IEM-HEALS

International Conference
on
Advancing Science and Technologies in Health Science
(IEM-HEALS-2024)

Date: 13th-15th September 2024

BOOK OF ABSTRACTS

Organised By

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DEPARTMENT OF BASIC SCIENCE & HUMANITIES
INSTITUTE OF ENGINEERING & MANAGEMENT
(SCHOOL OF UNIVERSITY OF ENGINEERING AND MANAGEMENT)
KOLKATA, INDIA

in association with

SMART
Smart Society, USA

EDITORS:

Prof. Dr. Ruchira Mukherjee Prof. Dr. Debasmita Bhattacharya Prof. Dr. Prabir Kumar Das

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About the Conference

The field of health science is constantly evolving due to advancements in basic science research, technological innovations and management in health-care delivery. The **First International Conference on Advancing Science and Technologies in Health Science IEM-HEALS** aims to provide a platform to explore the state-of-the-art breakthroughs, promote interdisciplinary collaboration and evaluate the impact of the ground-breaking research in individual and population health.

About the Organizer

Institute of Engineering & Management, Kolkata, INDIA

The Institute of Engineering & Management (IEM), Kolkata is one of the oldest premier technical institutes in West Bengal, India and had been providing quality education in the fields of technology and management since its inception in 1989. Being a **NAAC A** category institution and a **NIRF** rank holder, IEM continuously strives to reach out and add worth to people's lives, impart quality education for creating efficient manpower for the future, and promote a superior category of students and researchers who would apply knowledge for the advancement of society and meet the challenges of a rapidly changing world. It aims to spread and enhance education, collaborate with national and international institutions, promote interdisciplinary research work, upgrade educational standards and empower the youth with a holistic development.

PREFACE

We are pleased to present the ***Book of Abstracts*** for *the* ***First International Conference on Advancing Science and Technologies in Health Science (IEM-HEALS)***, organized by the **Department of Basic Science & Humanities, Institute of Engineering & Management, Kolkata, India.**

The field of health science is constantly evolving due to advancements in fundamental research, technological innovations and healthcare management. The conference aims to provide a platform to explore state-of-the-art breakthroughs, promote interdisciplinary collaboration and evaluate the impact of the ground-breaking research on the health of individuals and population at large. The conference aspires to exhibit scientific advancements in the diversified spectrum that includes Systems Biology Research in Health Science, Stem Cells and Regenerative Medicine, Exercise Nutrition and Diet, Mitochondrial Biology, Genomics, Biotechnology, Immunology, Microbiology, Healthcare Management and Health Literacy and many more. Even the impact of Artificial Intelligence on Health Care will be discussed and its effectiveness in medical practices will be analysed. We sincerely hope that this volume will serve as a valuable reference for researchers in academia and industry. It is our pleasure to acknowledge the help we have received in finalizing the technical contents of this International Conference. We wish to thank all the Reviewers and Editorial Committee members who helped us complete the review process on time. We thank all the authors and co-authors for enriching our International Conference through their valuable participation. Our deepest gratitude goes to the national and international experts who will deliver talks on various emerging domains during the keynote or plenary sessions of the conference and enlighten the gathering. We are grateful to the Advisory Committee members of IEM-HEALS for their valuable suggestions and guidance. We are also thankful to all Organizing Committee members as well as student volunteers for their hard work. Our heartfelt thanks to Prof. Dr. Satyajit Chakrabarti, President, Prof. Dr. Satyajit Chakrabarti, Director, Prof. Dr. Arun Kr. Bar, Principal and Dean and HODs of all departments, Institute of Engineering & Management, Kolkata for their constant support and valuable guidance in organizing this scientific meeting. On this note, we heartily welcome all the delegates at this International Conference. We hope this academic forum will provide the intellectual stimulation for a healthy discussion which will ultimately pave the way for an enriched society. It is our firm belief that the conference will fulfill all the objectives with which it is being organized.

Prof. Dr. Prabir Kumar Das

Prof. Dr. Debasmita Bhattacharya

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- **Prof. Dr. Magdalena Jaklewicz,** *Microscope and Flow cytometry specialist*, York University, Canada

- **Dr. Mitali Sengupta,** *Associate Professor*, Department of Management, Institute of Engineering &Management, Kolkata

KEYNOTE AND INVITED SPEECH

Plenary Talk – I

Keynote Speaker I

The Hallmarks of Cancer Research: A Historical Perspective

Dr. *Susanta Roychoudhury*

ICMR Emeritus Scientist
CSIR-Indian Institute of Chemical Biology
Honorary Advisor Research
Saroj Gupta Cancer Centre and Research Institute
Former J C Bose National Fellow
Former Chief Scientist
CSIR-Indian Institute of Chemical Biology
Former Professor, Academy of Scientific and Innovative Research
E-mail:susantarc@gmail.com

The Hallmarks of Cancer proposed first in the year 2000 by Douglas Hanahan and Robert Weinberg, and subsequently revised in 2011 and 2022, elegantly encapsulate the knowledge on cancer biology until now. With the advent of Next Generation Sequencing (NGS) technologies large number of cancer driver genes and their mutations have been identified in several tumour types. This led to the development of a repertoire of target specific anti-cancer drugs making implementation of personalized cancer treatment possible. The tumour suppressor gene TP53 has a very distinct place among all these cancer drivers. Despite being most frequently mutated cancer gene, no rationally designed drug has been developed against it. Initially discovered as an oncogene but later proved to be a bonified tumour suppressor gene. However, recent experimental evidence suggest it might act both as tumour suppressor as well as an oncogene. I shall discuss how accidentally our laboratory entered this field and what were our contributions

Plenary Session – I

<u>Keynote Speaker II</u>

Artificial Intelligence (AI), Application in Clinical Genomics

Dr. Saurav Guha

Director, Molecular Diagnostics
New York Genome Center, New York, USA
E-mail:sauravguha@gmail.com

Artificial Intelligence (AI) is revolutionizing clinical genomics by enhancing the accuracy, efficiency, and scalability of genomic data interpretation. Integrating AI-driven tools into clinical workflows facilitates the rapid analysis of vast and complex datasets, enabling clinicians to identify pathogenic variants, predict disease risk, and personalize treatment strategies with unprecedented precision. AI algorithms, particularly those based on machine learning and deep learning, have demonstrated significant potential in automating variant classification, improving the detection of rare genetic disorders, and prioritizing clinically actionable findings. Moreover, AI-powered predictive models are increasingly used to anticipate patient outcomes based on genetic profiles, thus aiding in developing targeted therapeutic interventions. However, challenges remain in ensuring the transparency, interpretability, and generalizability of AI models in diverse patient populations. This talk will review the current state of AI applications in clinical genomics, highlight key advancements, and discuss the ethical and regulatory considerations crucial for the widespread adoption of AI technologies in clinical practice.

Plenary Session – II

<u>Keynote Speaker III</u>

Immune Cell Gene Expression Mileu Reveals Novel Insights in Human Health: The "Enterprise Exploration"

Dr. Arindam Maitra

Associate Director and a Professor in BRIC-National Institute of Biomedical Genomics, Kalyani
Adjunct Professor of BRIC-Regional Centre for Biotechnology Faridabad
Fellow of West Bengal Academy of Science and Technology
Email: am1@nibmg.ac.in

The last decade has witnessed phenomenal understanding of the gene expression landscape in human diseases, primarily fuelled by the next generation methods of sequencing the transcriptome. However, this is only the proverbial tip of the iceberg. While these studies have investigated bulk tissue samples and the results provide averages of gene expression of millions of cells analysed at a time, these lack understanding of the active genes and other characteristics in individual cells to help classify their function, location and interaction with other cells. Recent initiatives like the Human Cell Atlas have resulted in efforts to catalogue the gene expression profiles of each of the approximately 37 trillion cells of the human body. We are undertaking such initiatives to understand cellular transcriptional profiles in Disease State as in oral cancer and preterm birth and in understanding the Healthy State. I will be talking about some of our recent findings on the cells of the immune system in these states and how they are leading us to territories "where no one has gone before."

Plenary Session – IV

Keynote Speaker IV

AI and Big Data Driven Health, Wellness, Resilience and Adaptation in extreme environments on Earth and in Space

Dr. Carolyn McGregor

Carolyn McGregor Dean and Professor, Faculty of Business and IT
Director and Research Chair, Joint Research Centre in AI for Health and Wellness
Canada Research Chair (Alumni) in Health Informatics
Professor, Faculty of Engineering and IT
University of Technology Sydney
E-mail:Carolyn.Mcgregor@ontariotechu.ca

Exploration, emergency response, peace keeping, asset protection and even premature birth, create situations where humans are faced with extreme environments. Health, wellness, resilience and adaptation are key components for human survival in the extremes and the success of missions in those settings. Real-time monitoring of humans in extreme environments on Earth and in Space is a complex integration of many technologies, human factor and theatre of operation components and factors. Solutions are impacted by size, power, weight and communication network limitations. McGregor has been proposing and deploying AI driven big data analytics frameworks and platforms, that enable the capture and processing of physiological data and other contextual data in real-time for new approaches to real-time health, wellness, resilience and adaptation monitoring. Their efficacy and reliability for real-time health monitoring has been demonstrated in the critical care domain and specifically within the domain of neonatal intensive care. Extensions of that work are proposing new approaches for wellness, resilience and adaptation per-deployment training for firefighters, paramilitary and military personnel. Finally, McGregor has proposed a new approach for autonomous health monitoring for health, wellness and adaptation within the spacecraft to support missions within and beyond low Earth orbit including two research studies on the International Space Station. Frameworks and infrastructure to enable real-time monitoring of humans in extreme environments such as premature birth, firefighting, tactical operations, spaceflight and diving will be presented and discussed.

Plenary Session - IV

Keynote Speaker V

Harnessing Clinical Bioinformatics: Transforming Precision Medicine and Shaping the Future of Healthcare

Dr . Mojgan Rezvani

Executive Dean
Faculty of Health Sciences (HS)
Durham College
E-mail:Mojgan.Rezvani@durhamcollege.ca

Clinical bioinformatics is rapidly emerging as a pivotal field at the confluence of biology, data science, and clinical practice, with profound implications for precision medicine. This keynote presentation will examine the transformative role of clinical bioinformatics in revolutionizing healthcare, focusing on its ability to enhance diagnostic accuracy, tailor therapeutic strategies, and improve patient outcomes. We will explore the integration of genomic data into clinical workflows, the application of artificial intelligence (AI) and machine learning to refine predictive models, and the ethical challenges posed by the management and interpretation of vast amounts of sensitive data. The presentation will also discuss the potential of emerging technologies, including quantum computing and multi-omics approaches, to further advance the capabilities of clinical bioinformatics. By addressing these key areas, this session aims to provide a comprehensive overview of the current landscape and future directions in clinical bioinformatics, offering valuable insights for researchers, clinicians, and industry professionals dedicated to advancing the frontiers of healthcare.

Plenary Session – IV

Keynote Speaker VI

"Gut-in-a-dish" model to develop personalized therapies for chronic inflammatory diseases

Dr. Soumita Das

Associate Professor, Department of Biomedical & Nutritional Science
University of Massachusetts-Lowell
E-mail: Soumita_Das@uml.edu

Gut microbes are linked to infections, gastro-intestinal diseases, and other chronic diseases. It is essential to develop a disease model that mimics physiological conditions and is closer to humans than the existing animal models. Utilizing the recent developments in stem-cell biology, we have developed a "gut-in-a-dish" model that utilizes patient-derived-organoids (PDOs) along with immune/nonimmune cells and microbes associated with the disease. This model is helpful in understanding the crosstalk between gastro-intestinal epithelial cells, immune cells and microbes (beneficial and pathogenic) with other environmental toxicants. Using this model, we showed that the host gut barrier is disrupted after encountering the microbes/toxin/microbial products leading to inflammation and chronic diseases. Inflammation following infection leads to DNA damage, predisposing the epithelium to neoplastic transformation and cancer initiation. Recent utilization of the model will be discussed in the context of inflammatory bowel disease and colorectal cancer. Examples will be given to show the usefulness of this model in the development of new personalized therapies and for prevention of the disease by screening drugs, nutraceuticals and environmental toxicants.

Plenary Session – III

Workshop Session I

Unravelling nanomaterial characteristics for biomedical use through molecular computation

Dr.Rajiv K. Kar

Jyoti and Bhupat Mehta School of Health Sciences and Technology
Indian Institute of Technology Guwahati, India – 781039
E-mail: rajivkar@iitg.ac.in

Molecular computation serves as a powerful tool for understanding the properties of nanomaterials. It aids in predicting material behaviour under various conditions such as solvent environments, phase behaviour, and molecular crowding. The widely utilized modelling and simulation tools facilitate the understanding of fundamental aspects such as charge distribution, stabilizing forces (including electrostatics and van der Waals), and structural dynamicity. Moreover, they instrumental in comprehending relevant quantum chemical properties for assigning experimental spectra from UV-vis, fluorescence, infra-red spectrum, and NMR. These tools are also utilized to explore advanced properties including thermal fluctuations, diffusion, and chemical reactions, enabling the fine-tuning of nanomaterial properties for specific applications in sensing, therapeutics, and diagnostics. Specific examples of molecular computation techniques encompass molecular dynamics simulations based on classical force-fields, quantum chemical calculations (especially density functional theory, which is considered more reliable than molecular mechanics) aiding in the exploration of chemical reactivity, electronic, and optical properties, as well as multiscale modelling such as coarse-grained simulation to examine aggregation and assembly behaviour of nanoparticles. In this presentation, we will delve into the foundational concepts of molecular computation, and correlate the calculations with experimental data obtained for gold nanoparticles and low-dimensional materials such as graphene oxide. Additionally, we will also have an interactive hands-on workshop to demonstrate the use of CHARMM-GUI for nanoparticles modelling and open-source servers for simulation purposes.

Plenary Talk – III

Workshop Session I

Molecular modelling and docking simulations of protein complex

Prof. Angshuman Bagchi

Professor of Biochemistry and Coordinator of DBT-funded Bioinformatics Infrastructure Facility
Department of Biochemistry and Biophysics
University of Kalyani
Kalyani-741235, Nadia, West Bengal, India
Email: angshu@klyuniv.ac.in

Molecular modelling has so far been considered as an integral part of most of the research topics. The technique is constantly and routinely being used to analyse data. One of the pivotal areas of research in this field is the building of the structures of macromolecules, proteins and nucleic acids. There are databases available, which provide sequence and structural information of biomolecules. The techniques of molecular modelling are used to generate the structural information of biomolecules which cannot be retrieved from the databases. Another aspect of the molecular modelling techniques is to study the interactions between the biomolecules. This is achieved through the method of molecular docking simulations. Therefore, my entire presentation is divided into three parts. At first an overview of the frequently used biological databases will be provided. After that the technique of building the model of a protein will be demonstrated. Finally, with the help of molecular docking simulations, a protein complex will be built and the modes of their binding interactions will be determined.

CONTRIBUTED SESSIONS

TRACKS

BIOTECHNOLOGY APPLICATIONS IN HEALTH SCIENCE

IEMHEALS -24/O/067

Identification of potential inhibitors of Tumor Suppressor Gene from phytochemical constituents found in Tomato (*Solanum lycopersicum*) via biocomputational analysis

[1]Atreyee Majumder, [2]Malavika Bhattacharya

[1,2]Department of Biotechnology, Techno India University, West Bengal
Email: atreyeemajumder@gmail.com

The research investigates the potential of phytochemical constituents found in tomatoes (*Solanum lycopersicum*) to inhibit the PTEN tumour suppressor gene, which is frequently mutated in endometrial cancer. Endometrial cancer, primarily adenocarcinomas, is often linked to genetic mutations, particularly in the PTEN gene, which is crucial for regulating cell proliferation and apoptosis through the PI3K/AKT pathway. This study leverages biocomputational analysis to identify bioactive compounds in tomato Peel, Pulp, and Seeds that could serve as alternative inhibitors to the PTEN gene comparing their efficacy to the control drug Lenvatinib mesylate. The methodology involved preparing the PTEN protein structure, retrieving phytochemicals from tomatoes, and performing molecular docking to assess binding affinities. The top three ligands from each tomato component were selected based on their binding energies and underwent ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) analysis to evaluate their drug-likeness. Results indicated that several tomato-derived compounds exhibit binding energies comparable to or better than *Lenvatinib mesylate*, suggesting potential as natural therapeutic agents. The study concludes that tomato phytochemicals, particularly those with high binding affinities, hold promise for developing dietary supplements aimed at treating endometrial cancer with potentially fewer side effects than conventional drugs.

Keyword: Bioinformatics, PTEN Tumor Suppressor Gene, Endometrial Cancer, *Solanum lycopersicum*, *Lenvatinib mesylate*.

IEMHEALS-2024/O/008

Different bioimaging applications and Si-nano-based biosensors performed a fundamental role in cancer prevention: An overview

[1]Rituparna Saha, *[2]Pratap Mukherjee

[1]University of Engineering & Management (UEM),
[2]Department of Basic Sciences & Humanities, Institute of Engineering & Management
**Email: pratap_muk@yahoo.com, pratap.psu@gmail.com*

A biosensor is a device used for the detection of biological materials. In current research, nanotechnology is growing significantly in the development of biosensors. Nano biosensor technology modernized the healthcare sector to measure the metabolites and monitor the diabetes rate, lung function, pulse rate, detect cancer cells etc. These sensors are used in advanced food technology to measure water quality, drug residue present in food, etc. Nanoparticles applied in biosensor development have enhanced their sensitivity and performance. Silicon nanoparticles are mostly used for making biosensors for the detection of cancer cells. These nanoparticles are used for various biological and biomedical applications as silicon (Si) has no toxicity and is favorably biocompatible. Different powerful tools are used for cancer treatment, diagnosis, and therapy. To demonstrate photoluminescence properties like strong fluorescence and robust photostability silicon nanoparticles (SiNPs) are applied for their excellent biocompatibility. As a bioimaging application, the strong fluorescent SiNPs are applicable for long-term cellular labeling, cancer cell detection, and high sensitivity in vitro and in vivo tumor imaging. In this review article, we highlighted the fundamental role of different bioimaging applications and silicon-based biosensors used for detecting cancer cells and chemoprevention methods.

Keywords: nanotechnology, biosensors, bioimaging, cancer therapy, si-nanoparticles (SiNPs).

IEMHEALS-24/O/027

Prebiotic-enriched chocolates with phytochemicals: nutritional and functional analysis

[*]Anindita Deb Pal, Poulami Chakraborty, Radhika Jitesh Gandhi

Department of Food Science & Nutrition Management, J.D. Birla Institute,
[*]Email: deb_anindita@yahoo.com

The present study aimed to demonstrate the nutritional and functional properties of the newly developed phytochemical-containing prebiotic-enriched chocolates. Nutrient and hytochemical composition were determined using the Association of Official Analytical Chemists' methods and standard biochemical processes. Antioxidant and prebiotic properties of *Lactobacillus rhamnosus GG* were assessed by DPPH, reducing potential test, growth kinetics, and plate count ($p < 0.01$, 95% confidence interval). The products' functionality was also assessed in an in vitro mimicked human intestinal digestion environment. Variation 3 (V3) chocolates, which contained cocoa powder (64%), cocoa butter (22.5%), stevia (3%), inulin (10%), and soy lecithin (0.5%), received the highest sensory score amongst all of the developed chocolates. V3 had a preferred proportion of proximate components including high fibre, low fat, vitamins (A, D, E, B6, and B12), minerals (zinc, sodium, calcium, iron, phosphorus), as well as bioactive components such as flavonoids, alkaloids, and polyphenols compared to standard chocolate (S) along with a lower calorific value. V3 was observed to substantially rummage 2, 2-diphenyl-1-picryl-hydrazyl radical, portray potent reducing power, and accelerate the growth of probiotic *Lactobacillus rhamnosus GG,* demonstrating antioxidant and prebiotic qualities. Notably, V3 was found to retain a considerable fraction of its antioxidant and prebiotic potential even after being exposed to a simulated intestinal digestion, showing its efficacy in propagating benefits in the human body after consumption. Hence, the nutritional and functional attributes of V3 in addition to the significant retention of antioxidant and prebiotic benefits following intestinal digestion, might enhance wellness as an alternative to conventional chocolates.

Keywords: Antioxidant, Functional, Chocolate, Phytochemicals, Prebiotic.

IEMHEALS-24/0/026

Genetic association study- Addiction and Single nucleotide polymorphism of Clock gene.

*Daytee Maji , Ishani Deb

Department of Biochemistry, University of Calcutta

Drug addiction or substance abuse is globally a significant clinical ailment, characterized by compulsive pursuit and use of drugs. It disrupts the circadian rhythm in mammals. Circadian locomotor output cycle kaput, CLOCK protein, a key regulator of circadian rhythm, functions as a transcription factor with histone acetyltransferase (HAT) activity. Genetic association studies of the Clock gene, indicates a direct effect on the prevalence of different behavioural disorders (such as bipolar disorder, mood disorder, and depression) in diverse populations. This study aimed to investigate previously reported SNPs of Clock gene (rs1801260, rs3749474,and rs10462028) in relation to drug addiction in the East Indian population, mainly Kolkata. These SNPs are located in the non-coding 3'UTR region of Clock gene and are associated with different behavioural disorders including addiction, in different populations. One of these polymorphisms, rs1801260 positioned at the miRNA binding site in 3'UTR, can affect gene regulation and stability. Previous experiments with the mutated form of rs1801260, state higher levels of Clock mRNA. Even elevated expression of Per2, a clock-controlled gene also confirmed. In this population study, the total population was divided into three cohorts- non-addicted volunteers, alcohol addicts, and opioid addicts. This investigation reveals a significant association of rs1801260, positioned in the 3'UTR miRNA binding region of Clock gene, with alcoholic subjects (odd's ratio 2.666 and 95%CI 1.416~5.019). Therefore, present study confirms rs1801260 of Clock gene as a risk factor and it can be one of the mechanisms of disturbed circadian rhythm associated with addiction.

Keywords- Addiction, Circadian Clock, CLOCK, Genetic Association, Single Nucleotide

IEMHEALS-24/O/103

In Silico Determination of Sn-2 Specific Lipase Activity: Alternative Strategy of Lipid Modification

[1]Debashrita Majumder, [1]Subrata Dash, [*1]Moupriya Nag, [*1]Dibyajit Lahiri

[1]Department of Biotechnology, Institute of Engineering and Management, Kolkata, University of Engineering and Management, Kolkata
**E-mail: dibyajit.lahiri@uem,edu.in ,moupriya.nag@uem.edu.in*

Lipases (EC 3.1.1.3) are the third most commercialised enzymes, converting oil into free fatty acids and glycerol. Sn-2 stereospecific lipases have lately gained attention due to their particular lipid modifying properties. Triacylglycerol digestion by Sn-2 stereospecific lipase leads to produce one 1,3-diacylglycerol and one free fatty acid. In silico approach is the first step to identify different genes coding for lipase in a particular organism. Gene hierarchy organisation indicates ancient gene duplication and divergence, making theoretical and analytical methods from phylogenetic systems applicable to comparative genomic studies. In this present study, firstly it was observed that the structure obtained via Pymol is 91% confidently modelled (420 residues out of 460; approximately). From CDD BLAST it was found that this protein belongs to alpha/beta hydrolase family with an abhydrolase super family domain. Then a multiple sequence alignment program was run to find the sequence similarity. After that, by using Swissmodel, Alpha fold and Phyre 2.0 the several homology modellings were done. Next, Model validation results were obtained from QMEAN4. PROCHECK, ROQ, ProSA and ERRAT servers. And finally, to check the lipolytic activity of the concerned protein a docking was performed using Autodoc. Three active sites were identified and the best site was selected on the basis of ligand binding depending on the affinity towards ligand PnPP. These molecular and structural properties of this lipase will help in production of a DAG oil and as a whole it will be helpful in many biotechnological applications.

`Keywords: Lipase, Homology Modelling, Molecular Dynamics Simulations, Docking.

IEMHEALS-24/O/077

Probiotics Drinks: Balancing the Benefits with Possible Side-Effects

[1]Rojina Khatun, [*1]Malavika Bhattacharya

Department of Biotechnology, Techno India University
[*]E-mail: malavikab@gmail.com

Drinks containing probiotics have grown in popularity in recent years because of potential health benefits. Live beneficial bacteria included in these drinks are believed to enhance general health and intestinal health. Probiotic drink kinds that are most popular are kefir, kombucha, and yogurt-based drinks. The capacity of probiotic beverages to restore a normal balance of bacteria in the stomach is one of its main benefits. Immunity, digestion, and even mental health can all benefit from this. Additionally, probiotics have been connected to improved weight management, healthier skin, and a decreased risk of certain illnesses like inflammatory bowel disease and irritable bowel syndrome. Remember that not all probiotic beverages are made equal and that the advantages could change based on the particular strains and mixes that are utilized. Certain probiotic beverages might not have enough live bacteria in them or might not be able to survive digestion, which would prevent them from offering the desired health advantages. Drinks with probiotics may also have unintended consequences. When starting probiotics, some people may have digestive problems such as gas, bloating, or diarrhea. Before including probiotic drinks into their diet, people with weakened immune systems or those on specific drugs should consult a healthcare professional. It is best to select probiotic beverages that have undergone scientific testing to determine their efficacy and contain a variety of strains. Reading product labels and researching the specific strains used can help ensure that you are getting a high-quality probiotic drinks.

Keyworks: Fermented foods, Gut Health, Healthy Bacteria, Immune System, Microbiome

IEMHEALS-24/O/025

Understanding the effect of sulfur nanoparticles against dermatomycosis

[*]Mangal Chandra Biswas and [*]Krishnendu Acharya

Molecular and Applied Mycology and Plant Pathology Laboratory, Department of Botany

E-mail: mangalchandrabiswas@gmail.com, krish_paper@yahoo.com

Due to the raising concern regarding antifungal drug resistance in case of dermatophytes. An, eco-friendly and economical nano-technology based approach has been made to produce antimicrobial sulfur nanoparticles (SNPs). SNPs were synthesized chemically using standard protocol and were analysed for their structural properties using an array of techniques including UV spectroscopy, X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), and transmission electron microscopy (TEM). The SNPs synthesized in this study exhibited a consistent spherical shape, with average sizes ranging 30-40 nm. To confirms the antimicrobial properties of SNPs, it was tested against three superficial dermatomycosis causing yeast Candida albicans, Trichophyton rubrum and *Microsporum gypseum*. The result shows SNPs have a strong antifungal effect. The minimum inhibitory concentration (MIC) was determined 250 µM, 500 µM and 1000 µM in case of Candida albicans, *Microsporum gypseum* and Trichophyton rubrum respectively. At MIC concentration biofilm growth of yeast and hyphal growth of the filamentous fungi were completely inhibited. The scanning electron micrographs (SEM) of SNPs treated test organisms shows deformed morphology at sublethal doses. The effect of SNPs to the cell protective layers were confirm by fluorescence micrographs. SNPs combat fungal infections involve the disruption of the integrity of the fungal cell membrane confirmed by ergosterol estimation. It signifies SNPs treatment made the pathogen susceptible to different stresses. This study emphasizes the potential medicinal uses of sulfur nanoparticles as novel antifungal drug, and could be utilized as a very potent anti-dermatomycotic drug through extra-dermal ointment formulation.

Keywords: Candida tropicalis, Dermatophytes, Ergosterol, SEM, TEM.

IEMHEALS-24/O/035

Deciphering the medicinal prospects of ethanolic extract of a novel Termitomyces sp. from lateritic belt of West Bengal

*[1]Rupsa Roy ,[2]Sanjoy Guha Roy, [3]Arun Kumar Datta, [3]Krishnendu Acharya

[1]Department of Botany, West Bengal State University
[2]Molecular and Applied Mycology Laboratory, Department of Botany, Gawhati University,
[3]Molecular and Applied Mycology and Plant Pathology Laboratory, Department of Botany, University of Calcutta
**E-mail: rupsroy93@gmail.com*

Indigenous communities have held mushrooms in high regard, recognising their culinary, nutritional and therapeutic values. In this regard, mention may be made of a wild variety of *Termitomyces sp*., collected from the lateritic belts of West Bengal, which happens to be an integral part of tribal cuisines comprising this region. The uniqueness of the species lies in presence of 'J' shaped pseudorhiza and further this study was extended that involved proper taxonomic identification using micro- and macro morphological attributes, validated by DNA barcoding and phylogenetic analysis through nr- ITS studies. In order to elucidate the novel functional component, an ethanolic extract (ethTe) was prepared from dried basidiocarp and subjected to comprehensive phytochemical investigation, as well as assesments of its antioxidant, antibacterial and anticancer properties.Besides, LC – MS analysis of ethTe showed the presence of bioactive compounds including phenolics, flavonoids, alkaloids and other secondary metabolites. The ethanolic extract exhibited strong antioxidant capacities, featuring potent abilities to scavenge DPPH radical, ABTS radical, reducing ability, ability to chelate ferrous ion and antilipid peroxidation activity. The microbroth dilution method showed significant growth retardation and formation of pore in the cell wall of gram- negative bacteria, including Escherichia coli and Salmonella typhimurium, and gram-positive bacteria, including Bacillus subtilis and Listeria monocytogenes , that was validated by SEM study. Furthermore the extract exhibited the capacity to impede proliferation, colonogenecity and migratory potential of lung adenocarcinoma cell line (A549), indicating its potential as an anticancer agent.Thus, this innovative mycofood has the potential to be incorporated in one's diet as it has potential to combat illnesses associated with oxidative stress, bacterial illness, and cancer.

Keyword : wild edible Termitomyces , molecular phylogeny , LC – MS , SEM , antibacterial

IEMHEALS-24/O/089

Adaptive Responses of Lantana camara L. to Heavy Metal Stress: Effect of Chromium Nitrate on Secondary Metabolism

[1*]Pratik Talukder, [1]Shaheen Sultana, [1]Snehika Sengupta,[1] Aritra Nandi,

[1]Souvick Das, [1]Meghna Mishra

[1]Department of Biotechnology, IEM Newtown Campus, UEM Kolkata University

[*]E-mail: pratik.talukder@uem.edu.in

Lantana camara Linn is an invasive weed that spread rapidly owing to its quick growth and easy distribution of seeds. Due to its invasiveness, it has grown to pose a danger to biodiversity by creating dense thickets that change the ecology by outcompeting native plants for the basic resources. Other plants' germination and growth are inhibited by the allelopathic compound emitted by this weed. Chromium, a common heavy metal contaminant shows stunted plant growth, reduce root length, and cause anatomical changes. Interestingly, Lantana camara can develop tolerance to chromium over time, making them potentially useful for phytoremediation, the process of cleaning up contaminated soil. In this study, we performed experiments by growing it in soils containing different concentrations of Chromium Nitrate over a varying time to monitor the trend of changes brought about in the secondary metabolite contents of the plant.This content was measured via performing the respective assays to quantify them. The study showed undoubted potentials of the plant to survive even at concentrations as high as 75 µM. Through these defense mechanisms, it has elevated the levels of available plant secondary metabolites. Understanding how this weed responds to metal stress is critical for promoting sustainable agriculture, and ensuring food security.

Keywords: - Lantana camara, chromium nitrate, heavy metals, phytoremediation, secondary metabolite

IEMHEALS-024/O/014

Effect of drying techniques on antioxidant, color, and total chlorophyll of wheatgrass (*Triticum aestivum L*)

[1]Seyashree Hazra, [2]Suman Kumar Saha, [3]Najmun Nahar, [1*]Runu Chakraborty

[1]Department of Food Technology and Biochemical Engineering, Jadavpur University, Kolkata
[2]Department of Food Science, Maulana Abul Kalam Azad University of Technology
[3]Food Safety Department, Kolkata Municipal Corporation
**E-mail: runuchakraborty2540@gmail.com*

Wheatgrass is a powerhouse of essential nutrients and phytochemicals, and drying is an effective way of preserving nutrients and extending the product's shelf life. This study investigated the effect of freeze drying (FD), hot air drying (HD), and microwave drying (MOD at power levels of 180 W, 300 W, and 600 W) of wheatgrass on drying kinetics, color profile, polyphenol, chlorophyll content and antioxidant activity of the powder. Among five thin layer drying mathematical models, Wang and Sing model provided the best fitting of experimental data with the lowest value of SSerror 0.0733, followed by Page model (SSerror: 0.0907). The study assessed the effect of drying processes on the hunter color parameters (L*, a*, b*) and ΔE in order to estimate the color deterioration of chlorophyll. The lowest value of ΔE was observed in the case of MOD at 180 W, indicating a very slight difference with the raw sample. FD power had the highest level of of TPC (11.55 g GAE/ 100g), chlorophyll (27.66 mg/g), and 2,2-diphenyl-1-picryllhydrazyl scavenging ability (81.64%). FD retained the maximum amount of phenolic compounds due to low pressure and temperature conditions during processing. Ascorbic acid, gallic acid, rutin, p-coumaric acid, and myricetin were identified by HPLC. FD was the most effective method, followed by microwave drying for preparing wheatgrass powder for everyday use. Innovations in drying technique can improve efficiency, reducing processing time and are important for its use in various food and beverage manufacturing industries. The innovative aspect of this work is the investigation of several drying techniques for wheatgrass and conducts a comparative analysis of these techniques based on their nutritional content, polyphenols, and color profile.

Keywords: Drying kinetics, antioxidant content and activity, HPLC, Colour, and Total Cholorophyll.

IEMHEALS-24/O/032

Lentinus polychrous: A promising boon to Immuno-Therapy

[*]Arghya Naskar, [*]Krishnendu Acharya

Molecular and Applied Mycology and Plant Pathology Laboratory, Department of Botany, University of Calcutta
E-mail: arghyanaskar@gmail.com, krish_paper@yahoo.com

The progressive improvement of immunostimulatory therapy has become essential in recent decades due to the continuous evolution of infectious pathogens and the increased risk of infections, particularly among immunocompromised individuals. Most of the immunostimulants now employed in therapeutics have cytotoxic effects that might cause secondary consequences in our body. β-glucan rich formulations, being side-effect-free alternatives, particularly polysaccharides from mushrooms, are well recognised for their immunoenhancing capabilities. Among the many underexplored mushrooms, one such is *Lentinus polychrous*, an edible basidiomycete found in the laterites of West Bengal, which received very little research attention, focusing on its immunostimulatory aspect. This study aims to evaluate the in-vitro antioxidant capacity and immunomodulatory effects of the unrefined hot water soluble polysaccharide extract obtained from the dried basidiocarps of L. polychrous. The extract has a notable capacity to scavenge oxidant species. The compositional analysis indicated a significantly higher concentration of β-glucan, a potent natural immunostimulator. Experiments conducted on Raw 264.7 cells showed that the crude polysaccharide extract stimulated the macrophage cells (optimal at 100 µg/mL), causing them to multiply rapidly without any cytotoxic impact up to 48 hours. In addition, an increase in the expression of nitric oxide, a crucial immunomodulatory signalling molecule, was detected, combined with an enhancement in the phagocytic capacity of the treated cells. The macrophage activation has been verified by the observation of morphological changes in the treated cells, including an increase in pseudopodia formation, as evidenced by microscopic examination. Our findings collectively elucidate the beneficial therapeutic properties of the polysaccharide fraction from *L. polychrous* and advocate for its use as a potent immunostimulant drug in the future. Therefore, it is imperative to conduct additional research on deciphering the molecular mechanism behind the immunomodulatory activity to improve our understanding.

IEMHEALS-24/O/086

Harnessing the Nutritional, Antioxidant, Phyto-Compound, and Soil Nutriology Potential of Finger, Pearl, and Sorghum Millets: A Relative Insight

[1]Saikat Mazumder,[2] Debasmita Bhattacharya,[3]*Dibyajit Lahiri3,[3]*Moupriya Nag

[1]Department of Food Technology, Guru Nanak Institute of Technology, Kolkata
[2]Department of Basic Science and Humanities, Institute of Engineering and Management, Kolkata
[3]Department of Biotechnology, Institute of Engineering and Management, Kolkata, University of Engineering and Management, Kolkata
**E-mails: dibyajit.lahiri@uem.edu.in ,moupriya.nag@uem.edu.in*

Millets are a super crop for nutrition, bioactive substances, and therapeutic potential, contributing to sustainable development goals in agronomic relevance and food value. The current research explored the antioxidant potential, phyto-compounds, and proximate composition of sorghum, pearl, and finger millets, including soil health and nutriology. The AOAC method was used for proximate analysis. The antioxidant capacity and scavenging activity of sorghum, pearl, and finger millet methanolic extract were assessed using total phenolic (TPC), total flavonoid (TFC), DPPH, H2O2, and antimicrobial assays. The soil's pH, electrical conductivity, organic carbon, nitrogen, phosphorus, potassium, micronutrients, and total bacterial and fungal population were evaluated. The carbohydrate, protein, fat, moisture and ash content of sorghum, pearl, and finger millets are estimated to be 72.74%, 68.59%, 74.31%,12.07%, 14.83%, 11.10%, 3.10%, 4.79%, 1.21%, 9.36%, 10.43%, 10.89%, 2.73%, 10.43%, and 10.89% respectively. Sorghum showed more TPC, and TFC followed by pearl and finger millet. While, finger millet shows 16.04% and 23.85% more H2O2 scavenging activity than sorghum and pearl millet respectively, and more DPPH scavenging activity at 91.02% at a concentration of 360 µg/ml in methanolic extract. GC-MS detected the presence of hydrocarbon, fatty acid, triterpene, fatty amide, and sterol compounds in plant extracts. The pH, electrical conductivity, and organic carbon are found to be 5.5, 0.25 dS/m, and 0.58%, respectively. The soil includes 65.9% sand, 12% slit, and 22.1% clay, further nitrogen, phosphorus, potassium, sulfur, calcium, magnesium, sodium, zinc, iron, manganese, led, and cadmium were 250.9 kg/ha, 51.3 kg/ha, 220.1 kg/ha, 9.73mg/kg, 295.8 mg/kg, 1.79 mg/kg, 138.9 mg/kg, 64.9 mg/kg, 2.39 mg/kg and 0.92 mg/kg respectively. Methanolic and ethanolic extract of sorghum showed strong antimicrobial activity against Staphylococcus spp.

Keywords: Millets, nutritional profile, phytocompound, soil nutrition, antimicrobial

IEMHEALS-24/O/003

Comprehensive Exploration of Diabetes Drug Candidates: Integrating ADMET, Drug Likeness, Network Pharmacology and Molecular Docking of Phytochemicals Derived from Methanol Extracts of *Triumfetta pentandra*

Mwalimu Raphael Jilani, Azhagu Saravana Babu Packirisamy

Department of Biotechnology, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology
E-mail: jmwalimu22@gmail.com

The rising global prevalence of chronic disorders, particularly diabetes mellitus, is causing significant financial issues for public health. Diabetes mellitus is a complex and hazardous disorder resulting from diminished insulin secretion or reduced insulin effectiveness, leading to symptoms such as hyperglycemia and glucose intolerance. Traditionally, *Triumfetta pentandra* has been utilized for addressing a range of health issues, demonstrating notable biological activities including inhibition of alpha-glucosidase, antioxidant effects, and the ability to lower cholesterol levels. We used ADMET analysis, network pharmacology, and molecular docking techniques to explore how well the plants can target diabetes markers. Results showed that plant compounds obeyed Lipinski's rule and variations of other rules, with 92.63% of their molecular targets being common targets for diabetes. Gene ontology enrichment analysis identified important relationships between Type II diabetes mellitus, the AGE-RAGE signaling pathway, and endocrine resistance. In order to investigate potential therapeutic targets, we performed molecular docking studies of MAPK1 and AKT1 using Swiss DOCK. From the findings, MAPK1 had the highest minimum binding energies in clusters 4, 5, and 6, which ranged from -7.84 to -7.06 kcal per mol. On the other hand, AKT1 showed the best minimum binding energies, which ranged from -8.07 to -6.14 kcal per mol in clusters 3, 5, and 6. These findings suggest that *Triumfetta pentandra* molecules are capable of treating diabetes and its related complications, indicating that drug research and discovery should prioritize the integration of insilico techniques. Further research employing in vitro and in vivo models is required.

Keywords: Diabetes Mellitus, *Triumfetta pentandra,* ADME/T, drug likeness, toxicity

IEMHEALS -24/O/054

Relative Expression Orderings of Circulating miRNA-Pairs as Novel Markers in Cancer Diagnosis and Prognosis

NA LI, Kah Keng Wong, Nik Soriani Yaacob and Shuhaila Mat-Sharani

Universiti Sains Malaysia, Malaysia

MiRNAs are crucial for organism function, and their dysregulated expression in cancers suggests they may act as oncogenes or suppressors. Therefore, using miRNAs as biomarkers could enhance cancer diagnosis and treatment by providing precise and early detection methods. In addition, miRNA biomarkers can be extracted from liquid biopsies, which are less invasive than tissue biopsies and offer greater safety and reproducibility. This makes miRNA biomarkers can be used both for diagnostic purposes and for ongoing patient monitoring. By enabling early detection, miRNA biomarkers can help avoid delayed treatments often associated with late-stage cancer diagnoses, thus significantly improving survival rates. In this review, we discuss the current knowledge about the possibility of using miRNA as a diagnostic marker and a potential target in modern anticancer therapies using the relative expression orderings of miRNA pairs. The highly stable relationship between miRNA-pairs offers us the chance to synthesize the potential applications of miRNAs and their miRNA-pairs through the diagnostic and therapeutic processes in diseases, especially as biomarkers. And then focuses on the changes in the relative expression of miRNA-pairs in related diseases and their association with clinical features. In addition, we analyze the challenges and opportunities in current research and the future potential of miRNA-pairs as biomarkers in clinical applications. Through a comprehensive review of the existing literature, this paper aims to provide a theoretical basis and practical guidance for the further development of miRNA-related diagnostic and therapeutic strategies.

IEMHEALS-24/O/106

Decomposing the ubiquitous: deciphering the interaction of genes and enzymes in microplastic degradation pathways

Aswini Sivadas Choolangal, Yasaswi Kollepara, Suchithra Tharamel Vasu*,

Department of Bioscience and Engineering, National Institute of Technology Calicut, Kozhikode, Kerala

**E-mail: aswini_p220112bt@nitc.ac.in, kollepara_b220962bt@nitc.ac.in, drsuchithratv@nitc.ac.in*

Widespread production and utilization of plastic and its incomplete degradation led to the accumulation of microplastics in the environment. Microplastics (MPs), defined as plastic particles smaller than 5 mm, have emerged as a significant environmental contaminant due to their pervasive presence in marine, terrestrial, and freshwater ecosystems. These pollutants pose severe risks to wildlife and human health, necessitating effective degradation strategies. Microbial degradation is a promising approach to address microplastic pollution by transforming this ubiquitous synthetic particle into harmless byproducts. The degradation process typically involves hydrolytic cleavage of polymer bonds, followed by oxidative and reductive reactions that further decompose the plastic fragments into smaller, more manageable molecules. For instance, the degradation of polyethylene consists of the action of alkane hydroxylases and esterases that convert long-chain hydrocarbons into shorter chains and eventually into monomers like ethylene glycol and adipic acid. Similarly, polystyrene degradation involves initial oxidation by laccase enzymes, followed by ring-cleavage mechanisms catalyzed by dioxygenases. *Pseudomonas*, *Bacillus*, *Rhodococcus*, *Ideonella sakaiensis* and *Alcanivorax* are notable bacterial genera involved in microplastic degradation. These bacteria possess unique genetic pathways that enable them to utilize microplastics as a carbon source, to facilitate the degradation process. This study aimed to understand the genes, enzymes, and metabolites involved in the degradation pathways based on data obtained from various databases such as NCBI, STRING, UniProt, and KEGG. Further network visualization using Cytoscape delves into complex interactions and core mechanisms underlying the degradation process. Research should focus on enhancing the efficiency of these microbial processes through genetic engineering and optimizing environmental conditions to support bacterial growth and activity. This approach could significantly contribute to sustainable environmental management and the reduction of microplastic pollution.

Keywords: Microplastic degradation, Network analysis, Cytoscape, Alkane hydrolase, Dioxygenase, Microplastic Degradation pathways

IEMHEALS-24/O/128

Simulation of Temperature Distribution Around LN2-Cooled Probe in Tissue Using the Pennes Bioheat Equation

Rahul Basu

VTU & JNTU, India
raulbasu@gmail.com

Cryosurgery stands as a promising technique for treating various diseases, including tumors and cancers, by employing controlled freezing. This paper investigates the temperature distribution around a liquid nitrogen (LN2)-cooled probe in brain tissue using the Pennes bioheat equation. We consider both steady-state and transient conditions incorporating blood perfusion effects to simulate a realistic biological environment. Numerical methods are employed to solve the bioheat equation in cylindrical coordinates, and results are compared for different probe diameters to understand the thermal response in brain tissue. The study highlights the influence of probe geometry on tissue cooling efficiency, aiming to optimize treatment efficacy while minimizing damage to surrounding healthy tissues.

High-throughput virtual screening of phytochemicals from Indian medicinal plants for the identification of potential inhibitors against NS2B-NS3 protease of dengue virus

[1]A. Kandavelmani , [1]T. Poongodi , [3]N.Saranya, [4]S.Gayathri Devi

[1]Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, India

[3]Department of Plant Molecular Biology and Bioinformatics, Tamil Nadu Agricultural University, Coimbatore, India

[4]Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, India

Dengue is an acute mosquito - borne viral infection that has become a major health problem worldwide in the recent years. Currently no specific antiviral therapies are available to treat dengue fever. Enormous number of deaths are reported due to dengue fever. This necessitates the identification of inhibitors against dengue virus. The RNA genome of DENV is composed of 10,723 nucleotides which encodes for 10 proteins (3 structural proteins and 7 non- structural proteins). The non-structural NS2B-NS3 protease complex has been reported to be the most powerful therapeutic target for the development of anti-dengue drugs. In the present study a ligand library of 3496 phytochemicals from 160 medicinal plants were subjected to high throughput virtual screening against NS2B-NS3 protease of dengue virus. The best fit compounds were shortlisted based on their binding affinity, RMSD UB and LB values. Based on the results, top-performing compounds sourced from several medicinal plants including *Centella asiatica, Eclipta prostrata, Wrightia tinctoria, Argemone Mexicana, Boerhaavia diffusa* and many more. Extracts of *Andrographis paniculata* and *Carica papaya* are widely used for the treatment of dengue. Phytochemicals from *A.paniculata, C.papaya* and several other top ranking medicinal plants were thoroughly analysed for their inhibitory potential against NS2B-NS3 protease using various computational strategies. With further experimental and clinical investigations, potential inhibitors identified in the present study could be used as effective lead molecules for the development of novel drugs against dengue virus.

Keywords: Dengue virus, virtual screening, phytochemicals, medicinal plants

IEMHEALS -24/O/059

Network Pharmacological approach to decipher the mechanism of action of phytocompounds present in *Thespesia populnea* against Atopic Dermatitis

T.Poongodi, A.Kandavelmani , S.Gayathri Devi

Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, India

Atopic dermatitis (AD) is a chronic inflammatory skin disease with symptoms of eczema, keratosis, erythema and skin dryness. Macrophages, eosinophils, mast cells, T-helper cells and dendritic cells mediate skin inflammation in conditions of AD. The inflammatory cytokines produced by T-helper cells cause skin barrier damage, reduced skin moisture and induce allergen penetration. In the present study, network pharmacological approach is used to explore the therapeutic potential of *Thespesia populnea* in treating Atopic dermatitis and understand the molecular mechanism of action of phytocompounds present in the flower part of *Thespesia populnea* against Atopic Dermatitis. The phytochemical data of *Thespesia populnea* was extracted from Indian Medicinal Plants, Phytochemistry and Therapeutics (IMPPAT) database, which revealed the presence of bioactives like Gossypol, Kaempferol, Quercetin, Lupenone, Lupeol, Quercetin-3-glucoside, Beta-sitosterol, etc. Structural data of the phytocompounds were retrieved from PUBCHEM database and protein target search was carried out using Binding database and Swiss target database. All target proteins associated with Atopic dermatitis were retrieved from Therapeutic target database. Atopic dermatitis associated targets of *Thespesia populnea* were screened using VENNY 2.1. Protein-protein interaction network of Atopic dermatitis associated protein targets were constructed using STRING database and imported the network to Cytoscape software. Ligand- target dermatitis network of *Thespesia populnea* were constructed using Cytoscape software, which consisted of protein targets like Peroxisome proliferator-activated receptor gamma, Cyclooxygenase-2, Proto-oncogene c-JUN, Epidermal growth factor receptor, Interleukin-6 (IL6), Serine/threonine-protein kinase, Apoptosis regulator Bcl-2, etc. The constructed multi-ligand-multi-targeted network, revealed the molecular mechanism of action of phytocompounds of *Thespesia populnea* against Atopic Dermatitis.

Keywords: Network Pharmacology, Dermatitis, Phytocompounds, Therapeutics

IEMHEALS -24/O/061

Exploring phytochemicals of Indian Medicinal Plants exhibiting inhibitory activity against Dengue Virus through High-throughput virtual screening, molecular docking and molecular dynamics simulation

[1]A.Kandavelmani , [1]T.Poongodi , [3]N.Saranya , [1]S.Gayathri Devi

[1,]Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, India

[3]Department of Plant Molecular Biology and Bioinformatics, Tamil Nadu Agricultural University, Coimbatore, India

Dengue is an acute mosquito - borne viral infection that has become a major health problem worldwide in the recent years. Currently no specific antiviral therapies are available to treat dengue fever. Enormous number of deaths are reported due to dengue fever. This necessitates the identification of inhibitors against dengue virus. The RNA genome of DENV is composed of 10,723 nucleotides which encodes for 10 proteins (3 structural proteins and 7 non- structural proteins). The non-structural NS2B-NS3 protease complex has been reported to be the most powerful therapeutic target for the development of anti-dengue drugs. In the present study a set of 159 Indian medicinal plants were explored. Phytochemical data of these medicinal plants were retrieved from the IMPPAT 2.0 database and their molecular structures were obtained from PubChem database. A ligand library comprising a total of 3454 phytochemicals was constructed using the OpenBabel GUI. High throughput virtual screening (HTVS) of the ligand library against NS2B-NS3 protease complex was conducted using Autodock Vina 1.1.2 integrated within PyRx 0.8. The best fit compounds were shortlisted based on their binding affinity, RMSD UB and LB values. Based on the results, top-performing compounds sourced from *Andrographis paniculata* and *Carica papaya* were further analysed through molecular docking studies at the allosteric site and catalytic site of the NS2B-NS3 protease complex. The allosteric site docked complex structure of polypropenol, stigmasterol, 4-Cyano-7-(2,4,6-trimethylphenyl)-5H-furo[2,3-c] thiopyran, 1,5-Dichloro-9,10dihydroxyanthracene and the catalytic site docked complex structures of amyrin acetate, beta-amyrin, 1-(2'-Amino-5'-hydroxy-4'-methoxyphenyl)-5,6,7-trim ethyloxy-3,4dihydroisoquinoline, Clausamine G were further analysed through molecular dynamics simulation. These compounds exhibited promising result against the target protein of dengue virus. With further experimental and clinical investigations, phytochemicals identified in the present study could be used as effective drugs against dengue virus.

Keywords: Dengue virus, virtual screening, phytochemicals, molecular docking, molecular dynamics simulation

IEMHEALS-24/P/026

Differentially methylated DNA as an early diagnostic biomarker of oral cancer in Northeast India

Bs Vaanrhaangh Anal and Srimoyee Ghosh

North-Eastern Hill University
Email: srimoyee2009@gmail.com, vaanrhaanghbsanaal@gmail.com

Cancer prevalence has become one of the major burdens on the global population. In India, oral cancer is one of the most common cancer types (Mathur et al., 2020). In the pathogenesis of oral cancer, DNA methylation plays a crucial role. Previously, differentially methylated genes in oral cancer were identified among the populations of Meghalaya (Khongsti et al., 2018). This review aims to examine selected differentially methylated genes (WT1, BVES, FLT3, EPB41L3, and ADPRH) as diagnostic markers for oral cancer detection in the Northeastern populations of India. Whole genome methylation assay by Infinium 450K revealed that the genes WT1, BVES, FLT3, EPB41L3, and ADPRH were hypermethylated in the populations of Meghalaya with a significant p-value. The correlation of methylation with the TCGA-HNSCC supports the relevance of the previous findings, particularly the survival outcomes associated with FLT3. GO analysis and KEGG pathways emphasize the involvement of these genes in critical biological processes and pathways related to cancer development, highlighting their potential as early diagnostic biomarkers for oral cancer, particularly for Northeastern Indian populations.

Keywords: DNA methylation, biomarker, oral cancer, survival, northeast India

IEMHEALS-24/P/025

Novel differentially methylated genes as biomarkers of gastric cancer in patients from Northeast India, a review

Sarowar Alom and Srimoyee Ghosh

Department of Zoology, North-Eastern Hill University, Shillong
*Email ID: srimoyee2009@gmail.com

Globally, gastric cancer (GC) is the fifth most common cause of cancer-induced fatalities. The Aizawl and Papumpare districts of Northeast India have the highest GC incidence. Early detection of cancer is crucial, and methylation-specific GC biomarkers canaid in early diagnosis, prognosis, and patient-specific treatment for this high-risk population. This review aims to investigate six differentially metnhylated genes as biomarkers of GC inpatients from Northeast India. Through genome-wide methylation sequencing (platform: HM450K), Lamare et al. (2022) have identified novel differentially methylated genes (PPP1R16B, FGF12, FEZF2, GDF7, KCNQ5, and ST3GAL1) in GC patients from Mizoram. From the HM450K result, it was found that, of six genes, five (PPP1R16B, FGF12, FEZF2, GDF7, and KCNQ5) were hypermethylated while one (ST3GAL1) was hypomethylated in cancer compared to matched normal tissue. The mRNA expression of PPP1R16B, FGF12, FEZF2, GDF7, and KCNQ5, measured by real-time PCR, and ST3GAL1 expression from TCGA-STAD-RNA-seq data were also correlated with the HM450K result. Moreover, TCGA-STAD data also revealed that the differential methylation of PPP1R16B, FEZF2, and ST3GAL1 was responsible for the poor overall survival of GC patients. In gene ontology enrichment analysis, significant enrichment against 118, 8, and 18 GO terms against biological process (GO_BP), cell component (GO_CC), and molecular function (GO_MF), respectively, was retrieved. In the KEGG pathway analysis, six pathways (hsa00533, hsa00603, hsa00604, hsa00512, hsa04350, and hsa04725) showed significant enrichment. Statistical significance was set at a P-value ≤ 0.05 for all the analyses. By integrating the previously reported lab results with our present and future analysis, we aim to identify one or more genes as specific methylation-based biomarkers for NE gastric cancer patients. This will require studying these genes in the cancer and matched normal tissue from this high-risk population.

Keywords: gastric cancer, northeast, biomarker, methylation, novel gene

IEMHEALS-24/O/090

Adaptive Responses of *Amaranthus viridis L.* to Heavy Metal Stress: Effect of Aluminium Chloride on Secondary Metabolism

Dr. Pratik Talukder[1], Titli Debnath[1], Titiksha Singh[1,] Suravi Dutta[1]
[1]*University of Engineering and Management, Newtown Action Area III, Kolkata, India*
E-mail: pratik.talukder@uem.edu.in
E-mail: titli11032003@gmail.com
E-mail: tsingh.kol@gmail.com

Amaranthus viridis, sometimes known as green amaranth, is a plant that is highly beneficial for its robust tolerance to a wide range of environmental factors. Aluminium chloride ($AlCl_3$), a common environmental pollutant that is known to have adverse effects on plant growth and development, are examined to develop the protective effects of secondary metabolites in *A. viridis*. Secondary metabolites are known for their antioxidative properties and their importance to resist stress. Examples of these include alkaloids, flavonoids, and phenolic acids. The goal of this study is to identify the precise secondary metabolic products and understand their mechanisms of action that control the stress response of *A. viridis* against $AlCl_3$. When plants are exposed to aluminium chloride, they experience oxidative stress, which damages their cells and disrupts their physiological processes. *A. viridis* plants were subjected to varying concentrations of $AlCl_3$, and samples were collected at various intervals to investigate changes in secondary metabolite production. These metabolites were identified and quantified while oxidative stress markers such as lipid peroxidation, superoxide dismutase (SOD) activity were assessed for biochemical testing. Initial research indicates that the $AlCl_3$ stress causes a considerable upregulation to a number of secondary metabolites. Notably, higher quantities of flavonoids and phenolic acid were observed, and these values were linked with enhanced activity of antioxidant enzymes. These findings suggest that secondary metabolites of A. viridis are critical for scavenging reactive oxygen species (ROS) and protecting cellular constituents from oxidative damage. This study has improved our understanding of the physiology of plant stress, and it may be possible to employ A. viridis in phytoremediation methods. By elucidating the mechanisms by which secondary metabolites mitigate $AlCl_3$-induced stress, this work highlights the importance of secondary metabolites in plant durability and their potential application in enhancing agricultural endurance to environmental pollutants.

KEYWORDS: *Amaranthus viridis*. secondary metabolites, Aluminium chloride, reactive oxygen species, oxidative stress, phytoremediation.

SYSTEMS AND MOLECULAR BIOLOGY RESEARCH IN HEALTH SCIENCE

IEMHEALS-24/O/080

Exploring the interaction of sars-cov-2 spike glycoprotein with human ace2: an overview

[1]Soumik Roy

[1]Department of Biotechnology, Adamas University
Email: soumoyqyq@gmail.com

The beginning of the outbreak at the end of 2019 witnessed a threat to public health and the world economy with coronavirus disease 2019 caused by severe acute respiratory syndrome coronavirus 2. By now, in June 2022, more than 500 million infections have been confirmed, with over 6 million deaths worldwide.[1,2,3] Other than the SARS-CoV-2, there are at least six other well-known CoVs that infect humans. These include: Human coronavirus NL63, HCoV-229E, HKU1, HCoV-OC43, SARS-CoV, and Middle East respiratory syndrome coronavirus. The first two coronaviruses, HCoV-OC43, as well as HCoV-229E, were discovered in the 1960s, whereas HCoV-NL63 and HKU1 are reported in the new past, in 2004 and 2005, respectively. These. However, with the emergence of SARS-CoV during 2002–2003, in which over 10% of all infected persons died, that picture changed dramatically [4,5]. About a decade later, MERS-CoV appeared with a high fatality rate of about 35% [6,7]. Now, nearly 20 years later, SARS re-emerged with SARS-CoV-2, which led to the current pandemic of COVID-19. Such highly pathogenic coronaviruses reflect the threat of emerging viruses in the 21st century. This project will look into the molecular level of the interaction between the spike glycoprotein of SARS-CoV-2 and the human ACE2 receptor to explain how such viral entry and infection are facilitated by auxiliary proteins, such as TMPRSS2 and GRP78. The revelation of these interactions can suggest the viral pathogenesis mechanism, and potential targets can be helpful for therapeutic intervention. Objectives: Structure-Function Analysis: Computationally analyse the structural feature of the spike protein of SARS-CoV-2, along with analysis of its interaction with the ACE2 receptor, using bioinformatic tools. Investigate TMPRSS2 and GRP78 Functions: See the roles played by TMPRSS2 and GRP78 in viral entry through the interaction with the spike protein. 3. Bioinformatics Application: Apply and assess various computational tools to study these molecular interactions, contributing to the broader understanding of the virus's mechanism of action.
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IEMHEALS-24/O/019

Absence of mitochondrial CX9C-CX10C protein Cox12 severely compromises the activity of mitochondrial complex IV and implicates cellular redox homeostasis

[*]Soumyajit Mukherjee, [*]Alok Ghosh
Department of Biochemistry, University of Calcutta
Email: soumyajitmukherjee23@gmail.com
alok.caluni@gmail.com

The cysteine-rich Cytochrome c oxidase 6B1 (COX6B1) is one of the less characterized subunits of the mitochondrial electron transport chain complex IV (CIV). Here, we studied the pathobiochemical and respiratory functions of Cox12 (yeast ortholog of COX6B1) using Saccharomyces cerevisiae BY4741 (cox12Δ) cells deficient by the Cox12 protein. The cells exhibited severe growth deficiency in the respiratory glycerol-ethanol medium, which could be reverted by complementation with the yeast COX12 or human COX6B1 genes. Cox12 with arginine 17 residue substituted by histidine (R17H) or cysteine (R17C) (mutations analogous to those observed in human patients) failed to complement the loss of Cox12 function. When cox12Δ cells were grown in rich respiratory/fermentative galactose medium, no changes in the expression of individual respiratory chain subunits were observed. Blue native PAGE/Western blotting analysis using antibodies against Rip1 and Cox1, which are specific components of complexes III (CIII) and IV (CIV), respectively, revealed no noticeable decrease in the native CIII2CIV2 and CIII2CIV1 supercomplexes (SCs). However, the association of the respiratory SC factor 2 (Rcf2) and Cox2 subunit within the SCs of cox12Δ cells was reduced, while the specific activity of CIV was downregulated by 90%. Although, these proteins are essential for the functioning of CIV, but their role in maintaining processes is unknown. Due to the presence of more cysteine, this protein may play a role in cellular redox processes. Here, we find out that in the absence of Cox12, Saccharomyces cerevisiae cells become sensitive under the oxidative and nitrosative stress. Interestingly, knockout of COX12 generates a significant amount of endogenous reactive oxygen species (ROS) and reactive nitrogen species (RNS) as evidenced by FACS analysis. Moreover, cellular redox status, redox-active enzymes glutathione reductase, catalase, S-nitroso glutathione reductase, and protein nitration were significantly affected in Cox12 null cells. Taken together, we provide proof of evidence that cysteine-rich protein Cox12 dynamically control the activity of CIV and cellular redox milieu and actively prevent reactive nitrogen and oxygen species generation.

Keywords: Mitochondrial CX9C-CX10C protein, Cox12, complex IV, redox homeostasis, Oxidative Stress

IEMHEALS-24/O/093

A comparative study on Vitamin C-rich natural supplements on macrophage cell line

Sudeshna Sengupta, Malavika Bhattacharya

Techno India University
Email: Senguptas4395@gmail.com

Oral dysplasia is a precancerous condition that can develop in the mouth and represents an early stage of head and neck squamous cell carcinoma. This condition is associated with changes in gene expression due to exposure to environmental carcinogens, leading to the activation of proto-oncogenes. Strengthening the immune system is crucial in defending against cancer. Researchers have found that combined treatments such as chemotherapy, radiation, and surgery have significantly increased the survival rate of patients with oral dysplasia. While synthetic pharmaceuticals are often recommended for treatment, focusing on natural healing processes is also important. Vitamin C, known for its powerful antioxidant, anti-inflammatory, and immune-boosting properties, is crucial for maintaining overall health. A strong immune system can help defend against cancer. Macrophages play a vital role in immunological surveillance, tumor immunology, and the activation of T and B lymphocytes. Vitamin C not only boosts the immune system but also helps prevent DNA damage and reduce the risk of diseases. This research study analyses the quantitative nutritional roles of different parts (seed, peel, pulp) of some citrus fruits along with in vitro antioxidant properties. It also applies cytotoxicity and viability assays using ascorbic acid, an essential bioactive compound found in citrus fruits, using the J774A1 cell line. The combined delivery of drugs with drugs is popular in human cancer treatment. The study shows lesser side effects on macrophages when the cells were treated with combined delivery of vitamin C with Cisplatin, suggesting it could be a new therapeutic approach for modern drug delivery systems based on drug resistance to the body. Lemon peels and seeds are rich in nutraceutical elements and vitamin C, making them highly beneficial. Citrus wastes can be utilized to extract limonene and can be used for further research in the pharmaceutical industry.

Keywords: oral dysplasia, chemotherapeutic drugs, vit c supplements, immunity, macrophages

IEMHEALS-2024/O/013

A Review on Mitochondrial Pathways of Apoptosis Under Heat Stress: The Role of Transcription-Independent P53 in Human Umbilical Vein Endothelial Cells (HUVECs):

[1]Swastika Mandal

[1]Department of Zoology, Chakdaha College, University of Kalyani
Email: swasmandal2004@gmail.com,

Heat stress is a significant environmental challenge that can compromise cellular integrity and function, leading to programmed cell death (PCD) or apoptosis. This abstract focuses on elucidating the role of mitochondrial pathways in apoptosis induced by heat stress, specifically highlighting the function of transcription-independent P53 in human umbilical vein endothelial cells (HUVECs).To investigate this, HUVECs were exposed to heat stress conditions, and various assays were conducted to evaluate apoptotic processes. It is observed that heat stress initiates apoptosis predominantly through mitochondrial pathways. Moreover P53, known for its role in regulating cell death and stress responses, is activated in a manner that does not involve its traditional transcriptional activities. Instead, P53 was found to dynamics directly by inducing mitochondrial outer membrane permeabilization (MOMP) and change in mitochondrial membrane potential, which led to the release of cytochrome c into the cytosol. This release is a crucial step in the apoptosome formation and activation of caspase cascades, ultimately driving the apoptotic process. This mechanism contrasts with the classical view of P53, which typically functions through transcriptional regulation of pro-apoptotic genes. These findings provide new insights into the molecular mechanisms underlying heat-induced cell death and suggest potential therapeutic targets for protecting endothelial cells from thermal stress. Understanding these pathways could contribute to developing strategies to prevent or mitigate heat-induced vascular damage, which is critical for maintaining endothelial cell function under stress conditions.

Keywords: Human umbilical vein endothelial cells (HUVECs), P53, cytochrome c, apoptosis.

IEMHEALS -24/O/047

Mitochondrial Replacement Therapy: Balancing Legal and Ethical Issues for Donors and Recipients

[1]Snehatit Sett, [2]Meghna Mishra, [3]Abhisikta Basu

[1] Department of Law, University of Engineering & Management, Kolkata.
[2] School of Biomedical Engineering, Indian Institute of Technology, BHU.
[3]Department of Law, University of Engineering & Management, Kolkata.

Mutations in mitochondrial DNA that are inherited from mother to child might be asymptomatic or result in conditions like liver failure, diabetes, neuropathy, deafness, blindness, developmental regression, and cardiomyopathy. After a child dies from a mitochondrial disorder, families usually seek genetic counselling before attempting another conception. Through counselling, if damage in the maternal mtDNA is observed, mitochondrial transfer mechanisms are advised to the parents. Various mtDNA transfer methods like Pre-fertilisation Spindle Transfer and Pro-nuclear Transfer Post-fertilisation are being researched. These methods should reduce the chance of recurrence because most mitochondrial DNA problems are maternally inherited. Mitochondrial Donation research using human embryos is explicitly governed by specific legislation in the United Kingdom and Australia. In 2015, the United Kingdom legalised nuclear transfer from oocytes and zygotes to prevent the onset of serious mitochondrial disease in the children of affected mothers. However, concerns have been raised about genetic modification and the slippery slope to designer babies. This article reviews ethical objections to mitochondrial replacement technology that fall into four sometimes overlapping categories: firstly, harm to egg providers, secondly, harm to potential offspring and future generations, thirdly, harm to specific interest groups, finally, harm to society. Based on this review, the paper analyses how the frameworks under study can influence future governance structures in India considering allowing clinical mitochondrial donation.

Keywords: Mitochondrial Donation, Three parent Child, In vitro Fertilization, Legal Framework

IEMHEALS-24/O/036

Cancer stem cell targeting therapy through cell signalling pathways – an overview

*Kowsalya Purushothaman, Karthik Ramasamy, Mathur Nadarajan Kathiravan

PG and Research Department of Biotechnology,
Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu, India.
Email: Kowsalya Purushothaman, kathiravanmn@drngpasc.ac.in

Cancer cells originate from cancer stem cells (CSCs), have significant therapeutic importance as a target for noval anti-tumor drug discovery in recent times. They are considered to be self-renewal and able to differentiate into multiple malignant tumor and aid in growth, recurrence and metastasis of cancer cells. At least four different cell types can give rise to CSCs: directed group progenitor cells, mature cells, normal stem cells, and the fusion of stem cells with other mutant cells. The development of CSCs and later cancer cells are regulated by any alteration in pluripotent transcription factors (KLF4, MYC, OCT4, Sox2 and Nanog), Hedgehog, Notch, PI3K/PTEN, Wnt/β-catenin, JAK/STAT, NF-κB signaling pathways and the cells microenvironment. Many cell surface markers, including CD44, CD24, and CD133, are frequently employed to locate and identified as CSCs are involved in solid tumors (breast, brain, colon, lung, pancreas, prostate, melanoma and glioblastoma cancers). Emerging clinical data has reinforced the use of CSCs by showing that they are resistant to traditional chemotherapy and radiation treatments and that they are most likely the source of cancer metastasis. Targeting the CSCs specific signalling pathways provide a new way of therapeutic approach in cancer treatment. In this review, targeting the specific pathways that regulate CSCs development and importance of target sites are discussed.

Keywords: cancer stem cells, cell signalling pathways, metastasis, targeted therapeutics

IEMHEALS -24/O/065

Investigating the Anticancer Effects of *Solanum betaceum* on Cervical Cancer Cells: An Integrative Approaches in Systems Biology

Arivazhagan Suganya , Chinnappan A Kalpana

[12]Department of Food Science and Nutrition
Avinashilingam Institute for Home Science and Higher Education for Women,
Coimbatore ,Tamil Nadu, India.
Email: suganyaa101@gmail.com

Solanum betaceum Cav., commonly known as tamarillo or tree tomato, is a small, rapidly growing shrub. Its edible fruits are low in calories while offering high nutritional value and bioactive compounds and a potential nutraceutical for addressing degenerative diseases. A recent study aimed to characterize and evaluate the anticancer activity of lyophilized tamarillo fruit and lyophilized tamarillo chutney and antioxidant activity was carried out by DPPH assay. Fourier-transform infrared spectroscopy (FTIR) was used to screen for functional groups and identify phytochemicals. Phenolic compounds, flavonoids, terpenoids, carotenoids, anthocyanins and glycosides were the maximum phytochemicals present. Identification of functional groups used to confirm the bioactive components: OHalcoholic/phenolic (3400-3200 cm-1), C=Caromatic(1650-1600cm-1), C-Haromatic(700-420cm-1). An IC50 inhibition of 48.4µl/mg, 58.6µl/mg in tamarillo fruit and chutney was observed. The methanol extracts of tamarillo showed significant cytotoxic effects against cervical cancer cells, with IC50 values ranging from 82.28 to 160.85 µg/ml for the tamarillo fruit and 84.60 to 139.12 µg/ml for the tamarillo chutney at 24, 48, and 72 hours. Flow cytometry analysis revealed that the tamarillo fruit extracts exhibited anticancer properties by inducing cell cycle arrest, apoptosis, and reactive oxygen species (ROS) generation in cervical cancer cells. The presence of functional groups and polyphenols in the fruit suggested a wealth of antioxidants that can protect cells from free radical damage. These findings indicated that tamarillo fruit and its derivatives chutney hold promise for their nutritional benefits and potential as nutraceuticals in the prevention and management of cervical cancer among women.

Key words: Lyophilization, terpenoids, antioxidant, tamarillo chutney, cytotoxicity.

IEMHEALS-24/O/079

Impact of Microgravity on Neuronal-Like Cell Excitability

Subhrajit Barua, Mario Mollo, Sibsankar Palit, Subhajit Hazra
Life-To & Beyond Foundation, Barasat, Kolkata, West Bengal, India

Microgravity, a unique environment experienced during spaceflight, has been shown to induce various cellular alterations, including those in neuronal function. However, the specific impact of microgravity on the excitability of neuronal-like cells, particularly concerning action potential dynamics, remains poorly understood. This study aims to investigate the effects of microgravity on the excitability of neuronal-like cells, focusing on the generation and propagation of action potentials. Using a neuronal-like cell line (Neuro2A or SH-SY5Y), we conducted an in-vitro study wherein cells were exposed to simulated microgravity conditions through parabolic flight, providing approximately 8.5 seconds of microgravity per parabola across 20 parabolas. Extracellular action potentials were recorded using a microelectrode array (MEA) before, during, and after microgravity exposure. In addition, voltage-sensitive dyes (e.g., Di-4-ANEPPS) were employed in a subset of experiments to visualize changes in membrane potential. Quantitative analysis of action potential parameters, including frequency, amplitude, and duration, was performed using appropriate software (MATLAB or Python). Statistical analysis using t-tests or ANOVA revealed significant alterations in action potential characteristics under microgravity compared to normal-gravity conditions, indicating that microgravity modulates neuronal-like cell excitability. This modulation could be due to changes in ion channel activity and membrane potential dynamics induced by the microgravity environment. These findings contribute to a deeper understanding of how microgravity influences neuronal function, with implications for astronaut health and the development of countermeasures for long-duration space missions.

Keywords: Microgravity, Neuronal Excitability, Action Potential, Microelectrode Array

IEMHEALS-24/O/015

Exploration of Natural Bioactive Flavonoids as CSF1/CSF-1R Signalling Pathway Inhibitors for Mitigating Microglial Activation and Neuroinflammation in Amyotrophic Lateral Sclerosis: An In- Silico Comparative Analysis with Masitinib

[*]Shucismita Biswas, Aindrila Mitra, Kunal Saha, Ayushi Nag Chowdhuri

Department of Biotechnology, Techno India University
[*]*E-mail:shuchismita2060@gmail.com*

Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease characterized by the degeneration of motor neurons, muscle weakness, and ultimately respiratory failure. Neuroinflammation, particularly the CSF1/CSF-1R signaling pathway, plays a significant role in ALS pathogenesis. This study aims to find a novel flavonoid compound with a stronger affinity towards CSF-1R protein than the standard drug Masitinib, thus offering a promising alternative drug candidate for ALS treatment. Six flavonoids (Daidzein, Genistein, Isorhamnetin, Epicatechin, Quercetin, and Genkwanin) were selected through an extensive literature review and underwent SwissADME, PreADMET, and pkCSM analysis to evaluate their drug-likeness, toxicity, and pharmacokinetic properties. Protein structure validation using ERRAT and PROCHECK and flexibility analysis using iMOD confirmed the reliability of the CSF-1R protein (PDB ID: 4R7H). CASTp analysis of the protein structure identified a binding pocket with significant volume and surface area, indicating a suitable space for ligand binding. Subsequently, docking results of these six flavonoids and Masitinib, against CSF-1R revealed that Daidzein and Genistein had the highest binding affinities with scores of -10 kcal/mol and -9.9 kcal/mol, respectively, surpassing the binding affinity of Masitinib (-8.5 kcal/mol). These findings were further validated by RMSF plots using CABS-flex, highlighting the stability of the ligand-protein complexes. In conclusion, the superior affinities of Daidzein and Genistein suggest their potential as promising drug candidates for ALS treatment via CSF-1R inhibition, potentially offering enhanced therapeutic efficacy over Masitinib. However, further in vitro and in vivo studies are warranted to confirm these findings and to explore their clinical potential in ALS treatment.

Keywords: Amyotrophic lateral sclerosis, CSF-1R Inhibition, Flavonoids, Binding Affinity, ALS treatment.

IEMHEALS-24/P/027

Characterisation of Myogenesis as a Prognostic Hallmark of Lung Adenocarcinoma

Marilyn Tanushka Gomes, *Dr. Gayatri Sharma

[1]*Center of Medical Biotechnology, Amity Institute of Biotechnology, Amity University-UP,*

Background: Cancer-associated muscle wasting, a major cause of mortality in cancer patients, leads to significant losses in body weight and muscle mass. Myogenesis, the process of forming and activating new muscle fibres, is critical during embryonic development and muscle repair in adults and is severely affected by cancer. This study aims to characterize this phenomenon in LUAD, the most common form of lung cancer.
Methods: We analyzed GEO microarray data and found significant downregulation of the HALLMARK_MYOGENESIS gene set in adenocarcinoma compared to the normal samples. Samples were grouped into high and low myogenesis cohorts based on gene set variation scores. Using Python's Lifelines library, we assessed the prognostic significance of these genes and the survival differences between the cohorts. We also explored the functional relevance through protein-protein interaction (PPI) networks and pathway analysis related to cell growth and metabolism. We conducted cell characterisation to study the immune landscape in both groups.
Results: Our study identified prognostically significant genes involved in actin-mediated contraction and sarcomere protein complex formation and alignment. Additionally, PPI analysis highlighted key genes in the troponin complex and Ca2+ binding. The low myogenesis group showed upregulated cell proliferation markers, increased metabolism, and worse survival outcomes.
Conclusions: Our results indicate that myogenesis is a key factor in lung adenocarcinoma and is linked to patient survival. Low myogenesis correlates with higher cell proliferation and metabolism in LUAD patients. Further analysis is needed to understand the role of myogenesis genes in patient survival.

Keywords: Lung adenocarcinoma, myogenesis, gene expression analysis, RNA analysis, Muscle wasting, in silico analysis.

IEMHEALS-24/O/101

Retinal Precursor based therapy in presence of dopamine enrichedmicroenvironment regenerates retinal ganglion cells

Neilanjan Maitra and Madhumita P. Ghosh

Lab 322, J3 block,Centre for Medical Biotechnology, Amity Institute of Biotechnology, Amity University, Noida, Uttar Pradesh, India.,

Email ID: neilanjanmaitra@gmail.com, mpghosh@amity.edu

Retina is responsible for converting light entering the eyes into neurological impulses that are sent via optic nerve to the brain which reflects back as visual signals to the retina.. Numerous cell types, including glial cells, photoreceptors, amacrine cells, bipolar cells, mullercells, and retinal ganglion cells, make up the retina. The retinal ganglion cells (RGCs) degenerate due to increased intraocular pressure in glaucomatous condition.. The current therapies emphasize on use of embryonic or pluripotent stem cells that are cultured and inducedto grow into RGCs when introduced in models of glutamate ecitotoxicity through over- activation of N-Methyl-D-Asparatate receptors (NMDA) on RGCs.. Our aim is to culture retinal precursor cells (RPCs) from the retina obtained from rat pups (Post Natal Day 15-Post Natal Day 28) in the growth specific media along with growth factors such as B27 and FGF and administer them intravitreally while they are in undifferentiated state in animal models ofNMDA induced retinal degeneration. The animals are kept in incubation for 8 weeks to allowdifferentiation and integration of RGCs in the ganglion layer. The integration of RGCs is supported by enriched microenvironment due to intraperitoneal dopamine supplementation throughout the incubation period. The animals after sacrifice and enucleation of eyes are subjected to morphological, histological and molecular assessments done to check the regeneration of RGCs through H&E staining and checking mRNA transcript levels of Grin2A, Grin2B, VEGFR1, VEGFR2, D2 receptors and tyrosine hydroxylase (TH). The recovery of retinal ganglion layer with and without dopamine supplementation is evident in H& E staining.This is supported by upregulation of Grin2A, VEGFR1 , VEGFR2, D2, TH expressions and downregulation of Grin2B receptor. We conclude that postnatal RPCs induced to grow to RGCs are able to regenerate retinal ganglion layer in animal model of NMDA induced. retinaldegeneration. Further studies showing RGC specific marker, Brn3a expression through immunohistochemistry and western blotting required to support the data.

Keywords: excitotoxicity, precursor cell, retina, microenvironment

IMPORTANCE OF MICROBIOLOGY RESEARCH IN HEALTH SCIENCE

IEMHEALS-24/O/110

Indian sub-variants of DENV1 evolution and distribution against global DENV1 scenario

[1]Satabarto Sarkar, [2]Ruchira Mukherjee and [2*]Subhamoy Banerjee

[1]Department of Computer Science and Engineering, Institute of Engineering and Management Kolkata
[2]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
**Email: subhamoy.banerjee@iem.edu.in*

Dengue virus is endemic to Indian subcontinent and every year it infects many people and few hundreds of fatalities are officially reported. DENV1 serotype has the highest number of sub-strains. The evolution of DNV1 is very important to study. In this study, we have analyzed all the available DENV1 strain by categorizing as India, Southeast (SE) Asia and worldwide. The objective is to check the Indian sub variants evolution against SE Asia and global strains. Indian DENV1 strains are influenced by codon usage bias and majorly segregated in 2 different clusters. In principal component analysis, strains are closer to Principal component 1, which means the variance is dominated by variance of Enc and GC3. From relative synonymous codon usage and codon adaptation index, few selected codons play significant role in DENV1 strain evolution. While comparing with other SE Asia strains and global DENV1 strains, Indian strains are majorly subdivided in two separate clusters-one with low GC3 and Enc value indicate weak mutational pressure and moderate codon usage bias where the other cluster with high Enc and GC3 that indicates higher mutational bias over selection pressure. Also, higher GC3 indicates a comparatively stable genome. Hence, it can be concluded that DENV1 strains circulating in India has two different origins.

Keywords: Dengue virus, DENV1, Effective number of codons, Codon bias, GC3

IEMHEALS-24/O/070

A Contextual Analysis through Cellular Signaling Pathway, Immunogenicity and Mechanism of Action in T- Cell Activation on Gut Microbiome

Debaleena Samanta, Malavika Bhattacharya
Techno India University

The gut ecosystem depends upon bidirectional microbiota-host communication without any direct cellular contact. According to the microbiota and host-derived extracellular vesicles (EVs), the main emphasis is given on performing inter-kingdom crosslinking. It is proven from previous accumulation of body that gut microbiota derived from bacterial secretion of certain vesicles helps to transport and deliver inside host cell effector molecules, which causes the modulation of host cell signaling pathways and cellular programming while secreting vesicles have efficient effects on the healthy or diseased conditions of body. The metabolic receptors of enigmatic inflammasomes in auto-immune diseases and crosstalk with innate immune regulators are dependent upon nucleotide binding domain and leucine rich repeat receptor (NLR). This NLR mediation of inflammatory activation is essential in host pathogenic response and danger-associated molecular patterns (DAMPs)- related metabolic disease. Several cellular metabolic pathways can cause interaction with NLRs, and in contrast to negative regulation, tumorigenesis and autoimmune disorders interact with multiple innate immune receptors and disease modulation. In the host pathogenic response, NLR activation is necessary in controlling metabolic pathways, which further target various levels of immune-metabolic diseases or syndromes. The lesser known NLR studies of inflammasomes, which are activated by particular modes, further help to interact with metabolites and immune receptors, but however, the function of the procession of metabolic diseases is not described thoroughly. So, this study is evidence of targeted NLR activity in metabolic pathways and crosslinking with immune receptor connections in GPCR signaling, gut microbiome, and also the complement pathways of the immune system to understand the disease procedures.

Keywords: Bacterial Extracellular Vesicles (BEVs), Immunomodulation, GPCR Signaling, Homeostasis, Helicobacter pylori.

IEMHEALS-24/O/006

Modification of flesh-eating bacteria to target cancer cells

Tanisha Poddar
St. Xavier's College, Kolkata, India
E-Mail: podder.tanisha@gmail.com

The treatment of cancer remains a significant challenge due to the complex nature of solid tumors and the development of resistance to conventional therapies like radiation, chemotherapy, and immunotherapy. However, there is a promising new approach called bacteriotherapy, which can be used alone or in combination with traditional methods and has shown positive results in shrinking tumors and preventing their spread. In this innovative technique, certain bacteria, specifically anaerobic ones from the Clostridium genus, are employed to target and destroy treatment-resistant hypoxic tumors. Hypoxia refers to a low-oxygen environment, which is a unique characteristic of tumors and not typically found elsewhere in the body. Clostridium novyi, an obligate anaerobic bacterium commonly found in soil and faeces, plays a key role in this approach. The wild type of Clostridium novyi has the ability to consume living cells and produce a potent protein known as alpha-toxin, which disrupts the structural molecules within cells, causing them to break down and die. This natural trait of C. novyi, while destructive, can be harnessed for therapeutic purposes. Moreover, C. novyi is well-suited for the hypoxic conditions within tumors, as these rapidly growing masses often lack adequate blood supply. To make this bacterium suitable for cancer treatment, researchers modify it by removing the gene responsible for the lethal alpha toxin. This is achieved by heating the bacterium to 70°C for 15 minutes, deactivating the phage (a virus that infects bacteria) carrying the toxin. The resulting attenuated, non-toxic strain of C. novyi can then be injected directly into tumor sites. When introduced into tumors, the modified C. novyi bacteria aggressively target and consume cancer cells, sparing the surrounding healthy tissue. However, they face resistance from the body's immune system if they venture into healthy areas beyond the tumor site. While this ensures that C. novyi remains localized to the tumor, it also means that each individual tumor mustbe specifically targeted for treatment.

Key words: cancer treatment, flesh-eating bacteria, clostridium novyi, tumor, hypoxic, alpha-toxin.

IEMHEALS-24/0/031

Production of tyrosol galactosides from the mixture of tyrosol and lactose by β-galactosidase from Enterobacter aerogenes KCTC2190

[1]Manisha Maity, [2]Dipak K. Bhattacharyya, [3*]Jayati Bhowal, [4]Ankita Das and [5]Ananya Barui
[1]Swami Vivekananda University, West Bengal, India
[2]School of Community Science and Technology, Indian Institute of Engineering Science and Technology, Shibpur, India
[3]Center of Healthcare Science and Technology, Indian Institute of Engineering Science and Technology, Shibpur, India
E-mail: jayatibhowal@gmail.com

In the present study, the β-galactosidase producing microorganism Enterobacter aerogenes KCTC2190 was screened from the soil around the cattle shed area. β-galactosidase from Enterobacter aerogenes was capable of synthesizing tyrosol galactosides from the mixture of tyrosol and lactose. Production of tyrosol galactosides was detected using TLC and HPLC methods. Structural elucidation of pooled fractions revealed the presence several peaks at m/z 318.16, m/z 323.1174 and m/z 485.17 respectively by liquid chromatography electrospray ionization mass spectrometry. Mass analysis of pooled fractions of tyrosol galactosides indicated the formation of tyrosol monogalactoside and tyrosol digalactoside. Produced tyrosol galactosides exhibited potential antioxidant activity and were able to degrade the cell viability of human bone cancer cells (MG-63).

Key word: β-galactosidase, Enterobacter aerogenes KCTC2190, tyrosol, lactose, tyrosol

IEMHEALS-24/O/009

Cryptic Mutation in the genome of *Salmonella enterica* to acquire AMR genes with alternation of amino acid sequences: A Patho-genomics study

Smaranika Pattnaik
School of Life Sciences, Sambalpur University
Email: drsmaranikapattnaik@gmail.com;smaranika2010@suniv.ac.in

The Mahanadi River is a fresh water sink of Odisha which has taken its course through the Western Odisha and finally end in Bay of Bengal. However, the river water is receiving pathogenic bacterial strains due to anthropogenic activities and therefore health of common man is severely affected with regular outbreaks. This present pursuit had aimed to carry out patho genomics of a bacterial isolate perpetuating in the said river water near a local tertiary care Hospital, Burla, Odisha, India. Relevant procedure and experimental were carried out, and a strain of Salmonella enterica was identified. The Whole Genome of said isolate were sequenced using NGS approaches. It was observed that there were alternation of amino acids leading genome with acquire of AMR genes. There was a change in nucleotide codon change from CTA reversed back to CTA, amino acid from I>P , position in contig, 143183-146332 at Node 15, and the eluted gene was acrB with identity 99.97%. In addition, AGC reversed back to ACC amino acid from T>S at node 17 position in contig, , with elution of genes, pmrA (109013-10968) and pmrB (109691-110761) in contig. It was further observed that there was depiction of nucleotide codon change from ATG to ACG, GTC to GCC, GGC to AGC, GTA to ATA, ATT to GTT, GCG to ACG. As a result of which, Methionine to Threonine (M>T), Valine to Alanine (V>A), Glycine to Serine (G>S), Valine to Iso Leucine (V>I), Iso leucine to Valine (I>V) and Alanine to Threonine (A>T) were changed without anychange in respect to AMR gene consociation.

Key Words: River water, *Salmonella enterica*, WGS, Pathogenomics, mutation in nucleotide,

IEMHEALS-24/O/096

Emergence of colistin resistance in carbapenem resistant *Klebsiella pneumoniae* isolated from clinical specimens

Abdulmalik Yakubu[1,2], Siti Marwanis Anua[1], Siti Suraiya[3,4] and Nurzafirah Mazlan[5]

[1] *School of Health Sciences, Health Campus Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan.*
[2]*Department of Microbiology, Umaru Musa Yar'adua University, PMB 2218, Katsina, Nigeria.*
[3]*Department of Medical Microbiology, School of Medical Science, Health Campus, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan.*
[4]*Infection Control Unit, Hospital Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan.*
[5]*Borneo Marine Research Institute, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.*
E-mail: smarwanis@usm.my

Carbapenem resistance among multidrug resistant organisms is a growing global concern with high rates being reported from Asia. Due to increased use of colistin as a last resort for the treatment of carbapenem-resistant Enterobacteriaceae infections, rising colistin resistance is now a global threat. The aim of this study was to determine the prevalence of carbapenamase and colistin resistant genes among carbapenem resistant *Klebsiella pneumoniae* clinical isolates in a tertiary care hospital in Malaysia. ***Methods***. From January 2017 to November 2020, *a total of 257 non-repetitive isolates of carbapenem resistant K. pneumoniae were isolated from patients in different ward/clinics. These clinical specimens from endotracheal tube, blood, urine, sputum, trachaeal aspirate, pus swab, tissue, pus aspirate, bile fluid, peritoneal fluid, pleural fluid, broncho-alveolar lavage, rectal swab, wound swab, cerebrospinal fluid, and slough tissue were tested for sensitivity to carbapenems as well as other antibiotics. Multiplex Polymerase chain reaction was used for detection of carbapenamase genes (bla_{NDM}, bla_{KPC}, bla_{OXA}) and mcr-1 gene for colistin resistance on these isolates.* ***Results:*** The bla_{NDM} gene was detected in 247 (95.33%) of the 257 isolates, bla_{OXA} gene in one strain (0.39%), and mcr-1 gene in two isolates (0.78%). Two isolates produced both bla_{NDM} and mcr-1(0.78%) while one strain produced both bla_{NDM} and bla_{OXA} (0.39%). No bla_{KPC} gene was identified in all the isolates. The highest percentage of carbapenamase gene (bla_{NDM}) was from ETT specimens (n=56, 21.8%), and the least was from bone tissue, CSF, pleural fluid, and slough tissue (n=1,0.4%). In this study, males had a higher frequency (n=169, 65.76.7%) than females (n=88, 34.24%). Carbapenmase genes were found to be highest in the age group of 61-80 years (n=129, 50.60%). The least occurrence was found in age group 81-100 years (n=13, 5.05%). Ertapenem gave the highest resistance at 99.61% among the carbapenems tested. **Conclusion:** This study identified the presence of bla_{NDM} gene in a large proportion of the CRKP isolates obtained. For the first time, colistin resistance gene mcr-1 in carbapenem resistant *K. pneumoniae* was detected. There is an urgent need for prudent use of colistin in treatment of infections with carbapenem resistant *K. pneumoniae*

Keywords: *Klebsiella pneumoniae*, Carbapenem resistant; Colistin resistant, Multiplex polymerase chain reaction

IEMHEALS-24/O/125

Navigating the Crossroads: Plastic Degradation, Antimicrobial Resistance and Ecological Catastrophe

[1]Suranjana Sarkar ,[2]Subhamoy Banerjee and [2*]Ruchira Mukherjee

[1]*Swami Vivekananda University, India*
[2] *Department of Basic Science and Humanituies, Institute of Engineering & Management, Kolkata*
Email: ruchira.mukherjee@iem.edu.

The overuse of plastics is a well-established threat to mankind. Plastic contamination is rampant and reaches every corner of the globe, from Mount Everest to the Mariana Trench. The polluting plastics degraded to form microplastics which seem to be a greater threat in different aspects. It is easily ingestible which results in easy entry into the biological system. Microplastics are a hotbed for microbial growth due to their highly reactive nature. Pathogenic microbes tend to colonize more predominantly on the microplastics. In this paper, we shall investigate the role of microplastics in different modes of antimicrobial resistance including the spreading of antimicrobial-resistant genes via horizontal gene transfer and the emergence of multidrug-resistant bacterial strains. The interplay between microplastics and pathogens is of particular interest. The existence of microplastics in aquatic species and marine ecosystems may have devastating effects. As the properties of microplastics vary from their bulk counterpart, they can easily enter the body of a living system through the food chain. Microplastics (100 nm to 5 mm) further degraded into nanoplastics (<100 nm) upon exposure to UV and other chemicals. These miniaturized plastic particles release toxic additives and adsorb various chemicals which increase their bioavailability. The long-term effects of micro and nano plastics and their half-life in the environment and the biological systems are poorly understood. In this paper, we will investigate the latest research on the effect of micro and nanoplastics on aquatic and terrestrial ecosystems and living organisms.

Keywords: Microplastic, microbial growth,ecosystems.

MACHINE LEARNING

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DEEP LEARNING

IN

HEALTH SCIENCE

IEMHEALS-2024/O/012

An Identification and Analysis of Tumour Cells in Histopathological Images Using Deep Learning and Open-CV

[1]Jayachandran T, [2]Bhuvaneshwari K S, [3]Bhanu D , [4]Vidhya D, [5]Biswadip Basu Mallik
[6]Kanimozhi, [*7]Girimurugan R
[1]Department of Electronics and Communication Engineering, Nandha Engineering College,
[2]Department of Computer Science and Engineering, Karpagam College of Engineering, Coimbatore Tamil Nadu, India
[3] Department of Information Technology, Karpagam Institute of Technology, Tamilnadu, India
[4]Department of Mathematics, Sri Krishna College of Engineering and Technology, Tamilnadu, India
[5] Mathematics, Department of Basic Science and Humanities, Institute of Engineering & Management, University of Engineering & Management, Kolkata, India
[6]Department of Computer Science and Engineering, Kongu Engineering College, Perundurai, Tamilnadu, India
[7]Department of Mechanical Engineering, Nandha College of Technology, Perundurai Tamilnadu, India
Email: dr.r.girimurugan@gmai.com

In recent years, medical imaging has been transformed by the ever-changing models and algorithms made feasible by deep learning. The identification of diseases like cancer relies heavily on histopathology images, which provide microscopic insights into the structure of stained tissue. Human pathologists, however, continue to depend on laborious and subjective examination methods. The authors of this work propose a novel approach that uses deep learning and computer vision to sidestep these problems. Cancer cells in histopathology photos may be automatically identified and categorised using OpenCV and a robust deep learning model. Generative Adversarial Networks (GANs) enhance the quality of future image analysis jobs by synthesising high-resolution pictures while simultaneously reducing artefacts and noise. The proposed approach depends on CNN architecture for accurate cancer cell classification. Both training and assessment make use of the TCGA dataset, which is notable for its large collection of annotated histological photos including many forms of cancer. With a remarkable 99.17%model accuracy, the experimental results demonstrate outstanding performance. The reliability and precision of the automated method in identifying and classifying cancer cells is shown by this high accuracy. Here, we used an experimental strategy with different epoch values to categorise the cells. The development of more precise and faster medical imaging technology is a direct result of this study. Innovative applications of deep learning and image processing have recently led to better patient outcomes, more efficient diagnostic procedures, and the possibility of more individualised medical care.

Keywords: Histopathological Images, Cancer Diagnosis, Convolutional Neural Networks (CNNs), Image Analysis, Deep Learning

IEMHEALS-24/O/024

Nucleus Net: A Deep Learning Technique for Coalition Related Schematized Cell Nucleus Region

G. Julin Leeya
University College of Engineering Arni

Cell nucleus has congenital rule which contains the photographic print for continued existence. A few abnormalities in its structure can expressively affect cellular activities, possibly leading to sickness. As a result, precisely isolating and examining cell nuclei is important for accepting the primary mechanisms of numerous sicknesses and emerging real treatments. Though, spontaneous exposure and combination of comparable nucleus structures in huge image datasets residues an important challenge. Towards, our examination services deep learning methods, together with U-Net as well as Mask R-CNN, to excerpt important structures from epithelial tissue images. Furthermore, we suggest an innovative method, Area Based CNN Segmentation (AB-CNN-S), planned to proficiently and precisely group related cell nuclei in huge datasets. By means of refining the exactness and quickness of cell nucleus alliance, our process aims to simplify previous sickness detection and improve our understanding of humanoid evolution and development.

Keywords: Cell Nucleus, U-Net, Mask R CNN,AB-CNN-S

IEMHEALS-24/O/082

Skin Diseases Detection Using Lightweight Deep Learning Model

Kunjan Parikh, Vansh Tiwari, Prof Divya Bhavani Mohan, Prakash Arumugam

Unitedworld Institute of Technology, Karanavati University Gandhinagar, India
Email: kunjanparikh1610@gmail.com, vanshtiwari912@gmail.com, divyamohan2009@gmail.com, prksh830@gmail.com

This following paper describes a novel way to transform the diagnosis of skin diseases by integrating deep learning techniques MobileNetV2, in particular with the Streamlit framework [15][17]. By utilizing the datasets obtained from Kaggle, the methodology guarantees the model's resilience and accurate classification of different types of skin lesions [18]. The trained MobileNetV2 model validates the efficacy of the suggested method with an astounding accuracy of roughly 86.7% through empirical evaluation. System information emphasizes the importance of MobileNetV2, which is well-known for its accuracy and computational efficiency in computer vision tasks. On the other hand, the deployment strategy that makes use of Streamlit provides a simple and effective way to diagnose dermatological conditions, making the process easier for dermatologists and those looking for quick assessments. The methodology entails extensive preprocessing of the data and an experimental configuration that includes GPU and CPU setups for training with particular batch sizes and learning rates. Findings show that the model performs well on a variety of assessment metrics, exhibiting efficient learning, generalization, and discrimination skills between positive and negative examples. As a result, this research represents a major step forward in the timely and accurate provision of skin condition information in the healthcare industry through the use of cutting-edge technology. It is possible to provide accessible and accurate dermatological assessment, potentially preventing chronic effects and facilitating early treatment, by deploying lightweight models like MobileNetV2 on web application frameworks like Streamlit. This highlights the suitability of lightweight models for web and mobile applications and promises improved accessibility and effectiveness of dermatological care globally.

Keywords—CNN(Convolutional Neural Network, GPU(Graphical Processing Unit), dermatological, MobileNetV2, Deep learning

IEMHEALS-24/O/030

Customized Metaheuristic Optimization System for Medical Image Analysis and Diagnosis

[1]J. Viji Gripsy, [2]C. Arunpriya, [3]L. Sheeba, [4]J. Angel Ida Chellam

[1] Department of Computer Science with Cognitive Systems, PSGR Krishnammal College for Women, Coimbatore, India. gripsy@psgrkcw.ac.in
[2] Department of Computer Applications, PSG College of Arts and Science, Coimbatore, India. arunpriya.bs@gmail.com
[3]Department of Computer Application, PSGR Krishnammal College for Women, Coimbatore, India. sheebabcom@gmail.com
[4]Department of Information Technology, Sri Ramakrishna Engineering College, Coimbatore, India.
E-Mail:angel.anbuseelan@srec.ac.in

With the increasing availability of electronic health records, medical imaging data and genomics information, there is a wealth of data that can be leveraged to gain deeper insights into diseases, treatment responses, and patient outcomes. Nevertheless, the immense scale and intricate nature of healthcare data provide substantial obstacles in extracting valuable insights and achieving precise forecasts. Traditional algorithms and optimization techniques struggle to handle the high-dimensional and heterogeneous nature of medical data, leading to suboptimal performance and limited generalization capabilities. Therefore, there is a critical need for novel approaches that can effectively harness the potential of healthcare data and optimize the decision-making process. Metaheuristic optimization techniques have shown promise in solving complex and multi-dimensional problems. However, their direct application in healthcare may not be optimal due to the unique challenges posed by medical data.

Keywords: Healthcare, Artificial Intelligence, Medical diagnosis, deep learning, Metaheuristic

IEMHEALS-24/O/085

Customized Nutrition: Individualized Diet Plans and Personalized Guidance Using Machine Learning

Appala Srinivasu Muttipati, Y Nooka Pravallika, Ajay Rapeti, Lochan Kumar Sunkara

Department of CSE (AI&ML, DS), Anil Neerukonda Institute of Technology and Sciences, Visakhapatnam
srinuvasum.csm@anits.edu.in, nookapravallika@gmail.com, ajayrapeti236@gmail.com, Lochansunkara@gmail.com

In today's health-conscious world, the demand for personalized nutrition is growing, as individuals recognize that generic diet plans often fall short of meeting their unique needs. This shift has led to the rise of diet recommendation systems powered by machine learning, which are transforming the way we approach dietary choices.This study proposes to generate accurate and personalized diet recommendations, the system employs advanced machine learning algorithms, including k-nearest Neighbors (KNN), Random Forest, Gaussian Naive Bayes, and Decision Trees. These algorithms meticulously analyze user data and health profiles, ensuring that dietary plans are tailored to individual needs and goals. Comprehensive back-end processes are in place, involving detailed data collection, storage, and preprocessing, which help maintain the accuracy and relevance of the recommendations. Experimental results demonstrate the system's effectiveness, with KNN showing 94.5% test accuracy in delivering personalized diet recommendations. The incorporation of various algorithms enhances the system's versatility, making it suitable for a broad range of user needs. This system represents a significant advancement in personalized nutrition, offering a robust and user-friendly tool for managing diet and health effectively. Future developments may include integrating real-time tracking and bio-metric data to further refine recommendations, enhancing the system's adaptability to users' evolving health and dietary needs.It uses sophisticated machine learning algorithms like K-nearest Neighbors, Random Forest, Gaussian Naive Bayes and Decision Trees to generate precise diet recommendations that are personalized based on individuals. Designed with algorithms that methodically break down user dta and health profiles to create the perfect dietary plan for every person based on their specific needs & goals. There are various back-end systems in place which collect, store and process all these data to ensure that the recommendations remain accurate & relevant.

IEMHEALS-24/O/102

Developing Hybrid Bio-Markers-based Machine Learning Model for Early Screening and Detection of Critical Diseases

[1]Devjyoti Das, [1]Sayani Ghosh, [2]Prasenjit Kundu, [2]Anupam Bhattacharya

[1]University of Engineering & Management2
[2]MBA Dept, Institute of Engineering & Management, UEM
E-mail: devjyoti.das@uem.edu.in,sayani.ghosh2692@gmail.com,
prasenjit.kundu@iem.edu.in, anupam.bhattacharya@iem.edu.in

The objective of this study is to analyse and data mine various biomarkers on liquid biopsy datasets through feature engineering approaches of machine learning for early screening, identification and prognostication of critical diseases. Liquid biopsies are the recent trend of medical science having a non-invasive, cost effective and faster alternative to conventional tissue biopsies, affording contemporaneous insights into the trajectory of diseases and responses to therapeutic interventions. Though, biomarkers research is significance is particularly pronounced in the context of early screening and detection, wherein traditional techniques may prove inadequate but such research having many issues due to the limited shedding of biomarkers in the nascent stages of disease manifestation. Also, biomarkers are often confoundedly as they may indicate multiples results instead of confirmatory diagnosis. This study would like to explore the potential of aligning biomarkers by combining them for critical disease predictions. These methodologies facilitate a swift, cost-effective means of constructing spectral profiles from serum samples, which can subsequently be subjected to analysis via machine learning algorithms to ascertain disease status. Notwithstanding these encouraging advancements, obstacles persist in the standardization of liquid biopsy assays and the assurance of their reliability across diverse clinical environments. Cooperative endeavours are imperative to surmount these hurdles, encompassing the establishment of standardized protocols and the provision of regulatory guidance. This study is an attempt towards potential future directions that are emerging for liquid biopsies as a powerful, multifaceted tool to help improve critical diseases detection.

Keywords: Liquid Biopsy, Biomarkers, Critical Disease, Feature Engineering, Machine Learning.

IEMHEALS-24/O/017

RadientFusion-XR: A Hybrid LBP-HOG Model for COVID-19 Detection Using Machine Learning

[1]Greeshma K. V, [2]J. Viji Gripsy

[1]Department of Computer Science with Cognitive Systems, PSGR Krishnammal College for Women, Coimbatore, India.
[2]Department of Computer Science, PSGR Krishnammal College for Women, Coimbatore, India.

The rapid and accurate detection of COVID-19 (coronavirus disease 2019) from normal and pneumonia chest X-ray images is essential for timely diagnosis and treatment. The overlapping features in radiology images make it challenging for radiologists to distinguish COVID-19 cases. This research study investigates the effectiveness of combining Local Binary Pattern (LBP) and Histogram of Oriented Gradients (HOG) features with machine learning algorithms to differentiate COVID-19 from normal and pneumonia cases using chest X-rays. The proposed hybrid model RadientFusion-XR utilizes LBP and HOG features in conjunction with Support Vector Machine (SVM) and k-Nearest Neighbors (KNN) classifiers. The publicly sourced dataset comprises 6,432 chest X-rays categorized into COVID-19, normal, and pneumonia classes. By combining LBP and HOG features, the model provides a comprehensive representation, enabling more precise differentiation between the three classes. This methodology presents a promising and efficient tool for early COVID-19 and pneumonia diagnosis in clinical settings, with potential for integration into automated diagnostic systems. The findings highlight the potential of this hybrid feature extraction and machine learning approach to significantly improve diagnostic accuracy in chest X-ray analysis. The hybrid model using LBP and HOG features with SVM achieved an exceptional accuracy of 96.27%, with precision, recall, and F1-score values for COVID-19 classification of 97%, 96%, and 97%, respectively. While KNN offered competitive performance, SVM proved slightly more effective. These results demonstrate the efficacy of our hybrid approach in enhancing feature representation and achieving superior classification accuracy. The proposed RadientFusion-XR model with hybrid feature extraction and machine learning approach significantly increases the accuracy of COVID-19 and pneumonia diagnosis from chest X-rays. The interpretable nature of Radiant Fusion-XR, alongside its effectiveness and explainability, makes it a valuable tool for clinical applications, fostering trust and enabling informed decision-making by healthcare professionals.

Keywords: COVID-19, LBP, RadiantFusion-XR, HOG, X-ray, SVM, KNN, Machine Learnin

IEMHEALS-24/O/074

Automated Severity Classification of Knee Osteoarthritis Using Deep Learning and Image Sharpening

[1]Ponmalar S
[2]Mary Magdalene Jane F
[1]Research Scholar
[1],[2]Dr N.G.P. Arts and Science College, Coimbatore, India.
[1]Assistant Professor, Department of Computer Science, PSGR Krishnammal College for Women, Coimbatore, India.
[2]Professor and Dean of the Computer Science Department
E-Mail: ponmalar.phdcs@gmail.com
E-Mail: marymagdalenejane@drngpasc.ac.in

Deep Learning is used to develop a model that produces categorization labels from raw medical image pixels. Deep learning algorithms have advanced to the point that they can effectively perform a wide range of visual tasks, including segmentation, object detection, and image categorization. Deep learning allows computers to identify and extract characteristics from images, reducing the need for filters in analysis. Furthermore, Deep Learning may also help radiologists make more accurate diagnosis by quantitatively analyzing suspicious lesions, which might speed up medical processing. Deep learning has been employed in medical image analysis for the past five years to detect and classify mitosis, segment white lesions, and segment retinal blood vessels. Many academics employ algorithms rooted in deep learning to evaluate Knee Osteoarthritis (KOA).Scope of this work: KOA is vital to affect people at some point in their lives, and indicators of OA include one joint that is present in more than half of those 65 and older. Early detection and treatment enhance and slow the progression of OA, but comprises the risks. Several studies have improved KOA severity classification recently. Post-data collection pre-processing is utilized to automatically determine KOA severity using deep learning models. The ROI of knee joints is calculated using contour detection and segmentation algorithms, which use Open CV's cutting-edge image enhancement approaches to improve the knee X-ray dataset. Deep learning models with parameter hyper-tuning and unique hidden layers for KL Grading processed knee X-ray images.

Keywords: KOA, Classification, Deep Learning, Image Sharpening

IEMHEALS -24/O/050

A DNA-based Algorithm Methodology for Securing Cloud Data Storage

[1]Animesh Kairi, Tapas Bhadra[2], Arindam Roy[3], Debasmita Guha Biswas[4]

[1] Insititute of Engineering and Management, Kolkata, India, [2] Aliah University, Kolkata, India, [3,4]UEM Kolkata, India
E-mail: ani.kairi@gmail.com, tapas.bhadra@aliah.ac.in, arindammtech@gmail.com, debasmitaguha3@gmail.com

Cloud computing, with its amazing performance, affordability, accessibility, and plethora of other benefits, has drastically changed the world and opened up new opportunities. It deals with the on-demand provision of computing resources, particularly computational power and data storage (cloud storage), through data centers that are reachable by many clients via the Internet. This technology makes it possible to employ computer resources quickly and affordably. This paper ensures cloud data security, comprehensive safety policies, a strong organizational safety culture, and cutting-edge solutions for cloud security are essential using DNA-based genetic algorithms. Encryption is the main technique among many that protect information exchange in the cloud, guaranteeing the integrity and confidentiality of data or messages transmitted Genetics-based cryptography has been studied recently, looking at how genetic concepts can improve cryptographic techniques for data processing, storing, and sending. This work presents a novel approach to protecting data stored in the cloud by incorporating DNA-based cryptography. This methodology technique, called Cloud-Based DNA Cryptography, provides a cutting-edge way to strengthen cloud data security by utilizing DNA's built-in capacity for data storage and strong encryption capabilities. The goal of the study is to investigate the foundations, methods, and possible benefits of using genetic cryptography in cloud systems. Using this investigation, the research aims to augment comprehension and provide significant discernments about the practicability and efficacy of genetic encryption in strengthening the security of cloud-based data storage.

Keywords: DNA, Cryptography, Cloud Computing, Genetics Algorithm, Cryptosystem

IEMHEALS-24/O/069

Remote Healthcare Management using Blockchain-Driven Deep Learning Optimization

Brarathraj.E
Sri Ramakrishna Engineering College, Department of Information Technology
E-Mail:angel.anbuseelan@srec.ac.in

Healthcare is a field dedicated to the prevention, diagnosis, treatment and management of illness, diseases and injuries to promote overall health and well-being. The Healthcare industry has been revolutionized by healthcare 4.0 to provide many improvised diagnoses, disease treatment and even prediction of diseases. Healthcare 4.0 incorporates the storage of the patient's records as Electronic Health Records (EHR) which has been given easy access to the doctors for verification and diagnosis. However, every person is required to visit the hospital frequently for checkups and disease treatment. The Remote Monitoring Systems (RMS) in which the patients were deployed with wearable sensor and image devices and the patients' real-time health data information is collected and stored as EHR in the hospitals' huge servers which can be used for the further treatment and diagnosis. With the advancement of technology, including Artificial Intelligence (AI), healthcare is experiencing a transformative shift. AI learning models in healthcare refer to the application of AI algorithms and techniques to investigate enormous amounts of healthcare data, extract insights and support decision-making in clinical settings. Cognitive computing involves AI techniques such as ML, NLP and data analytics to enable intelligent decision-making. The potential benefits of cognitive blockchain in healthcare management systems, including remote patient monitoring, diagnosis, treatment planning and decision support are examined to improve patient outcomes, data security, interoperability and resource utilization.

Keywords: Artificial Intelligence, Electronic Health Records (EHR), Remote Monitoring Systems (RMS), Blockchain

IEMHEALS-24/O/104

Network Visualization of Antibiotic Resistance Genes in *Acinetobacter baumannii*

M Amrutha[1], Suchithra Tharamel Vasu*

[,1]Department of Bioscience and Engineering, National Institute of Technology Calicut, Kozhikode, Kerala, India*
Email: drsuchithratv@nitc.ac.in, amrutha_p230108bt@nitc.ac.in

*Acinetobacter baumannii*has emerged as a critical pathogen in healthcare settings due to its remarkable ability to acquire resistance to multiple antibiotics. The increasing prevalence of multidrug-resistant (MDR) strains of *A. baumannii*necessitates a thorough understanding of the genetic mechanisms underlying antibiotic resistance. This study systematically identifies and analyzes the antibiotic resistance genes present in *A. baumannii*and explores their associated pathways using the Kyoto Encyclopedia of Genes and Genomes (KEGG). The primary objective was to map out the genetic landscape of resistance in *A. baumannii*and to elucidate the pathways associated with these genes through network analysis.An extensive collection of antibiotic resistance genes in *A. baumannii*was gathered from existing literature and databases, covering resistance mechanisms across various antibiotic classes, including beta-lactams, carbapenems, aminoglycosides, fluoroquinolones, tetracyclines, macrolides, and polymyxins. These genes were systematically mapped to their corresponding metabolic and signaling pathways using the KEGG database. This mapping process helped identify key pathways that are crucial for the development and persistence of antibiotic resistance in *A. baumannii*. To analyze these resistance genes, Cytoscape, a robust platform for network analysis and visualization, was employed. Cytoscape generated detailed network diagrams illustrating the complex relationships among the resistance genes.By mapping the pathways linked to resistance genes, this study lays the groundwork for developing targeted therapeutic strategies designed to disrupt these networks.Such strategies could be crucial in addressing the escalating problem of multidrug resistance in *A. baumannii*and improving the effectiveness of existing antibiotic treatments. This research makes a significant contribution to ongoing efforts to combat antibiotic resistance, providing a detailed and network-based perspective on *A. baumannii*, a pathogen of critical clinical concern.

Keywords: *Acinetobacter baumannii*, Antibiotic resistance, Cytoscape, Network analysis, Therapeutic strategies, Resistance mechanisms

ARTIFICIAL INTELLIGENCE IN HEALTH SCIENCE

IEMHEALS-24/O/023

Optimizing Healthcare using Artificial Intelligence

Deepan Pramanick, Soumik Das

IT Department, Institute of Engineering and Management (IEM), Salt Lake

Artificial Intelligence is proving itself to be one of the most precise tools the human race has ever seen. Though it requires extensive training and huge datasets for keen accuracy it can highly transform and enhance the healthcare systems. Through the computational intelligence, healthcare management systems in the medical facilities can be improved and optimized. Finances, service allotment process, patient flow check and many more fields can be managed efficiently with the aid of AI. Proceeding further AI can be implemented for predictive medicining also. It can be used for early disease detection, optimized treatment and also prediction of epidemics and pandemics. We know that AI models can be trained using datasets and the best it does is statistical analysis of the data to provide an output or result. So it does proves itself again to excellently manage patient data and diagnostics. Our field of research includes the use of grounding AI to automate the process of healthcare management and release the burdens from busier organizations like Government hospitals. We have also explored AI models that helps in predictive medicining shortening the diagnosis process and minimizing the risk of epidemic outbreaks. Our research work also extends to post clinical aids that includes processing of patient data to keep a track on their health. Using statistical data related approach AI could detect fluctuations and report immediately. AI is a very powerful tool to minimize management related burdens. It also proves to be excellent in the field of healthcare due to its accuracy and variability. Thus we can implement them for human welfare and ease.

IEMHEALS-24/O/076

A Multimodal MRI Study on the Effect of Brain Disorder Using Artificial Intelligence Based Computer Aided Diagnosis

[1]Sadaf Qasim, [2]Nandita Pradhan

[1]Department of Electronics and Communication, United University, Prayagraj, India
[2]Department of Electronics and Communication, United College of Engineering and Research, Prayagraj, India

Recently, there has been an augmented growth in research field studying about the cytology and techniques of various brain disorders, such as Multiple Sclerosis (MS), Gliomas, Epilepsy, Alzheimer's Disease (AD), Schizophrenia etc. In the past few years, the particle application of artificial intelligence (AI) has been reconnoitering in a diversification of exploration coliseum which include the evolution of advance computer-aided diagnosis (CAD) systems. The application of medical imaging and its distinguishing illustration given by medical maestro in AI-based CAD system is expanding with an intent of more precise production of authentic symptomatic suggestions that will in due course assist physicians coming up with more significant and customize treatments. To illustrate, white matter in the analysis of textured image of brain T2-weighted magnetic resonance imaging (MRI) proves to be major tool in recognizing Multiple Sclerosis. Besides, AI-based CADs will ease the simplification and utilization of the data available, alleviating the manual evaluation, and provide easy accesses in practicing daily clinic.

Keywords: brain disorder, AI based CAD system, Alzheimer's Disease (AD), Schizophrenia (SZ), MRI

IEMHEALS-2024/O/010

Blockchain-Enabled AI Model for Secure Medical Data Transmission and High-Accuracy Disease Diagnosis in IoT Healthcare Systems

Anusuya S[1], Muhammadu Sathik Raja[2], Ganesh Babu L[3], Niraja Jain[4], Pankaj Agarkar[5],Keerthika T[6], Biswadip Basu Mallik[7], Girimurugan R[8*]

[1] *Department of Computer Science, Sri Vasavi College (Self-Finance Wing), Erode 638 316,Tamilnadu, India*

[2] *Department of Medical Electronics, Sengunthar Engineering College, Tiruchengode 637 205, Tamilnadu, India*

[3], *Department of Robotics and Automation, Rajalakshmi Engineering College, Chennai 602 105, Tamilnadu, India*

[4] *Department of Computer Science Engineering, MIT ADT University, Pune 412 201, Maharashtra, India*

[5] *Department of Computer Science Engineering, Ajeenkya DY Patil School of Engineering, Pune 412 105, Maharashtra, India*

[6] *Department of Information Technology, Sri Krishna College of Engineering and Technology, Coimbatore 641 008, Tamilnadu, India*

[7] *Department of Basic Science and Humanities, Institute of Engineering & Management, University of Engineering & Management, Kolkata, India*

[8] *Department of Mechanical Engineering, Nandha College of Technology, Perundurai 638 052, Tamilnadu, India*

E-Mail: dr.r.girimurugan@gmail.com

Internet of things (IoT) technologies are now widely used in the healthcare industry. Due to the growing demands of the Internet of Things, enormous amounts of patient data are being collected and used for diagnosis. In order to reliably identify diseases in real-time scenarios, artificial intelligence (AI) approaches have recently advanced. Security, energy constraints, and a lack of training data remain the main problems in the IoT-enabled medical field, despite its advantages. Blockchain technology, a decentralised architecture that is extensively used, was recently developed to achieve security. This study presents a new blockchain based approach that enables secure medical data transmission and diagnosis through distributed ledger technology. The proposed model aims to diagnose the illness with the highest possible detection rate while safely transmitting medical images. This model integrates several phases of the process, including image capture, blockchain, encryption, and diagnosis. After that, the diagnostic procedure includes neural network-based classification, segmentation based on U-Net model, and Dense Net based feature extraction. Using benchmark medical images, the experimental performance of the proposed technique was verified, and the obtained results demonstrated the technique's increased performance. While the feature extraction is based on Dense Net, the suggested model achieved maximum classification performance with sensitivity of 97.94%, specificity of 98.56%, and accuracy of 98.92%.

Keywords: IoT Healthcare Systems, High-Accuracy, Disease Diagnosis, Blockchain, AI Model, Medical data Transmission.

IEMHEALS-2024/O/011

An IoT and Edge-Based Clinical Decision Support System for Predicting and Monitoring Chronic Kidney Disease using AI techniques

Krishnamoorthy N[1], Balachandran S[2], Kavitha P M[3], Raghavendran N[4], Krithika S[5], Mohit Tiwari[6], Biswadip Basu Mallik[7], Girimurugan R[8*]

[1] Department of Computer Science and Applications, Faculty of Science and Humanities, SRM Institute of Science and Technology, Ramapuram, Chennai 600 089, Tamil Nadu, India
[2]Department of Chemical Engineering, Saveetha Engineering College Thandalam, Chennai 602 105, Tamil Nadu, India
[3] Department of Computer Science and Applications, Faculty of Science and Humanities, SRM Institute of Science and Technology, Ramapuram, Chennai 600 089, Tamil Nadu, India
[4] Department of Artificial intelligence and Date Science Engineering, RMK College of Engineering and Technology, Chennai 601 206, Tamil Nadu, India
[5] Department of Computer Science and Engineering (Cyber Security), Nandha Engineering College, Perundurai 638 052, Tamil Nadu, India
[6] Department of Computer Science and Engineering, Bharati Vidyapeeth's College of Engineering, Paschim Vihar, Delhi 110 063, India
[7] Department of Basic Science and Humanities, Institute of Engineering & Management, University of Engineering & Management, Kolkata, India
[8] Department of Mechanical Engineering, Nandha College of Technology, Perundurai 638 052, Tamilnadu, India
**Corresponding Author: dr.r.girimurugan@gmail.com*

By combining health monitoring tools like sensors and medical devices to see patient records remotely and deliver more intelligent and sophisticated Medicare services, the Internet of Health Things (IoHT) has several uses in the healthcare industry. In this research, we present an IoT with edge based clinical decision support system for the prediction and monitoring of Chronic Kidney Disease (CKD) with its degree of severity with the goal of providing the best healthcare services to consumers utilising e-health applications. The suggested architecture gathers patient data from user-affixed IoT devices and stores it in the cloud with the relevant medical records from the UCI repository. In addition, we utilise a Deep Restricted Boltzmann Machine (DRBM) classifier to predict the severity of CKD. To enhance the DNN classifier's performance, a feature selection technique based on Enhanced Crow Search Algorithm (ECSA) is also applied. The standard CKD dataset is used to validate the suggested model. To compare the suggested model's performance across a range of classification metrics, various classifiers are used. The accuracy of the proposed DRBM classifier alone in predicting CKD is 98.75%, and the ECSA-FS technique further improves this to 99.36%.

EMHEALS-24/O/022

Determination of Age and Sex from Human Bite Mark Using Artificial Intelligence

[1]Rithu P., [2]Greeshma K.V., [3]Afrin Sona A. S and [4]Dr. Siva Prasad

[1] Department of Forensic Science, University of Calicut, Kerala Police Academy, Thrissur

[2] Department of Computer Science with Cognitive Systems, PSGR Krishnammal College for Women, Coimbatore

[3] Department of Forensic Science, University of Calicut, Kerala Police Academy, Thrissur

[4] Department of Forensic Science, University of Calicut, Kerala Police Academy, Thrissur

Bite mark analysis is pivotal in forensic investigations, aiding in the identification of individuals involved in criminal activities such as rape, murder, and child abuse. The process of analysing and comparing bite marks left on human skin with a suspect's dentition is complex and challenging. However, the integration of Artificial Intelligence (AI) into forensic analysis promises to enhance the accuracy of these assessments. This study aims to develop and validate a Convolutional Neural Network (CNN) model for determining the age and sex of individuals from bite mark samples. A dataset comprising 50 bite mark images, evenly split between 25 males and 25 females aged 18-25, was collected and analysed using the CNN model. The results demonstrate that the CNN model exhibits high accuracy and robust generalization capabilities in classifying bite marks by sex and predicting age. This model's performance underscores its potential as a valuable tool in forensic investigations, offering an innovative, AI-based approach to bite mark analysis. By improving the precision and efficiency of determining age and sex from bite marks, this research contributes significantly to forensic science. The findings suggest that the implementation of AI in forensic investigations can streamline the process and provide reliable results, enhancing the overall effectiveness of bite mark analysis in criminal cases. This study's successful application of a CNN model to bite mark data represents a significant advancement in forensic methodologies, paving the way for future research and development in AI-driven forensic science.

Keywords: Bite Mark, Age, Sex, Artificial Intelligence, Convolutional Neural Network (CNN).

IEMHEALS-24/O/091

AI in Healthcare: A Critical Review of Large Language Models

[1]Moumita Ghosh, [2]Apurbalal Senapati

Department of Computer Science and Engineering

[1]Siliguri Institute of Technology,[2]Central Institute of Technology

The advancement of large language models (LLMs) is driving a paradigm shift across various dimensions of artificial intelligence.There are extensive uses and advancements in the healthcare domain that offer unprecedented capabilities in understanding and processing complex medical information [1]. Fine-tuning a large language model (LLM) for specific diseases exemplifies a tailored approach to healthcare analytics, enhancing accuracy and relevance in its outputs [2].Foundational models form the basis for specialized LLMs in healthcare. These models are trained on an extensive corpus of data, covering a wide range of knowledge.These specialized models become increasingly proficient at addressing queries and delivering information within their area of expertise.Using these techniques, applications like MedAlign, MedLM, MediPalm [3] have emerged as generative AI solutions specifically designed for the healthcare industry.New techniques and applications in this field are emerging every day.Consequently, LLMs have significant potential to improve the working conditions of healthcare professionals and, by extension, the quality of care provided to patients [4].Prompt engineerimg has crucial technique for enhancing the power of large language models (LLMs).All approaches CoT,PoT and ToT represent reasoning steps through free-form text and code,which face challenges when dealing with intricate table scenarios.This process enhances intermediate results. It is empowering LLMs to make predictions through logical visualized reasoning chains [5]. This paper aims to present the latest state-of-the-art LLMs in healthcare, including specialized models within this domain.

Keywords : Large language models, fine-tuning, prompt engineering, chain of table, healthcare.

IEMHEALS-24/O/072

Leveraging AI for Alzheimer's Disease Detection under the Indian Legal Framework

[1]Keya De Mukhopadhyay, [2]Abhisikta Basu

[1]Department of Biotechnology, University of Engineering & Management
[2]Department of Law, University of Engineering & Management
Email: Keya.Demukhopadhyay@uem.edu.in, abhisikta.basu@uem.edu.in

Alzheimer's disease, a neurodegenerative disorder predominantly affecting the elderly, is benefitting from advancements in Magnetic Resonance Imaging (MRI) technology. These advancements have facilitated the development of sophisticated, deep-learning-based algorithms for AI-enhanced diagnostics, improving early detection and timely interventions. This progress holds the potential for more effective treatment strategies and better patient outcomes. However, the differential diagnosis of dementia remains a significant challenge in neurology due to symptom overlap across different etiologies. Accurate differentiation is crucial for developing early, personalized management strategies. This paper introduces a novel artificial intelligence (AI) model that harnesses a wide range of data, including demographics, individual and family medical history, medication use, neuropsychological assessments, functional evaluations, and multimodal neuroimaging, to identify the underlying etiologies contributing to dementia in individuals. The proposed model offers an innovative method for detecting Alzheimer's disease and other forms of dementia. Furthermore, it involves medical brain mapping, which presents complex legal and ethical issues. Consequently, this paper also addresses the laws and policies supporting and limiting the study of such advanced diagnostic methods. By integrating and analyzing diverse datasets, the AI model aims to accurately distinguish between various dementia etiologies, facilitating precise and personalized therapeutic approaches. This multifaceted approach marks a significant step towards more nuanced and effective management of neurodegenerative diseases, potentially transforming clinical practices and patient care while navigating the legal and ethical framework.

Keywords: Alzheimer’s, Dementia, Artificial Intelligence, MRI, Legal Framework

IEMHEALS-2024/O/004

Capitalization of Digital Healthcare: An Emerging Cornerstone of Modern Medicine

Subhajit Hazra, Kundan Singh Bora*

University Institute of Pharma Sciences, Chandigarh University

Digital health or digital healthcare is a broad multidisciplinary concept that embraces concepts from technology and healthcare and includes mobile health (mHealth) apps, electronic health records (EHRs), electronic medical records (EMRs), wearable devices, telehealth, telemedicine etc. It plays an increasingly important role in healthcare today as it aids in the prevention of disease, lowering healthcare costs, helping patients monitor, managing chronic conditions and tailoring medicine for individual patients. Thus, in the contemporary landscape of healthcare, the integration of digital technologies has emerged as a pivotal aspect in shaping the delivery of medical services. Owing to this, the global digital health market was valued at $211.9-$262.63 billion in 2022 and is expected to grow $939.54-$1,592 billion by 2032 with a compound annual growth rate (CAGR) of 13.1-18.7%. Likewise, in India, the digital healthcare market recorded a revenue of 440.49 billion INR and is projected to reach 1.16 trillion INR by 2028 with a CAGR of 15.76%. This is a result of popular government policies and initiatives such as EHR Standards and the Integrated Health Information Program (IHIP), which were aimed at regulating digital healthcare services across India. Therefore, the present work explores the current and prospective market landscape of digital healthcare in India, besides analyzing the various distinct digital healthcare segments their implications, opportunities (especially amidst a potential future pandemic), and the regulatory frameworks governing such healthcare advancements, .

Keywords: Digital Healthcare, Electronic Health Records, Healthcare Policies, Regulatory Framework

IEMHEALS -24/O/058

Protagonist of Artificial Intelligence in Recognition of Hepatoma using Multi-Pronged Aggregate Compact Graph Convolutional System

[1]Mrs S. Kowsalya, [2]Dr.S.Saraswathi

[1] Department of Computer Science, Sri Krishna Arts and Science College, Coimbatore-641008.
[2]Nehru Arts and Science College Coimbatore
[1]E-mail:skowsalya@skasc.ac.in

Hepatocellular Carcinoma (HCC) is one of the major causes of tumor-specific mortality lobally. Merely 20-30% of HCC patients are qualified for accurate diagnosis because of inadequate early recognition strategies, emphasizing the importance of true biomarkers. The mixture of multi-omics is a vital tool for biomarker analysis in HCC diagnosis. In the past era, Graph Convolutional Networks (GCNs) have been developed based on the Patient Similarity Network (PSN) for HCC diagnosis. Amongst, an Inter-scale Amalgam Cluster DenseGCN (IACDGCN) model outperformed other GCNs by using Cluster DenseGCN with softmax to classify HCC. But the DenseGCN's many dense connections make learning more difficult and lead to an overfitting issue, especially when the labeled data are insufficient. Saturation and noise in Data Propagation (DP) also contribute to poor categorization results. Hence this article proposes a Multi-channel IACDGCN (MIACDGCN) model for HCC classification. Initially, an Improved Data Propagation Graph (IDPG) is produced for improving DP over long-distance nodes in Cluster DenseGCNs with no utilization of many convolutional layers. As well, a dropout is added to the IDPG to extract a sequence of alternatives of the given graph by reducing IDPG edges arbitrarily. After that, a multi-channel Cluster DenseGCN model is constructed on various dropout IDPGs to alleviate DP saturation and noise, resulting in solving overfitting. Further, a softmax function is applied for HCC classification. Finally, experiment results reveal that the MIACDGCN model on the Liver Hepatocellular Carcinoma (LIHC) omics dataset achieves 97.93% accuracy compared to the outdated HCC classification models.

Keywords—Liver cancer, Cluster DenseGCN, IACDGCN, Data propagation graph, Multi-channel GCN, Dropout

IEMHEALS -24/O/145

An exploratory study of primary health care using AI based symptom analysis for Rural Bengal

Sanhita Ghosh, Subrata Chattopadhyay, Sujit Dutta

MBA Department , Institute of Engineering & Management
Email ID: subrata.chattopadhyay@iem.edu.in

Primary healthcare is a real challenge in rural Bengal, with the dispensaries and hospitals being distant and remote, the gamut of health checkups are either done with experiential knowledge or at the hands of the quack doctors. Indian doctors are able to diagnose patients for scarcely two minutes on average, based on a global study which found that primary care consultations last less than five minutes for half the global population, ranging from 48 seconds in Bangladesh to 22.5 minutes in Sweden.

While India's primary care consultation time was less than two minutes in 2015, the mean duration was just 1.79 minutes in 2016 in neighboring Pakistan, one of the greatest international study on consulting time, published in the British medical journal BMJ Open, found. "Shorter consultation times have been linked to poorer health outcomes for patients and a heightened risk of burnout for doctors," researchers wrote in the journal.

As demand for primary health care upsurges around the globe, the length of a consultation has increasingly come under pressure.

To ease out the potential impact on patients and the wider healthcare system, the researchers reviewed the data on consultation length from 178 relevant studies covering 67 countries and more than 28.5 million consultations.

The study is an exploratory research of medical prescription based on common diseases and recommending the same via medical kiosks or applications on mobile device. With the mobile penetration rate very high in rural India as well, this may help lessen the load of the doctors in rendering better consulting time for effective diagnosis of the patients especially in densely populated rural Bengal & India.

Keywords: medical diagnosis, AI based prescription, rural healthcare, consultation time, primary healthcare

IEMHEALS -24/O/144

THE INFLUENCE OF ARTIFICIAL INTELLIGENCE BASED INCUBATION AND NICU

[1]N.Prabhu, [2]M.Harini Mukila, [3]S.Srini

Department of Computer Science with Cognitive Systems, PSGR Krishnammal College for Women, Coimbatore.

Premature and severely ill infants may fare better thanks to AI-based features and technologies. In Neonatal Intensive Care Units (NICUs), where many newborns are born before eight months of age and some weigh as little as 2.5 kg, artificial intelligence (AI) plays a significant role. AI helps physicians in Neonatal Intensive treatment Units (NICU) by improving the precision and effectiveness of patient treatment. Artificial Intelligence plays a major role in improving the treatment that critically ill neonates receive. Artificial Intelligence (AI) assists medical professionals in monitoring a newborn's vital indicators, including heart rate, breathing rate, oxygen saturation, blood pressure, respiratory rate, and temperature. Better care plans for the premature newborn are also aided by it. Neonatal Intensive Care Units (NICU) have implemented models and algorithms powered by artificial intelligence. It supports both early detection and ongoing monitoring. AI modules and algorithms are utilized to recognize respiratory distress signals, among other early warning indicators. Artificial Intelligence gathers information from multiple monitoring devices in the incubator to give the physician a thorough picture of the infant's health. Artificial intelligence (AI) has the ability to alter procedures and promote ongoing progress in NICUs by gathering and evaluating vast amounts of data from incubators and NICUs. Machine learning (ML), one of the AI technologies, enables us to customize the needs of the premature child. The vital indicator is more accurate thanks to AI technology. The majority of case studies have demonstrated how AI-driven support systems significantly improve patient management, which increases the percentage of positive outcomes. An innovative development in the realm of newborn healthcare is the incorporation of artificial intelligence (AI) into neonatal incubation and neonatal intensive care units (NICUs). Conversely, AI-driven automation in incubator settings lessens the stress on medical staff by optimizing ambient conditions that are customized to each patient's needs. Data privacy problems are one of the challenges associated with integrating AI in newborn care. This study demonstrates how artificial intelligence (AI) has the power to completely transform newborn care by enhancing accuracy, productivity, and the standard of patient care in NICUs and incubator environments. Artificial intelligence (AI) offers a revolutionary chance to improve the standard of care for infants who are at risk of malnutrition by being integrated into incubation procedures and neonatal intensive care units (NICUs).

Keywords: Artificial Intelligence, Machine Learning, Deep Learning, Incubation and NICU.

HEALTH CARE MANAGEMENT AND LITERACY

IEMHEALS-24/O/021

Identification of authorship using lateral palmprint

[1]Revathy B., [2]Greeshma K. V.

Department of Forensic Science, University of Calicut, Kerala Police Academy Thrissur

The potential of lateral palm prints as a forensic tool for authorship identification is explored in this research. By analysing the unique characteristics of lateral palm prints left near signatures, it aims to extract valuable information that can aid in criminal investigations, particularly those involving anonymous correspondence. Unlike traditional questioned document analysis, which heavily relies on handwriting comparison, this approach offers a novel perspective by focusing on the physical interaction between the writer's palm and the writing surface. Through a meticulous examination of lateral palm prints, forensic experts can potentially determine several crucial details about the author. These include handedness, the instrument used for writing (e.g., pen, pencil, stylus), and even approximate age based on lateral palm print characteristics. Such information can significantly narrow down the suspect pool in cases of anonymous letters, providing investigators with a more focused direction. To enhance the efficiency and accuracy of lateral palm print comparison, this study employs Content-Based Image Retrieval (CBIR) techniques, specifically Local Binary Patterns (LBP) and Histogram of Oriented Gradients (HOG). These algorithms are designed to extract distinctive features from the lateral palm prints, enabling a robust comparison between questioned and known samples. By identifying patterns and similarities, this study aims to establish a reliable method for determining authorship based on lateral palm print evidence. If successfully validated, this innovative approach has the potential to revolutionize forensic investigations. Lateral palm prints, much like fingerprints, possess unique and individual characteristics that can serve as compelling evidence in a court of law. By introducing this new forensic tool, we seek to contribute to the advancement of forensic science and improve the efficiency of criminal investigations.

Keywords: lateral palm print, authorship identification, forensic science, CBIR, LBP, HOG, questioned document analysis.

IEMHEALS-24/O/028

Perception of Pay-For-Performance (P4P) Reward Scheme: A Qualitative Study with Public Teaching Hospital Doctors

Mohd Hamdi Mohd Ibrahim, David Joseph Pereira, Nur Syahmina Rasudin, Rosminah Mohamed

School of Health Sciences, Health Campus, Universiti Sain Malaysia
Email: dpereira@usm.my

The Pay-for-Performance (P4P) scheme rewards healthcare professionals for meeting targeted clinical indicators. However, the P4P reward scheme has not been implemented in Malaysian public healthcare. This study aimed to explore public teaching hospital doctors' perceptions towards the P4P reward scheme. The study participants were 16 doctors from a range of specialties at a university teaching hospital located in the Malaysian east coast state of Kelantan. The sample size provided sufficient data saturation for an exploratory qualitative study. Semi-structured interviews were conducted with participants over a period of six months in 2022. All research sessions were recorded, transcribed and subject to thematic content analysis. Findings indicate that doctors' feedback is a mixture of being favourable towards P4P, being favourable towards team-based P4P or being unfavourable towards P4P. Reasons for viewing P4P positively are rewarding doctors for good performance, promoting better patient care, efficiency and cost savings benefits, attracting and retaining doctors in the public sector and creating healthy competition among clinicians. Even with P4P being viewed positively, there are concerns of fairness, evaluation of relevant performance criteria, tailoring reward schemes based on specialty and adequacy of staffing. Reasons for preferring team-based P4P are fairness in rewarding teamwork in the delivery of patient care, incentivizing department- level performance improvements and individual-based P4P being seen as materialistic. Reasons for viewing P4P unfavourably are unfairness to doctors with patient care outcomes being influenced by factors beyond their control, the pursuit of some efficiency outcomes jeopardizing the quality of care and the perception of non-financial rewards being a better source of motivation. Given the mixed feedback, there is a need to reconcile potential P4P benefits with concerns. Rewarding based on P4P will require consideration for individual and team contributions towards patientcare outcomes, besides tailoring P4P reward schemes by department specialty clinical indicators.

Keyword: Pay-for-Performance (P4P), Doctors, Patient care performance, Reward scheme, Qualitative research

IEMHEALS-24/O/040

Methanol Poisoning from Hand Sanitizers: Forensic Challenges and Case Studies

[1]Neenu Maria Thankachan., [2]Greeshma K.V., [3]Pioosh Kundu, [4]Dr Anindya Bose

[1]Department of Cyber Science and Technology, Brainware University, Kolkata.
[2]Department of Computer Science with Cognitive Systems, PSGR Krishnammal College for Women, Coimbatore.
[3]Department of Cyber Science and Technology, Brainware University, Kolkata.
[4]Department of Cyber Science and Technology, Brainware University, Kolkata.

The use of hand sanitizer has dramatically increased due to the COVID-19 epidemic. This also led to increased methanol poisoning because of the low-quality or harmful substances of hand sanitizer used to reduce costs and meet supply chain variations. In this research paper, we will discuss the importance of differentiating between accidental and intentional ingestion of hand sanitizers that result in methanol poisoning and its forensic challenges. The significance of mandatory laws and regulations and the collaboration of different entities to prevent forensic challenges in these cases is also depicted. This review paper is remarkably examined on the basis of various case studies on methanol and other alcohol poisoning deaths from hand sanitizer. Therefore, the detection of alcohol in hand sanitizer is very important to know how ingestion of this leads to poisoning. The presence of methanol in these hand sanitizers drastically resulted in high methanol poisoning cases. Therefore, this paper will also explore different methodologies used to detect methanol poisoning, including traditional and emerging portable methods. In traditional methods, gas chromatography and liquid chromatography are explained for the detection of alcohol in hand sanitizer, whereas in emerging portable methods, headspace analysis and portable detectors are focused. Apart from this, spectroscopic methods are also used for the detection of alcohol in hand sanitizers. The importance of public awareness for the safe usage of hand sanitizers to avoid alcohol poisoning cases, especially methanol poisoning, is also depicted. Proper care and attention are required towards children while using hand sanitizer to avoid accidental ingestion. From the research study, a new method for the easy detection of MeOH by the fluorometric detection of Al(iii)-complex and the preparation of hand sanitizer without alcohol is also introduced.

Keywords: Hand Sanitizer, Methanol Poisoning, Forensic Science, ABHR, COVID-19, Alcohol

IEMHEALS-24/O/075

Acceptance of Healthcare Apps Among Urban and Rural Populations in West Bengal: A Quantitative Study Using the Technology Acceptance Model

Suvayan Biswas.

University of Engineering and Management, Kolkata

Growing access to mHealth apps is a significant opportunity for improved delivery of care across India. However, the acceptance and use of these apps vary between communities, largely due to socio-economic and technological differences. Therefore, this research will be conducted based on the variables of the Technology Acceptance Model, with perceived usefulness and perceived ease of use being the primary predictors of technology adoption in healthcare apps.

It was a quantitative approach, where, through surveys, 300 diverse urban and rural participants from the state of West Bengal were taken into consideration, and in analyzing data approaches applied, such as statistical methods to explore the influence of perceived usefulness, perceived ease of use, and factors like trust and accessibility in app acceptance.

The findings suggest that perceived usefulness successfully positively affected acceptance in both urban and rural settings, with urban sector users being more receptive since healthcare awareness and infrastructure in urban setups are much more refined and disseminated as compared to the rural sector. For the rural area, perceived ease of navigating and using the application was crucial, as the level of digital literacy and awareness is not highly satisfactory in this sector. Besides, trust in the safety, security, and privacy of their data and information as a result of using the application was also a significant and jointly common impact factor for users in both sectors.

Besides, the study has gone to conclude acceptance of healthcare apps is increased largely by localized content, user-friendly interface, and robust privacy measures in use. Such findings will have important implications for developers and policymakers with the view to design effective mHealth solutions answering to the unique needs of the urban and rural masses of West Bengal.

IEMHEALS-24/O/083

Enhanced Pneumonia Diagnosis Using CNN for Chest X-ray Analysis

Vishwa Patel

Department of AIML, Unitedworld School of Computational Intelligence

Pneumonia, a significant cause of morbidity and mortality worldwide, necessitates early and accurate diagnosis to improve patient outcomes. Traditional diagnostic methods, such as chest X-rays interpreted by radiologists, are subject to variability and can be time-consuming. This research addresses the critical need for efficient and reliable diagnostic tools by exploring the application of Convolutional Neural Networks (CNNs) for pneumonia detection using chest X-ray images. Previous studies have demonstrated the potential of deep learning models in medical image analysis, yet challenges remain in achieving high accuracy and generalizability across diverse datasets. Our study aims to bridge this gap by developing a CNN-based model that leverages advancements in image processing and machine learning to enhance diagnostic precision. The central question of this research is: Can a CNN-based approach significantly improve the accuracy and speed of pneumonia diagnosis from chest X-rays compared to traditional methods? To address this, we constructed a robust dataset of chest X-ray images and employed state-of-the-art CNN architectures. The model was trained using various preprocessing techniques and data augmentation to enhance its robustness and prevent overfitting. Our findings indicate that the CNN-based model outperforms traditional diagnostic methods, achieving high precision and recall rates. The model demonstrated an F1-score surpassing that of existing approaches, highlighting its potential as a reliable tool for pneumonia detection. The implications of these findings are profound, suggesting that CNNs can significantly aid in the early and accurate diagnosis of pneumonia, ultimately improving patient management and outcomes. In conclusion, this research underscores the importance of integrating advanced machine learning techniques into medical diagnostics. By addressing the limitations of current diagnostic practices and introducing a more efficient method, we contribute to the ongoing efforts to enhance healthcare delivery and patient care.

Keywords: Pneumonia Detection, Convolutional Neural Networks (CNNs), Chest X-ray Analysis, Medical Image Processing, Diagnostic Accuracy

IEMHEALS-24/O/002

Space Pharmacovigilance: Safeguarding Astronaut Health in the Era of Human Spaceflight

Subhajit Hazra[1*],Janmejay Pant[2], Thais Russomano[3], Marlise A dos Santos[3], Saswati Das[4]

[1]LIFE-To & Beyond Foundation®, Barasat-700124, West Bengal, India
[2]University Institute of Pharma Sciences (UIPS), Chandigarh University, Mohali-140413, Punjab, India.
[3]InnovaSpace Ltd, London-SE28 0LZ, United Kingdom.
[4]Dr Ram Manohar Lohia Hospital, New Delhi, India.
Email Id: operations.lifetoandbeyond@gmail.com

Pharmacovigilance (PV) is a science concerned with the continuous monitoring of adverse drug reactions (ADRs) to existing medications. It plays an indispensable role in ensuring the health and well-being of humans, here on Earth. Recent strides in next-generation spacecraft technology have reignited global enthusiasm for the exploration of humans beyond our pale blue dot. However, this surge should be in sync with the pressing need for innovation for the continuous monitoring of ADRs in those who travel far and beyond, namely the astronaut(s). For example, microgravity has been evidenced to cause changes in gastrointestinal function, in turn affecting drug absorption or decreased clearance of numerous drugs, thus potentially reducing their efficacy or increasing their toxicity. Hence, situations like these, call for a specialized branch of PV or Space Pharmacovigilance (SPhV), which would be dedicated to the monitoring and management of the above-mentioned ADRs in astronauts when faced with the extraordinary environment of space. This, in turn, would not only ensure the safety and efficacy of pharmaceutical products but also could aid in bioastronautical research which aims to understand the physical responses of humans to the environment of space and develop countermeasures to minimize health risks for astronauts through the development of effective and viable engineering designs, such as in astronaut suits, and/or in-situ medical units on board the proposed Bharatiya Antariksha Station (Indian Space Station). Hence, consequently, providing a framework for effective integration of SPhV within the existing framework of bioastronautical research and ensuring a holistic approach to astronaut health, which could address both pharmacological and physiological challenges posed by space travel. In this regard, the present concept paper aims to emphasize the significance of space pharmacovigilance and explore the most effective means of achieving it through the development of a unique SPhV database for the analysis and monitoring of ADRs pertaining to astronauts.

Keywords: Pharmacovigilance, Space, Adverse Drug Reaction, Astronaut Health, Space Pharmacovigilance.

IEMHEALS -24/O/066

Tourism for Treatment: A systematic literature review of Healthcare Hotel Perspective on Medical and Wellness Travel

[1]Pratim Chatterjee , [2]Smita Datta, [3]Mitali Sengupta

[1]Department of Management University of Engineering and Management, Kolkata
[2]Department of Management Eastern Institute for Integrated Learning in Management, (EIILM) Kolkata
[3]Department of Management Institute of Engineering and Management, Kolkata & University of Engineering and Management, Kolkata
Email Id: chatterjeepratim29@gmail.com, smitadatta16@gmail.com, mitali.sengupta@uem.edu.in

Medical and wellness tourism, that includes healthcare tourism, travel for medical purposes and wellness retreats are practices where the tourists travel to national and international destinations for elective procedures or complex surgeries. India is emerging as a finely crafted medical tourism hub where people from different parts of the country and beyond travel to these hotspots for addressing their holistic wellbeing. While a lot of research has been done for medical tourism and branding strategies to enhance tourism, not much attention is given towards facilities and non-medical attributes of their stay while seeking medical help. In this context, this paper aims to present a comprehensive review of all published research articles on medical tourism, wellness tourism and healthcare hotels with an aim to establish their impact on customer satisfaction. A systematic literature review has been conducted in the abovementioned research thrust areas where the inclusion criteria include considering research articles, conference papers, proceedings that have been published in the last two decades. Data has been extracted from Scopus database using keywords extracted from subject headings such as using "(Medical OR Wellness OR Healthcare) AND (Tourism OR Tourism OR Hotel or Healthcare Hotel)". The findings of the study explore the tremendous growth of medical and wellness tourism and recommend innovation from hospitality industry in terms of healthcare hotels to gain competitive edge in this area. This study provides promising directions of future research for the academicians and industry professionals in terms of a useful yet unexplored avenue in the tourism and hospitality industry.

Keywords: Medical tourism, Wellness tourism, Healthcare hotel, Systematic review

IEMHEALS -24/O/053

Sentiment Analysis on Postpartum Depression Tweets Using Polarity and Sentiment Score Using Natural Language Processing

Suganthi D, A. Geetha, Dhivya M

Chikkanna Government Arts College, India, PSGR Krishnammal College for Women, India
Email Id: dhivyam@psgrkcw.ac.in

Postpartum depression (often known as PPD) is a medical condition that many women experience following childbirth. Strong feelings of melancholy, anxiety (concern), and exhaustion persist for a long period after giving delivery. These feelings can make it difficult for you to look after yourself and your baby. PPD can occur at any moment following childbirth. It normally starts between one and three weeks after having a baby. It requires treatment to recover. Post Partum depression (PPD) is a type of prenatal depression. This is depression that occurs during pregnancy or in the first year following childbirth. PPD is the most frequent issue that newlywed mothers face. Up to 1 in 7 women (about 15%) may be affected. Some women undergo physical, behavioural, and emotional changes following childbirth, which may result in the development of postpartum depression (PPD), a significant medical condition. It is challenging to distinguish between the signs of this mental illness and to identify it. In order to ensure effective treatment and control the morality rate, early detection and treatment of PPD are essential. A number of machine learning (ML) models were created to forecast PPD in patients by taking into account their vital signs, mental health history, and demographics. However, additional psychological characteristics are required to identify those at risk for PPD and to predict mental status. Additionally, ingenious and affordable techniques are required to diagnose PPD in individuals and determine possible developmental trends. In this paper sentiment analysis were used. Based on the sentiments the tweets are classified as positive or negative or neutral. This analysis can be done by classifying the dataset using Naïve - Bayes Machine Learning Algorithm.

IEMHEALS-24/O/018

Effect of Starch Digestion on Postprandial Blood Glucose Level Supplemented with Dietary Polyphenol as an Antidiabetic Agent for Diabetes Management

Ankita Nath, Ravi Kant Avvari

Department of Biotechnology and Medical Engineering, National Institute of Technology Rourkela,
Email- nath.ankita222@gmail.com

According to the recent statistics of 2021, type II diabetes or Diabetes Mellitus (DM) has become one of the top threats in the health aspect of urban lifestyle, causing more than 400 million people across the globe to suffer from the disease. Though medications exist for diabetes, they come up with severe side effects; thus, research interests are developing in naturally controlling blood sugar levels. Sometimes, patients are susceptible to the rapid rate of digestion of starch, the major carbohydrate source in our staple diet, leading to a sharp increase in postprandial blood glucose level, which may further lead to the development of diabetes. Despite numerous studies involving in vitro starch digestion, the details of the rate kinetics of the multienzyme hydrolysis of starch in in vivo conditions remain a mystery. This study explores mathematical simulation of starch digestion under in vivo conditions and further estimates the rate of glucose formation in MATLAB. Polyphenols obtained from plant-based sources have shown inhibitory effects on the key enzymes for starch digestion i.e, α-amylase and α-glucosidase, thus modulating the hydrolysis and affecting the postprandial glucose levels. Using mathematical models on Rate Law kinetics and Michaelis-Menten equations for enzyme kinetics, we have performed preliminary studies on the rate kinetics of the formation of these metabolites and the inhibition of the enzymes by the polyphenols. The results of the kinetic assay are graphically represented using MATLAB simulation and interpreted. Comparing the control and inhibition kinetic graphs, we can deduce that polyphenols, when in higher concentration, bind strongly to the enzymes in a competitive inhibition manner and thus reduce the rate of starch breakdown drastically. This comparative analysis will provide valuable insights into the potential mechanisms by which polyphenols may modulate the kinetics of starch digestion and thus act as antidiabetic agents. These findings may contribute to developing dietary strategies for managing postprandial glucose response and improving metabolic health in controlling diabetes.

Keywords: Starch digestion; Polyphenols, α-amylase, α-glucosidase, Enzyme inhibition, Mathematical models, Postprandial glucose, Diabetes management

IEMHEALS -24/O/060

The Fitness Tracker and Smartwatch Revolution: Transforming Health

C Selvaraj[1]*, Anitha Nallasivam[2]*, Mahalakshmi S[3*,] Anantha Subramanya Iyer K N[4]

[1]Jain Online, Jain Deemed to be University, Bangalore [2]Department of Management Eastern
[234]CMS Business School, Jain Deemed to be University, Bangalore
Email Id: selvaraj1971@gmail.com, dranithanallasivam@gmaIl.com ,
mitali.sengupta@uem.edu.in , mahalakshmi.s@cms.ac.in , asi@cms.ac.in

The popularity of fitness trackers and smartwatches represents a significant change in the way individuals manage their own health. These revolutionary gadgets have transformed the way people track their health by offering immediate information on activities, heart rate, sleep quality, and other metrics. Smartwatches provide a range of capabilities including step tracking, GPS navigation, and sophisticated health indicators such as ECG and blood oxygen levels. These features empower users to make sensible decisions concerning their fitness and health. With the continuous advancement of technology, wearables are providing more advanced insights and tailored suggestions, fundamentally transforming the way individuals monitor and accomplish their health objectives. This advancement not only improves individual well-being but also sets new benchmarks for monitoring health and managing one's lifestyle. This article will analyse the increasing recognition of fitness trackers and smartwatches, with a specific emphasis on how individuals use these gadgets to enhance and sustain their health. The analysis will assess the efficacy and influence of these technologies on individual well-being, providing insights into how users use this advancing technology to attain their health goals.

Keywords: *Fitness trackers, Smartwatches, Health management, Health indicators, Lifestyle management*

IEMHEAL-24/P/004

From Anxiety to Fluency: Understanding Stress in Second Language Learning

Deepa Rani

Department of Humanities and Social Sciences, MMEC, Maharishi Markandeshwar (Deemed to be University)
E-mail: deepumj122@gmail.com

Second Language acquisition (SLA) is a complicated process that depends on the exposure of a learner in multiple situations for effective way of language learning. Various studies discuss the impact of stress on the process of language learning. Nevertheless, various studies suggests that stress has a key role in shaping the process of acquiring skills, potentially impeding learners from reaching remarkable levels of proficiency by disturbing their ability to concentrate. Although stress can work as a source of motivation, its beneficial effect on learning is optimised when students actively participate in classroom activities. This can impede their capacity to draw advantages from the learning process and build substantial expertise through the act of producing errors. Stress manifests in diverse intricate forms, encompassing cognitive, psychological, emotional, and behavioural aspects that humans must manage in their daily existence. The aim of this study is to examine the impact of stress on the acquisition of a second language, employing both qualitative and quantitative research methods. The study investigated the subjective perception of stress among students and its impact on their language acquisition abilities. This was accomplished by the implementation of semi-structured interviews. The study strategy entailed conducting an initial assessment to create a baseline for stress levels, followed by monthly evaluations utilising standardised tests. Preliminary findings suggest a nuanced correlation between stress and language acquisition: moderate levels of stress may enhance motivation and performance, but extreme stress might detrimentally affect concentration and hinder the attainment of proficiency. An essential factor that influenced learning results was the comprehension of stress management strategies and individual coping mechanisms. This study deepens our comprehension of the intricate influence of stress in educational settings.

Keywords: concentrate, frustration, learning, knowledge, stress.

IEMHEAL-24/O/094

Bone Fracture Detection

Dr Geeta R Bharamagoudar

KLE Institute of Technology, Hubballi
E-mail: geetatotad@yahoo.co.in

The significance of accurate and timely diagnosis of bone fractures, a common and critical musculoskeletal injury affecting individuals of all age groups, cannot be overstated. The emergence of artificial intelligence (AI) and computer vision (CV) presents considerable potential for enhancing the detection and classification of fractures in medical imaging. This study evaluates the performance of three pre-trained Convolutional Neural Network (CNN) models – VGG16, ResNet50, and DenseNet121 – in the detection of bone fractures using the comprehensive FracAtlas dataset, which comprises a wide collection of X-ray images. Our comparative analysis revealed that ResNet50 outperformed the other models, achieving an impressive accuracy of 98.17%, followed by DenseNet121 with an accuracy of 95.73%, and VGG16 with an accuracy of 84.84%. These results underscore the superior performance of ResNet50 in bone fracture classification tasks. The high accuracy rates demonstrated by these models highlight the effectiveness of AI-driven techniques in improving the precision and reliability of orthopedic diagnoses. This research contributes to the field of medical imaging by providing valuable insights into the application of CNN models for bone fracture detection. The findings suggest that the implementation of specialized AI algorithms in clinical settings can significantly enhance diagnostic capabilities, ultimately leading to improved patient outcomes.

Keywords: Bone Fracture, AI-driven, Computer Vision(CV),VGG16, ResNet50,DenseNet121

IEMHEALS-24/O/107

Mitigating Hospital-Acquired Pneumonia: Evaluating the Impact of Closed-Loop Adiabatic Coolers on *Legionella* Transmission from Rooftop Open-Cooling Towers

Alomoy Banerjee[1] Kanad Banerjee[1] Grant Hall [1]

[1]*Paharpur Cooling Towers Ltd. Special Products Division*

Hospital-acquired pneumonia (HAP) is a significant concern within healthcare settings, contributing to increased morbidity, mortality, and healthcare costs. Among the diverse pathogens responsible for HAP, *Legionella* species, particularly *Legionella pneumophila*, pose a notable risk. This research investigates the connection between *Legionella* propagation from rooftop open-cooling towers and the incidence of HAP in hospitals. Open-cooling towers, prevalent in many hospitals for their efficient cooling capabilities, provide an environment conducive to the growth and aerosolization of *Legionella* bacteria. The cooling towers operate by exposing water to the air, allowing *Legionella* to multiply in the water droplets that are then expelled into the atmosphere. These aerosols can be inhaled by patients and staff, potentially leading to severe respiratory infections.

To address and mitigate this risk, we propose the transition from open-cooling towers to closed-loop adiabatic coolers. Closed-loop systems differ significantly from their open counterparts by recirculating the same water through a closed circuit, thus eliminating the exposure of water to the environment and significantly reducing the risk of aerosolized Legionella dissemination. In addition to containing water within a sealed system, closed-loop adiabatic coolers use air-cooled heat exchangers to manage temperature, which not only limits the growth of Legionella but also enhances energy efficiency and reduces operational costs.

Our comparative analysis demonstrates that hospitals switching to closed-loop adiabatic coolers experienced a marked decrease in Legionella contamination and a concurrent reduction in HAP cases. This transition represents a practical and effective measure to safeguard patient health by addressing one of the critical sources of Legionella exposure. The findings underscore the importance of adopting advanced cooling technologies in healthcare facilities to enhance infection control practices and promote a safer environment for patients and staff.

IEMHEALS-24/P/125

Addressing Healthcare Gaps In A Growing Population: Telehealth as a Sustainable Solution for India's overburdened Infrastructure

[1]Meenal Sharma,[2]Debolina Mitra, [3]Gyan Kiran,[4]Kesar Ladha, [5]Devika Mulchandani,[6] Dr. Udit Chawla

[1]Symbiosis Institute of Business Management, Pune, [2] Indian Institute of Management, Bangalore, [3] Heritage Business School, [4]Bhawanipur Education Society College, [5] The Calcutta Anglo Gujarati College, [6] University of Engineering and Management

E-mail: Meenalsharma32@gmail.com, Debolina.mitra@iimb.ac.in, Gyankiran2002@gmail.com, kesarladhaa@gmail.com, Devikamulchandani671@gmail.com, Dr.uditchawla@gmail.com

India's burgeoning population, currently exceeding 1.4 billion, is placing unprecedented strain on its healthcare infrastructure, exacerbating existing disparities and accessibility issues. The challenge of delivering equitable and efficient healthcare services is further compounded by the uneven distribution of medical resources, a shortage of healthcare professionals, and logistical barriers in remote areas. Thus, this study investigates the influence, adaption and effectiveness of the factors such as infrastructure, technology, literacy, trust, privacy, skilled employees, and government assistance. In this context, telehealth emerges as a transformative solution capable of addressing several critical gaps in the healthcare system. Telehealth, leveraging digital technologies to deliver medical services remotely, offers a sustainable approach to overcoming geographical and resource constraints. A structured questionnaire method with purposive sampling was used for data collection. It facilitates access to quality healthcare for underserved populations, including those in rural and semi-urban regions, who otherwise face significant challenges in accessing traditional healthcare facilities. By enabling virtual consultations, remote diagnostics, and continuous monitoring, telehealth can mitigate the impacts of infrastructure deficiencies and enhance healthcare delivery efficiency. The integration of telehealth into India's healthcare system can also contribute to a more balanced distribution of medical resources. Through tele-consultations, specialists can provide services to a wider patient base without the need for physical relocation, thereby addressing the shortage of healthcare professionals in underserved areas. Additionally, telehealth platforms can support ongoing education and training for local healthcare workers, further strengthening the healthcare system's capabilities. However, the widespread implementation of telehealth in India requires overcoming several barriers. These include ensuring reliable internet connectivity across diverse regions, addressing digital literacy issues among patients and providers, and integrating telehealth services with existing healthcare infrastructure. Policy frameworks must be adapted to support telehealth practices, ensuring data security and privacy while promoting equitable access. Overall, telehealth represents a promising and sustainable solution for addressing healthcare gaps in India's overburdened system. By enhancing accessibility, optimizing resource distribution, and supporting continuous care, telehealth can play a pivotal role in transforming India's healthcare landscape and improving health outcomes across its diverse population. Addressing the challenges associated with telehealth

implementation will be crucial to realizing its full potential and ensuring its benefits are equitably distributed throughout the country.

IEMHEALS-24/O/140

Investigation of the Medical Image Modalities to Detect the Abnormalities In the Spinal Cord Using Thresholding Techniques

Manjima Saha, Goldina Ghosh

Department of Computer Applications and Science,
Institute of Engineering & Management (IEM)
University of Engineering & Management (UEM)
Email ID: manjima.saha@iem.edu.in

Different medical image modalities are required to detect different types of diseases or abnormalities. Like as, X-rays are used for detecting any fracture in a bone, CT is used for testing of diseases present in bones and soft tissues, even MRI is mainly used for detecting any lesion in soft tissues. The imaging modalities in nuclear medicine are PET and SPECT. Hence it is observed that different modalities are required as per the patient's severity of the disease. Given the versatility of these imaging modalities in diagnosing various regions of the human body, this study specifically targets the spinal cord to evaluate their effectiveness in identifying spinal abnormalities. Currently the experiment has been done with the MRI images. The target of this work is to classify the different parts of the image by determining the similarity among the pixels based on the pixel intensity levels. Instead of processing the entire image only the important portion of the image can be segmented out for further analysis. In order to overcome this process different Thresholding techniques are used here. The selected methods are Binary/Global, Otsu, Adaptive and Standard Deviation. The difference in the resultant value have also been discussed in this paper. In the Binary method single value is considered to partition the image, whereas in the Otsu's method the pixels are separated into foreground and background. The Standard Deviation of the pixel values is used as a threshold value to analyze the image and in Adaptive method, threshold values are automatically selected as per the image pixels. For further clarity, Bio-inspired Optimization Algorithm has been incorporated. Hence from the segmented value it was observed that different threshold techniques give a clear view of the different segments of the image. This resultant value will help in further decision making of various deformations.

CONTRIBUTED POSTERS

IEMHEALS-24/PO/01

Advanced Treatment of Spinal Cord Injury Using Stem Cell Based Engineering

[1]Akanksha Ghata, [2]Sumedha Pal

[12]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata

Email: akankshaghata@gmail.com , palsumedha06@gmail.com

This poster consists of an in-depth analysis of effective use of stem cells in peripheral neural tissue engineering on spinal cord injury. This deals with the effective use of stem cell-based tissue engineered nerve grafts on spinal cord injury and its effect. Spinal neurons with long axons play critical roles in transmitting signals between the brain and the rest of the body, controlling our movement and sensory perception. Due to injury, it can cause irreversible damage to the axon and neurons and can lead to prolonged or permanent loss of mobility. Artificial development and deployment of the stem cells in the affected region can result in faster healing of those cells resulting into quicker recovery of the patient. The human neural stem cells (hNSCs) derived from the pluripotent stem cells are an essential source of neurons and glial cells and thus are used for nerve regeneration and have shown progress in promoting spinal cord regeneration. The genetically modified hNSCs expressing half-dose of a gene SOX9 resulted in robust neuronal differentiation and maturation after transplantation which promotes neural circuits reconstruction in the spinal cord within a shorter period of time. It also remarkably reduced glial scar accumulation, facilitating long-distance axon outgrowth. This innovative approach offers promising new therapeutic opportunities, providing more effective autologous stem cell therapy for severe traumatic spinal cord injury, while minimalizing immune rejection risks and ethical concerns.

Keywords: human neural stem cells, spinal cord injury, SOX9 gene, neuron damage, axon regeneration, tissue engineering.

IEMHEALS-24/PO/02

Advancement and application of sustainable bioplastics

[1]Soumyajit Banerjee, [1]Arjya Kumar Paul, [1]Mayukh Datta, [1]Pradipta Sau

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: banerjeerupa12@gmail.com, arjya2004@gmail.com, mayukhdatta45@gmail.com, pradiptasau1234@gmail.com

Plastics are a big environmental issue because they don't break down easily, leading to long-lasting pollution from tiny particles called microplastics. Cities like Delhi, Chennai, and Mumbai in India generate a lot of plastic waste. One potential solution is to use microbes to create biopolymers, a type of eco-friendly plastic. Research on this has been particularly active in countries like India, China, the U.S., South Korea, and Brazil between 2018 and 2023. To make this solution affordable, it's important to find microbes that can use cheap and easily available materials. Polyhydroxyalkanoates in short PHAs are a type of biodegradable polyester made by bacteria, especially when they don't have enough nutrients like phosphorus, nitrogen, or oxygen. PHAs are flexible because they can be made from a variety of materials, including agricultural waste, fatty acids, olive oil leftovers, fermented molasses, and waste from paper or palm mills. Bacteria like *Pseudomonas sp.*, *Rhodobacter sphaeroides, Rhizobium sp., Ralstonia eutropha,* and *Enterobacter sp.* can produce PHAs from these materials.This versatility has led to the development of various biodegradable and bio-based plastics, like PLA, PHAs, PBS, and starch blends. PLA, another biodegradable plastic, is commonly made from the fermentation of sugars or starch from plants like corn, sugarcane, wheat, and rice straws. These plants contain polysaccharides like cellulose and hemicellulose, which can be broken down into sugars through chemical or enzymatic processes. These sugars can then be fermented into lactic acid, which is used to make PLA. Another attractive biodegradable polymer is PBS, a thermoplastic polyester that can be made from food waste or similar sources as PLA, as well as from algal, plant, or vegetable oils. Microbial biopolymers, like PHAs and PLA, offer promising eco-friendly alternatives to traditional plastics, leveraging agricultural and waste materials to reduce environmental impact. By optimizing the use of these materials, we can make biodegradable plastics more affordable and widely adopted.

Keywords: Sustainable Biopolymers, Genetically Modified Microorganisms, Polyhydroxyalkanoates, Environmental Impact, Renewable Resources

IEMHEALS-24/PO/03

Application of stem cells in the treatment of liver cancer

[1]Diya Samanta, [1]Sambiti Chattopadhyay, [1]Priyanshu Hazra

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata

Email: - diya6samanta@gmail.com , sambitichattopadhyay@gmail.com, priyansuhazra92@gmail.com

A disease caused due to the deregulation of cell growth. Yes! It's cancer- also known as malignant neoplasm, a broad group of diseases involving unregulated cell growth which forms a tumor. Liver cancer is the sixth most diagnosed cancer, yet it ranks second in cancer mortality rate for men. Our topic of discussion is exploring the unique biology of liver cancer stem cells which will open new avenues for targeted therapies and personalized medicine. The first report from Bruce et al. regarding Cancer Stem Cell (CSC) has demonstrated the relatively sparse population of stem-like cells in acute myeloid leukemia (AML). Discovery of leukemic CSCs lead to further identification of CSCs in various types of solid tumor. Extensive research on CSCs has attempted to identify these in multiple types of solid tumors in brain, head, neck, lung, liver, etc. and based on these researches we hypothesize the initiation and development of most malignant tumors rely greatly on CSC population. Recent studies indicated that stem cell-related markers or signaling pathways, for instance, Epithelial Cell Adhesion Molecule (EpCAM), Aldehyde Dehydrogenase (ALDH), CD133, and Notch Signaling, contribute to the beginning and development of various liver cancer types. Most importantly, CSCs are noticeably resistant to conventional therapeutic approaches and current targeted therapeutics. Therefore, it is believed that selectively targeting specific markers or signaling pathways of hepatic CSCs is a strategic and effective way to treat chemotherapy-resistant liver cancer. Thereby, we conclude reminding the fact that targeting the CSC compartment should have limited toxicity to normal stem cells. It should be noted that normal stem cell niche in adult somatic tissues play an important role in maintaining stem- like rate and regulating cell fate. Due to similarity between cancer stem cells and normal stem cells, drugs which target cancer stem cells niche may also give rise to several health issues. With an emerging understanding of Liver Cancer Stem Cells biology, it is anticipated that more improved and targeted therapies will be developed in near future.

Keywords: EpCAM, ALDH, CD133, Notch Signaling, hepatic CSCs

IEMHEALS-24/PO/04

ARTIFICIAL INTELLIGENCE IN HEALTHCARE - Opportunities for Artificial Intelligence In Advancing Precision Medicine

[1]Nirmalya Kusum Ghosh

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - Nirmalyaghosh57@gmail.com

Artificial Intelligence is a set of programs or advances that enables us to perform significantly advanced functions that affixes the essentials of our everyday lives. Advances on therapeutic grounds, includes the future prospects of machine learning (ML), deep learning (DL), and artificial intelligence (AI) in precision medicine. The accessibility of AI, permits us to discover new drugs, establish imaging, health records, and improving workflow over time. Highly Advanced technologies in healthcare results in the upcoming addition of biomedical data, such as genome-wide sequencing (GWS), new medical images, or drug disruption screens of healthy, developing and diseased tissue. In the past few years, discussions like genetic diseases and cancer, have been benefitted in great amount. Databases of patients and artificial intelligence, makes up a great coordinate in creation of theories with respect to treatment of the disease. The debate of signaling and transcriptional networks connecting between the healthy, diseased, stromal and immune cells complexes the development of related biomarkers based on a single gene or protein. The outcome of chromosomes didn't translate into a sum of new drugs. The pharmaceutical industry announced a rejected output on the basis of the new drug approved despite the increasing rate of commercials on drug research and development. Hence, machine learning and recent technologies, Artificial Intelligence are developing with proactive inventions. Precision medicines is to predict the best treatment, drug responses when research over with the help of artificial intelligence advancements, creates revolutionary outcomes. New invention in pattern recognitions and image extracting have enabled discoveries between AI technology and modern pathology. Formulation in Electronic Health Records have made drastic changes in the past years and produces thesis or records that benefits the whole worlds. Historically, AI and systemically biology have mixed together to facilitate the world with applications of precise medicine approaches.

Keywords: - Artificial Intelligence (A.I.), Machine Learning (ML), Deep Learning (DL), Precision Medicine, Genome Wide Sequencing (GWS)

IEMHEALS-24/PO/05

Biotechnology- It's Application in Various Fields

[1]Aratreeka Pahari, [1]Asmita Sinha, [1]Rikta Maity

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - aratreekapahari@gmail.com , asmitasinha313@gmail.com

The term Biotechnology refers to the use of living organisms or their products to modify human health. Its application in various fields are: -In Agriculture, In medicine, In Animals and so on. In Agricultural fields, Agro-chemical based Agriculture, Organic Agriculture farming and genetically crop-based agriculture. In Medicine, at present 30 recombinant therapeutics have been approved globally and 12 of these are presently being marketed in India some are: - Human Insulin, Streptokinase, Human Growth Hormone and so on. In Animals, the animals are called Transgenic Animals, Animals that have had their DNA Manipulated to process and express an extra gene. Example of transgenic animals are cow, rats, mice and so on. 95% transgenic animals are mice. The first transgenic cow is Rosie.

Gene Therapy is a field in biotechnology, it aims to cure an inherited disease by providing the patient with a correct copy of defective gene. The first clinical Gene Therapy was given in 1990 to a four-year-old girl with Adenosine Deaminase (ADA Deficiency). Another wide field of Biotechnology is Molecular Diagnosis, it refers to the act or process of determining the nature and cause of a diseases through evaluation of patient history, examination and review of laboratory data. Some methods of molecular diagnosis are PCR-Polymerase Chain Reaction, ELISA- Enzyme-linked immunoassay, DATA Sequence.

IEMHEALS-24/PO/06

Cancer cells and it's regenerative medicine

[1]Sapna Singh

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - sapnasinghh71@gmail.com

The cells in the human body that have the tendency to develop into many cell types or more precisely, the cells that can divide and renew themselves over a period of time are STEM CELLS. They survive much longer than the ordinary cells with a higher chance of accumulating genetic mutations. It might take a certain number of mutations for a single cell to lose control over the self-renewal and growth and become the rising source of CANCER. Certain theories and researches stated that tumors were linked to embryonal tissue growth, culminating in a comprehensive "embryonal rest" theory put forward by Julius Cohnheim in 1875. This theory highlights the fact that- cancers arise from the activation of dormant embryonic stem cells present throughout the human body. In 2003, Michael Clarke of the University of Michigan and now at Stanford, found cancer stem cells in breast tumors and demonstrated that most other cells in the tumor were incapable of seeding growth on their own, Similar discoveries in brain cancer, colon cancer, bone cancer and melanoma. The point being, if a few errant stem cells are the centre of the origin of cancer. Generally, these treatments target fast growing cells, which might leave the slow cycling stem cells untouched. Because they may be relatively protected from current treatment strategies, cancer stem cells are thought to be responsible for resistance to chemotherapy and the recurrence of disease. It might explain why many treatments that reduce tumor mass fail to cure patients of cancer. Cancer immunotherapy is one of the regenerative medicines of cancer treatment. The process of directing, engineering or regenerating human cells to establish human cells is known as cancer immunotherapy. Cancer immunotherapy was shown to be very efficient at treating blood cancers, both academia and industry across the globe are now demonstrating the wide potential of these therapies in solid tumors as well. This brings new hopes to patients with cancer previously thought to be incurable. C3i is a Montreal-based contract development manufacturing organization specialized in cell and gene therapy. Once working solely on cancer immunotherapy, C3i was recently mandated to work on regenerative medicine as well, and now operates the only cGMP manufacturing unit with commercial capacity in cell and gene therapy in Canada. However, new strategies are now at the realm of targeting cancer stem cells, which maybe a very small percentage of total tumor mass. In combination with current treatments,however, these new treatments may lead to a more complete and durable response. A recent study completed by Markus Frank, Assistant Professor at Harvard Medical School, and Associate Faculty member of HSCI, identified a class of stem cells that initiate melanomas (skin cancer) in an animal model, and identified an antibody that slowed tumor growth by specifically targeting these stem cells. It was a first-time demonstration of this new therapeutic strategy.

IEMHEALS-24/PO/07

Diet, Nutrition, Exercise and The Prevention of Diabetes

[1]Sonam Kumari, [1]Kaushiki Chowdhury, [1]Sampurna Mitra, [1]Soutri Bose

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - deepakdvc20@gmail.com , dgp.kau@gmail.com , me.sampurna.mou@gmail.com, soutribose321@gmail.com

According to the 10th International Diabetes Federation (IDF), there is a global diabetes prevalence of nearly 10% (573 million), and the cases can also reach up to 783 million by 2040. According to a survey, diabetes caused 6.7 million deaths in 2021. Unlike most metabolic diseases, it is also treatable and preventable, but not curable. Diabetes is caused when the body is not able to regulate blood sugar properly, either due to insulin secretion or sensitivity (T1D) or (T2D), two types of traditional diabetes. Diabetes (T2D) can lead to foot problems, heart strokes, and nerve damage, which could lead to amputation if not treated. Diabetes prevention and control will yield great societal and economic benefits. Blood sugar can be controlled with healthy eating (protein) and exercise at the initial stages. Eating protein from meat, eggs, fish, or tofu with carbs can slow that flow of glucose, help stabilise blood sugar, and then release it into the blood stream. This is called the insulinotropic effect, and it promotes insulin secretion. Exercise such as dance, resistance activities, and weightlifting lowers the glucose level in the blood, which boosts our body's sensitivity to insulin. Thus countering insulin resistance. Also, whole grains, berries, broccoli, and nuts are the doctors' preferred foods for curing diabetes.

Keywords – diabetes (TD1) (TD2), IDF, metabolic, glucose level, insulin resistance, resistance activity, weightlifting, insulinotropic effect, blood sugar, protein, sensitivity.

IEMHEALS-24/PO/08

Human induced pluripotent stem cells for studying mitochondrial diseases in the heart.

[1]Teesta Kar

[1]*Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata*
Email: - teestakar447@gmail.com

Mitochondria is well known as the powerhouse of eukaryotic cells, as they are the site of oxidative reactions that results in the formation of ATP, the source of energy used by the cell in its various cellular activities. Besides this, the mitochondria also plays multiple roles in physiology including, waste removal, fission, fusion, biosynthetic growth, stress signaling and the balance of cellular life and death. Mitochondrial function play a vital role for nearly all cells and tissues, from highly proliferative tumors to highly aerobic post-mitotic tissues. Hence, mitochondrial dysfunction can be found across many cell types and in a wide range of human diseases. Heart is a high-energy consuming organ, and hence contains more mitochondria than any other tissue in the body. In various heart failure cases, mitochondrial dysfunction can be observed. The introduction of Human Induced Pluripotent Stem Cells (iPSC) technology provides a unique characteristic for investigation human diseases. Reprogramming donor cells using an integrating virus can yield pluripotent iPSCs capable of differentiating into diverse cell types. This procedure offers various advantages over existing traditional models. One of the few are that, they provide unlimited sources of human cardiac cells, which can be expanded, matured and maintained in micro propagation; when the tissue or cell is grown in an artificial medium separated from the parent organism, for over 200 days. The foundation of this procedure resulted in affordable, high quality induced pluripotent stem cell-derived cardiomyocytes (iPSC-CMs) for mass production for variety of applications, such as, in regenerative medicine, diagnostics, drug toxicity and efficacy testing. Currently, there are no reliable mitochondrial treatments, as it is majorly halted by broad clinical predictions, genetic heterogeneity and incomplete discoveries of basic mitochondrial phenotype-genotype relationships. This abstract summarizes the limitations and the advantages of using iPSC-CMs to study mitochondrial diseases in the heart.

Keyword: - Mitochondria, Adenosine Triphosphate (ATP), Mitochondrial Dysfunction, Heart, Human-Induced Pluripotent Stem Cells (iPSC), Micro-Propagation, Induced Pluripotent Stem Cell-Derived Cardiomyocytes (iPSC-CMs), Mitochondrial Treatments, Mitochondrial Diseases.

IEMHEALS-24/PO/08

Integration of Ayurveda with Modern Medical Science

[1]Pratyusha Nandi, [1]Saraswata Tarafdar, [1]Swapnil Chakraborty, [1]Banhita Chakraborty

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - pratyushanandi2006@gmail.com

"Prevention is better than cure." This is one of the base philosophies of Ayurveda. The prevention-oriented approach and the emphasis on the overall physical, mental and emotional wellbeing of Ayurveda compliments the acute, scientific, systemic and cure-oriented approach of Modern Medical Science. Modern Medicine treats patients based on diseases and often ignores the rudimentary lifestyle, stress and nutrition of the patients which are a major factor for chronic diseases. Ayurveda on the other hand treats patients based on their unique constitution (Prakriti) and invokes the significance of food to evoke emotions of happiness, pleasure and love ascending its nutrition value. Ayurveda's holistic approach of maintaining vitality through lifestyle and nutrition and Modern Medical Science's promise to cure complex diseases through medicines and advance scientific treatments when integrated together hold a huge promise to improving the vitality and lifestyle of people. Ayurveda offers potential solutions to various problems and diseases through a plant based medicinal approach which is also very cost effective. Ayurveda also has limitations because of its approaches as certain plants are not available in many parts of the world and their mixture and nature is very complex. Modern Medicine has found it difficult to accept Ayurveda because of the lack of evidence-based research and not following the systemic regulatory requirements. Research on the scientific functionality of Ayurvedic approaches and understanding its unique and complimentary nature to Modern Medicine will help in integrating them and create a new approach that would promise to minimize the risk of diseases with a healthy lifestyle and fooding habit and also cure any diseases with the help of medicine and technology.

Keywords: - Prevention-oriented, Cure-oriented, Lifestyle, Nutrition, Scientific, Evidence-Based

IEMHEALS-24/PO/09

Male Y chromosome extinction theory

[1]Syeda Sarah Parvin, [1]Sonusree Sarkar, [1]Soumi Chakraborty,[1]Ahona Sarkar

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - sarahsuhana2211@gmail.com

Gradual degradation seems inevitable for non-recombining sex chromosomes. This has been supported by the observation of degenerated non-recombining sex chromosomes in a variety of species. Y chromosomes are genetically degenerate, having lost most of the active genes that were present in their ancestors. The human Y chromosome has also degenerated significantly during its evolution, and theories have been advanced that the Y chromosome could disappear within the next ~4.5 million years, if the degeneration rate it has experienced continues. All of these involve a reduction in effective population size as a result of selective events occurring in a non-recombining genome, and the consequent weakening of the efficacy of selection. However, recent studies suggest that this is unlikely. Conservative evolutionary forces such as strong purifying selection and intrachromosomal repair through gene conversion balance the degeneration tendency of the Y chromosome and maintain its integrity after an initial period of faster degeneration. We will discuss the evidence both for and against the extinction of the Y chromosome. We will also discuss potential insights gained on the evolution of sex-determining chromosomes by studying simpler sex-determining chromosomal regions of unicellular and multicellular microorganisms.

KEYWORDS: How the Y chromosome determines human sex,X-Y crossing,evolution and microorganism,the degrading human Y, Rodents with no Y chromosome results.

IEMHEALS-24/PO/10

MITOCHONDRIAL BIOLOGY - Human Induced Pluripotent Stem Cells for Studying Mitochondrial Diseases in The Heart

[1]Sukanya Das, [1]Anwesha Ghosh

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata

Email: - sukanyadas335@gmail.com, anweshagh1906@gmail.com

Mitochondria is well known as the powerhouse of eukaryotic cells, as they are the site of oxidative reactions that results in the formation of ATP, the source of energy used by the cell in its various cellular activities. Besides this, the mitochondria also plays multiple roles in physiology including, waste removal, fission, fusion, biosynthetic growth, stress signaling and the balance of cellular life and death. Mitochondrial function play a vital role for nearly all cells and tissues, from highly proliferative tumors to highly aerobic post-mitotic tissues. Hence, mitochondrial dysfunction can be found across many cell types and in a wide range of human diseases.

Heart is a high-energy consuming organ, and hence contains more mitochondria than any other tissue in the body. In various heart failure cases, mitochondrial dysfunction can be observed. The introduction of Human Induced Pluripotent Stem Cells (iPSC) technology provides a unique characteristic for investigation human

diseases. Reprogramming donor cells using an integrating virus can yield pluripotent iPSCs capable of differentiating into diverse cell types. This procedure offers various advantages over existing traditional models. One of the few are that, they provide unlimited sources of human cardiac cells, which can be expanded, matured and maintained in micro propagation; when the tissue or cell is grown in an artificial medium separated from the parent organism, for over 200 days. The foundation of this procedure resulted in affordable, high quality induced pluripotent stem cell-derived cardiomyocytes (iPSC-CMs) for mass production for variety of applications, such as, in regenerative medicine, diagnostics, drug toxicity and efficacy testing. Currently, there are no reliable mitochondrial treatments, as it is majorly halted by broad clinical predictions, genetic heterogeneity and incomplete discoveries of basic mitochondrial phenotype-genotype relationships. This abstract summarizes the limitations and the advantages of using iPSC-CMs to study mitochondrial diseases in the heart.

Keywords :Mitochondria, Adenosine Triphosphate (ATP), Mitochondrial Dysfunction, Heart, Human-Induced Pluripotent Stem Cells (iPSC), Micro-Propagation, Induced Pluripotent Stem Cell-Derived Cardiomyocytes (iPSC-CMs), Mitochondrial Treatments, Mitochondrial Diseases.

IEMHEALS-24/PO/11

Optimizing Induced Pluripotent Stem Cells (iPSC) Differentiation for treating Parkinson's Disease

[1]Srijoni Sarkar, [1]Moupiya Mondal

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - srijoni.s06@gmail.com

This study addresses a method for differentiating human-induced pluripotent cells (iPSCs) into midbrain dopaminergic (mDA) progenitors which offers an assuring approach for treating Parkinson's disease (PD). Parkinson's disease is a progressive neurodegenerative disorder that is primarily induced by loss of dopaminergic neuronal projections from Substantia Nigra in the midbrain to the Striatum leading to motor deficits. Symptomatic relief is the best traditional treatments could provide to us. Therefore, the need for regenerative therapies is increasing in a large number. The researchers used a special method called CTraS along with three specific inhibitors to help iPSCs differentiate and mature into mDA progenitors. The mDA progenitors were transplanted PD mice models which was induced by a chemical called 6-hydroxydopamine. The study's main objective was to observe the transplanted cells' differentiation and therapeutic potential to help improve motor functions in the mice. The results showed that over 80% of the treated cells expressed markers of mDA progenitors and further differentiated into A9 dopaminergic neurons in vitro. After transplanting these cells in the PD mice models, more than 90% became mDA neurons and about 15% matured without forming tumors. The mice showed evident improvement in their motor functions demonstrating the efficiency of this method for cell therapy in PD. In conclusion, the CTraS-based differentiation is an achievable option for generating mDA progenitors from iPSCs. This method offers high efficiency and thus provides a potential alternative for PD treatment through cell transplantation. The study highlights the perspective of using iPSC-derived therapies in tackling neurodegenerative disorders and emphasize the need for more research to improve these techniques for use in clinical applications.

Keywords: induced pluripotent cells (iPSCs), midbrain dopaminergic (mDA) progenitors, neurodegenerative disorders, regenerative therapies, CTraS method, A9 dopaminergic neurons, potential alternative, cell transplantation

IEMHEALS-24/PO/12

Overarching Complete Analysis On Cervical Cancer

[1]Suhina Choudhury, [1]Ayushi Ghosh
[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - suhinachoudhury2006@gmail.com

Cervical cancer is the most common cancers threatening women's health. Each year, more than half a million women are diagnosed with cervical cancer and the disease results in over 300000 deaths worldwide. The freight of cervical cancer falls on the women who lacks access to health service specially in lower- and middle-income families. In high income countries treatment is preliminary done by locally available resources which involve radical hysterectomy or chemoradiation. Women with low risk and at the early stage of the disease are cured by conservative fertility-preserving surgical procedures. The advancement in radiotherapy technology that is intensity modulated radiotherapy has decreased the toxic nature of treatment for women affected with this advanced disease. The overall prognosis for women with metastatic and recurrent disease remains deficient with the assimilation of the anti-VEGF agent bevacizumab which has been able to extend overall with a survival beyond 12 months. Novel immunotherapeutic approaches became similar to that of tumor that finally processed out a satisfying result so far. Vaccines are effective but not sufficient for cervical cancer. This applies for HPV too.70% of cervical cancer cases are cured by two vaccines. HPV vaccines are capable of preventing 90% of genital warts. HPV vaccines have shown effectiveness and safety in sexually transmitted diseases. The dosage of Cervical Cancer vaccine are as follows : -In 9-14 years of age group: - Two successive doses are given in a time gap of 6-12 months. In 15-25 years of age group: - Three successive doses are given the second dose is given at an interval of a month and the 3rd dosage is given after 6 months. Lastly, we can conclude about the attitudes of parents, healthcare provides towards the HPV vaccine and summation of controversial issues, covering HPV vaccination.

Key words: - cervical cancer, human papillomavirus, radiotherapy, radical hysterectomy, chemoradiation, bevacizumab, novel immunotherapeutic approaches, vaccines

IEMHEALS-24/PO/13

Placental stem cells: a more novel and promising alternative to embryonic stem cells in regards to application in regenerative medicine and tissue engineering

[1]Sauhadri Ghosh

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - sauhadrighosh20@gmail.com

This paper consists of an in-depth analysis on the more advanced applications of Placental Stem Cells (PSCs) over Embryonic Stem Cells (ESCs) in the fields of Regenerative Medicine and Tissue Engineering. This study conducts a comprehensive comparison between the two types of stem cells and highlights this through various aspects like: derivation, culture, differentiation, transplantation, core usage and difficulties faced while obtaining the stem cells from the two sites respectively. This paper also addresses the ethical concerns associated with ESCs and proposes PSCs as a promising alternative. This work aims to demonstrate their similarities like: Self-renewal, Plasticity and Expression of stem cell markers etc., their dissimilarities like: Disparity in sources, Varied growth rates, Distinctive cell potencies etc. while majorly focusing on the disparities between them regarding their applications as well. The findings which we have gathered from separately reading various research papers regarding the two topics and conducting comparative studies are : PSCs which can be easily derived from discarded placental tissue after childbirth; are a more feasible option to obtain stem cells without raising any ethical concerns whereas; ESCs which are obtained from blastocysts; which is the early form of a developing embryo; makes ESCs a harder to obtain and ethically controversial source than PSCs, Cultures of PSCs have exhibited faster growth rates of differentiating cells when compared to cultures of ESCs , ESCs have a higher risk of forming teretomas and rejection during transplantation whereas PSCs have immunomodulatory properties which reduce both the above mentioned risks. Even though the paper tries to demonstrate PSCs to be a more novel option, it also acknowledges the challenges associated with procuring both the cell types; as obtaining both, require optimized techniques.

Keywords – PSCs, ESCs, Ethical Concerns, Applications, Challenges

IEMHEALS-24/PO/14

Robotics in surgery

[1]Sandipani Chakraborty, [1]Riitom Modak, [1]Tuhina Karan, [1]Ankita Sarkar

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - sandipanichakraborty06@gmail.com,

In the last decade, humans have made great progress in technology, especially in artificial intelligence. It is also worth noting that it has also turned to surgery, and thus now we have robotic surgeries. In this article, we will talk about how robotic surgery has influenced the medical field. The first robotic surgery was performed in 1985. Since then, robotic surgery has become a major surgical procedure, almost synonymous with Minimally Invasive Surgery (MIS), and has been accepted in many specialties to reduce patient mortality, improve postoperative care, and shorten recovery time. The Da Vinci Surgical System is a surgical robot designed to help surgeons perform MIS with more precision, accuracy and control than the traditional surgeries. Something to note here is that robots do not actually perform the surgery, they just help the surgeons do the operation. RS also has many advantages like better access to the surgical site, three-dimensional images that are better understood, smaller incisions, better alignment, allowing the surgeon to perform more surgeries in less time, which makes RS a popular method. However, despite the many advantages of robotic surgery, it also has some disadvantages like high surgical costs, frequent equipment maintenance, extensive training and practice required for the surgeon to know how to use robotics, and most importantly, depending immensely on technology. The technology can reduce traditional surgical skills. However, the pros definitely outweigh the cons and as RS becomes more popular, the prices will come down. India currently has 66 centres and 71 robotic units with over 500 medical professionals. Over 13,000 robotic surgeries have been performed in India so far. Robotic surgery is still evolving in India.

KEYWORDS- Artificial Intelligence, Robotic Surgery, Minimally Invasive Surgery (MIS), Da Vinci Surgical System, Advantages and Disadvantages of Robotic Surgery

IEMHEALS-24/PO/15

STEM CELL IN CANCER TREATMENT

[1]Iman Datta, [1]Priyabrata Pattanayak, [1]Sk Afraj Alam,[1]Emon Dhar

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - dattaiman56@gmail.

In today's world cancer is developing as a leading cause of death both in developing and developed countries, but stem cell treatment is the beacon of hope for cancer patients. The application of this treatment on cancer is discussed below. Induced Pluripotent Stem Cells(iPSC) are derived from patient's own cell and administered personalized cancer treatment. Here one adult cell is programmed in such way that it acts like an embryonic cell, thereby the chance of immune rejection becomes very minimum. (CAR) t-cell therapy is revolutionized treatment for blood cancer. It increases the potential of a normal human's t-cell, hence it can better target and destroy cancer cells in better way. Exosome released from stem cells can deliver the therapeutic molecules to the stem cell directly. Hematopoietic Stem Cell Transplantation (HSCT), the patient's stem cell is replaced with a healthy stem cell to treat blood cancer. But donor stem cells can attack residual cancer cells, leading to a Graft-Versus-Tumour (GVT) effect. CRISPR-Cas9 acts like a molecular-scissors. Here, 'Cas 9' is an enzyme which cut DNA in specific position. It can edit gene which is responsible for cancer also and can modify stem cell to produce more efficient immune cell that target cancer cells. The stem cells can be as much effective as those of the pharmaceutical units manufacturing situ drugs, which can release anti-tumour agent for longer periods of time and can overcome the limitations of various kinds of cancer therapies. Additionally, stem cell can be used in regenerative medicine, immunotherapy and drug screening. Combining stem cells with other therapy, we can enhance the potentiality of cancer treatment with negligible side effects. This abstract focuses on the recent development in medical science towards stem-cell based cancer treatment and summarizes treatment's advantages, opportunities and the upcoming progressive future of cancer treatment.

Keywords: Induced Pluripotent Stem Cells(iPSC), (CAR) t-cell therapy, Exosome, Hematopoietic Stem Cell Transplantation (HSCT), Graft-Versus-Tumour (GVT), CRISPR-Cas9.

IEMHEALS-24/PO/16

Synthetic Diagnostic: Weaving Technology into The Fabric Of Health

[1]Saagar Sengupta, [1]Torsa Mondal, [1]Alokparna Mitra,[1]Swapnoneel Mondal
Email: - senguptasaagar2711@gmail.

This abstract presents the development of an innovative medical care software aimed at enhancing diagnosis and pre-diagnosis processes in the Indian and Asian healthcare sectors. The software integrates data on prevalent regional diseases from sources like NLM, INHATA, Google Scholar, and GHDx, using a GPT API Key to create a specialized AI tool. This tool processes health data to diagnose patients based on their inputs and recent medical certifications, offering probable health conditions and recommended next steps. Patients begin by typing out or using the mic button to talk about the symptoms, after which the software provides tailored queries and recommendations. It also suggests nearby medical facilities and low-dosage medications with minimal side effects for non-critical cases, potentially reducing the need for immediate doctor visits. In emergency situations, these medications can help stabilize conditions until further medical help is available.The software incorporates real-time image processing to interpret medical reports such as blood tests and blood pressure readings, significantly reducing diagnostic time and assisting in pre-diagnosis during long wait times at healthcare facilities. By providing preliminary reports, it helps expedite consultations and improves patient outcomes. Future enhancements include facial recognition technology to detect visible symptoms, regular health monitoring, home assistance, medication delivery, and automated alerts for missed appointments. The inclusion of native language support aims to improve patient communication and accessibility.

KEYWORDS: Healthcare, Diagnosis, Automation, Consultancy, AI based Recognition, Medical Data Analysis.

IEMHEALS-24/PO/16

The Alchemy of Calm: Exploring rare remedies for stress and panic attack recovery

[1]Soumee Bhaumik, [1]Sarvani Jhantu Saha, [1]Dibakar Roychoudhury

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - sahasarvani30@gmail.com

Stress is a phenomenon experienced by many individuals. It is a natural human response essential for addressing challenges and threats, influencing both mental and physical well-being. Stress is characterized by the body's production of chemicals and hormones like cortisol, epinephrine, catecholamine and adrenocorticotropic. While some stimuli may cause discomfort increasing the stress levels in the body, there are certain external agents and techniques which provide sensory relief and help to reduce the stress levels of the body bringing it back to its stable state. This paper aims to explore the physiological and psychological effects of stress, the diverse stressors contributing to its prevalence and how to overcome them.Stress can invariably lead to several mental disorders it has been observed in many adolescents that there is a certain relationship between psychopathology and panic attacks. The root cause of these disturbances is stress and what triggers this is known as the Stressors. Stressors can be categorized into various types: physical, social/relational, financial, organizational and significant life events. The role of external stimuli in causing stress plays a more powerful role in neurodivergent people. This paper shows how external stimuli such as loud noise, bright light, crowded spaces can cause meltdowns. Due to their heightened sensitivity, this can lead to sensory overload, therefore increasing stress levels in the body. This paper explores the various objects and methods such as the 54321 rule that can reduce stress levels in the body such as appeasing the sensory nerves via acknowledging five things to see, four things to touch, three things to hear, two things to smell and one to taste. Sensory organs, if given the right stimuli, can oppose stress. The correlation between trauma and stress shows that not only physical but also mental stimuli can lead to stress.

Keyword: Stress, Stressors, Sensory relief, Neurodivergent, Panic Attack, Mental disorders, 54321 rule, Trauma

IEMHEALS-24/PO/17

The Effects of Vitamin D, calcium and their supplements in health of Women's life

Arya Dutta, Arpan Samanta, Bandhan Mukherjee

Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - aryadutta1000@gmail.com

This Abstract is going to discuss "The Critical Role of Vitamin D and Calcium Supplementation in Female day to day life and it's side effects". Other than the way both of them affect bone health and general wellbeing, the synopsis is going to be addressed. Both are important nutrients in the growth and maintenance of cells. Deficits in these, especially among women, can cause problems like low bone density and increase fracture risk. Many

of the women use Supplements which serves the purpose of these nutrients but with that they can also cause other issues and side effects. The sufficient quantity of vitamin D and calcium is required for the development of muscular strength and bone density in women. Vitamin D is a nutrient that facilitates the absorption of calcium in the intestines, which is then utilized to maintain dense bones and also to prevent bone disorders like osteoporosis. This is more relevant for women who are at higher risk of disorders related to bones, particularly in a postmenopausal state. Supplementation of these nutrients can reduce the risk of bone fracture and bone density and improve overall muscles and bones health by enhancing their functioning and strength. This, turns out it helps in preventing fracturing related injuries, which are common in older age peoples. While supplementation provides benefits it also come with potential side effects. Excess intake of calcium can lead to kidney stone, as it also leads to hypercalciuria. On the other hand, some reports also suggest that excessive intake of calcium increase the risk of cardiovascular events, although evidences aren't up to the mark further research is required, some shows that excessive amount of vitamin D can result in hypercalcemia which leads to high level of calcium in blood, leading to symptoms like nausea, vomiting and kidney problems, and other shows the side effects such as gastrointestinal discomfort. It has been established that as long as one takes the right dose and the levels are carefully monitored, they can achieve maximum benefit from the supplements of vitamin D and calcium form while subjecting themselves to a minimum level of side effects. Maximum benefits can be realized only if optimum doses are used and patients are monitored properly.

Keywords: - Vitamin D, Calcium, Supplementation, Bone health, Muscle strength, Bone density Osteoporosis, Fracture risk, Side effects, Kidney stones, Hypercalciuria, Cardiovascular events, Hypercalcemia, Gastrointestinal discomfort, Appropriate dosing, Monitoring, Optimal outcomes

IEMHEALS-24/PO/18

The Role of AI In Health Care, Diagnostics & Treatment

[1]Shubham Chakraborty, [1]Kamakshya Ghosh, [1]Sneha Ghosh , [1]ADITYA CHATTERJEE

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata

Email: - sc9088996@gmail.com

This Abstract is going to discuss "The Critical Role of Vitamin D and Calcium Supplementation in Female day to day life and it's side effects". Other than the way both of them affect bone health and general wellbeing, the synopsis is going to be addressed. Both are important nutrients in the growth and maintenance of cells. Deficits in these, especially among women, can cause problems like low bone density and increase fracture risk. Many of the women use Supplements which serves the purpose of these nutrients but with that they can also cause other issues and side effects. The sufficient quantity of vitamin D and calcium is required for the development of muscular strength and bone density in women. Vitamin D is a nutrient that facilitates the absorption of calcium in the intestines, which is then utilized to maintain dense bones and also to prevent bone disorders like osteoporosis. This is more relevant for women who are at higher risk of disorders related to bones, particularly in a postmenopausal state. Supplementation of these nutrients can reduce the risk of bone fracture and bone density and improve overall muscles and bones health by enhancing their functioning and strength. This, turns out it helps in preventing fracturing related injuries, which are common in older age peoples. While supplementation provides benefits it also come with potential side effects. Excess intake of calcium can lead to kidney stone, as it also leads to hypercalciuria. On the other hand, some reports also suggest that excessive intake of calcium increase the risk of cardiovascular events, although evidences aren't up to the mark further research is required, some shows that excessive amount of vitamin D can result in hypercalcemia which leads to high level of calcium in blood, leading to symptoms like nausea, vomiting and kidney problems, and other shows the side effects such as gastrointestinal discomfort. It has been established that as long as one takes the right dose and the levels are carefully monitored, they can achieve maximum benefit from the supplements of vitamin D and calcium form while subjecting themselves to a minimum level of side effects. Maximum benefits can be realized only if optimum doses are used and patients are monitored properly.

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IEMHEALS-24/PO/19

Use Of AI & ML in Treating Parkinson's Disease

1Sormista Pal, [1]Gungun Roy

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - subhaspal1979@gmail.com

This abstract talks about Parkinson disease, the challenge it possesses, it causes, its symptoms and use of AI and ML in the treatment of PD in a brief manner. To get started with Parkinson disease (PD), it is being characterized by the loss of neuronal cells leading to synaptic dysfunction and cognitive defects. The utmost important things for effective management of PD are its early prediction and diagnosis. Furthermore, differentiating between Parkinson disease patients and healthy individuals presents a challenge in early detection of PD. In order to deal with these challenges, models of artificial intelligence and machine learning (AI & ML) have been associated in the diagnosis, prediction and treatment of PD. Moreover, the potential lying between AI and ML integrated models in classifying PD through the analysis of neuroimaging, breathing patterns, speech recordings, Gail patterns and other relevant data, have been showcased by many recent advancements. Herein, we would like to brief the roles played by AI an ML in the effective treatment of PD such as: early diagnosis & treatment, targeting brain homeostasis, predicting novel biomarkers, early detection of PD, involvement of neurosurgical care, enhanced Parkinson care and management, improve motor & non motor symptoms and accelerate Parkinson therapeutics. So, advancement in technical field, especially AI & ML, have transformed the landscape of human health and disease, including PD. AI & ML applications and advanced algorithms with internet of things improve the quality of life and help reduce financial burden with early detection and diagnosis, enhancing patient care and management and much more. Lastly focusing on the implantation of AI & ML algorithms in neurological process and drug discovery can be very beneficial to human health as well.

Keywords- neuroimaging, Gail patterns, brain homeostasis, novel biomarkers, motor & non motor symptoms, advanced algorithms, internet of things

IEMHEALS-24/PO/20

Uses of Artificial Intelligence in Electronic Health Records to Improve Medical Data Privacy and Security in India

Tanisha Chakrabarti, Soujash Chatterjee

Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - tanisha.c2020@gmail.com

As one progresses through one's life, every record of every clinical encounter represents a health-related event in one's life. An Electronic Health Record (EHR) is a collection of various medical records that get generated during any clinical encounter .With rise of self-care and homecare devices and systems, nowadays meaningful healthcare data get generated 24x7.In September 2013, the Ministry of Health & Family Welfare (MoHFW) notified the EHR Standards for India.At the time of notifying the standards, it was understood that the standards themselves will continue to evolve over time. The MoHFW,in the year 2015,published a note on establishing a National e-Health Authority (NeHA) to regulate the emerging usage of electronic mediums in healthcare especially for maintenance of EHR. Artificial Intelligence (AI) can play a big role to identify and address different issues of EHR ranging from 'patient identifiers', 'coding system', 'imaging', 'e-prescription', 'discharge summary', to 'data privacy and security' and 'data encryption'. Of these, 'data privacy and security' is very important as healthcare data often contains sensitive and personal information about patients. Protecting this information is essential to maintain patient confidentiality and trust.MoHFW had drafted a "digital Information Security in Healthcare Act (DISHA Act)" with the objective to ensure data privacy, confidentiality, reliability and security of digital health data. This Ministry forwarded the draft legislation to Ministry of Electronics and Information Technology (MeitY) for seeking their inputs and guidance. NeHA will act as an enforcement agency with suitable mandate and powers.AI can be utilized to assist NeHA in enhancing healthcare data security by proactively preventing security breaches and ensuring data protection. Healthcare systems can leverage AI-enabled platforms to proactively prevent security breaches and their far-reaching effects, enhancing data security within the healthcare sector. Effective collaboration between security, AI,and IT departments is crucial to ensuring medical data protection. Prioritizing privacy and security considerations will be fundamental to maintaining the integrity of healthcare systems and upholding ethical standards as AI advancements continue.

Keywords- Electronic Health Records (EHR), Data privacy and security, Artificial Intelligence (AI), National e-Health Authority (NeHA), Digital Information Security in Healthcare Act (DISHA Act), Healthcare data protection

IEMHEALS-24/PO/21

Using Crispr-cas9 to correct cancer causing gene mutations for cancer immunotherapeutic operations

Souptik Biswas, Soham Dey, Rishit Ghosh

Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - biswassouptik056@gmail.com

This paper consists of an introduction and application of Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)-associated protein 9(CRISPR-Cas9). It is a powerful gene editing tool with strong specificity and high efficiency, resulting in rapid and efficient screening of the whole genome to administer gene therapy for diseases. Cas9 improves the effectiveness of chimeric antigen receptors (CARs) and T-Cell receptors in targeting Tumor antigens to strengthen immune response to cancer. Major significance of this tool in cancer immunotherapy, is its ability to cut of genes that play vital role in controlling the immune response, hence highly specific cancer treatments unique to individual genetic profiles can be developed. As such, the CRISPR-Cas9 system has facilitated direct manipulation of genome sequences that are responsible for tumour cell invasion from immune responses. This also includes upregulating checkpoint proteins among other mechanisms. Genomic manipulations at strategic points have improved the activation and proliferation of Cytoxic T-lymphocytes and other effectors to enhance cancer cell recognition and elimination properties. This ability of CRISPR-Cas9 in cell engineering Ex Vivo before reintroducing them into patients has led to significant ACTs(adoptive cancer cell therapies) , potentially exceeding the constraints of traditional Cancer immunotherapy. Although this genome editing tool is a cutting-edge technology, it is crucial to use regulations carefully and comply rigorously with them to avoid ethical issues, particularly regarding the modifications of human germline, which might have enormous negative effect on the future generations. Therefore, Regulatory agencies are essential for establishing the boundaries of acceptable use and ensuring the adoption of this cutting edge technology in ethical and socially responsible manner.

Key words: CRISPR-Cas9, Cancer immunotherapy, Tumour antigens, immune response, Genomic manipulations, cell engineering

IEMHEALS-24/PO/22

Exercise, Nutrition and Diet

[1]Deepsikha Halder, [1]Arushi Das

[1]Department of Basic Science and Engineering, Institute of Engineering and Management Kolkata
Email: - khusihalder33733@gmail.com

This paper presents the development of a website designed to scan health reports, detect nutritional imbalances, and generate personalized diet plans. Nutritional deficiencies or excesses are critical health issues that contribute to chronic diseases, reduced immunity, and poor well-being. Current health reports provide valuable information, but the translation of this data into actionable dietary advice is often left to the individual or healthcare providers, which can be time-consuming and complex. This website aims to extract relevant data from health reports, including blood tests, vitamin levels, and metabolic information and recommend a personalized diet.The system integrates user-uploaded health reports in common formats (PDF, JPEG, etc.), which are scanned to extract pertinent medical information. taking into account factors like age, gender, activity level, and medical history. The system generates a customized diet plan tailored to the user's specific nutritional needs. The platform provides users with easy-to-understand reports that highlight their nutritional status and offers personalized meal plans designed to address identified imbalances. These recommendations are grounded in current nutritional science and dietary guidelines.In conclusion this website offers a practical solution to improving health through nutrition by bridging the gap between complex medical data and simple, actionable diet plans. It holds promise for increasing accessibility to personalized nutrition and promoting better health outcomes.

IEMHEALS-24/P/017

Predictive Modelling of Cardiovascular Disease Risk Using Machine Learning Techniques on Electronic Health Records

[1]P. Mangaiyarkkarasi, [*]S.Saraswathi

[1.] Nehru Arts and Science College, [1.]Nehru Arts and Science College, Coimbatore*
Email: mangaisivaphd@gmail.com, nascsaraswathi@nehrucolleges.com

The present research they can used for the build the accurate prediction model for the likelihood of a heart attack by using deep learning methods to evaluate the use of EHRs on different health conditions. Detailed feature engineering and selection, comparison algorithm creation, thorough model optimization, and extensive data collecting are all part of the goals. Validation, proficient risk interpretation and categorization, and the deployment and impact analysis of a decision-support system. To get anonymized EHRs covering a range of demographic, clinical, and lifestyle factors, a complete dataset is first produced through collaboration with healthcare facilities. Principal component analysis (PCA) and other dimensionality reduction techniques are used when necessary after exploratory data analysis and domain expertise is used to identify and design key characteristics. To determine how a decision-support system prototype affects clinical decision-making and patient outcomes, it is built and tested in clinical settings. Analyzing the result outcomes they can used whenever it relates to estimating CVD risks, combination methods that involve numerous models from machine learning receive the most accurate results. Significant gains in accuracy, precision, recall, F1-score, and area under the receiver operating characteristic curve (AUC-ROC) are shown by the final model, which has been tested on several test datasets. Increased patient awareness and involvement, better clinical decision-making, better risk stratification, lower healthcare costs, and advances in medical research are among the anticipated results. The long term objective of the research they can use for the decrease the impact associated with cardiovascular conditions among with targeted treatments, that will change the provision of preventive healthcare. The model for prediction can be used for numerous diseases and the medical settings because of adaptable and universal traints.

Keywords: Heart disease, Machine learning, Shapley additive explanations (SHAP), Local Interpretable Model-agnostic Explanations (LIME)

IEMHEALS-24/P/013

Comparative model manifesting the treatment of Parkinson's disease by using ethnomedicinal properties of *Gingko biloba* (maidenhair tree) and *Rosemarinus officinalis* (rosemary)

Debdeep Chattopadhyay[1], Shreyan Biswas[2], Srimoyee Ghoshal[2]

[1] *Post Graduate & Research Department of Biotechnology, St. Xavier's College (Autonomous), Kolkata, West Bengal, India*
[2] *Bachelor of Medicine & Bachelor of Surgery (MBBS), Calcutta National Medical College & Hospital, Kolkata, West Bengal, India*
Email: chattopadhyay.debdeep777@gmail.com

This review article compares Rosmarinus officinalis (rosemary), whose extracts reduce reactive oxygen species concentration and neuronal degeneration by increasing antioxidant enzyme activity in Parkinson's disease treatment, and the neuroprotective potential of Ginkgo biloba (maidenhair tree), which contains terpenoids and flavonoids with anti-inflammatory and antioxidant properties. Ginkgo biloba, on the one hand, increases cerebral blood flow and inhibits monoamine oxidase B. It has been shown to be effective as an adjunctive treatment for a number of neurological conditions, including Parkinson's disease, according to studies. Rosemary, on the other hand, has been extensively studied for Alzheimer's treatment and appears to have promising potential for Parkinson's treatment. Rosemary's vital bioactive parts, for example, rosmarinic acid and carnosic acid, show neuroprotective properties. Particularly, carnosic acid reduces inflammatory cytokines and inhibits microglial activation, indicating a central health-promoting pathway. This article also proposes a cell line concentrate on utilizing neural progenitor cells (NPCs) in a brain-on-a-chip model to examine the impacts of these plants on Parkinson's sickness. This approach consolidates cell science, pharmacology, and bioengineering to assess the neuroprotective impacts of Ginkgo biloba and rosemary separates in a microenvironment emulating the mind. Both plants have shown promising results in clinical studies. In Parkinson's patients, ginkgo biloba extract had few side effects and improved cognitive functions as well as reduced the severity of motor symptoms. In animal studies, rosemary extract reduced Parkinson's symptoms, and carnosic acid may protect brain cells from free radical damage and oxidative stress. Overall, both Rosmarinus officinalis and Ginkgo biloba have potential as complementary treatments for Parkinson's disease because they offer neuroprotective effects with few side effects. However, our review will determine which plant extract has more significant applications. Further examination utilizing progressed models like the brain-on-a-chip could give important experiences into their viability and systems of activity.

Keywords- Rosmarinus officinalis (rosemary), Ginkgo biloba (maidenhair tree), Parkinson's disease, neural progenitor cells (NPCs), brain-on-a-chip model, cognitive functions

IEMHEALS-24/P/013

Comparative model manifesting the treatment of Parkinson's disease by using ethnomedicinal properties of *Gingko biloba* (maidenhair tree) and *Rosemarinus officinalis* (rosemary)

Debdeep Chattopadhyay[1], Shreyan Biswas[2], Srimoyee Ghoshal[2]

[1] Post Graduate & Research Department of Biotechnology, St. Xavier's College (Autonomous), Kolkata, West Bengal, India, [2] Bachelor of Medicine & Bachelor of Surgery (MBBS), Calcutta National Medical College & Hospital, Kolkata, West Bengal, India

Email: chattopadhyay.debdeep777@gmail.com

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Keywords- Rosmarinus officinalis (rosemary), Ginkgo biloba (maidenhair tree), Parkinson's disease, neural progenitor cells (NPCs), brain-on-a-chip model, cognitive functions

IEMHEALS-24/P/011

Artificial Intelligence (AI) in monitoring Environmental Microbiology

Sreyati Ghosh, Avinaba Choudhury

Department of Microbiology and Biotechnology, Sister Nivedita University

Artificial Intelligence is the new normal since it has been emerging and affecting every aspect of human life. Artificial intelligence (AI) has transformed microbiology into a multi-scale field and initiated a shift away from its history of mostly manual work and towards a largely technology-, data- and statistics-driven discipline that is often coupled with automation and modelling. AI is also playing a crucial role in environmental microbiology, the study of micro-organisms and its interaction with the environment. AI analyses data from environmental samples to monitor microbial populations, diagnose and find effective treatments for microbial-risen disease and their impact on ecosystems. AI in the form of machine learning (ML), deep learning (DL), image processing, pattern recognition and internet of things (IoT) are being widely implemented in this field in all aspects from theoretical development and identification to process monitoring and optimization of the environment from a close end. Microbial communities are ubiquitous and carry an exceptionally broad metabolic capability. On the perturbation of the environment the microbes are the first element to respond thus informing us about the status and condition of the environment. The interface between molecular microbial ecology and artificial intelligence (AI) appears to show considerable potential for significantly advancing environmental monitoring and management practices through their application and prove rich data that can help environmentalists and researches to predict and forecast environmental changes. There has been a rise in the development and adoption of machine learning (ML) and deep learning (DL) for solving research challenges and monitor the environment.

Keywords- Artificial Intelligence (AI), Environmental microbiology, Machine learning (ML), Deep learning (DL), Internet of things (IoT), environment, ecology, ecosystem, microbial community.

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Association of Artificial Intelligence in the Healthcare sector

Md Affan Siddique, Dipankar Ghosh

Department of Biosciences, JIS UNIVERSITY Kolkata
E-mail: dghosh.jisuniversity2@gmail.com

Artificial Intelligence has been booming in the recent times and it would only be to our advantage if we can incorporate it into our healthcare system which would make more computationally cost effective as well as faster, AI involves a deep neural network known as the CNN(Convolutional Neural Network) and based on the dataset it can give out results based on user requirement, AI in healthcare would mainly focus on the following aspects such as Medical imaging and diagnostics, virtual care of patients, medical research and discovery, rehabilitation and other administrative applications. The most major impact was observed during the recent outbreak of covid in 2019 with early diagnosis using AI enabled tools and managing the workload of healthcare professionals but the most important sector was the discovery of new drugs and vaccines using advanced technologies and also with AI enabled in healthcare the cost effectiveness also comes into question and personalized medicine would be the further future for development using AI, the ill effects of generic medicine would serve through the common mechanism for every individual but with personalised medicine based upon specific parameters based upon the analysis and administrative application would help to create a more effective treatment with less adverse effects and more emphasis as to how the treatment would vary for each individual, earlier the diagnostics method would be based upon the symptoms and thereafter generalized treatments would be given but with AI incorporated these diagnostics methods would improve certainly taking into account that the process becomes much more faster and the results would be based upon disruptive technologies like bioinformatics. Precision medicine is a cutting edge technology that will be of great aid in clinical practice and study and multi omics data can be used using machine learning methods and deep learning methods and the future would be to simulate the functions, diagnosis and treatment using these networks.

Keywords: CNN, Generic, Artificial Intelligence(AI), Bioinformatics

IEMHEALS-24/P/022

Vitifiber : A Novel Approach to Obesity Mitigation

Somali Ghosh, Chinnappan A Kalpana

Department of Food Science and Nutrition, School of Home Science, Avinashilingam Institute for Home Science and Higher Education for Women
E-mail: 21phfnf001@avinuty.ac.in

Winemaking generates substantial quantities of byproducts, including grape skins, seeds, and stalks, replete with dietary fiber, antioxidants, and other bioactive compounds. This study investigates the potential of wine byproduct fiber- vitifiber, as a functional ingredient to mitigate obesity. The elevated fiber content of these residues can augment satiety, enhance gut microbiota, and potentially modulate glycemic control. Concurrently, the antioxidant profile may attenuate oxidative stress and inflammation associated with obesity. While preliminary research is promising, additional investigations are imperative to optimize extraction methodologies, characterize bioactive constituents, and assess the efficacy and safety vitifiber supplements for weight management. The association between obesity and the Mediterranean diet, characterized by a high fiber intake, has garnered considerable attention. The French paradox, wherein a relatively high-fat diet coexists with low cardiovascular disease rates, has been linked to moderate wine consumption. Although the underlying mechanisms of these phenomena are intricate, the role of dietary fiber as a key component of the Mediterranean diet cannot be overstated. Indian market presents a unique opportunity for the development and commercialization of wine byproduct-based product with growing middle class, increasing health consciousness, and traditional use of plant-based ingredients create a favorable environment for innovative food and beverage formulations. By harnessing the potential of wine byproducts, the food industry can develop innovative anti-obesity interventions while promoting sustainable and value-added utilization of agricultural resources.

Keywords: Vitifiber, Obesity, Dietary fiber, Antioxidants, Functional foods.

IEMHEALS-24/P/014

Managing Circadian Rhythm with RPM, EHR, and Nanoparticle induced wireless Pacemakers

Debdeep Chattopadhyay[1], Rishvi Mukhopadhyay[2], Meghmukto Sharma[2]
[1] *Post Graduate & Research Department of Biotechnology, St. Xavier's College (Autonomous), Kolkata, West Bengal, India*
[2] *Bachelor of Medicine & Bachelor of Surgery (MBBS), Calcutta National Medical College & Hospital, Kolkata, West Bengal, India*
E-mail: chattopadhyay.debdeep777@gmail.com

Our paper centers around the applications and the man-made intelligence consolidated behind the utilization of Remote Patient Monitoring (RPM) in ideal mediation of the diurnal changes in pulse through different simulated intelligence fueled gadgets to treat the imperfections in endothelial capability, platelet accumulation and blood clot development that by implication influences the circadian changes that from this point forward may influence the cardiovascular framework causing a few cardiovascular sicknesses (CVDs) for example myocardial localized necrosis, stroke, arrhythmia, and unexpected cardiovascular passing. RPM is a healthcare delivery method that uses technology to monitor patients outside of traditional healthcare settings. It enables the healthcare assistant to track patient health status, detect early signs of deterioration or complications, and intervene proactively to prevent frequent hospitalizations. According to statistical data, approximately 75 million patients rely on RPM. By 2027, this Number is likely to reach around 115 million. The use of cardiac biomarkers, such as creatinekinase, myoglobin, CRP, B-type natriuretic peptide, and various classes of cardiac troponins, in detection, as well as nanoparticle-induced bio-compounds that can not only be considered replacement for conventional pacemakers but also be used to address issues associated with cardiac resynchronization therapy (CRT), which is administered through long wires known as leads that are attached to pacemakers Sadly, these leads are inclined to cracking, dislodging, and relocating away from the first area. This survey likewise focusses on upkeep of Electronic Health record (EHR) that gives a IoT Cloud design-based membership model that keeps a period time check of the circadian framework and furthermore the utilization shrewd controlled gadgets to keep a mind the Nanoparticle incited simulated intelligence fueled AI powered pacemaker, that guarantees a steady, ideal, patient-explicit treatment.

Keywords- Remote Patient Monitoring (RPM), cardiovascular sicknesses (CVDs), cardiac resynchronization therapy (CRT), Electronic Health record (EHR), IoT Cloud, AI pacemakers

IEMHEALS-24/O/057

Is Indian Financial Market Ready for Pandemics?

Rajashik Datta, Sanjan Baitalik and Sanket Ghosh, Saugata Ghosh, Swarnendu Ghosh

Institute of Engineering & Management, India
University of Engineering and Management, India
Email id: saugata.ghosh@iem.edu.in , swarnendu.ghosh@iem.edu.in

The COVID-19 Pandemic has been a crucial wakeup call for several sectors contributing to the national economy. The stock market's reaction to such events can give several insights regarding the economic strength of the nation. As compared to the overall economy, the pharmaceutical sector has a very different relation to such healthcare emergencies. It is very essential to understand these dynamics to ensure improved policy making to counter future healthcare emergencies. This paper examines the impact of COVID-19 on the stock prices of twenty prominent pharmaceutical companies from July 2019 to December 2022, covering various phases of the pandemic. Utilizing a dataset of monthly closing prices, we analyze the stock price trends through regression analysis and statistical tests. Our exhaustive experiments revealed significant relationships between the stock market and the pandemic before, after and during the multiple waves. By implementing data-driven regression models we were able to infer several economic indicators such as market sentiments, financial health indicators, impact of government policies, competitive dynamics, and innovation in product development. This study attempts to read the impacts of medical treatments, vaccine developments, and public health responses from the stock market behavior. Our observations have been clearly established with intuitive visualizations, correlation matrices, volatility charts along with extensive statistical tests to signify the validity of our inferences. The findings reveal critical insights into the pharmaceutical sector's response to the pandemic, offering valuable implications for investors and stakeholders. The primary goal of this study is to perform a holistic SWOT analysis regarding the readiness of the Indian financial market for future pandemics.

Keywords- COVID-19, economy, pharmaceutical, healthcare, stock, regression, sentiments

IEMHEALS-24/P/002

Ameriolative Effect of Curcumin against breast carcinoma – A review

Sangram Polley, Dr. Soumosish Paul

Department of Zoology , Acharya Prafulla Chandra College

Breast cancer is a complex disease and it has surpassed lung cancer as the most diagnosed malignancy globally.Some recent advanced statistical analysis reveal that it will affect more than 16 million people and women is more affected than men. Even with advances in technology and treatment strategies, therapeutic intervention is still warranted. Curcumin is an active bio-available compound found in turmeric and it shows some promising treatment for breast cancer due to its anti-cancer, anti- proliferative, apoptotic, anti- inflammatory and anti-oxidant properties .Cancer cell lines treated with curcumin showed increased levels of Bax, an apoptosis activator, and p53 DNA binding activity.As apoptotic genes are expressed, TRAP3 and MCL-1 are upregulated, whereas TRAIL, AP13 are downregulated by breast cancer. miR-19a, miR-19b proteins are upregulated, and miR-19 is regulated by downstream expression. It highlighting the bility to modulate various signaling pathways and gene expressions such as p53, MAPK, and Wnt/β-catenin PI3K/Akt/mTor, JAK-STAT, leading to inhibited tumor growth, proliferation, and metastasis. Additionally, curcumin affects the expression of genes linked to breast cancer, including NF-kB (nuclear factor kappa-light-chain-enhancer of activated B cells), BRCA1 (breast cancer gene 1), and IGF-1 (insulin-like growth factor). It reverses IGF-1-induced apoptosis resistance and suppresses the proliferation of breast cancer cells activated by IGF-1. The thorough investigation highlights curcumin's potential as a breast cancer treatment that is both economical and effective, with implications for better patient outcomes. In order to completely utilise curcumin's potential and include it into conventional breast cancer therapy protocols, more investigation and clinical trials are required.

Keywords : Breast cancer, Curcumin, p53, Signaling pathways, Regulatory genes

IEMHEALS-24/P/030

Suppression of Immune Checkpoint Molecules for Immunotherapy against Cancer

Dhrubajyoti Ganguly, Debarshi Das Adhikary

Department of Microbiology, Ramakrishna Mission Vidyamandira, Belur Math
Email id: gangulydhrubajyoti1@gmail.com

T regulatory cells, which are crucial for regulating the immune response against the body's own proteins and tumours, play a significant role in immune regulation. Specifically, Tregs expressing Forkhead box p3 (FOXP3) help suppress immune reactions to self-proteins and tumours. Their presence in tumour tissues is often linked to a worse prognosis. Cancer cells frequently evade immune detection through various strategies, including lowering the expression of cancer antigens and major histocompatibility complex (MHC) class I molecules, increasing levels of immunosuppressive factors (such as Cytotoxic T-lymphocyte-associated protein 4 and Programmed Death-Ligand 1), and recruiting immunosuppressive cells like myeloid-derived suppressor cells and Tregs. Here we have focused on designing immunotherapy by targeting checkpoint molecules CTLA-4 and PD-1 to reactivate CD8+ T cells, which can lead to effective cancer cell destruction and significant clinical improvements, even in advanced cancers. New research indicates that anti-CTLA-4 monoclonal antibodies (mAbs) lacking antibody-dependent cellular cytotoxicity (ADCC) can enhance anti-tumour responses by depleting FOXP3+ CD4+ Tregs within tumours. These antibodies block CTLA-4, thereby lifting the inhibition on activated T cells and boosting their anti-tumour activity.

Keywords: Forkhead box p3, cytotoxic T-lymphocyte-associated protein 4, programmed death-ligand 1, antibody-dependent cellular cytotoxicity, monoclonal antibodies.

IEMHEALS-24/P/006A

Evaluation of Photoluminescence Spectra of Dairy Products as a Non- destructive and Speedy Method for Analysing Important Ingredients

Trisha Saha, Saloni Singh, Dr. Laavanya Das*

Food and Nutrition Department, Brainware University, Kolkata, India
**Email: dld.fnt@brainwareuniversity.com*

Photoluminescence spectroscopy has become an effective tool for understanding chemical ingredients in complex foods. With advanced instruments and software, it can measure sample compositions at various conditions and excitation wavelengths. Its rapid, non-destructive, discriminating, and sensitive nature makes it an essential technique for understanding natural and food products, particularly in dairy products with vitamin A, riboflavin, perfumed amino acids, Maillard reaction products, NADH, porphyrins, chlorophylls, and other oxidation foodstuffs. This study measures photoluminescence spectra of cheese products in local markets to identify and quantify important ingredients. The emission intensity, full width half maxima, area under the curve, and emission colorimetric properties are analysed. The spectra and PL intensities are monitored under UV excitations and time. All products showed a broad blue emission spectrum, ranging from 360 to 650 nm. The simple curve deconvolution method was used for identifying chemical compositions.

Keywords – Photoluminescence, Dairy products, oxidative activity, Non destructive method, Natural food products.

IEMHEALS-24/P/003

Advancements in Cancer Treatment: Harnessing the Power of PELNVs coated Curcumin, an ethnomedicine via Photodynamic Therapy combined with in vivo tumor specific assembly enhanced binding effect augments and CRISPR-Cas9 in Synergistic glioblastoma multiforme (GBM) treatment

Debdeep Chattopadhyay[1], Srimoyee Ghoshal[2], Rishvi Mukhopadhyay[2], , Shreyan Biswas[2], Meghmukto Sharma[2]

[1] *Post Graduate & Research Department of Biotechnology, St. Xavier's College (Autonomous), Kolkata, West Bengal, India*

[2] *Bachelor of Medicine & Bachelor of Surgery (MBBS), Calcutta National Medical College & Hospital, Kolkata, West Bengal, India*

Email address: chattopadhyay.debdeep777@gmail.com

Our paper focuses on the formulation of Plant Exosome Like Nano-vesicles (PELNVs) and implementation of ethnomedicinal properties of PELNVs coated Curcumin, an active component of the turmeric via the application of combination therapy induced photodynamic therapy and in vivo tumor specific augments surpassing the side effects that have been observed in normal radiotherapy and chemotherapy. Prospects pertaining to the choice of curcumin over other ethnomedicinal plants has been provided in detail in this paper. Further the formulation, incorporation and synthesis of this curcumin coated PELNVS has also been stated. Here we have focused on the treatment of a certain class of aggressive brain cancer, glioblastoma multiforme (GBM) and how this PELNVs coated curcumin conjugate and combination therapy induced blue light photodynamic therapy (PDT) and targeted tumor specific therapy be applied to cure it. We have also implemented some ideas pertaining to the classical approach of radiation therapy coupled with Temozolomide and later on tried to replace the side effects pertaining to it through the application of new age combination therapy. Case study based on certain positive findings, leading to the European Organisation for Research and Treatment of Cancer (EORTC) Brain Tumor and Radiotherapy Groups and the National Cancer Institute of Canada (NCIC) Clinical Trials Group initiated a randomized, multicentre, phase 3 trial comparing radiotherapy plus temozolomide to radiotherapy alone in newly diagnosed glioblastoma patients has also been stated in our paper. Statistical and tabulated interventions pertaining to the case studies have also been included. Certain aspects pertaining to the combination of blue light PDT with Curcumin loaded Bovine Serum Albumin (BSA) nanoparticles has also been implemented.

A small approach pertaining to the integration of CRISPR-Cas9 technology with Curcumin Loaded Plant Like Exosome Nanovesicles as a novel approach to deal with Glioblastoma Treatment as also been stated in our article. Hereafter perspectives pertaining to this innovative approach combining CRISPR-Cas9, curcumin, and PELNVs can be a promising frontier in glioblastoma treatment. By simultaneously addressing multiple aspects of tumor biology through gene editing and natural compound delivery, potential for more effective and personalized therapy can be developed.

Keywords- Curcumin, an ethnomedicine, Plant exosome like nano-vesicles (PELNVs), Temozolomide, Photodynamic therapy (PDT), glioblastoma multiforme (GBM), CRISPR - Cas9

IEMHEALS-24/P/005

Heterologous expression, isolation and purification of OsHsp18.0-C-II, a hetero-oligomeric small heat shock protein from rice

Santanu Mondal*, Md. Azharuddin, Rakhi Dasgupta

Plant small heat shock proteins (sHsps) are categorised into at least 16 subfamilies based on the similarity of their intracellular distribution and amino acid sequences. Rice (Oryza sativa subsp. japonica.), a major agricultural crop can tolerate a variety of abiotic stresses in its natural habitat due to the presence of particular genes whose over-expression is related to stress. Among the 23 different sHsps present in rice, OsHsp18.0 belong to the CII subfamily and is located on chromosome 1. Escherichia coli (BL21 DE3) by heterologous synthesis of the OsHsp18.0 fusion protein, has shown improved thermotolerance and thermoprotection. Here we report production of large quantities of OsHsp18.0, a protein located in the cytoplasm and nuclear envelope of rice (Oryza sativa subsp. japonica.) plant whose structure and function still remain to be explored in details. The protein is produced using the Escherichia coli strain BL21 (DE3) expression system. Rice gene that codes for a class II sHSP with a molecular weight of 18.0 kDa is the source of the OsHsp18.0-CII cDNA clone. The modified TEV vector with 6× -histidine peptide fused was used. The cells were treated with IPTG (isopropyl β -D-thiogalactopyranoside) to induce the expression of OsHsp18.0. Purification method is based on His-Tag fusion Ni-NTA chromatography. Purified protein was confirmed through SDS-PAGE and native PAGE Gel electrophoretic profile of purified His-OsHSP18.0 demonstrated oligomeric polydispersity. Substrate binding interactions study and suppression of heat-induced aggregation of L-LDH enzyme at 60°C by purified small heat shock protein Oshsp18.0, were observed by spectrophotometry. Future studies are aimed at 2 examining the role of plant cells in maintaining a balance between protein synthesis and proteostasis in the cytosol and chloroplast, as well as in other subcellular spaces.

Keywords: Heat shock; OsHsp 18.0; SDS-PAGE; His-Tag; Chromatography

IEMHEALS-24/P/010

Nutrition, Diet and Exercise

Santanu Mondal*, Md. Azharuddin, Rakhi Dasgupta

Nutrition, diet, and exercise are fundamental pillars of human health, influencing physiological functions and overall well-being. This poster explores the interconnectedness of these elements and their impact on various aspects of health, including cardiovascular fitness, metabolic processes, and mental acuity. Through a poster of current literature, this study examines how dietary choices, such as balanced macronutrient intake and micronutrient adequacy, contribute to optimal health outcomes. Additionally, the role of regular physical activity in enhancing cardiovascular health, muscle strength, and flexibility is discussed. Furthermore, the synergistic effects of nutrition and exercise on weight management and chronic disease prevention are highlighted. Understanding the inter-relationships between nutrition, diet, exercise, and human health is crucial for developing effective strategies to promote healthier lifestyles and improve overall quality of life.


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