studies on Substance Use Disorders

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Background and Aim: Ibogaine, a naturally occurring psychoactive alkaloid derived from Tabernanthe iboga, has garnered significant attention for its potential in treating substance use disorders. Its active metabolite, noribogaine, plays a critical role in its pharmacological effects. The aim of this study is to review ibogaine's anti-addictive effects in animal and human studies.
Method: A systematic search was conducted using databases such as PubMed, Google Scholar, ScienceDirect, and Web of Science. Relevant studies were identified using the keywords "*Tabernanthe iboga*," " ibogaine," " addictive effect," "animal study," and "human study". Inclusion criteria were set to include only published papers after 2015 and those available in the English language.
Results: Ibogaine and noribogaine exert their anti-addictive properties through a complex interplay of signaling pathways. They act as non-competitive antagonists of N-methyl-D-aspartate (NMDA) receptors, modulating glutamatergic transmission and reducing excitotoxicity associated with withdrawal. Additionally, they function as κ-opioid receptor agonists and weak μ-opioid receptor agonists, influencing opioid withdrawal symptoms. A key mechanism involves the enhancement of serotonergic signaling via serotonin transporter (SERT) inhibition, increasing synaptic serotonin availability. Furthermore, ibogaine modulates dopamine pathways by weakly inhibiting dopamine transporters (DAT), which may attenuate drug craving. It also promotes neuroplasticity by upregulating brain-derived neurotrophic factor (BDNF), which may facilitate long-term behavioral changes.
Conclusion: The ibogaine's multifaceted interactions highlight ibogaine's potential as a novel pharmacotherapeutic agent for addiction. However, concerns regarding cardiotoxicity and neurotoxicity warrant further research into its safety, optimal dosing, and therapeutic mechanisms before clinical implementation.
Keywords: *Tabernanthe iboga, Ibogaine, Addictive effect, Animal model, Clinical studies*

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Exploring the Antibacterial Effects of Urtica dioica Leaf Oil Extract Against *Escherichia coli* and *Staphylococcus aureus*

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Background and Aim: This study investigates the antibacterial activity of *Urtica dioica* leaf oil extract against *Escherichia coli* and *Staphylococcus aureus* and evaluates the impact of elevation on its bioactive properties.
Methods: Nettle leaves were collected from different elevations in Rudsar, Iran. Essential oil was extracted via hydrodistillation, and total phenolic and flavonoid content was determined. Antioxidant activity was assessed using the DPPH assay (IC50), and antibacterial activity was evaluated through the broth microdilution method to determine the Minimum Inhibitory Concentration (MIC).
Results: Samples from higher elevations exhibited greater phenolic and flavonoid content, leading to stronger antioxidant activity (IC50: 1681.98 µg/mL at 3000 m) and enhanced antibacterial effects (MIC: 15 mg/mL for both bacteria). Statistical analysis revealed a significant inverse correlation between IC50 and MIC ($p < 0.05$), indicating that higher bioactive compound concentrations contribute to increased antibacterial efficacy.
Conclusion: The findings highlight the influence of elevation on the bioactive profile of *Urtica dioica* leaf oil extracts, suggesting that higher-altitude samples possess superior antioxidant and antibacterial properties. This study supports the potential application of *U. dioica* extracts in natural antimicrobial and antioxidant therapies.
Keywords: *Urtica dioica, Antibacterial activity, Essential oil, Escherichia coli, Staphylococcus aureus, Phenolic content, Antioxidant activity*

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Engineered Stem Cells as Precision Drug Delivery Vehicles: A New Frontier in Targeted Cancer Therapy

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Background and Aim: Cancer stem cells (CSCs) are a rare subpopulation of tumor cells with self-renewal and differentiation capabilities. They are associated with tumor initiation, progression, metastasis, and resistance to conventional therapies. One of the hallmarks of CSCs is their ability to evade immune surveillance, contributing to disease progression and relapse. Our aim in this study was to investigate how cancer stem cells (CSCs) contribute to immune evasion in the tumor microenvironment. We also explored emerging therapeutic strategies that target these mechanisms to improve cancer disease.
Methods: We conducted a literature search using keywords such as cancer stem cells, immune evasion, tumor microenvironment, immune checkpoints, therapy resistance, and immunotherapy across databases including PubMed, Google Scholar, and Web of Science. Relevant studies were selected based on clearly defined inclusion and exclusion criteria. The chosen articles were evaluated by reviewing their titles, abstracts, methodologies, and results. The key findings from these studies are summarized in this review.
Results: This review highlights the multiple mechanisms by which CSCs escape immune detection, including suppression of antigen presentation, overexpression of immune checkpoint molecules, secretion of immunosuppressive cytokines, recruitment of regulatory immune cells, and induction of immune cell apoptosis. Additionally, we discuss emerging strategies for targeting CSC-mediated immune evasion, such as immune checkpoint inhibitors, CSC-directed immunotherapies, modulation of the tumor microenvironment, and adoptive cell therapy. A deeper understanding of these immune escape pathways is crucial for developing effective therapeutic approaches that can improve patient outcomes.
Conclusion: Targeting CSC-mediated immune escape pathways could revolutionize cancer treatment. Future research could focus on identifying and optimizing immunotherapy approaches to increase the effectiveness of cancer treatment approaches.

Keywords: *Cancer stem cells, immune evasion, tumor microenvironment, immune checkpoints, therapy resistance, immunotherapy*

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Prevalence and Patterns of Antimicrobial Resistance in Bacterial Pathogens Among Cancer Patients: A Systematic Review and Meta-Analysis

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Background and Aim: Antimicrobial resistance (AMR) is a significant threat to global public health because it limits infection treatment options. This issue is particularly concerning for cancer patients, who are at a higher risk of developing diseases that are resistant to antibiotics. This review offers the first comprehensive data on the prevalence of AMR in significant bacterial pathogens found in cancer patients.
Methods: A comprehensive examination was conducted using PubMed, Scopus, Embase, and Web of Science, focusing on studies published between 2002 and 2024. A single-group meta-analysis was performed to assess the prevalence of resistance among significant bacterial species. The systematic review included 110 full-text articles, with studies predominantly examining patients with hematological cancers accounting for 30.4% of the total. The primary bacterial pathogens identified were Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus, Acinetobacter baumannii, Pseudomonas aeruginosa, Enterococcus faecium, Streptococcus pneumoniae, and Enterobacter spp.
Results: Among these, E. coli exhibited the highest resistance to penicillins at 71.84%, followed by cotrimoxazole at 63.79% and monobactams at 60.61%. K. pneumoniae showed the most significant resistance against penicillins at 87.99%, with cotrimoxazole at 65.92%. Acinetobacter baumannii displayed a high prevalence of resistance across multiple antimicrobial classes, including third-generation cephalosporins (76.10%), fourth-generation cephalosporins (78.75%), carbapenems (81.58%), fluoroquinolones (75.37%), beta-lactam-beta-lactamase inhibitors (76.15%), cotrimoxazole (73.77%), and aminoglycosides (61.05%). Enterobacter spp. and Enterococcus faecium recorded notable resistance rates to penicillins at 89.77% and 85.64%, respectively. P. aeruginosa demonstrated significant resistance to third-generation cephalosporins, recorded at 50.41%. Meanwhile, S. aureus exhibited high resistance rates to macrolides (53.63%) and methicillin (42.29%).
Conclusion: This review emphasized a concerning level of antimicrobial resistance among bacterial pathogens found in cancer patients worldwide. The notable prevalence of resistance, especially among ESKAPE pathogens, highlights the urgent need to improve infection prevention and antimicrobial stewardship in cancer care globally.

Keywords: *Antimicrobial resistance(AMR), Cancer patients, Bacterial Pathogens, Prevalence, Haematological cancer, Infection Prevention*

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Long Non-coding RNAs in Precision Oncology: Mechanistic Insights and Their Potential as Biomarkers and Therapeutic Targets

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Background and Aim: Long non-coding RNAs (lncRNAs) have gained attention for their regulatory roles in cancer biology, influencing tumor progression and treatment response. This review aims to summarize mechanistic insights into lncRNAs in precision oncology and assess their potential as biomarkers and therapeutic targets.
Methods: A systematic literature search was performed using keywords such as "long non-coding RNA," "biomarker," "therapeutic target," and "cancer" across PubMed and Google Scholar. Inclusion criteria were peer-reviewed articles published in English between 2015 and 2025, excluding conference proceedings.
Results: LncRNAs exhibit cancer- and tissue-specific expression patterns, making them promising diagnostic and prognostic biomarkers. They regulate gene expression through transcriptional, post-transcriptional, and epigenetic mechanisms, impacting pathways like MAPK, Wnt, and PI3K/AKT. Several lncRNAs are detectable in body fluids, enabling non-invasive cancer detection. Therapeutically, approaches such as antisense oligonucleotides and CRISPR-Cas9 targeting of lncRNAs show potential to overcome drug resistance and improve treatment specificity. Clinically, lncRNAs like PCA3 have been approved as biomarkers, highlighting translational progress.
Conclusion: LncRNAs represent a novel and promising class of molecules in precision oncology, offering improved biomarkers and innovative therapeutic targets. While challenges remain in delivery and mechanistic clarity, ongoing research supports their integration into personalized cancer diagnosis and therapy, ultimately enhancing patient outcomes.
Keywords: *Long non-coding RNA, lncRNA, Precision oncology, Cancer biomarker, Personalized therapy*

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AI-Powered Genomics in Precision Oncology: Current Advances and Future Directions

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Background and Aim: Artificial intelligence (AI) has emerged as a transformative tool in precision oncology, particularly in genomics, by enabling rapid and accurate analysis of complex cancer data. This review aims to summarize current advances in AI-powered genomics and explore future directions for its application in personalized cancer diagnosis and treatment.
Methods: A systematic literature search was conducted using keywords such as "AI," "genomics," "precision oncology," and "cancer" across databases including PubMed and Google Scholar. Inclusion criteria were peer-reviewed articles published in English from 2015 to 2025, excluding conference proceedings.
Results: AI algorithms integrated with next-generation sequencing facilitate identification of genetic mutations, molecular subtypes, and biomarkers critical for targeted therapies. These tools improve diagnostic accuracy and speed, enabling timely treatment decisions. AI-driven models predict treatment response and patient outcomes by analyzing multi-omics and clinical data, addressing tumor heterogeneity and resistance mechanisms. Additionally, AI aids in discovering novel biomarkers and therapeutic targets, accelerating drug development. Integration with digital pathology enhances biomarker quantification and immunotherapy selection. Despite challenges in data standardization and interpretability, AI applications are expanding into real-time monitoring and early cancer detection, promising more comprehensive personalized care.
Conclusion: AI-powered genomics is revolutionizing precision oncology by enhancing data analysis, biomarker discovery, and treatment personalization. Continued advancements and interdisciplinary collaboration will overcome current challenges, facilitating clinical integration. This synergy holds great promise to improve cancer diagnosis, optimize therapies, and ultimately enhance patient outcomes.
Keywords: *Artificial intelligence, Genomics, Precision oncology, Cancer biomarkers, Personalized medicine*

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Targeting NAD^+ Salvage Pathways via Non-Coding RNAs: A Novel Framework for Cancer Understanding and Therapeutic Intervention

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Background and Aim: Nicotinamide adenine dinucleotide (NAD^+) is a pivotal metabolite and signaling molecule involved in tumor metabolism, cell death regulation, and epigenetic control. This review aims to explore how the NAD^+ salvage pathway, regulated by non-coding RNAs (ncRNAs), contributes to cancer progression and how it may be targeted for therapeutic interventions.
Methods: A comprehensive literature search was conducted using PubMed and Google Scholar, focusing on publications from the past five years. Keywords included “NAD(+)”, “ncRNAs”, “Cancer”, and “Therapeutic Intervention”. Relevant studies investigating the interplay between NAD^+ metabolism and ncRNAs in cancer were selected for review.
Results: NAD^+ salvage pathways play a key role in regulating ferroptosis, translational control, and cancer stemness. SIRT1, a NAD^+-dependent deacetylase, enhances ferroptosis in glioma via ATF3 and is regulated by ROS-induced AROS. NMNAT-2-mediated NAD^+ synthesis supports ribosomal MARylation and proteostasis in ovarian cancer. In colorectal cancer, NFIB promotes NAD^+ production by inhibiting miR-182-5p’s repression of NAMPT, while SIRT1 reduces miR-1185-1 to promote CD24-mediated stemness. Furthermore, the tumor-suppressive lncRNA MDHDH destabilizes MDH2, altering the NAD^+/NADH ratio and suppressing glycolysis in glioblastoma.
Conclusion: : The interaction between NAD^+ salvage metabolism and ncRNAs offers a novel framework for understanding cancer biology and developing targeted therapies. Modulating this axis, especially via key ncRNAs, holds promise for therapeutic advances across multiple cancer types.
Keywords: *Nicotinamide Adenine Dinucleotide, Non-coding RNAs, Salvage pathways, Therapeutic intervention, Cancer*

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Exosomes as Natural Nanocarriers: Advancements in Drug Delivery and Associated Risks

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Background and Aim: This review explores the emerging potential of exosomes as natural nanocarriers in drug delivery systems (DDS). With their intrinsic biocompatibility, targeting capabilities, and ability to transport diverse therapeutic agents, exosomes present a promising alternative to synthetic delivery vehicles. The aim is to analyze their mechanisms of action, isolation methods, surface modifications, and therapeutic applications, while also highlighting challenges that limit clinical translation.

Methods: The review examines key techniques related to exosome-based DDS. Isolation methods include ultracentrifugation, precipitation, and immunoaffinity capture. To enhance their functionality, strategies such as genetic engineering and surface functionalization are explored. Drug loading approaches are categorized into passive and active methods, depending on the nature and stability of the therapeutic cargo.

Results: Recent findings demonstrate that exosomes can effectively deliver proteins, RNA, and small molecules, with significant promise in treating cancer, neurodegenerative diseases, and viral infections. Their advantages include high bioavailability, reduced side effects, and the ability to cross biological barriers such as the blood-brain barrier. However, key challenges remain, including immune activation risks, variability in exosome production, and difficulties in large-scale manufacturing.

Conclusion: To optimize the clinical utility of exosome-based DDS, the review proposes solutions such as precise exosome engineering, advanced surface modification techniques, and the integration of biomaterials to enhance stability and targeting specificity. While exosomes hold considerable potential to transform drug delivery, ongoing research is essential to address current limitations and ensure safe, effective therapeutic use.

Keywords: *Exosomes, Drug Delivery Systems (DDS), Nanocarriers, Extracellular Vesicles, Targeted Delivery, Biocompatibility.*

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Genetic Factors in Leukemia: A Mini Review

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Background and Aim: Leukemia is a diverse group of hematologic malignancies that result from genetic mutations disrupting normal blood cell development. Understanding the genetic basis of leukemia can inform both prognosis and treatment strategies. The genetic landscape of leukemia involves a wide range of mutations, chromosomal abnormalities, and epigenetic changes.
Methods: A review of relevant literature was conducted by searching databases such as PubMed, Scopus, and Google Scholar. Articles from 2015 onwards written in English were included. Keywords such as “genetic factors in leukemia,” “genetic mutations in leukemia,” “chromosomal translocations,” and “leukemia prognosis” were used to gather studies.
Results: Studies revealed that various genetic mutations contribute to leukemia development. Chromosomal translocations such as t(9;22) in chronic myelogenous leukemia and mutations in the TP53 gene are well-documented. Mutations in genes related to the cell cycle, apoptosis, and DNA repair also contribute to leukemia progression. Environmental factors, such as exposure to chemicals and radiation, interact with genetic predispositions to increase leukemia risk.
Conclusion: Genetic factors play a pivotal role in the pathogenesis of leukemia. Further research into the genetic mutations and pathways involved in leukemia will improve early diagnosis, prognostic predictions, and the development of personalized therapeutic approaches, thereby enhancing patient outcomes.
Keywords: *Leukemia, Genetic factors, Mutations, Chromosomal translocations*

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Pharmaceutical Strategies for Targeting Genetic Mutations in Cancer: Challenges and Opportunities

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Background and Aim: Cancer is fundamentally a genetic disease driven by mutations that alter cell growth and survival mechanisms. Over the past two decades, pharmaceutical strategies have increasingly focused on targeting these mutations through precision medicine, aiming to develop treatments that are more effective and less toxic than traditional chemotherapy. Despite significant progress, challenges such as drug resistance, tumor heterogeneity, and regulatory hurdles continue to limit the widespread success of these approaches. This review aims to provide an overview of current pharmaceutical strategies for targeting genetic mutations in cancer, assess their effectiveness and limitations, and explore emerging technologies that hold promise for the future of precision oncology.
Methods: A comprehensive literature review was conducted, analyzing recent advancements in targeted therapies, including small molecule inhibitors, monoclonal antibodies, RNA-based therapies, and gene-editing approaches. The review also examines case studies of successful treatments and discusses challenges such as resistance mechanisms, off-target effects, and accessibility.
Results: While targeted therapies have significantly improved patient outcomes in various cancers, challenges such as adaptive resistance, limited treatment response in certain mutations, and high costs remain major barriers. However, the integration of artificial intelligence in drug discovery, advancements in CRISPR-based therapies, and combination treatment strategies are showing potential to overcome these limitations.
Conclusion: Targeting genetic mutations in cancer presents both remarkable opportunities and ongoing challenges. Although current therapies have transformed cancer treatment, further research, collaboration, and innovative approaches are needed to address resistance, improve treatment accessibility, and enhance long-term efficacy. The future of precision oncology will rely on continued advancements in technology and stronger partnerships between researchers, clinicians, and regulatory bodies.
Keywords: *Cancer genetics, targeted therapy, precision medicine, drug resistance, gene editing, CRISPR, pharmaceutical strategies, mutation-driven cancer, precision oncology*

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Genomic Profiling of Tumors: A Gateway to Personalized Cancer Treatments

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Background and Aim: Cancer is a complex disease and Traditional treatments, such as chemotherapy, are not always effective and may lead to various side effects. Therefore, personalized treatments, which are tailored based on the genetic profile of each patient's tumor, have become increasingly important. Tumor genetic profiling aids in identifying genetic and molecular alterations, which can help in selecting more targeted and effective therapies. The aim of this review article is to explore the role of tumor genetic profiling in personalized cancer treatment.
Method: In this review, a comprehensive literature search was conducted using databases such as PubMed, Scopus, and Google Scholar to gather relevant studies on tumor genetic profiling and personalized cancer treatments. Predefined inclusion and exclusion criteria were applied to select peer-reviewed articles focusing on genetic profiling techniques, personalized therapies, and their clinical applications.
Results: The reviewed studies indicate that the genetic profile of tumors which are crucial for personalized cancer treatments. Advanced techniques, such as next-generation sequencing (NGS), have made it possible to identify specific mutations and offer effective targeted therapies for different types of cancers.
Conclusion: Genetic profiling of tumors plays a pivotal role in advancing personalized cancer treatments by identifying specific genetic alterations that drive tumor growth and response to therapies. The integration of advanced genomic technologies, such as next-generation sequencing, has significantly improved the accuracy of tumor profiling, leading to more targeted and effective treatments.
Keywords: *Genomic Profiling, Personalized Cancer Treatment, Tumor Genomics, Targeted Therapy*

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Antidepressant Effects of Ketamine: A Review of Mechanisms, Efficacy, and Clinical Applications

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Background and Aim: In recent years, the use of ketamine as antidepressant has garnered marked interest particularly for the cases resistant to routine treatment, however, the mechanism of ketamine action on depression treatment is still unclear. The aim of this study is to review the mechanisms, efficacy, and clinical applications of ketamine in treatment of depression.

Methods: A systematic search was conducted using databases such as PubMed, Google Scholar, ScienceDirect, and Web of Science. Relevant studies were identified using the keywords "depression," "ketamine," "mechanism of action," "clinical applications," and "efficacy." Inclusion criteria were set to include only published papers after 2015 and those available in the English language. Studies that met these criteria were selected for review.

Results: Ketamine, an NMDA receptor antagonist, has emerged as a rapid-acting antidepressant, particularly for treatment-resistant depression (TRD) and major depressive disorder (MDD). Unlike traditional antidepressants, ketamine produces rapid mood improvement within hours. Its effects are driven by NMDA receptor inhibition, leading to increased glutamate, AMPA receptor activation, and stimulation of BDNF and mTOR pathways. This cascade enhances synaptic plasticity, neurogenesis, and connectivity in brain regions like the prefrontal cortex and hippocampus, which are often impaired in depression.

Conclusion: The studies emphasize how research into ketamine's mechanism of action has created a crucial connection between fundamental synaptic signaling pathways and their practical clinical implications.

Keywords: *Ketamine, Depression, Mechanism, Efficacy, Clinical Application*

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Antimicrobial Resistance in Developing Countries: Challenges in Medicine Development and Policy Implementation

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Background and Aim: Antimicrobial resistance (AMR) is a growing global health crisis, with developing countries disproportionately affected due to high infectious disease burdens, weak health infrastructure, and unregulated antimicrobial use. This study aims to explore the challenges faced by developing countries in addressing AMR, particularly in medicine development and policy implementation.
Methods: A scoping review was conducted using peer-reviewed journals, WHO reports, and policy documents from 2005 to 2024. The analysis focused on identifying key barriers to antimicrobial research and development (R&D), regulatory enforcement, and implementation of national AMR action plans in low- and middle-income countries (LMICs).
Results: The study found limited investment in antimicrobial R&D due to low market incentives and inadequate infrastructure. Many LMICs lack robust surveillance systems, leading to underreporting and mismanagement of resistant infections. Widespread over-the-counter antibiotic sales, poor public awareness, and insufficient stewardship programs further exacerbate resistance. Implementation of AMR policies is often hampered by fragmented governance, lack of funding, and limited technical expertise.
Conclusion: AMR in developing countries is fueled by systemic weaknesses in healthcare, regulation, and innovation. Addressing these challenges requires global collaboration, investment in local R&D, strengthening of regulatory frameworks, and education on responsible antibiotic use. Coordinated action is essential to prevent AMR from reversing decades of medical progress.

Keywords: *Antimicrobial resistance, Developing countries, Medicine development, Health policy*

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Immune Evasion Mechanisms of Cancer Stem Cells and Their Role in Therapy

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Background and Aim: Cancer stem cells (CSCs) are a rare subpopulation of tumor cells with self-renewal and differentiation capabilities. They are associated with tumor initiation, progression, metastasis, and resistance to conventional therapies. One of the hallmarks of CSCs is their ability to evade immune surveillance, contributing to disease progression and relapse. Our aim in this study was to investigate how cancer stem cells (CSCs) contribute to immune evasion in the tumor microenvironment. We also explored emerging therapeutic strategies that target these mechanisms to improve cancer disease.
Methods: We conducted a literature search using keywords such as *cancer stem cells*, *immune evasion*, *tumor microenvironment*, *immune checkpoints*, *therapy resistance*, and *immunotherapy* across databases including PubMed, Google Scholar, and Web of Science. Relevant studies were selected based on clearly defined inclusion and exclusion criteria. The chosen articles were evaluated by reviewing their titles, abstracts, methodologies, and results. The key findings from these studies are summarized in this review.
Results: This review highlights the multiple mechanisms by which CSCs escape immune detection, including suppression of antigen presentation, overexpression of immune checkpoint molecules, secretion of immunosuppressive cytokines, recruitment of regulatory immune cells, and induction of immune cell apoptosis. Additionally, we discuss emerging strategies for targeting CSC-mediated immune evasion, such as immune checkpoint inhibitors, CSC-directed immunotherapies, modulation of the tumor microenvironment, and adoptive cell therapy. A deeper understanding of these immune escape pathways is crucial for developing effective therapeutic approaches that can improve patient outcomes.
Conclusion: Targeting CSC-mediated immune escape pathways could revolutionize cancer treatment. Future research could focus on identifying and optimizing immunotherapy approaches to increase the effectiveness of cancer treatment approaches.

Keywords: *Cancer stem cells, immune evasion, tumor microenvironment, immune checkpoints, therapy resistance, immunotherapy*

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Exosomal Non-coding RNAs in the Tumor Microenvironment: Emerging Roles in Cancer Progression and Personalized Therapy

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Background and Aim: Exosomal non-coding RNAs (ncRNAs) are key mediators of intercellular communication within the tumor microenvironment (TME), influencing cancer progression through modulation of proliferation, metastasis, immune evasion, and therapy resistance. This review aims to provide mechanistic insights into the roles of exosomal ncRNAs in the TME and evaluate their emerging potential in personalized cancer therapy.

Methods: A systematic literature search was conducted using keywords including "exosomal non-coding RNA," "tumor microenvironment," "cancer progression," and "personalized therapy" across databases such as PubMed and Frontiers journals. Inclusion criteria were peer-reviewed articles published in English from 2015 to 2025.

Results: Exosomal ncRNAs are selectively packaged into exosomes secreted by tumor and stromal cells, modulating recipient cell behavior in the TME. They regulate key oncogenic pathways by promoting tumor cell proliferation, metastasis, angiogenesis, immunosuppression, and chemoresistance. For example, tumor-associated macrophage-derived exosomal ncRNAs induce M2 polarization and enhance tumor invasiveness. Exosomal ncRNAs also contribute to immune escape by inducing T cell exhaustion and upregulating immune checkpoint molecules. Clinically, their stability in body fluids makes them promising non-invasive biomarkers for cancer diagnosis, prognosis, and treatment monitoring. Furthermore, exosomes serve as natural vehicles for delivering therapeutic ncRNAs, enabling targeted and personalized interventions.

Conclusion: Exosomal ncRNAs play multifaceted roles in shaping the tumor microenvironment and cancer progression. Their dual utility as biomarkers and therapeutic agents positions them at the forefront of personalized oncology. Continued research into their mechanisms and delivery strategies will facilitate their clinical translation, improving cancer diagnosis and individualized therapy.

Keywords: *Exosomal non-coding RNA, Tumor microenvironment, Cancer progression, Personalized therapy*

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Integrating Multi-Omics Approaches for Cancer Biomarker Discovery: A Bioinformatics Perspective

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Background and Aim: Integrating multi-omics approaches has become pivotal in cancer biomarker discovery, offering a comprehensive view of tumor biology by combining genomics, transcriptomics, epigenomics, proteomics, and metabolomics data. This review aims to explore bioinformatics strategies for multi-omics data integration and their application in identifying robust cancer biomarkers for diagnosis, prognosis, and personalized therapy.
Methods: A systematic literature search was conducted using keywords such as "multi-omics," "cancer biomarker," "bioinformatics," and "data integration" across databases including PubMed, Nature, and Frontiers journals. Inclusion criteria were peer-reviewed articles published in English from 2015 to 2025.
Results: Multi-omics integration leverages diverse high-throughput datasets to construct comprehensive molecular profiles of tumors. Techniques like Similarity Network Fusion (SNF) and Ranked SNF enable the fusion of patient similarity matrices across data types to identify key biomarker candidates. Network-based analyses reveal regulatory interactions among genes, miRNAs, and transcription factors, highlighting hub nodes implicated in cancer progression. Bioinformatics tools and public repositories facilitate data processing, visualization, and pathway analysis. Multi-omics biomarkers have demonstrated improved accuracy in predicting treatment response and survival across various cancers, including neuroblastoma, ovarian, and esophageal cancers. Challenges include data heterogeneity, integration complexity, and clinical validation. Advances in machine learning and AI are enhancing biomarker discovery by handling high-dimensional data and uncovering novel signatures.
Conclusion: Bioinformatics-driven multi-omics integration represents a powerful approach for cancer biomarker discovery, enabling deeper insights into tumor biology and precision oncology. Continued methodological improvements and clinical validation will accelerate the translation of multi-omics biomarkers into personalized cancer diagnosis and therapy.
Keywords: *Multi-omics integration, Cancer biomarker discovery, Bioinformatics*

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Personalized Medicine in Oncology; the Role of Omics Technologies

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Background and Aim: Personalized medicine is revolutionizing oncology by moving away from one-size-fits-all treatment approaches toward strategies tailored to individual patients' genetic, molecular, and environmental profiles. This review aims to provide an overview of recent advancements in personalized cancer care, discuss the barriers to its widespread clinical implementation, and explore future directions and broader implications in related disease contexts.
Methods: A comprehensive review of current literature was conducted, focusing on studies published in the past decade. Sources included peer-reviewed journals, clinical trial data, and reports on the integration of omics technologies, artificial intelligence, and pharmacogenomics in oncology practice.
Results: Technological progress in genomic profiling, next-generation sequencing (NGS), and pharmacogenomics has enabled more accurate tumor classification, early detection of rare and aggressive cancers, and tailored therapeutic regimens. These innovations have improved treatment outcomes and reduced adverse effects. However, several challenges remain, including the complexity of multi-omics data interpretation, disparities in access to molecular testing and targeted therapies, regulatory and ethical concerns, and the need for robust bioinformatics infrastructure.
Conclusion: While personalized oncology has demonstrated significant clinical potential, its broader application requires addressing systemic, technical, and ethical challenges. Advancements in AI-driven analytics, data standardization, and equitable healthcare delivery are critical for the next phase of precision medicine. Additionally, the methodologies developed in oncology are beginning to influence treatment strategies for genetic and autoimmune disorders.
Keywords: *Personalized medicine, Oncology, Genomic profiling, Pharmacogenomics, Precision oncology, Bioinformatics, Targeted therapy, Cancer genomics*

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Synergistic Effects of Curcumin, Allicin, and Propolis in Eradicating Helicobacter pylori and Preventing Precancerous Gastric Lesions Through a Translational Approach

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Background and Aim: Helicobacter pylori is a primary cause of chronic gastritis, gastric ulcers, and gastric cancer. Rising resistance to standard antibiotic treatments, such as triple therapy, highlights the need for safer and more effective alternatives. This study investigates the synergistic effects of curcumin, allicin, and propolis on H. pylori elimination and inhibition of inflammation and cancer-related pathways.
Methods: In vitro assessments included minimum inhibitory concentration (MIC) tests and bacterial adhesion assays using AGS gastric epithelial cells. In vivo experiments involved mice infected with H. pylori, treated with the three-compound formulation. Inflammatory markers (IL-8 and TNF-α), histopathological changes, and expression levels of CagA, NF-κB, and COX-2 were evaluated.
Results: All compounds demonstrated strong anti-H. pylori activity, with MIC values below 0.1 mg/mL. Propolis reduced bacterial adhesion by 95 percent and suppressed CagA secretion by 72 percent. In vivo treatment reduced gastric inflammation by 65 percent and intestinal metaplasia by 50 percent. Antioxidant activity increased by 30 percent. In a related human trial, the curcumin-garlic combination achieved an 85 percent suppression rate and a 60 percent reduction in dysplastic lesions, along with a 45 percent decrease in NF-κB and COX-2 expression.
Conclusion: The curcumin-allicin-propolis combination shows strong potential as a natural therapeutic strategy against H. pylori. Its antimicrobial, anti-inflammatory, and chemopreventive effects warrant further clinical evaluation, especially in populations where antibiotic resistance is prevalent.
Keywords: *Helicobacter pylori, herbal compounds, Curcumin-Allicin-Propolis, Anti-bacterial resistance, Gastric cancer, Gastric ulcers*

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ABSTARCTS

Heat Stress Augments the Detrimental Effects of Salt and Drought Stress in Quinoa Under Field Conditions

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Background and Aim: Soil salinity, drought and heat stress are among the major contributors of decline in crop yields all over the world due to climate change. Climate resilient crops like quinoa (*Chenopodium quinoa* Willd.) can ensure food security by overcoming these challenges.
Methods: A field experiment was conducted using two genotypes of quinoa (Titicaca and Puno) under arid conditions on salt affected soil to evaluate the effects of heat, drought and salinity stress on quinoa plants.
Results: The decrease in plant growth and grain yield when plants were subjected to high temperature, drought, and salinity stress simultaneously was more as compared to individual stresses. A significant decrease in plant biomass (34%) and grain yield (33%) was noted in genotype Puno when it was grown under combined stress of heat, drought and salinity, as compared to salinity alone. Similarly, the combined stress of heat, drought and salinity caused a significant decrease in plant biomass (41%) and grain yield (43%) of genotype Titicaca, as compared to salinity alone treatment. Leaf relative water contents and stomatal conductance were also decreased more when heat stress was imposed along with drought and salt stress in both genotypes. When plants were grown under the combination of salinity, heat and drought stress, K concentration was the lowest, and Na concentration was the highest in both genotypes. The combined stress also resulted in significant decrease of grain mineral contents (Ca, Mg, Fe, Zn, Cu, K, and Mn). The carbohydrate, lipid and protein contents of grains were not significantly affected by salinity alone. However, combination of salinity with heat and drought resulted in a significant decrease of these contents.

Conclusion: Overall, Puno showed better grain yield and quality than Titicaca hence, it should be preferred for cultivation on salt affected soils in dryland farming systems having heat stress problems.

Keywords: *Climate change, Soil salinity, Quinoa, Heat stress, Drought*

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Interactive Effects of Arsenic and Heat Stress on Plant Arsenic Uptake and Physiological Attributes of Quinoa

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Background and Aim: Soil contamination with heavy metals including arsenic (As) and heat stress are resulting in severe decline in crop production around the world. The aims of the current experiment were to evaluate physiological and biochemical changes induced by the combination of As and heat stress in quinoa.
Methods: Plants were gown in pots under different concentrations of arsenite (0, 10, 20 and 30 mg kg^{-1} soil) under ambient temperature (30/12 ℃ day/night) or 5 ℃ higher than ambient temperature.
Results: Plant growth, leaf relative water contents, membrane stability index, stomatal conductance, chlorophyll contents, and grain yield were significantly decreased under As stress. The combination of heat stress with As further decreased these attributes in quinoa plants. Heat stress also increased As accumulation in plants and the plants treated with As levels higher than 20 mg As kg^{-1} soil, with or without heat stress, could not reach maturity. The uptake of As under all the treatments was in the order of root > shoot > grains. Oxidative stress resulting from As and heat stress increased the TBARS and H_2O_2 contents and declined the stability of cell membranes. The over expression of antioxidant enzymes (CAT, POD, SOD) partly neutralized the oxidative stress in quinoa caused by As and heat stress.
Conclusion: It can be concluded that quinoa is not suitable for cultivation in areas having high ambient temperatures and soils contaminated with As levels greater than 20 mg As kg-1 soil.
Keywords: *Soil arsenic contamination, High temperature, Quinoa, Oxidative stress*

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The Correlation of L-theanine and Caffeine Levels with the Antioxidant Activities of Different Tea Extracts and Changes in L-theanine and Caffeine in White Tea Extracts Supplemented with Milk

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Background and Aim: Tea (*Camellia sinensis*) contains several bioactive compounds, including the relaxant L-theanine and the stimulant caffeine. Tea possesses strong antioxidant properties, which vary due to its bioactive compounds. In this study, we conducted two separate experiments. In the first experiment, we determined the relationship between the antioxidant activities of tea preparations and their L-theanine and caffeine contents. In the second experiment, we assessed the effects of adding milk to white tea extracts on their L-theanine and caffeine levels.

Methods: In the first experiment, white, green and black tea samples were infused in cold (<1°C) water for 5 min (the tea to water ratio was 1g/20ml W/V). After filtering and treating with polyvinylpolypyrrolidone (PVPP) to eliminate polyphenols, the antioxidant activity of each tea extract was analyzed using a DPPH radical scavenging assay using a 0.004% (W/V%) DPPH solution in methanol. Then, 1 ml of the DPPH solution was added to 3 ml of each tea sample. After shaking and incubating the samples in darkness at room temperature for 30 min, the absorbance of each sample was recorded in triplicate at 515 nm using a UV/Visible spectrophotometer. Furthermore, the tea extracts were analyzed by high-performance liquid chromatography (HPLC) to determine and compare their L-theanine and caffeine levels. In the second experiment, white tea was infused in cold (~10 to 11°C) water for 5 min (1g/20ml W/V). After filtering and treating with PVPP, the tea sample was added 0%, 10%, 20% or 50% (V/V) partly skimmed fresh milk (2% milk fat), shaken and left in the refrigerator (~4°C) for 20 min. Then, the samples were immediately analyzed by HPLC in triplicate. In both experiments, the L-theanine and caffeine contents of all the tea samples were simultaneously determined using HPLC Agilent 1100 series and Phenomenex® column-Gemini 5µm C18 110Å (150 × 4.60 mm, 5 µm). The mobile phase was methanol and HPLC-grade water (25:75% V/V), and the flow rate was set to 1 ml/min. All the samples were analyzed in triplicate. Statistical analyses were performed using GraphPad Prism Software version 10.1.1 for macOS. A p-value < 0.05 was considered statistically significant.

Results: The first experiment showed that white, black, and green teas possess different levels of antioxidant activity, L-theanine, and caffeine. Relatively lower levels of L-theanine (0.31±0.017 mg/ml) and caffeine (0.106±0.004 mg/ml) were detected in black tea. However, the L-theanine-to-caffeine ratio in the black tea was high, which was associated with high DPPH radical scavenging activity (85±0.23%). The second experiment showed that adding 10% and 20% (V/V) milk significantly decreased the caffeine level in white tea infusions by about 17% and 42%, respectively. The highest L-theanine-to-caffeine ratio in this experiment was 2.37±0.46, obtained in samples supplemented with 20% milk.

Conclusion: These data show that the antioxidant properties of tea are associated with their L-theanine to caffeine ratios, which can be adjusted by manipulation of the extraction procedure. Tea-based drinks with higher L-theanine and lower caffeine levels can be prepared for the consumption of individuals who want to benefit from L-theanine without the stimulating effect of caffeine.

Keywords: *Tea, Camellia sinensis, L-theanine, Caffeine, Antioxidant activity, HPLC*

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Modification of Reproductive Parameters in Phytoseiulus Persimilis and Amblyseius Swirskii under Artificial Nutrient Medium

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Background and Aim: In contemporary agriculture, plant protection in controlled environments increasingly relies on biological control methods, with predatory phytoseiid mites occupying a pivotal role due to their efficacy in regulating pest populations. However, conventional rearing of phytoseiids on plant material infested with phytophagous pests presents limitations, including spatial demands, challenges in harvesting acariphagous, variability in performance across mite species, and occupational health risks associated with allergens and microorganisms in substrate materials. This study aims to develop an artificial nutrient medium for mass rearing Phytoseiulus persimilis and Amblyseius swirskii, and to implement these predators for managing greenhouse pests to facilitate organic crop production.

Methods: The research employed standardized entomological and plant protection methodologies.

Results: Four artificial diets were evaluated. The control diets consisted of Tetranychus urticae for Ph.persimilis and Carpoglyphus lactis for A.swirskii. The impact of diets on the development and reproduction of phytoseiids was assessed. For Ph.persimilis, daily oviposition rates per female were 1.6 eggs on diet D3, 2.6 on D3 (likely a typographical error; presumed to denote D1 or another variant), 3.3 on D2, and 3.6 on D4. For A. swirskii, cumulative egg production over three days was lowest on D3 (0.3 eggs), followed by D1 (1.6 eggs), D2 (2.0 eggs), and D4 (2.3 eggs), compared to the control (2.6 eggs). Predatory efficacy by Ph.persimilis nymphs per day was highest in the control (22.0 eggs), followed by D4 (15.0), D2 (15.3), D1 (12.0), and D3 (10.6). For A.swirskii, consumption rates were 19.0 (control), 13.5 (D4), 12.0 (D2), and 8.0 (D1). Lifespan of predators reared on artificial diets ranged from 10 to 22 days.

Conclusion: Diet D4 demonstrated superior efficacy but higher production costs. Diet D2, supplemented with G.mellonella, offered an optimal balance of efficiency and cost-effectiveness, rendering it suitable for scalable industrial production.

Keywords: *Tetranychus urticae, Carpoglyphus lactis, Amblyseius swirskii, Phytoseiulus persimilis, artificial nutrient medium*

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Unraveling The Attitude of Generation Z Towards Climate Change: A Nationwide Study in Indonesia

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Background and Aim: Generation Z (Gen Z) was born between 1997-2012. In Indonesia, Gen Z constitutes 26.4% of the population. Generation Z's attitude towards climate change is crucial because their mindset will shape the trajectory of climate change policies and practices in the coming decades. This study aimed to assess Indonesian Gen Z's attitude towards climate change.
Methods: This cross-sectional study was conducted in 5 major cities from 5 major islands in Indonesia with a random sampling technique. This study conducted from February to March 2023, obtained 1126 respondents aged 13-19 years old using an online questionnaire. Data were analyzed using univariate and bivariate analysis.
Results: Positive attitudes towards climate change were higher among Gen Z from developed regions. The majority of respondents were 16 years old (19.1%), students from public schools (30.5%), have parents with a senior high school level (45.2%). The results of the study have shown a significant difference between region ($p<0.000$), age ($p<0.000$), sex ($p<0.000$), school type ($p<0.000$), class ($p<0.000$), parent education ($p<0.000$), source of information ($p<0.000$) and the attitude towards towards climate change among Indonesian Gen Z. Gen Z's primary motivation to participate in environmental protection actions was love for plants/animal/nature (32.2%).
Conclusion: The study revealed the varying attitudes toward climate change among Indonesian Gen Z, emphasizing the influence of regional development, education, and socio-demographic factors. This study suggests that enhancing environmental education, leveraging digital platforms for climate communication, and engaging families in discussions can significantly strengthen positive attitudes and Gen Z's role in addressing climate change in Indonesia.
Keywords: *Gen Z, Generation Z, Attitude, Climate change*

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Associations between Binge Eating Disorders and Obesity of Adolescent in Indonesia

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Background and Aim: Obesity is a global health issue profound implications for public health, primarily due to its association with non-communicable diseases. Mental health issues, including Binge Eating Disorders (BED), can contribute to the onset of obesity. The aim of this study is to determine the association between BED and the occurrence of obesity among adolescents in Indonesia.
Methods: This study employed a cross-sectional design utilizing an online questionnaire. The inclusion criteria were individual 18-25 years old in Indonesia. The data were categorized according to several factors, such as sex, age, body mass index (BMI), education, occupation, and domicile. Univariate analysis was conducted to determine the frequency of variables, and bivariate analysis using Chi-Square was employed to investigate the association between these variables.
Results: There were 231 respondents with a higher proportion of females (65.4%) compared to males (34.6%). The research findings revealed a prevalence of BED was 16.5% and obesity was 12.6% among the respondents. Bivariate analysis indicated a significant association between (POR): 3.96, 95% Confidence Interval (95% CI): 1.69-9.29).
Conclusion: Our findings indicated that BED can affect obesity. If Indonesia stakeholders can manage BED in the population, obesity eventually decrease.
Keywords: *Binge eating disorder, obesity, adolescent*

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Physicochemical, structural and antioxidant properties of polysaccharides isolated from Artemisia campestris leaves

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Background and Aim: Plant polysaccharides are gaining interest due to their safety and biological properties, including antioxidant, antimicrobial and anticoagulant activities, which make them valuable in food and pharmaceutical industries. *Artemisia campestris* is an aromatic herb traditionally used as a remedy for various diseases. While its medicinal benefits are attributed to essential oils and polyphenolic extracts, the potential of its polysaccharides as bioactive compounds remains underexplored. This study aimed to isolate and characterize polysaccharides (ACWSP) from *A. campestris* and to investigate their potential antioxidant properties.
Methods: ACWSP were extracted from *A. campestris* leaves using hot water extraction followed by ethanol precipitation. The polysaccharides were characterized for their chemical composition and monosaccharide profile. Structural features were assessed using Fourier-transform infrared spectroscopy (FTIR), nuclear magnetic resonance (NMR), X-ray diffraction (XRD) and scanning electron microscopy (SEM). Antioxidant activity was assessed using DPPH and β-carotene bleaching assays.
Results: The monosaccharide composition of ACWSP revealed a predominance of uronic acids. The high content of uronic acids, along with the presence of galactose and rhamnose, suggests the pectic nature of ACWSP. FTIR and NMR spectra showed characteristic peaks confirming the pectic structure. SEM micrographs revealed a compact, rough and pore-free surface, which is desirable for applications requiring high stability and uniformity. XRD analysis revealed a predominantly amorphous structure, as evidenced by the broad diffraction halo around 20–25°. This amorphous nature is typical of pectic polysaccharides, which generally exhibit a disordered arrangement due to their complex and flexible macromolecular structure. ACWSP demonstrated notable antioxidant activity, with dose-dependent effects observed in both the DPPH assay (EC50 = 1.4 mg/ml) and the β-carotene bleaching assay (EC50 = 1.7 mg/ml).
Conclusion: ACWSP represent a promising source of natural antioxidants, supporting their application in the development of functional food ingredients and health-promoting formulations.

Keywords: *Antioxidant properties, Structural properties, Artemisia campestris, Polysaccharide*

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Prevalence and Risk Factors of Work-Related Musculoskeletal Disorders (WRMSDs) Among Construction Workers: a Scoping Review

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Background and Aim: Work-related musculoskeletal disorders (WRMSDs) are chronic injuries affecting muscles, tendons, ligaments, and nerves due to occupational risk exposures. Globally, WRMSDs account for up to 43% of all work-related injuries, representing a major occupational health concern. Construction workers are particularly susceptible to WRMSDs due to the physically demanding nature of tasks such as repetitive motions, heavy lifting, and awkward postures. This scoping review aims to identify the prevalence, causative factors, and risk factors associated with WRMSDs among construction workers worldwide, based on studies published from 2014 to 2024.
Methods: A systematic literature search was conducted using five electronic databases: Scopus, Science Direct, PubMed, Taylor & Francis Online, and ProQuest. The search used relevant keywords related to musculoskeletal disorders and construction work. A total of 1,628 records were identified, and after screening and eligibility assessment, 47 studies were included in the final review.
Results: The included studies were conducted between 2014 and 2024, with the highest contributions from India, the United States, and several Asian and African countries. The prevalence of WRMSDs among construction workers varied significantly across body regions. The shoulder, wrist/hand, knee, hip, lower back, and neck exhibited the highest prevalence rates. The identified risk factors were classified into individual and work-related categories. Individual factors included age, gender, BMI, lifestyle behaviors, and socioeconomic status. Work-related factors included organizational conditions, psychological demands, physical exertion, repetitive motions, awkward postures, and environmental hazards.
Conclusion: WRMSDs are a critical issue in the construction industry, requiring ergonomic interventions, safe work practices, and organizational support to protect vulnerable body areas and promote worker well-being.
Keywords: *construction safety, ergonomic risk factors, musculoskeletal disorders, occupational health*

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Land Tenure and Rural Livelihoods in Cameroon: Rethinking Women's Access to Land Ownership

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Background and Aim: In most agrarian economies like Cameroon, land remains the backbone and source of rural livelihoods. Although women constitute about 51% of the population in Cameroon, provide 70% of the agricultural workforce, they own just about 2% of land. This existing gap in ownership rights seems to widen the gap between agricultural productivity and rural livelihoods. And the gap is exacerbated partly as a result of Cameroon's gendered land tenure systems. This study explores how gendered land systems in Cameroon impede secured agricultural productivity, leading to household impoverishment and increasing food insecurity. The paper goes ahead to call for a rethink of these formal and informal land systems in order to ensure agricultural productivity and household welfare.
Methods: Theories of social representations and of gender and development were used in the qualitative research. Purposive and snowball sampling techniques were used to select participants. Case studies, direct observation, semi-structured interviews and life stories were used to gather useful information in Fako division. And the content analysis method was employed to interpret data.
Results: Findings reveal the weight of land tenure systems, the capitalist scramble for peasant land and the weight of patriarchal mentalities as factors that widen the gap between agricultural productivity and rural livelihoods. It further reveal that, in spite of the implementation of strategies aimed at guaranteeing the transformation of households and communities by facilitating women's access to land, women continue to face persistent restriction to access land, thus, necessitating a rethink of existing land laws and traditional practices.
Conclusion: As such, the transformation of rural livelihoods would require a contextual reconstruction of power dynamics by giving women and men the skills and resources to bring about the desired changes in communities.
Keywords: *land ownership, women land right, land governance, agricultural productivity, rural livelihoods*

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Gender and Education Disparities in Ecosystem Service Perceptions and Management: Implications for Sustainable Wetland Conservation in Numidia, Northeastern Algeria

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Background and Aim: Climate change and anthropogenic pressures are degrading critical ecosystems, threatening biodiversity and human well-being. In Numidia, northeastern Algeria—a region rich in biodiversity and cultural heritage—understanding how different social groups perceive ecosystem services (ESs) is essential for effective conservation. This study aims to assess the influence of gender, education, occupation, and site status on local perceptions of provisioning, regulating, and cultural ecosystem services, with the goal of informing socially inclusive and ecologically grounded conservation strategies.
Methods: The study surveyed 597 respondents across 12 wetlands (9 protected, 3 unprotected) using a structured, mixed-methods questionnaire available in the local dialect. Perceptions of ESs were measured using Likert-scale questions. Chi-Square tests were used to identify significant associations between sociodemographic variables and ES perceptions. Ordered Logit Regression Models were then applied to examine the strength and direction of these relationships.
Results: Chi-Square and Ordered Logit analyses showed that education significantly shaped perceptions across all ecosystem services, particularly usage and management of provisioning services ($p < 0.001$). Gender had limited effect here. For regulating services, women expressed higher concern (Logit $p = 0.005$) and awareness of environmental change ($p = 0.019$), while education increased concern ($p = 0.003$). In cultural services, women valued these services more ($p = 0.004$), but higher education was linked to lower traditional engagement ($p = 0.042$). Site status positively influenced perceptions in both regulating and cultural categories.
Conclusion: Perceptions of ecosystem services in Numidia are shaped by intersecting sociodemographic factors, particularly gender and education. Women's concern and cultural engagement underscore the need for gender-sensitive policies, while the "awareness–engagement" gap in more educated individuals highlights the importance of integrating traditional knowledge with formal education. Conservation strategies must recognize these nuances to foster inclusive, resilient, and culturally informed biodiversity governance.

Keywords: *Ecosystem services, gender, Education, Sociodemographic factors, Conservation strategies, Numidia*

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The Impact of Intermittent Fasting on Decision-Making: An Eye-Tracking Analysis During Ramadan

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Background and Aim: This study investigates the impact of intermittent fasting on cognitive and attentional processes during Ramadan, using eye-tracking metrics to examine visual attention, response times, and gaze-based predictors, comparing obese and non-obese individuals.

Methods: A longitudinal study on 30 adult participants before and during Ramadan fasting recorded their gaze duration, dwell switch counts, and response times. Participants answered 31 binary-choice questions, and their BMI was calculated from height and weight to classify them as obese or non-obese.

Results: Participants chose the most-viewed option 92.3% of the time during fasting and 93.8% after fasting. Both were significantly higher than chance (50%), with t-tests (During: $t(929) = 55.6$, $p < 0.001$; After: $t(929) = 58.9$, $p < 0.001$). A direct comparison between fasting and non-fasting showed no significant difference ($t(1858) = -1.02$, $p = 0.31$), suggesting that fasting did not reduce attention-driven decision-making accuracy. However, response time during fasting was marginally longer (2.12 seconds) than after fasting (2.05 seconds) ($p > 0.05$). Logistic regression revealed that gaze duration significantly predicted choice in both states (During: $\beta = 0.67$, $p < 0.001$; After: $\beta = 0.71$, $p < 0.001$), supporting the notion that attentional bias drives decision outcomes regardless of fasting status. Non-obese participants showed slightly higher target choice rates (93.5%) than obese participants (90.6%) during fasting ($t(456) = 2.01$, $p = 0.045$), suggesting a possible interaction between metabolic health and cognitive function.

Conclusion: Intermittent fasting does not impair visual-attention-based decision-making. However, it significantly impacts cognitive effort and strategic decision-making, particularly in individuals with obesity. These findings add to the emerging evidence connecting metabolic states with cognition, and suggest that fasting-induced autophagy might preserve or enhance cognitive functions.

Keywords: *Intermittent Fasting, Decision-Making, Eye-Tracking, Cognitive Effort, Ramadan, BMI, Obesity, Visual Attention, Gaze Duration, Autophagy.*

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Impacts of Climate Change on Coastal Zone and Tropical Wetland Ecosystems: Technologies for Adaptation and Mitigation

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Climate change poses significant threats to the coastal areas and tropical wetlands, as well as causes detrimental impacts on environmental, ecological, socioeconomic and human health conditions of the peoples throughout the world. The fisheries and aquaculture sector in the coastal and wetlands areas is subjugated by export-oriented saltwater shrimp and freshwater prawn farming. However, different variables including drought, cyclone, flood, salinity, rainfall, sea level rise, and sea surface temperature have profound antagonistic effects on shrimp and prawn production. Fishery resources are very sensitive to the seashore, river flows and elevation of the lake, and variations related to ocean, coastal and wildlife productivity. Adoption of climate change with such high exposure to climate risks is becoming an important global concern. Although fisheries have always had to cope with variable production and unpredictable changes in weather, future climate change will bring shifts in climatic means and in the frequency and severity of extreme events that are beyond the managing capacity of even the more flexible and adapted fishery systems. Considering vulnerability in fishery production systems to the effects of climate change on coastal fisheries and aquaculture, it is still worth investing in building the capacity of fishery production systems to adapt future climate change scenarios. The main reason is that the most options for building adaptive capacity are also required to manage fish stocks effectively and to reduce the poverty and vulnerability of fishing-dependent people. Adaptation and mitigation measures are crucial for ensuring the sustainability of fisheries and aquaculture in coastal areas and wetland ecosystems, which are continuously facing climate change impacts. Adaptation involves adjusting to the current and future effects of climate change, while mitigation aims to reduce greenhouse gas emissions and slow down climate change. In fisheries, this could include diversifying livelihoods, changing fishing strategies, and developing early warning systems. For aquaculture, it means improving water quality, exploring climate-resilient aquaculture practices, and developing low-carbon production systems. Mitigation efforts might involve reducing fleet overcapacity, promoting low-carbon aquaculture, and exploring carbon sequestration in aquatic ecosystems.

Keywords: *Climate change, Coastal zone, Tropical Wetland, Marine ecosystem, Adaptation, Mitigation, Socioeconomics, Human health*

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Effects of Foliar and Soil Iodine Applications on Biofortification Levels and Stress Factors in Some Leafy Vegetables

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Background and Aim: Nutritional problems due to iodine deficiency in foods are among the most important problems in terms of human nutrition and health worldwide and require new solutions for iodine enrichment of food products in plant production. Iodine biofortification applied from various sources according to plant species and cultivation techniques seems to be among the most suitable options to increase iodine content in plant foods. Plant characteristics, soil characteristics, application forms and doses and plant stress tolerance are important determinants of the success of iodine biofortification. In this study, it was aimed to increase the iodine content of some leafy vegetable crops with foliar and soil iodine solutions and to determine the effects on the plant.

Methods: In the study carried out under greenhouse and substrate conditions, different doses of iodine were applied to spinach, chard, lettuce and red cabbage plants through foliar and soil applications during the growth stages. Growth parameters, iodine contents and stress factors of the plants were analysed at harvest stage.

Results: Foliar and soil iodine applications to leafy vegetable crops increased iodine content in all species. The species effect of iodine application on the iodine enrichment level of leafy vegetables was dominant, with spinach and chard plants responding more effectively to iodine biofortification. Iodine applications in both forms increased crop yield at low application levels and decreased at high doses. Malondialdehyde and total phenol levels in all plants increased at high iodine application doses. Foliar iodine applications increased the iodine content of spinach, chard and lettuce plants more than soil applications. Malondialdehyde and total phenol levels in foliar iodine applications were higher in spinach, chard and lettuce than in red cabbage.

Conclusion: The results showed that iodine biofortification was more successful in foliar iodine applications in spinach, chard and lettuce plants, while soil iodine applications were more successful in red cabbage plants. Foliar iodine application dose of 0.05-0.1% and soil iodine application dose of 5-10 ppm were considered to be optimum for iodine biofortification in leafy vegetable crops.

Keywords: *Biofortification, Iodine, Foliar and soil application, leafy vegetables*

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