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PRESENTS

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Messages from the desk of the Editor

It gives us immense joy and satisfaction to introduce the first issue of 2025 of the magazine 'Pharma Innovations'. I hope you will enjoy reading the magazine which will be beneficial to enrich your knowledge in Pharmacy, medicines, and health. As always this issue is also an attempt to bring out the knowledge concealed within the students and faculty. Before looking ahead, however, I would like to offer a word of thanks to our readers, our contributors, and our editorial board for their support of the journal and its mission I hope you enjoy reading this issue as much as we have enjoyed making it.

DR. R. MAZUMDER
PROFESSOR AND DEAN
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Messages from the desk of the Associate Editor

On behalf of the editorial board members, it is announced that the first issue of 2025 “Pharma Innovations”. has been published. “Pharma Innovations” is a magazine that sturdily focuses on inspiring the faculty and students to gain knowledge and actively driving the mind toward research in health, medicines, and pharmacy. This unprejudiced attitude toward the scope of the magazine allows the reader to have a divergent and convergent aspect on different topics. Enables budding researchers to think in a rational way to make the scientific pavement.

DR. SWARUPANJALI PADHI
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FACULTY FORUM

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BIOELECTRONICS MEDICINE IN PHARMACY

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Electronic technology that integrates with neurons to control electrical transmission between cells and the underlying function of organs is commonly referred to as bioelectronic medicine. The body's ubiquitous, immediate electrical communication system, which coordinates organ function on a large scale, is mediated by neurons. The conventional perspective assumes that the fundamental principles of the body's electrical communication system stem from the regulated bulk transport of ions across cell plasma membranes. This makes it possible to create and alter membrane potentials, which in turn creates an electrochemical potential gradient that can propel the movement of bulk charges. Redox reactions produce biochemical processes that lead to the creation of faradaic current, which is the flow of electrons. Redox reactions need the production of an electron exchange between two biological entities, an electron donor and an electron acceptor.

BIOELECTRONICS MEDICINE IN PHARMACY

NADH, NADPH, GSH, ascorbic acid, and ubiquinone are some of the most well-known and prevalent naturally occurring biological electrochemical mediators, which are described as molecules that readily take or donate an electron or electrons. These mediators are vital for Faradaic currents. Furthermore, enzymes like oxido-reductase and other biomacromolecules can function as electron shuttles. The production of oxidant sources within the mitochondrial respiratory chain in reaction to inflammation or bacterial infection is an example of faradaic signaling. Furthermore, all cells move electrons across membranes for a variety of reasons via membrane electron transport systems.

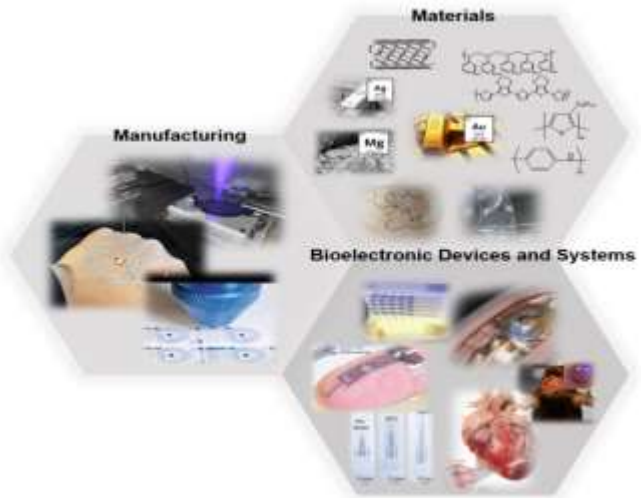

Fig 1: Bioelectronic devices and Systems (Reprinted from the review work of Zhou N, Ma L. Smart bioelectronics and biomedical devices. Bio-design and Manufacturing. 2022 Jan;5(1):1-5))

STUDENTS' FORUM

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PERSONALIZING MEDICINE THROUGH PHARMACOGENOMICS

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Pharmacogenomics is revolutionizing healthcare by tailoring treatments to individual genetic profiles. It combines pharmacology (the study of drugs) and genomics (the study of genes) to understand how genetic variations affect a person's response to medications. This innovative approach is paving the way for more effective and safer treatments.

Traditionally, medications have been prescribed based on a "one-size-fits-all" approach, assuming that all patients will respond similarly. However, in reality, people metabolize and respond to drugs differently. Factors like age, weight, lifestyle, and, most importantly, genetics play a significant role in these variations. Pharmacogenomics helps identify these genetic differences, allowing healthcare providers to customize drug choices and dosages for each individual.

For example, some people have genetic variations that make them process certain drugs too quickly, reducing the drug's effectiveness. Others may process drugs too slowly, increasing the risk of side effects. In such cases, pharmacogenomic testing can guide doctors in selecting the right medication and dose from the start.

This field has shown remarkable promise in areas like cancer treatment, where targeted therapies match a tumor's genetic makeup. It is also beneficial in managing chronic conditions like heart disease and mental health disorders.

PERSONALIZING MEDICINE THROUGH PHARMACOGENOMICS

For instance, pharmacogenomic testing can help determine whether a patient will benefit from specific antidepressants or blood thinners, avoiding a trial-and-error approach.

Despite its potential, pharmacogenomics is still not widely implemented due to challenges like high costs, limited access to testing, and the need for more research. However, as technology advances and the cost of genetic testing decreases, personalized medicine is becoming more accessible.

In the future, pharmacogenomics could become a standard part of medical care, ensuring that treatments are not just effective but also tailored to each patient’s unique genetic blueprint. This shift promises to improve outcomes, reduce adverse drug reactions, and enhance overall patient care.

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Pathophysiology of Cancer

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Pathophysiology: The study of pathophysiology examines how illness or injury alters the body's physiological and functional processes. It helps us comprehend the mechanisms underlying symptoms, signs, and the course of disease and describes how disease alters normal biological processes.

Crucial Elements

Etiology: The disease's underlying cause, such as an infection or genetics.

Pathogenesis: Explains how the disease starts, spreads, and affects the body.

Morphological changes: Cell or tissue structural modifications.

Clinical manifestations: The disease's visible signs and symptoms.

Cancer Overview

Cancer is a complex group of diseases characterized by abnormal cell growth that has the potential to invade or spread throughout the body. The underlying mechanisms of cancer involve genetic alterations, cell transformation, and the disruption of typical physiological functions.

Pathophysiology of Cancer

1. Cellular Mutation and Oncogenesis

Changes in the DNA of healthy cells are what mark the onset of cancer. These genetic alterations can occur spontaneously or be induced by external factors such as radiation, carcinogenic substances, or viral infections. Key genes affected include:

Oncogenes – mutated versions of normal genes (proto-oncogenes) that promote excessive cell development.

Tumor suppressor genes – genes like TP53, which, when inactivated, lose their capacity to regulate cell division or induce programmed cell death (apoptosis).

2. Unregulated Cell Growth

Cancerous cells bypass standard growth controls and proliferate uncontrollably. This results from:

Loss of regulation of the cell cycle

Resistance to cell death (apoptosis)

Sustained angiogenesis – the formation of new blood vessels to support the growing tumor.

3. Invasion and Spread

Cancer poses a significant threat to life when malignant cells infiltrate adjacent tissues and spread (metastasize) to distant organs through blood or lymphatic pathways. This process unfolds in several stages:

Local invasion

Pathophysiology of Cancer

Intravasation (entry into the bloodstream)

Extravasation (departure into new tissues)

Establishment at a new site

4. Tumor Microenvironment

A tumor includes more than merely cancerous cells. It encompasses immune cells, fibroblasts, blood vessels, and various signaling molecules. The interactions between cancer cells and their microenvironment facilitate tumor growth and help evade immune responses.

Common Signs and Symptoms

Cancer may lead to fatigue, unintended weight loss, persistent pain, lumps, or symptoms specific to particular organs (e.g., a cough associated with lung cancer). These symptoms arise from both local effects and systemic involvement.

Conclusion

The pathophysiology of cancer is influenced by genetic and epigenetic alterations that disrupt normal cellular functions. Gaining insight into these mechanisms has led to the development of targeted therapies and immunotherapies aimed at treating cancer more effectively with reduced side effects.

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Precision Medicine and Personalized Therapies: Redefining the Future of Pharma

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The pharmaceutical industry is undergoing a transformative shift, driven by a convergence of advanced data analytics, artificial intelligence (AI), and genetic science. At the heart of this transformation is precision medicine—an approach that tailors treatment to a patient's genetic, molecular, and clinical profile rather than using generalized protocols.

One of the most promising area is oncology where personalized therapies have shown remarkable results.AI tools now help decode vast genomic datasets to identify actionable mutations, enabling more targeted and effective therapies. A notable example is **Moderna's mRNA-4157 vaccine**, a personalized cancer vaccine, developed in collaboration with Merck. In a **Phase IIb trial for *melanoma***, when paired with *pembrolizumab*, it reduced the risk of recurrence or death by **44%**. This vaccine is customized to each patient's tumor-specific mutations, training the immune system for a precise attack.

Similarly, **CAR-T cell therapy**, once restricted to blood cancers, is now showing promise in **solid tumors** like *glioblastoma* and *gastric cancers.* **ASCO 2025** reports highlighted a 40% increase in survival in early-stage gastrointestinal cancer trials using this approach.

Precision Medicine and Personalized Therapies: Redefining the Future of Pharma

Beyond cancer, precision therapies are expanding into rare diseases and immune disorders. **CRISPR-based treatments** for conditions like sickle cell disease and beta-thalassemia have yielded encouraging results—more than **90%** of patients became transfusion-independent after treatment.

These innovations enhance patient outcomes by improving drug efficacy, reducing side effects, and offering longer-lasting results. Biomarker-driven trials also allow for smarter patient stratification, increasing the chances of clinical success while lowering development costs.

However, challenges persist. High costs, limited scalability, and ethical concerns about biased AI models pose real barriers. Moreover, data fragmentation across healthcare systems makes integration complex.

Still, the momentum is clear. With over **50% of global biopharma leaders** prioritizing personalized therapies, precision medicine is no longer experimental—it is becoming a standard of care that offers patients the most important advantage of all; the right treatment, at the right time.

Nanotechnology In Drug Delivery

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Nanotechnology Is the branch of science that deals with use of nano (10^{-9}) range particles. Collaborating it with medicine gives us a branch of pharmaceutical called nanomedicine. In this era of new discoveries, nano delivery or nanomedicine system is new but developing sector of science with great potential. This system includes materials in nanoscale range to target the desired location for treatment. Even with various drug delivery systems we still feel challenges In regards to the effective drug release and absorption thus, we need an advance technology with better results and less chances of failure. Nanoscale particles are a small minute particle which can be easily absorbed in systemic system Without causing much plasma fluctuations they can easily penetrate the target tissue and stay in system for prolonged periods making it possible to incorporate the medicine in specified doses which permits efficient drug delivery and absorption. Nanotechnology can be particularly used in drugs with poor solubility less absorption as we can tag them with nanoparticles that can easily reach the target location. The drug delivery systems particularly depend upon the size, shape and other inherent biophysical and chemical characteristic of particles.

Nanotechnology In Drug Delivery

Nanotechnology in drug delivery. Nanomedicine found applications in including cancer therapy, biological agents and Immunotherapeutics in chronic diseases (such as cancer, diabetes, etc). Key delivery system includes polymeric nanoparticles, liposome, micelles, metallic nanoparticles, etc each with distinct advantages for drug targeting. In designing nanocarriers biopolymers like chitosan, alginate and xanthium gum plays a vital role that represents that they can have applications in cancer therapy, ocular drug delivery and gene therapy. The first-generation nanoparticle-based therapy included lipid system- liposomes and missiles which are now FDA approved. Gold particle on nano scale is used as biomarkers and tumour labels for various procedural assays. The research and proper innovation on nanotechnology can bring a huge change in drug delivery system that can ensure the advancement of medicine while we know nanotechnology has great potential but we cannot neglect the fact that nanoparticles can exhibit toxic property, but with cautious approach and thorough research we can mitigate risks, enhance therapeutic outcomes, and have safe results.

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The Critical Role of Pharmacists in Managing Chronic Diseases: A Multidisciplinary Approach to Improve Patient Outcomes

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Chronic Diseases, such as diabetes, Hypertension, asthma, and cardiovascular Diseases, are among the leading causes of morbidity and mortality worldwide. These conditions require long-term management strategies, including both pharmacological interventions and lifestyle modifications . Pharmacists play a pivotal role in the management of Chronic Diseases, utilizing their expertise in medication therapy management (MTM) , Patient counseling, and interdisciplinary collaboration to enhance Patient care and Improve health outcomes. The increasing prevalence of chronic diseases, coupled with the complexity of managing multiple medications, has created an urgent need for Pharmacists to be integrated into Healthcare teams.

The Critical Role of Pharmacists in Managing Chronic Diseases: A Multidisciplinary Approach to Improve Patient Outcomes

Pharmacists are uniquely positioned to optimize pharmacotherapy, ensure medication adherence, and prevent adverse drug reactions or drug interactions that can complicate disease management. Through comprehensive medication reviews, Pharmacists can identity potential issues such as polypharmacy , inappropriate prescribing, and medication-related problems, which are common in patients with Chronic conditions. By reviewing a patient's entire medication regimen, Pharmacists can recommend adjustments to optimize drug Efficacy and safety, while also providing strategies to mitigate side effects. Beyond their role in medication management, Pharmacists also contribute to Patient education, promoting self-management of Chronic conditions. This involves helping patients understand their disease, the importance of adhering to prescribed therapies, the role of lifestyle changes, such as diet and exercise, in Managing their condition. For instance, in diabetes management, Pharmacists can provide guidance on blood glucose monitoring, insulin administration, and dietary adjustments, significantly improving patient's control over their disease and reducing the risk of complications. Know Hypertension, Pharmacists can educate patients on the importance of monitoring blood pressure at home and following a heart- healthy lifestyle, thus complementing the physician's treatment plan.

The Critical Role of Pharmacists in Managing Chronic Diseases: A Multidisciplinary Approach to Improve Patient Outcomes

The role of Pharmacists extends to Chronic disease prevention as well . Through the implementation of preventive Healthcare measures, such as immunization and screening programs, Pharmacists contribute to reducing the incidence of certain Chronic Diseases and their complications. As Healthcare systems continue to evolve, the expanding role of pharmacists in chronic disease management is becoming increasingly recognized. Pharmacists ability to manage complex medication regimens, provide patient education, and engage in collaborative care makes them an invaluable asset in improving patient outcomes. By ensuring that patients receive optimal medication therapy, are well-informed about their conditions, and are empowered to manage their health, pharmacists play an essential role in reducing the burden of chronic diseases on individuals and Healthcare systems.

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CENTRAL DRUGS STANDARD CONTROL ORGANISATION

The Central Drugs Standard Control Organization (CDSCO) is the primary national regulatory authority responsible for overseeing pharmaceuticals, medical devices, cosmetics, and clinical research in India.

Operating under the Ministry of Health & Family Welfare, CDSCO ensures that medical products in the country meet global standards of safety, efficacy, and quality.

Given India's position as one of the largest producers of generic medicines, the Central Drugs Standard Control Organisation (CDSCO) plays a critical role in safeguarding public health.

CENTRAL DRUGS STANDARD CONTROL ORGANISATION

Central Drugs Standard Control Organization has 8 Divisions

- Clinical Trials
- BA/BE
- New Drugs
- Import & Registration
- Cosmetics
- Biological
- Medical Device & Diagnostics
- DCC-DTAB

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SUGAM is an online e-Governance Portal

Introduced by the government of India **to build an in-depth framework for the Regulatory registration processes of the CDSCO**

Detailed Registration Steps

- Access the SUGAM Portal
- Initiate Registration
- Choose Applicant Type
- Provide Personal and Company Details
- Upload Necessary Documents
- Submit Application
- Verification and Confirmation
- Login
- Dashboard Access

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SUSTAINABLE PHARMACEUTICAL INDUSTRY POLICY

Minimizing environmental impact throughout the drug lifecycle, from raw material sourcing to waste disposal

Key Areas for Policy

- **Environmental Impact Reduction**
- **Policy and Regulatory Frameworks**
- **Addressing Specific Challenges**
- **Collaboration and Stakeholder Engagement**

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SUSTAINABLE PHARMACEUTICAL INDUSTRY POLICY

Benefits of a Sustainable Pharmaceutical Industry

- •Reduced Environmental Impact, Contributing to a Healthier Planet.
- Improved Public Health Through Access to Safer and More Effective Medicines
- Enhanced Corporate Reputation and Brand Loyalty
- •Greater Social Responsibility and a More Equitable Future for All.
- Reduced Costs Through Improved Resource Utilization and Waste Management

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LIST OF NEW DRUG CANDIDATES APPROVED BY FDA (Jan-June 2025)

Drug Name	Active Ingredient	Approval Date	FDA approved use
Datroway	datopotamab deruxtecan-dlnk	1/17/2025	To treat unresectable or metastatic, HR-positive, HER2-negative breast cancer who have received prior endocrine-based therapy and chemotherapy for unresectable or metastatic disease
Grafapex	treosulfan	1/21/2025	For use in combination with fludarabine as a preparative regimen for allogeneic hematopoietic stem cell transplantation for acute myeloid leukemia and myelodysplastic syndrome
Journavx	suzetrigine	1/30/2025	To treat moderate to severe acute pain
Gomekli	mirdametinib	2/11/2025	To treat neurofibromatosis type 1 who have symptomatic plexiform neurofibromas not amenable to complete resection
Romvimza	vimseltinib	2/14/2025	To treat symptomatic tenosynovial giant cell tumor for which surgical resection will potentially cause worsening functional limitation or severe morbidity
Blujepa	gepotidacin	3/25/2025	To treat uncomplicated urinary tract infections
Qfitlia	fitusiran	3/28/2025	To prevent or reduce the frequency of bleeding episodes in hemophilia A or B

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Drug name	Active ingredient	Approval date	FDA approved use
Vanrafia	atrasentan	4/02/2025	To reduce proteinuria in adults with primary immunoglobulin A nephropathy at risk of rapid disease progression
penpulimab-kcqx	penpulimab-kcqx	4/23/2025	In combination with either cisplatin or carboplatin and gemcitabine, to treat adults with recurrent or metastatic non-keratinizing nasopharyngeal carcinoma (NPC), or as a single agent while on or after platinum-based chemotherapy and at least one other prior line of therapy
Imaavy	nipocalimab-aahu	4/29/2025	To treat generalized myasthenia gravis
vmapki Fakzynja Co-Pack	avutometinib and defactinib	5/8/2025	To treat KRAS-mutated recurrent low-grade serous ovarian cancer (LGSOC) after prior systemic therapy
Emrelis	telisotuzumab vedotin-tllv	5/14/2025	To treat locally advanced or metastatic, non-squamous non-small cell lung cancer (NSCLC) with high c-Met protein overexpression after prior systemic therapy
Tryptyr	acoltremon	5/28/2025	To treat the signs and symptoms of dry eye disease
Enflonsia	clesrovimab-cfor	6/9/2025	To prevent respiratory syncytial virus (RSV) lower respiratory tract disease in neonates and infants who are born during or entering their first RSV season

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“See you in the Next Edition”
Stay Safe, Stay healthy,
and
Keep Learning

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