5th Edition of International Conference on

Tissue Engineering and Regenerative Medicine

5th Edition of Euro-Global Conference on

Biotechnology and Bioengineering

18,19,20
Sept, 2025

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LONDON, UK OR VIRTUALLY

Venue: Sheraton Skyline Hotel London Heathrow
Heathrow Airport, Bath Rd, London, England
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BOOK OF ABSTRACTS

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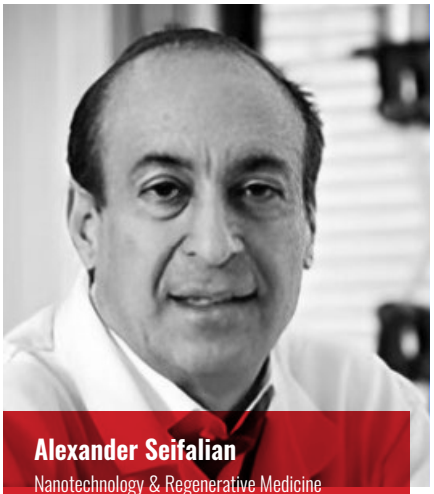

Alexander Seifalian
Nanotechnology & Regenerative Medicine Commercialisation Centre, United Kingdom

Anand Srivastava
Global Institute of Stem Cell Therapy and Research, United States

Anant Marathe
Total Potential Cells (P) Ltd, India

Darwin Eton
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Julia Sidorova
Centro de Investigación Biomédica En Red Enfermedades Hepáticas y Digestivas (CIBEREHD), Spain

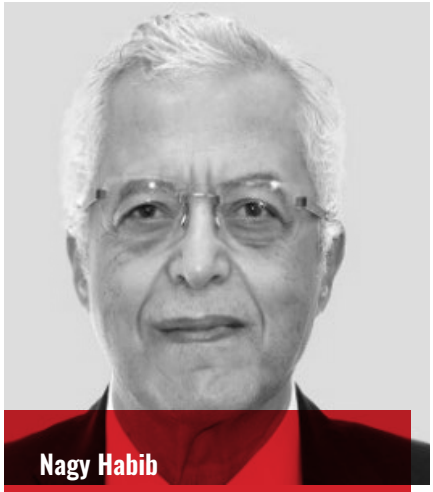
Kara E McCloskey
University of California, Merced, United States

Kunal Mitra
Florida Tech, United States

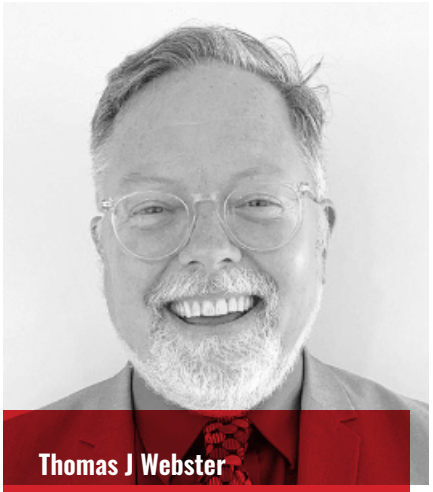
Lucie Bačáková,
Institute of Physiology of the Czech Academy of Sciences, Czech Republic

Luis Jesús Villarreal Gómez
Universidad Autónoma de Baja California, Mexico

Keynote Speakers

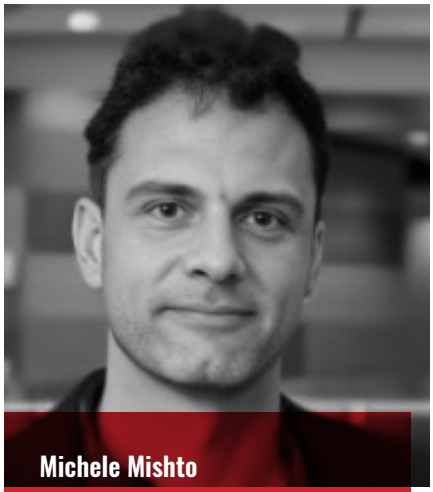


Nagy Habib
Imperial College London, United Kingdom

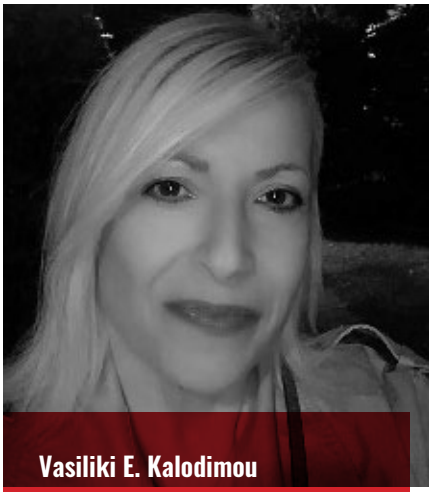


Thomas J Webster
Brown University, United States

Tina Møller Tagmose
Novo Nordisk A/S, Denmark



Michele Mishto
The Francis Crick Institute, United Kingdom



Vasiliki E. Kalodimou
European University-Cyprus Ltd., Germany

Welcome Message

Dear Esteemed Colleagues and Guests

It is with immense pleasure that I welcome you to the 5th Edition of the International Conference on Tissue Engineering and Regenerative Medicine (TERMC 2025), set to take place in the vibrant city of London, United Kingdom, and virtually from September 18-20, 2025.

London, a global hub of culture, history, and innovation, offers the perfect backdrop for our hybrid conference, which unites researchers, clinicians, and industry leaders from around the world. This year, our theme, Innovations in Tissue Engineering: Shaping the Future of Regenerative Medicine, highlights the transformative power of cutting-edge research in overcoming obstacles and driving advancements in our field.

TERMC 2025 will delve into a diverse range of topics, including tissue engineering, scaffold, smart material, medical devices, surgical implants, biobanking, biosensors, biomarkers, 3D bioprinting, organ-on-chip systems, and many other forefronts of tissue engineering research. With its hybrid format, this conference is designed to provide an inclusive platform for both onsite and virtual attendees, ensuring the widest possible reach for meaningful collaboration and knowledge sharing.

I am especially delighted to extend a warm invitation to our keynote speakers, whose groundbreaking contributions will set the tone for this inspiring event. Your expertise and insights will undoubtedly shape the discussions and stimulate innovation throughout the conference.

I encourage all participants to take full advantage of the opportunities to engage with peers, exchange ideas, and explore new horizons in regenerative medicine. For those attending in person, I hope you also have a chance to experience the unparalleled charm of London—whether it's the rich history of Westminster and night life, will be organise with us and the cutting-edge research at its renowned universities, or the vibrant energy of its streets.

My heartfelt thanks to the organizers, speakers, and participants who have made this event possible. Together, let us seize this opportunity to shape the future of tissue engineering and regenerative medicine.

I look forward to welcoming you to London and to TERMC 2025!

Professor Alexander Seifalian
Nanotechnology & Regenerative Medicine
Commercialisation Centre, United Kingdom

Welcome Message

Welcome to the 5th Edition of the International Conference on Tissue Engineering and Regenerative Medicine (TERM C), to be held in London, UK September 18 to 20, 2025. The Magnus Group LLC once again is bringing together scientists, industry experts, and clinicians to foster international collaboration around this year's theme: Innovations in Tissue Engineering: Shaping the Future of Regenerative Medicine.

We are gathering to meld our collective experiences to accelerate the implementation of durable, inexpensive, lower risk strategies to manage disease.

As a vascular surgeon, I recognize that the published outcomes of traditional vascular invasive procedures often fall short in comparison to the perfection of Mother Nature. We each originate from 2 cells. We are born with miles of vascularity. Hemorrhage does not occur as vessels grow to match our stature. Nature knows how to engineer vessels. Unfortunately, as vascular disease advances, neovascularization often becomes impaired. Our approach is to improve the biology of the ischemic environment so neovascularization can proceed as Nature intended. Proteomic and cytometry data support hemodynamic, angiographic, and clinical evidence of restored neovascularization in patients so treated.

Restoring natural processes through tissue engineering and regenerative medicine will be the platform for disease management in the future. This meeting provides a valuable gateway for synergistic investigation to expedite reaching this endpoint.

Darwin Eton MD FACS DFSVS
Chief Science and Medical Officer
Vasogenesis Inc, 32 Marshal Street - Suite 3,
Brookline MA 02446-5465 USA

Welcome Message

Not in the right environment to innovate and commercialize your research? MOVE! I did and now my breakthroughs are in 30,000+ patients!

Without a doubt, recent advances in tissue engineering and regenerative medicine have revolutionized our ability to prevent, diagnose, and treat infectious diseases over the past century. But, how did this occur? Was your research part of these advancements? Have we innovated and commercialized enough? While some of these wonderful research advances have made it to the market helping real people, many have not. Are we doing enough to translate tissue engineering research into real products? Are companies not paying attention to this wonderful research? Are Universities not doing enough to help you? Is your research being licensed to larger companies to make products that help society? Starting new companies? What about federal funding agencies? Are they supporting your commercialization efforts? And, most importantly, are you in the right environment to innovate and commercialize your research?

Well in my own experience, above all else, it takes a supportive environment. We all have great ideas. But, it takes more than that. It takes a supportive community to translate lab research into commercial products. It takes determination and fortitude to see it through. You need to surround yourself with the right people – and if you are currently not around a supportive optimistic environment, leave ! Leave that negative, ultra-competitive University you are at - I did! Leave that company that is stifling your advances. Attend the right conferences, not those super competitive conferences where the same people give the same talks, and put your work down!

Once I found a truly supportive environment just 4 years ago, I was able to not only start numerous companies, but commercialize my tissue engineering research into medical devices now in over 30,000 patients with no failures, only success. No infection. No chronic inflammation. No implant loosening. No failures. Period. It just took courage to leave a University which did not care about my research and colleagues who only pushed their own research, constantly putting others down. Negativity everywhere! Once I found the right environment, everything else moved very quickly – including FDA approval and my tissue engineering research advances in patients in just 4 years!

So I encourage everyone to find that right environment. Attend the right conferences: TERC-2025 at the heart of innovation and commercialization! Meet the right people! Be energized by optimistic people! It will change your life once you make the commitment to surround yourself with positive people.

At TERC-2025, we will not only discuss the next tissue engineering breakthrough, but more importantly, we will discuss how to commercialize it !

I look forward to seeing everyone and sharing my story!

Thomas J. Webster, Ph.D.

Fellow, AANM, AIMBE, BMES, FSBE, IIAM, IJN, NAI, and RSM

Nominated for the Nobel Prize in Chemistry (2025)

Welcome Message

Dear congress visitors, it is an honor and pleasure to write a few welcome notes. Bioinformatics today makes unprecedented progress, due to several factors, including powerful methods based on deep learning being included into the arsenal of practitioner's tools alongside with classical methodologies implementing the gold standards of statistical analysis. The software packages, too, are becoming ever more accessible to practitioners with no formal training in data sciences, especially so that AI can instantaneously give answers to the questions such as: Which statistical test should one use in such a situation? Unsurprisingly, new opportunities come with numerous new dangers and risks that should not be present in the context of clinical research. Excessive trust in handy AI, seemingly easy to program tasks, not minding the gap in terminology and objectives between clinical analysis and the adjacent research community of Computer Science, can lead to spurious conclusions and the consequent need to retrieve high-profile articles. The solid basis for future success is entrusting mission critical analysis into the hands of professionals and investing years of their university education into solid mathematical training.

Dr. Julia Sidorova
Senior Research Scientist, Bioinformatics Platform,
CIBER-EHD, Instituto Carlos III de Salud, Spain

Welcome Message

Dear esteemed participants,

It is with great pleasure and enthusiasm that we welcome you to the 5th Edition of the Euro-Global Conference on Biotechnology and Bioengineering. This conference serves as a premier platform for leading researchers, scientists, and industry professionals to exchange groundbreaking ideas and explore innovative solutions shaping the future of biotechnology. As we navigate an era of rapid advancements—ranging from gene editing to sustainable bioprocesses—our collective efforts are pivotal in addressing global challenges in healthcare, agriculture, and environmental sustainability.

We encourage you to engage in thought-provoking discussions, forge valuable collaborations, and contribute to the dynamic exchange of knowledge that defines this event. Your participation is key to driving progress in this ever-evolving field.

Welcome, and let us together advance the frontiers of biotechnology and bioengineering.

Dr. Luis Villarreal
Autonomous University of Baja California, Mexico

ABOUT
MAGNUS GROUP

Magnus Group, a distinguished scientific event organizer, has been at the forefront of fostering knowledge exchange and collaboration since its inception in 2015. With a steadfast commitment to the ethos of Share, receive, grow, Magnus Group has successfully organized over 200 conferences spanning diverse fields, including Healthcare, Medical, Pharmaceutics, Chemistry, Nursing, Agriculture, and Plant Sciences.

The core philosophy of Magnus Group revolves around creating dynamic platforms that facilitate the exchange of cutting-edge research, insights, and innovations within the global scientific community. By bringing together experts, scholars, and professionals from various disciplines, Magnus Group cultivates an environment conducive to intellectual discourse, networking, and interdisciplinary collaboration.

Magnus Group's unwavering dedication to organizing impactful scientific events has positioned it as a key player in the global scientific community. By adhering to the motto of Share, receive, grow, Magnus Group continues to contribute significantly to the advancement of knowledge and the development of innovative solutions in various scientific domains.

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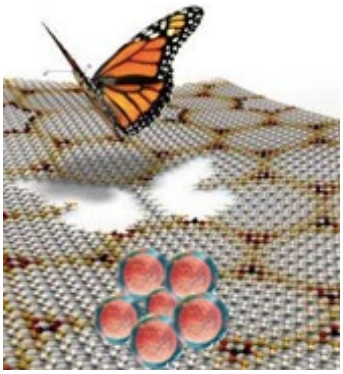
KEYNOTE PRESENTATIONS

Professor Alexander Seifalian

Nanotechnology & Regenerative Medicine Commercialisation Centre LBIC, University of London, United Kingdom

Graphene, butterfly structures, and stem cells: A revolution in surgical implants

Technological advancements have accelerated rapidly, as evidenced by everyday innovations like mobile phones. However, healthcare diagnostics, treatments, and surgical procedures have seen minimal progress over the last 50 years. Despite optimistic reports in the media and academia regarding breakthrough medical technologies, the reality is that many innovations have been confined to preclinical tests, often limited to rodents, and have not transitioned effectively to human application. This is primarily due to the complexity of medical devices developed in academic settings, the challenges in moving these devices to clinical practice, and the limited transferability of results from rodent models to humans.



It is therefore essential to revisit the foundational approach to medical device design, ensuring that they are commercially viable, reliable, sensitive, reproducible, non-toxic, and biocompatible. The use of smart nanomaterials has seen remarkable advances over the past decade, opening new frontiers in tissue engineering and regenerative medicine. One of the most ground breaking discoveries was made in 2010 when two scientists in the UK isolated a single

Biography

Alexander Seifalian, Professor of Nanotechnology and Regenerative Medicine worked at the Royal Free Hospital and University College London for over 26 years, during this time he spent a year at Harvard Medical School looking at caused of cardiovascular diseases and a year at Johns Hopkins Medical School looking at the treatment of liver cancer. He published more than 687 peer-reviewed research papers and registered 14 UK and International patents. On editorial boards of 41 journals. He supervised 121 PhD students, all successfully completed. He is currently CEO of NanoRegMed Ltd, working on the commercialisation of his research. During his career, Prof Seifalian has led and managed many large projects with successful outcomes in terms of commercialisation and translation to patients. In 2007 he was awarded the top prize in the field for the development of nanomaterials and technologies for cardiovascular implants by Medical Future Innovation, and in 2009 he received a Business Innovation Award from UK Trade & Investment (UKTI). He was the European Life Science Awards' Winner of Most Innovative New Product 2012 for the synthetic trachea. Prof

layer of carbon atoms—graphene—using simple scotch tape. Since then, graphene has captured the scientific imagination due to its extraordinary properties. It is approximately 200 times stronger than steel, highly elastic, and an excellent conductor. Its carbon atoms are arranged in hexagonal lattices, forming a honeycomb-like structure.

Functionalized Graphene Oxide (FGO) combined with Polyhedral Oligomeric Silsesquioxane (POSS), a material inspired by the structure of butterfly wings, exhibits nontoxic, antibacterial properties. FGO has been utilized in various biomedical applications such as drug and gene delivery, biosensor development, and nanocomposite materials for organ regeneration.

In this presentation, I will discuss the application of FGO-POSS in the development of medical sensors, drug, gene, and stem cell delivery systems, as well as human organ fabrication using stem cell technologies. These materials can be shaped into human organs using 3D printing and other fabrication techniques. Scaffolds derived from these nanocomposites are functionalized with bioactive molecules to facilitate tissue regeneration. Data from ongoing research will be presented, showcasing the significant potential of FGO-POSS for the repair and replacement of human organs, offering new hope for advancements in gene therapy, drug delivery, and tissue engineering.

Seifalian won the Nanosmat Prize in 2013 and in 2016 he received the Distinguish Research Award in recognition of his outstanding work in regenerative medicine from Heals Healthy Life Extension Society. His achievements include the development of the world first synthetic trachea, lacrimal drainage conduit, and vascular bypass graft using nanocomposite materials, bioactive molecules and stem cell technology. Currently, he is working on the development and commercialisation of human organs using graphene-based nanocomposite materials and stem cells technology. Recently he has commercialised a novel functionalised graphene oxide for medical and other industrial applications and synthetic graphene-based nanocomposite materials for surgical and medical devices application. He is currently working on the development of facial organs, heart valves and tendons.

Anand Srivastava
Global Institute of Stem Cell Therapy and Research, United States

Role stem cell therapy in degenerative diseases: Where we stand?

Tissue and organ damage due to chronic diseases reduces the quality of life of an individual. Regenerative medicine, the field of research focused on repair, replacement or regeneration of cells, tissues and organs to restore impaired function. Approaches of regenerative therapy include soluble molecules, stem cell transplant, tissue engineering, gene therapy and reprogramming of cell and tissue types. Stem cell transplant and tissue regeneration methods for various diseases have rapidly grown up over the past decades. Remarkable progress in stem cell research has established the cell based therapy for diseases which are cannot be cured by conventional medicines. Stem cells plays major role in regenerative medicine with its specialized characteristics of self-renewal and potential to differentiate into other types of cells. This review dealt with the recent advancement in tissue regeneration and highlighted with application of stem cell transplant in life threatening diseases.

Dr. Srivastava has been associated with leading universities and research institutions of USA. In affiliation with University of California San Diego Medical College (UCSD), University of California Irvine Medical College (UCI), Salk Research Institute, San Diego, Burnham Institute for Medical Research, San Diego, University of California Los Angeles Medical College (UCLA), USA has helped develop several research programs and has an extensive research experience in the field of Stem cell which is documented by more than 100 publications in revered scientific journals.

Dr. Anant Marathe

Technical director, Total Potential Cells Pvt. Ltd., India

Stem cell therapy: An affordable healthcare therapy for various diseases

At total potential cells, anticipating the future is not enough; we believe in creating it. with traditional means of medicine falling short of the demands of the day, it is up to science and technology to provide solutions to the world's most pressing needs. Total potential cells has been founded by two senior doctors- Dr. Bhaskar Vyas, plastic surgeon and Dr. Rajni Vyas gynaecologist and is comprised of an experienced team of stem cell scientists, bio-technologists, medical doctors, and marketing professionals.

Our team works on research of isolation of Mesenchymal Stem Cell (MSC) from different sources. Establishing the protocols for digestion, separation, isolation in pure form by culturing in vitro. Phenotypic characterization of MSCs by surface markers.

Two project grants are awarded to TPC by Department of Biotechnology, Government of India.

1. Translation of ADMSCs to insulin secreting islet like clusters, funded by SBIRI
2. A novel modality of treatment of Osteoarthritis (OA) with Adipose Derived Mesenchymal Stem Cells (ADMSCs)– Biotechnology Ignition Grant (BIG) from Biotechnology Industry Research Assistance Council (BIRAC)

Two Patents granted BY Government of India for 15 years:

1. 2051/Mum/2015 Title: Process of Preparing Mesenchymal Stem Cells for The Treatment of Osteoarthritis as Regenerative Medicine

Biography

Dr. Anant Marathe studied at Baroda Medical College of M.S. University of Baroda, Gujarat, India. He did his M.Sc. in the 1983, Worked as consultant Microbiologist for several years. Completed PhD. from Baroda medical college in Medical Microbiology in the year 2006. He worked with different medical colleges and currently he is working as Professor in department of Microbiology with Parul Institute of medical sciences and Research of Parul University. He is a post doctoral contributing member of ASM (American Society for Microbiology). He is Reviewer for BMJ case reports and Indian Journal Orthopedic and a member of Editorial Board in IP. Journal of Medical Microbiology and Tropical Diseases. He has publishes over 15 papers in national as well as International Journals. He was CO-PI in 2 central government projectsthan 70 research articles in SCI(E) journals.

2. 201621005097 Dated 12/02/2016 Title: Differentiation of human adipose tissue derived stem cells to Islet Cell Aggregates (ICA) And treatment as regenerative medicine for diabetes

We will discuss the therapeutic ptential od MSCs (Mesenchymal Stem Cells) in different clinical conditions. How the therapy can be made affordable to patient at large. Our different products and their applications. And future plans.

Darwin Eton MD, FACS, DFSVS

Chief Science and Medical Officer, Vasogenesis Inc, 32 Marshal St Boston MA 02446, USA

Progenitor cell mobilization and induced neutrophilia promote neovascularization and fibrinolysis in chronically ischemic tissue

A quarter of a century ago Granulocyte Colony Stimulating Factor (G-CSF) was used to induce progenitor cell mobilization in clinical trials so as to promote neovascularization in patients with chronic ischemia, both in the heart and in patients with Chronic Limb Threatening Ischemia (CLTI). At that time, the associated induced significant neutrophilia was considered anti-angiogenic and pro-thrombotic. However recent evidence has identified the context dependent role of neutrophils in modulating both angiogenesis and fibrinolysis. The pro-angiogenic impact of activated neutrophils includes the release of hepatocyte growth factor, VEGF-A, MMP-9, and angiopoietin 1. Moreover, neutrophils secrete proteases that degrade thrombus and have context-dependent fibrinolytic capacity.

Proteomic and cytometry data were obtained a day after the fifth and tenth doses of G-CSF in a CLTI population treated with a novel G-CSF regimen (Filgrastim 7-10 mcg/kg every 72 hours for up to 10 doses). Enzyme-linked Immunosorbent assays identified significant ($p<0.01$) elevation of the concentration pro-angiogenic serum proteins (Hepatocyte Growth Factor, VEGF-A, MMP-9, and others) and of the pro-fibrinolytic plasma protein plasmin (>10-fold), as well as evidence of fibrinolysis as measured by the increase in Fibrin Degradation Products (>5-fold) in plasma. Levels peaked one day after each G-CSF dose, as did the Absolute Neutrophil Count (ANC). Levels decreased toward baseline before the next dose, in conjunction with the ANC. No hemorrhage occurred

Biography

Dr Darwin Eton is a Distinguished Fellow of the Society of Vascular Surgery. He graduated from the Massachusetts Institute of Technology (BSc, MSc.) in 1978 and New York University Medical School (M.D.) in 1982. He initiated this project in 1999 at University of Miami where he was Professor and Chief of Vascular Surgery. He continued the clinical work as Professor of Surgery at the University of Chicago. This project won the Cures Within Reach Award in 2016. The proceeds were used to fund a confirmatory study at University of Illinois at Chicago, where Dr Eton had a Voluntary Professor appointment in Surgery. He started Vasogenesis Inc (Boston MA), where he presently serves as the Chief Research and Medical Officer. He has authored 45 peer review publications, book chapters, and books in Vascular Surgery, and has been an invited speaker in USA and internationally.

during the month of G-CSF treatment. Angiographic evidence of both neovascularization and fibrinolysis was observed in these CLTI patients. These explained the improved arterial hemodynamics and the improved clinical course. The significance of this study is reflected in the use of ELISA and cytometry to inform dosimetry, which was lacking in previous G-CSF trials.

Conclusion: Clinical evidence supports a new hypothesis that both induced neutrophilia and progenitor cell mobilization can promote a pro-angiogenic and pro-fibrinolytic environment in the context of chronically ischemic tissue. This potentially transformative cell therapy supports further investigation into a durable tissue level revascularization approach that could evolve into first line therapy, deferring or obviating the need for invasive large artery revascularization to manage chronically ischemic tissue.

Keywords: Neutrophilia, Neutrophil, Angiogenesis, Arteriogenesis, Filgrastim, Neupogen, Granulocyte-Colony Stimulating Factor, G-CSF, Fibrinolysis, Thrombosis, Nitric oxide Synthase, Neovascularization, Plasmin, Hepatocyte Growth Factor, VEGF, ArtAssist Device, Ischemia, Vascular Disease, VEGF-165B, MMP-9, Hematopoietic Stem and Progenitor Cell, Endothelial Progenitor Cell, Hematopoietic Stem Cell, Hematopoietic Progenitor Cell.

Darwin Eton MD, FACS, DFSVS

Vasogenesis Inc. Boston MA, USA

Quantum physics and cells: The evolution of life from energy

We now stand at the threshold of a transformative era in medicine, where cellular and molecular approaches are revolutionizing treatment of chronic diseases. To fully harness this potential, an understanding of matter at its most fundamental level is required. The subatomic realm - where energy and mass become interchangeable according to Einstein's $E=mc^2$-offers profound insights for biomedical innovation. But to comprehend these quantum-scale phenomena, we must begin with the fundamental physics that govern all matter. As an example, nearly 99% of our visible mass as a human being comes from the binding energy of the strong nuclear force that holds quarks together within protons and neutrons–quantum chromodynamics energy. Only about 1-2% of our mass represents the intrinsic mass of fundamental particles like quarks and electrons, which themselves acquired mass through interactions with the Higgs field following electroweak symmetry breaking. In other words, our mass really is just energy. Where did life come from? The Physicist consensus is that Life evolved from the energy released from the big bang at t=0. The understanding of the first seconds after the Big Bang relies on a combination of mathematical models rooted in general relativity, quantum field theory, and particle physics. The bottom line is that the universe began as pure energy, from which we evolved. Within the first second after the Big Bang, the four fundamental forces of nature—gravity, electromagnetism, the weak nuclear force, and the strong nuclear force—became distinct. Quarks formed and combined into protons and neutrons. By 10 seconds, electrons and other leptons emerged. Between 3 to 20 minutes, the first atomic nuclei (hydrogen, helium, trace lithium) formed through Big Bang

Biography

Dr. Darwin Eton is a Distinguished Fellow of the Society of Vascular Surgery. He graduated from the Massachusetts Institute of Technology (B.Sc, MSc.) in 1978 and New York University Medical School (M.D.) in 1982. He initiated this project in 1999 at University of Miami where he was Professor and Chief of Vascular Surgery. He continued the clinical work as Professor of Surgery at the University of Chicago. This project won the Cures Within Reach Award in 2016. The proceeds were used to fund a confirmatory study at University of Illinois at Chicago, where Dr. Eton had a Voluntary Professor appointment in Surgery. He started Vasogenesis Inc (Boston MA), where he presently serves as the Chief Research and Medical Officer. He has authored 45 peer review publications, book chapters, and books in Vascular Surgery, and has been an invited speaker in USA and internationally.

nucleosynthesis. From 3 minutes to 47,000 years after the Big Bang, photons and neutrinos dominated the universe's energy density which was also filled with the hot, dense plasma of nuclei and electrons. During the following 380,000 years of expansion and cooling, nuclei captured electrons to form stable neutral atoms, releasing the cosmic microwave background radiation we detect today. This primordial matter underwent remarkable transformations—condensing into stars and planets, ultimately leading to life through an unbroken chain of increasing complexity. The first atoms became stellar fuel, with nuclear fusion in stars forging heavier elements like carbon and oxygen, while supernovae created even heavier elements. Earth formed from this enriched material 4.6 billion years ago, where energy-driven chemistry produced life's building blocks—amino acids, sugars, and nucleotides.

The transition to life required self-replicating systems, with RNA likely serving dual roles as both genetic material and catalyst in early protocells bounded by lipid membranes. By 3.5 billion years ago, prokaryotic cells with DNA genomes and metabolic pathways had emerged. Cyanobacteria developed photosynthesis, eventually oxygenating Earth's atmosphere. An evolutionary leap occurred when prokaryotes formed endosymbiotic relationships—aerobic bacteria evolved into mitochondria, while photosynthetic bacteria became chloroplasts. This endosymbiosis granted eukaryotic cells unprecedented energy efficiency, enabling greater size and complexity. Multicellular life subsequently developed, featuring specialized, cooperative cells.

Each evolutionary milestone—from stellar nucleosynthesis to cellular respiration—represents energy's transformation into increasingly complex systems. Human consciousness stands as the current pinnacle of this 13.8-billion-year cosmic journey, demonstrating energy's extraordinary capacity for self-organization from quantum beginnings to biological complexity.

This is the 21st Century. Life is organized energy. We are organized energy. The time has come to understand and innovate around this. Quantum biology is a nascent field that seeks to uncover how living systems harness quantum phenomena—such as coherence, entanglement, and tunneling—to achieve remarkable efficiencies that defy classical explanation. By studying how photosynthesis achieves near-perfect energy transfer, how enzymes leverage quantum tunneling to accelerate reactions, or how birds might use quantum entanglement for navigation, this emerging field aims to bridge physics and biology. Its ultimate goal is twofold: to reveal nature's quantum tricks for optimizing life's processes, and to translate these discoveries into transformative technologies—from ultra-efficient solar cells modeled on photosynthetic complexes to quantum-inspired medicines that target diseases at the molecular level with unprecedented precision. Success could rewrite our understanding of life's fundamental mechanics while delivering breakthroughs in energy, computing, and healthcare.

Julia Sidorova

Bioinformatics Platform, Centro de Investigación Biomédica en Red Enfermedades Hepáticas y Digestivas (CIBEREHD), Instituto de Salud Carlos III, Monforte de Lemos 3-5, Pabellón nº 11, 8029 Madrid, Spain

Blood glucose monitoring from voice signal, 5 years later

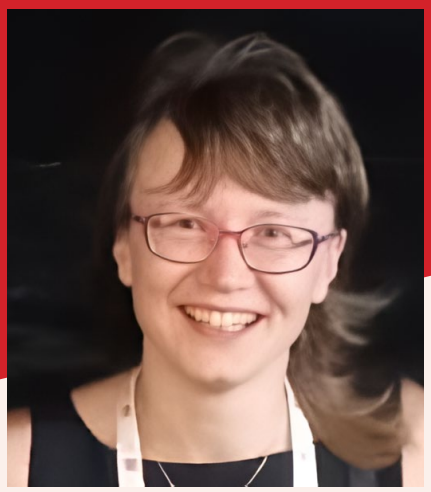
Non-invasive glucose monitoring is a notoriously difficult problem including the unfortunate history of several biomarkers developed and then retrieved. Vocal biomarkers are non-intrusive and cost-effective, and therefore are very desired. Several systems were developed for both diabetes diagnostics and Blood Glucose (BG) monitoring. The former is possible, because associated diseases cause permanent damage to the systems involved in the voice production and consequently the pathological trace is detectable from voice. Regarding the latter, there are two explanations of why voice reflects BG swings:

- The change in BG concentration makes the elastic properties of the tissue of the larynx and cord change, which in turn causes the change in spectral characteristics of voice, and
- Hypoglycemia is often accompanied by anxiety, whereas hyperglycemia is accompanied by lethargy, and it is known that emotional states are detectable from voice [4].

The statistical association between voice and BG has been repeatedly confirmed in the literature, as a next step effective detection has been aimed. I will review the architectures of the successful systems:

- Several generations of feature extraction software for voice signal (praat, openEAR, convolutional NNs), and
- Diverse classification functions (from linear regression to deep neural networks).

Biography



Born in 1980, PhD from Universidad Pompeu Fabra in 2009, Spain. After an extensive and international postdoctoral training in algorithms and bioinformatics (incl. Universidad Carlos III de Madrid, ETH-Zurich), she served as an Assistant Professor at Blekinge Institute of Technology, Sweden, where she was predominantly working in industrial projects with Sony, Boeing, Telenor, Ericsson. In 2019/2020 she held a position of honour at Universidad Complutense de Madrid and was an Adjunct Professor teaching research methodology and deep learning at KTH Royal Institute of Technology, Stockholm. From 2021, she is a Senior Researcher in service at the CIBER, the Spanish national consortium of hospitals. As far as research is concerned, her interests lie in classical data analysis vs deep neural networks, understanding their suitability or deficiencies. She serve at the Editorial Board of Frontiers of Neuroscience (Biomakers).

The superiority of some newer architectures over the old ones were claimed, but cause doubts in the light of information leakage and cheating/ignorance on the state of the art. These defects were not well understood when those research aerticles were published. I will review the pitfalls of working with glucose and voice, including the sources of nontrivial information leakage. Non-invasive glucose biomarkers based on other sources than voice were reviewed, for example in [3.] For future work, the deep neural architecture is recommended with a number of useful practices taken from the bioinformatics analysis for trasncriptomics such as itegrating survival analysis framework, including {age, sex} features, avoiding information leakage if tranfer weight is used, and considering influential deep architectures in the light of the problem.

Jose E. Zamora Alvarado[1,4], Hoda Arab Zadeh[1], Diana Cruz Garcia[3], Jessalyn Arteta[3], Maria Mendoza[2], Tyler Gaudery[3], Roger D. Kamm, Kara E. McCloskey[4*]

[1]Graduate Program in Materials and Biomaterials Science and Engineering, University of California Merced, United States

[2]Graduate Program in Quantitative and Systems Biology, University of California Merced, United States

[3]School of Natural Science, University of California Merced, United States

[4]School of Engineering, University of California Merced, United States

Assembly and stability of on-chip microvasculature

Blood vessels exhibit a range of structural and functional differences, contain a range of matrices and even specialized accessory cells that align with the specific needs of the tissue in which they reside. To study and recapitulate the highly complex behavior of blood vessels, we explore the Three-Dimensional (3D) assembly of Microvascular Networks (MVNs) from multiple cells in vitro. Using a three-channel microfluidic device design we co-cultured Human Umbilical Vein Endothelial Cells (HUVECs) with either Normal Human Lung Fibroblasts (NHLFs), Pericytes (PCs), Smooth Muscle Cells (SMCs), or both PCs and SMCs in 3mg/mL fibrin gels and measured their assembly dynamics, morphology, length scales, branching, and tortuosity over time. Results find that HUVECs cultured with both human SMCs and human PCs generate the smallest MVNs ~30□m in diameter that are also stable for over 2 months. Furthermore, after 21 days, these MVNs

Biography

Dr. Kara E. McCloskey, PhD, is a Founding Professor at the University of California, Merced in the Chemical and Materials Engineering (CME) Department and Fellow with the American Institute of Medical and Biomedical Engineering (AIMBE). She received her degrees in Chemical Engineering from The Ohio State University and Biomedical Engineering Department at The Cleveland Clinic Foundation and was an NIH-NRSA postdoctoral fellow at Georgia Institute of Technology. Early in her career, Dr. McCloskey was awarded a New Faculty Award from the California Institute of Regenerative Medicine (CIRM) is the Program Directors for a CIRM-funded Training Program in Undergraduate Stem Cell Engineering and Biology (TUSCEB) and the UC Merced Shared Resource Facility (SRL). She has been Founder and Chair of Graduate Program in Biological Engineering and Small-scale Technologies (BEST) and Materials and Biomaterials Science and Engineering (MBSE), and lead developer for UCM's new B.S. degree in Chemical Engineering. Dr. McCloskey has participated in numerous NSF-funded research

began exhibiting angiogenic activity. To our knowledge, this is the longest demonstrated stability and the first example of the generation of perfusable microvasculature enabling an initial vasculogenesis phase, a stability phase, and then subsequent angiogenesis activity.

centers (CREST-CCBM, STC-CEMB, STC-EBICS and ERC-TARDISS). She is known for her work in directing and characterizing Endothelial Cells (EC) from Embryonic Stem Cells (ESCs) and Induced-Pluripotent Stem (iPS) cells. She has co-authored over 50 peer-reviewed journal articles in areas from magnetic cell separation, stem cell differentiation, and tissue assembly and is currently focusing her efforts examining cell-material interactions for developing functional tissues.

Kunal Mitra

Biomedical Engineering, Florida Tech,
Melbourne, FL, USA

AI-integrated high-throughput tissue-chip for brain aging

Cognitive health is associated with the maintenance of a well-functioning cerebrovascular system throughout life. Because the aging population continues to grow worldwide, the risk and impact of age-related diseases is increasing. Over decades of aging research, several key biological hallmarks have been identified, such as oxidative stress, genomic instability, telomere attrition, epigenetic alterations, loss of proteostasis, mitochondrial dysfunction, stem cell exhaustion, and altered intercellular communication. Among these, cellular senescence has emerged as a critical driver of age-related decline. Cellular senescence is recognized as cell fate involving major alterations in genes expression and proliferative arrest rather than apoptosis and has been associated with increased inflammation and tissue dysfunction. Importantly, senescent cells secrete a wide range of Senescence-Associated Secretory Phenotypes (SASP), which include proinflammatory cytokines, chemokines, proteases, and a variety of circulating, extracellular exosomal microRNAs (miRNAs). These small non-coding RNAs can act as epigenetic factors regulating post-transcriptionally the translation of different proteins by either inhibiting the translation process or degradation of mRNA. There is little data on the regulatory mechanisms of miRNAs during the process of cellular senescence and the role of miRNAs in cerebrovascular responses to senescence-induced stressors.

Current models, especially traditional 2D in vitro cultures, lack the complexity required to recapitulate the in vivo architecture and function of human brain vasculature, limiting our ability to investigate these processes

Biography

Dr. Mitra is a Tenured Professor of Biomedical Engineering with joint appointment in Mechanical Engineering at Florida Tech. He earned his BSME degree from Jadavpur University, Calcutta, India in 1991. He then earned his M.S. and Ph.D. degree in Mechanical Engineering from NYU School of Engineering in 1993 and 1996 respectively. He is a Fellow of American Society of Mechanical Engineers and American Society for Laser Medicine and Surgery. He is also Associate Editor of four journals in the areas of medical device, and tissue engineering. He has published more than 150 articles in peer reviewed journals and conference proceedings.

comprehensively. Animal models, while informative, present their own challenges. Long-term studies in aging animals such as mice are costly, time-consuming, and offer limited translatability due to species differences. 3D bioprinted models paired with Microphysiological (MPS) systems mimicking complex vasculature will provide significant advantages compared to existing 2D/3D counterparts, including more relevant representations of cell morphology, proliferation gradients, response to drugs, gene expression, and overall cell behavior.

This research involves integration of microfluidic organ-on-chip MPS systems with human stem cell–derived neural tissues to develop a physiologically relevant, engineered cerebrovascular model. By incorporating automation and Artificial Intelligence (AI), we aim to establish a high-throughput, animal-free, and fully automatable drug screening platform. There is a new development of treatments using senolytics to reduce cellular senescence, yet there is a lack of knowledge about when it is safe and necessary to incorporate the treatment. The main goal of this paper is to develop an innovative approach by establishing 3D cerebrovascular organoids composed of human-Induced Pluripotent Stem Cells (iPSC) derived neurons, astrocytes, and Cerebromicrovascular Endothelial Cells (CMVECs) for studying the impact of senescent cells on differential expression and exosomal secretion of senescent-associated miRNAs in the process of aging and age-related diseases. We will use the generated experimental data to develop and train an AI-agent to perform in silico drug response predictions, which when paired with our high-throughput bioprinted functional organoid tissues fabrication can significantly speed up novel drug discovery for brain aging research, while reducing the current reliance on imperfect models such 2D cell cultures and animal models.

Lucie Bacakova[1*], Julia Tomsu[1], Yu-Chieh Wu[1], Marina Malic[1], Antonin Broz[1], Andrea Hejdova[1,2], David Lukas[2], Zuzana Tirpakova[3], Lenka Luptakova[3], Eva Petrovova[3*]

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[2]Faculty of Science, Humanities and Education, Technical University of Liberec, Studentska 1402/2, Liberec, 46117, Czech Republic

[3]University of Veterinary Medicine and Pharmacy in Kosice, Komenskeho 73, 041 81 Kosice, Slovak Republic

A versatile principle for creating pre-vascularized tissue in vitro for soft and hard tissue engineering

Pre-vascularization of in vitro engineered tissues significantly enhances their survival and proper function after in vivo implantation and is also a prerequisite for the relevance of in vitro tissue models. We propose a relatively simple and uniform principle for the construction of pre-vascularized tissues that can be further developed into skin tissue, blood vessel wall, or even the osteochondral interface.

The support structure for this construct is an electrospun nanofibrous membrane, usually made of a synthetic degradable polymer such as PLA, PLGA, or PCL. This membrane is seeded with Mesenchymal Stem Cells (MSCs), usually derived from Subcutaneous Adipose Tissue (ASCs), which are relatively easy to obtain by liposuction. After reaching subconfluence, the ASCs are

Biography

Assoc. Prof. Lucie Bacakova, MD, PhD, graduated from the Faculty of General Medicine at Charles University in Prague in 1984. She then joined the Institute of Physiology (IPHYS) of the Czechoslovak Academy of Sciences, where she received her PhD degree in 1992. She completed three research fellowships, namely at the University of Washington, Seattle, USA (Prof. S.M. Schwarz, 1996), the University of Pavia, Italy (Prof. Carlo Pellicciari, 2000) and the University of Pennsylvania (Prof. D. E. Discher, 2000-2001). In 2005, she founded a new Laboratory of Biomaterials and Tissue Engineering at IPHYS. In 2022, she received the prestigious Praemium Academiae award. She has published more than 290 articles in SCI journals (WOS: 9,636 citations, h-index 46).

overlaid with a collagen-based hydrogel loaded with Endothelial Cells (ECs). ASCs gradually migrate into the hydrogel and support the ECs in the formation of pre-capillaries where they act as pericytes. Human dermal fibroblasts (NHDFs) can be used instead of ASCs, but the precapillary network is less developed. When the surface of the construct is seeded with human keratinocytes, the pre-capillaries stop growing below the surface of the construct. However, if the pre-capillaries are allowed to reach the surface of the construct, they form openings on the surface and the endothelium forms a confluent layer on top.

In this way, either a vascularized dermo-epidermal skin construct can be obtained (ASCs are cells phenotypically close to fibroblasts), or a spontaneously endothelializing tunica intima and media complex, as ASCs are relatively easy to differentiate into smooth muscle cells. Bone marrow MSCs can also be seeded onto the nanofibrous membrane to support ECs in forming pre-capillaries comparable to ASCs. By adding chondrocytes to the collagen hydrogel, we have the opportunity to create an osteochondral interface where bmMSCs and chondrocytes support each other in inducing an osteogenic phenotype and maintaining a chondrogenic phenotype, respectively.

Interesting results were obtained when a construct containing ASCs and endothelial cells was implanted on the Chorioallantoic Membrane (CAM) of the chick embryo in the ex ovo system. This construct attracted vessels from the CAM, resulting in a greater area, length and number of branching vessels than after implantation of a cell-free control construct. In some cases, we also observed a connection between the original in vitro engineered vasculature and the CAM vasculature, i.e., inosculation.

Thus, the construct is promising in terms of regenerative medicine for soft and hard tissues, as well as for the creation of in vitro models of these tissues for various (patho) physiological and pharmacological studies that should limit the use of experimental animals in modern science according to the 3Rs principle. Our next perspective is the use of better-defined synthetic polymer matrices, e.g. hydrogels functionalized with cell adhesion-mediating oligopeptides.

Supported by the National Institute for Research of Metabolic and Cardiovascular Diseases project (EXCELES Programme, Project No. LX22NPO5104) - funded by the EU - Next Generation EU, the Czech Acad. Sci. (Praemium Academiae grant No. AP2202), P JAC Project No. CZ.02.01.01/00/22_008/0004562 of the MEYS, CR, co-funded by the European Union, and the Czech Health Research Council, Ministry of Health of the Czech Republic (grant No. NU22-06-00016).

Luis Jesús Villarreal Gómez[1*], Daniela Alejandra Hernández Hernández[1], Sergio Origel Lucio[2], Graciela Lizeth Pérez González[1], Lucia Margarita Valenzuela Salas[3], Yoxkin Martínez Estevez[4]

[1]Facultad de Ciencias de la Ingeniería y Tecnología, Universidad Autónoma de Baja California, Unidad Valle de las Palmas, Blvd. Universitario No. 1000, C.P. 22200, Tijuana, Baja California, México

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[4]Tecnológico Nacional de México, Unidad Tecnológica Acatlán, Campús Acatlán de Osorio, Carretera Acatlán - San Juan Ixcaquistla kilómetro 5.5, Del Maestro, Puebla, Acatlán, 74949, Mexico

Development and characterization of Exo-ITC: A fibrous bilayer exosome delivery system for dermatological applications

This study focuses on the development of an exosome delivery system, called Exo-ITC, with specific applications in dermatology. Exosomes are extracellular vesicles that play a crucial role in intercellular communication and hold great therapeutic potential in regenerative medicine and dermatology. The primary objective of this research is to synthesize a bilayer fibrous system capable of loading and releasing exosomes in a controlled manner for skin applications and collagen production. To achieve

Biography

Dr. Luis Villarreal is a research professor at the Faculty of Engineering Sciences and Technology, Autonomous University of Baja California, Tijuana, Baja California, Mexico, member of the National System of Researchers SNII-CONAHCyT Level 2, and a member of the academic body Applied Bioengineering In Consolidation. To date, Dr. Villarreal has published 51 indexed articles, with a total of 1,134 citations in Scopus. Currently, Research and Graduate Coordinator of the Faculty, General Coordinator of MyDAUD-Multicampus. He has participated in more than 70 national and international conferences. Founder and Editor-in-Chief of the Revista de Ciencias Tecnológicas (RECIT) (only 5 official ones at UABC), organizing president of the main international conferences of the Faculty FCITEC and member of the editorial committee of important publishers such as Bentham, MDPI, Hindawi, Wiley. He is a member of the editorial advisory board of the journal Current Drug Delivery and a referee for more than 210 articles participating in publishers such as Elsevier, Wiley, Springer, MDPI and Hindawi among others. He also participates as an

this, the system is synthesized using electrospinning techniques, incorporating exosomes into the bilayer fibrous structure. Subsequently, the resulting system is characterized by evaluating its morphology (via scanning electron microscopy), particle size (using dynamic light scattering), stability (through thermogravimetric analysis), and exosome release capacity. The results provide essential insights into the viability and effectiveness of the Exo-ITC system for dermatological applications. It is anticipated that this system could be employed to treat various skin conditions, leveraging the regenerative and therapeutic properties of exosomes. In summary, this thesis represents a significant advancement in the development of innovative topical therapies for skin care.

evaluator of research projects for funding in Mexico, Italy, Malaysia and Peru. He has contributed to the generation of human resources with 10 undergraduate theses, 10 master's theses and 5 doctoral theses. His research lines in the area of Biomaterials are in Tissue Engineering, Drug Release Systems and Biotechnology, among others. The improvement in the treatment of infants is his primary objective.

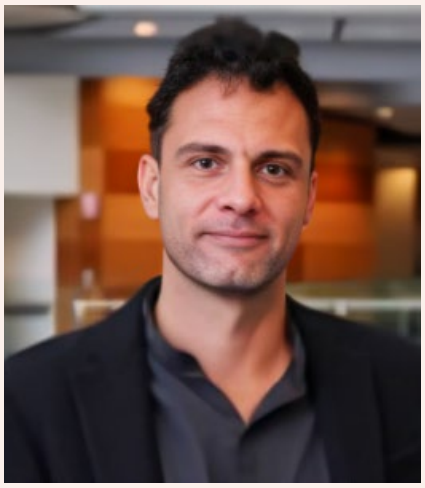
Michele Mishto

King's College London, UK

The Francis Crick Institute, UK

Targeting noncanonical epitopes in anti-cancer immunotherapy

MHC class I complexes can present antigenic peptides that have a sequence produced by post-translational mechanisms such as peptide splicing. Some examples of tumour-associated spliced epitopes have been investigated for their immunogenicity in the context of cancer so far. We developed several pipelines to identify and predict these noncanonical epitopes, which are freely available. In addition, we tested the immunogenicity and the potential for therapeutical applications for those associated to various forms of cancer.



Prof. Michele Mishto is Professor in Immunobiology at the King's College London and Senior Group leader at the Francis Crick Institute in London (UK). PhD in Medical Biotechnology at University of Bologna (ITA) and a long post-doc and project leader experience at the Institute of Biochemistry at Universitätsmedizin Charite' Berlin (GER). His research focus on antigen presentation and proteasomes. ORCHID: 0000-0003-3042-2792.

Professor Nagy Habib

Department of Surgery & Cancer, Imperial College London, London, United Kingdom

mRNA and RNA biodistribution to brain and bones

- The use of transferrin receptor ligand aptamer to target the brain in-vivo
- Widespread expression in the dellp p [arts of the brain
- How to target cartilage and bone for rare and acquired diseases
- A new approach for cell longevity.

Biography

For over three decades Nagy has been at the forefront of clinical research and clinical practice in cancer. He pioneered the first clinical trial in the use of adenovirus and plasmid for the treatment of liver cancer, as well as the use of plasmid gene therapy in hydrodynamic gene delivery. Nagy is a founder and was the Head of R&D of MiNA Therapeutics. Whilst at MiNA he was driving the development of an saRNA drug (a new class of medicines) which is currently being trialled in patients with liver cancer in eight UK centres, and sites in Singapore and Taiwan (OUTREACH study, ClinicalTrials.gov ID NCT02716012) and in a second trial in patients with solid tumours (TIMEPOINT study, ClinicalTrials.gov ID NCT 04105335) in the UK, USA, Europe, Singapore and Taiwan. He has published widely in gene therapy, stem cell therapy, oligonucleotides, endoscopy and surgery. Currently he is the CEO of Apterna Limited, a company focussed on novel oligonucleotide deliver. Previously Nagy was founder and Chairman of EMcision Limited (acquired by Boston Scientific Inc. in 2018).

Patrizia Ferretti

Department of Developmental Biology and Cancer, Stem Cells and Regenerative Medicine Section, UCL Great Ormond Street Institute of Child Health, University College London, London, UK

Stem cell-derived models for studying human disease mechanisms and therapeutic interventions

Congenital diseases often present defects in multiple tissue and organs and require complex clinical care and in some cases surgical intervention. The use of autologous mesenchymal stem cells and patient derived cells from induced Pluripotent Stem Cells (iPSCs) can allow one to study different aspects of birth defects in different affected tissues that may require different therapeutic solutions. These cells might also be valuable for the repair of tissue damage caused by disease or injury. The possibility of stimulating effective tissue repair or of engineering tissues for grafting with properties similar to native ones has indeed generated extensive interest over the years. The use of stem cells, and particularly autologous ones, still presents several challenges, particularly given the often limited information on the mechanisms leading to the disease, and issues with achieving consistent differentiation and with scaling up the generation of tissues in vitro.

I will discuss the value of different sources of patient-derived cells (e.g. iPSCs and mesenchymal stem cells, MSCs) for therapeutic development and approaches to disease modelling using as examples our work on diseases such as microtia, acrodysostosis and Duchenne Muscular Dystrophy (DMD), with a focus on cartilage and neural tissues, and highlight advantages and disadvantages of different models.

Biography

Patrizia Ferretti is Professor of Regenerative Biology at UCL Great Ormond Street Institute of Child Health, University College London, UK. She studied at Pisa University and at the Mario Negri Institute for Pharmacological Research, Milan, Italy, prior to moving to the Max Planck Institute, Goettingen, Germany, and then to London. Her group has made sustained and internationally recognized contributions to the regeneration and rare disease field, by identifying cellular and molecular mechanisms which play a role in response to injury and repair and establishing human disease models using stem/progenitor cells. She has published over 130 papers.

Our work on cartilage has indicated that all of the progenitor/stem cells we have studied differentiate more efficiently into cartilage when they are allowed to self-organize as spheroids than when encased in the different scaffolds we tested. At least in the case of microtia, spheroids mimic aspects of the disease that are not readily apparent in 2D (2-Dimensional) culture. Furthermore, the organoids may provide a good model for studying skeletal growth defects in other diseases, such as acrodysostosis. On the neural tissue front, I will highlight the impact of culture cytoarchitecture also on hNSC (human neural stem cell) phenotype and damage response. Our studies have indicated that 3D (3-dimensional) models in hydrogels may be better predictors of human in vivo response to damage and compound toxicity than 2D cultures, hence could provide a simpler and higher throughput system than brain organoids for initial drug screenings. On the other hand, important information on the molecular basis of disease can be facilitated by simpler models, and this has led to the identification of cell-autonomous defects in DMD astrocytes and their potential role in the neural pathology of the disease.

Thomas J. Webster

School of Health Sciences and Biomedical Engineering, Hebei University of Technology, Tianjin, China

School of Engineering, Saveetha University, Chennai, India

Division of Pre-College and Undergraduate Studies, Brown University, Providence, RI USA

Nanomedicine eliminating infection: Human clinical results

Implant infection is rising with the U.S. centers for disease control predicting one person every three seconds will die from a bacteria infection by 2050. Nanomedicine is the use of nanomaterials to improve disease prevention, detection, and treatment which has resulted in hundreds of FDA approved medical products. While nanomedicine has been around for several decades, new technological advances are pushing its boundaries. For example, this presentation will provide an over 25-year journey of commercializing nanotexture implants now in over 30,000 patients to date showing no signs of failure. Current implants face a failure rate of 5–10% and sometimes as high as 60% for cancer patients. Further, Artificial Intelligence (AI) has revolutionized numerous industries to date. However, its use in nanomedicine has remained few and far between. One area that AI has significantly improved nanomedicine is through implantable sensors. This talk will present research in which implantable sensors, using AI, can learn from patient's response to implants and predict future outcomes. Such implantable sensors not only incorporate AI, but also communicate to a handheld device, and can reverse AI predicted adverse events. Examples will be given in which AI implantable sensors have been used in medicine to inhibit implant infection and promote prolonged tissue growth. In vitro and in vivo experiments will be

Biography

Thomas J. Webster's (H index: 128) degrees are in chemical engineering from the University of Pittsburgh (B.S., 1995; USA) and in Biomedical Engineering from RPI (Ph.D., 2000; USA). He has formed over a dozen companies who have numerous FDA approved medical products currently improving human health in over 30,000 patients. His technology is also being used in commercial products to improve sustainability and renewable energy. He is currently helping those companies and serves as a professor at Brown University, Saveetha University, Hebei University of Technology, UFPI, and others. Dr. Webster has numerous awards including: 2020, World Top 2% Scientist by Citations (PLOS); 2020, SCOPUS Highly Cited Research (Top 1% Materials Science and Mixed Fields); 2021, Clarivate Top 0.1% Most Influential Researchers (Pharmacology and Toxicology); 2022, Best Materials Science Scientist by Citations (Research.com); and is a fellow of over 8 societies. Prof. Webster is a former President of the U.S. Society for Biomaterials and has over 1,350 publications to his credit with over 66,000 citations. He was recently nominated for the Nobel

provided that demonstrate how AI can be used towards our advantage in nanomedicine, especially implantable sensors. Lastly, this talk will summarize recent advances in nanomedicine to both help human health and save the environment.

Prize in Chemistry. Prof. Webster also recently formed a fund to support Nigerian student research opportunities in the U.S.

Thomas J. Webster

School of Biomedical Engineering and Health Sciences, Hebei University of Technology, Tianjin, China

School of Engineering, Saveetha University, Chennai, India

Division of Pre-College and Undergraduate Studies, Brown University, Providence, RI USA

Eliminating implant infection: 30,000 nanotextured implants in humans with no failure

Implant infection is rising with the U.S. Centers for disease control predicting one person every three seconds will die from a bacteria infection by 2050. Nanomedicine is the use of nanomaterials to improve disease prevention, detection, and treatment which has resulted in hundreds of FDA approved medical products. While nanomedicine has been around for several decades, new technological advances are pushing its boundaries. For example, this presentation will provide an over 25-year journey of commercializing nano orthopedic implants now in over 30,000 patients to date showing no signs of failure. Current orthopedic implants face a failure rate of 5–10% and sometimes as high as 60% for bone cancer patients. Further, Artificial Intelligence (AI) has revolutionized numerous industries to date. However, its use in nanomedicine has remained few and far between. One area that AI has significantly improved nanomedicine is through implantable sensors. This talk will present research in which implantable sensors, using AI, can learn from patient's response to implants and predict future outcomes. Such implantable sensors not only incorporate AI, but also communicate to a handheld device, and can reverse AI predicted adverse events. Examples will be given in which AI implantable sensors have been used in orthopedics to inhibit implant

Biography

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infection and promote prolonged bone growth. In vitro and in vivo experiments will be provided that demonstrate how AI can be used towards our advantage in nanomedicine, especially implantable sensors. Lastly, this talk will summarize recent advances in nanomedicine to both help human health and save the environment.

recently nominated for the Nobel Prize in Chemistry. Prof. Webster also recently formed a fund to support Nigerian student research opportunities in the U.S.

Tina M. Tagmose

Novo Nordisk A/S, Therapeutic Development Accelerated Execution, Novo Nordisk Park, DK-2760 Maaloev, Denmark

Solving the challenges of engineering an ultra-long acting insulin

Millions of people with diabetes suffer from the burden of daily subcutaneous insulin injections. Engineering a basal insulin for once weekly injection will result in fewer injections and likely improved acceptance of and compliance to the treatment, thereby improving glucose control and long-term outcomes for the patients. Different strategies can be applied to prolong the half life of biopharmaceuticals. Pharmacokinetics (PK) are determined by clearance. Insulin is mainly cleared by its receptor. Reducing receptor clearance alone is not sufficient for the development of ultra-long acting insulins and contribution from additional technologies is crucial. Two strategies will be presented. The first strategy to improve PK involves reversible albumin binding. Reduction of insulin receptor affinity in combination with a careful design of albumin binders results in long acting insulin analogues. The second strategy combines covalent conjugation to Fc with low receptor affinity. For this purpose, conjugation chemistry was developed to be able to chemically link one insulin molecule to the homodimeric Fc. Ultra-long pharmacokinetic profile of the insulin Fc conjugates was the result of concertedly slowing insulin receptor mediated clearance by 1) introduction of amino acid substitutions that lowered the insulin receptor affinity and 2) conjugating insulin to the Fc element. Fc-conjugation leads to recycling by the neonatal Fc-receptor and increase of the molecular size both contributing to the ultra-long pharmacokinetic and pharmacodynamic profiles of the insulin-conjugates.

Biography

Sr. Principal Scientist, PhD Tina M. Tagmose studied Chemical Engineering at the Technical University of Denmark and graduated as MS in 1993. She continued studying organic chemistry at Technical University of Denmark in the Carbohydrate Group supervised by Inge Lundt and Mikael Bols leading to her PhD degree in 1996. After a two year postdoctoral fellowship at Novo Nordisk A/S in the Medicinal Chemistry area supervised by John Bondo Hansen she obtained a permanent position in the same department. In 2011 she was promoted Principal Scientist. She's an inventor of several patent applications and has published more than 20 research publications.

Assist. Professor Dr. Vasiliki E. Kalodimou BSc (Hons), MSc, PhD, CABP (H), IARMES

Assistant Professor, School of Medicine at the European University-Cyprus Ltd. Frankfurt Branch, and Former Acting Chair, School of Medicine at the European University-Cyprus Ltd. Frankfurt Branch

Scientific and Medical Advisory Board at Stem Cell Reserve, USA

Board/Committee on Research Ethics at the National Hellenic Research Foundation (E.I.E)

Tissue engineering and regenerative medicine in the AI era

Tissue Engineering and Regenerative Medicine in the AI Era represents a transformative convergence of biology, materials science, and digital intelligence. Artificial Intelligence (AI) is reshaping how we design, fabricate, and apply regenerative therapies, accelerating the path from bench to bedside with unprecedented precision and speed. In the AI era, tissue engineering and regenerative medicine are entering a new frontier where data-driven design, automation, and personalization enhance outcomes, reduce costs, and accelerate innovation. The synergy between biological systems and artificial intelligence holds enormous potential but it must be matched with robust ethics, regulatory adaptation, and cross-disciplinary collaboration.

Biography

Dr. Vasiliki E. Kalodimou is the Assistant Professor as well as the former acting chair, at School of Medicine at the European University-Cyprus Ltd. Frankfurt Branch, Director at the Flow Cytometry-Research and Regenerative Medicine Department of IASO Maternity-Pediatric and Research Hospital in Athens, Greece, the Board/Committee on Research Ethics at the National Hellenic Research Foundation (E.I.E). Since 2006, Dr. Kalodimou has studied and working with stem cells from placenta, umbilical cord and adipose tissue, in every day practice and their applications in regenerative medicine, clinical trials, medical tourism and Flow Cytometry. Also, is working in the area of human genetics & population genetics as well as cellular standards. In addition to collaboration with state universities and pharmaceutical companies on research projects (20), Kalodimou frequently publishes (55 & 14 books/bestseller) her findings. She has 2 patents.

Viggo Bitsch, DVM, DVSc

Retired, Independent Researcher, Denmark

The lines of antigen-antibody interactions in vitro and their significance for sensitive and specific antigen and antibody assays, including hybrid ELISAs, and for the possibility of more efficacious vaccines

Basic studies of the reactions in conventional neutralization tests without interference from complement and in complement-enriched neutralization tests were published in 1978 and 1982.

The reaction in the conventional neutralization test was found to be bi-factorial, consisting of 1) an early, prompt, and short-lasting over-neutralization reaction and 2) a slowly progressing but enduring reaction following the formula $k_{st} = \frac{[Ab][Ag]^q}{T}$. Here, kst is the binding or neutralization rate factor of the antigen-antibody system, Ag and Ab are antigen and antibody titers, T is the reaction time, and q is a particular temperature-dependent co-determiner of the reaction rate, which was designated the log-antibody/log-virus equivalence factor of neutralization, i.e., a genuine measure of the antigen-antibody affinity. The factor q was found to be approximately 0.15 at 37 oC but 0.24 at 4 oC in the herpesvirus/IgG-antibody system investigated. The influence of temperature is shown indirectly in the formula by the varying values of the factor q.

The action by the complement component C1q is central in the complement-enriched neutralization test. A significant neutralizing effect of otherwise non-neutralizing IgM antibodies could be demonstrated in serum as early as 4 days after experimental nasal infection and after 8 to 14 days in samples diluted 1:10.000 or more, illustrating an extraordinary potency of the non-neutralizing IgM antibodies in inactivating infectious agents.

Biography

Viggo Bitsch, DVM, DVSc, is a Danish veterinary scientist with extensive expertise in the diagnosis and control of infectious diseases, particularly of viral origin. His research has focused on virology, immunology, epidemiology, and the pathology of infectious diseases. From 1965 to 1985, he worked at the Danish Veterinary Diagnostic and Research Institute (State Veterinary Serum Laboratory), where he contributed significantly to national efforts in veterinary diagnostics. He then served as Head of the Cattle Health Laboratory at the Danish Dairy Board from 1986 to 2002, where he played a key role in advancing cattle health programs. Throughout his career, Dr. Bitsch initiated and led the control and eradication of five major infectious diseases affecting swine and cattle in Denmark. Now retired, he continues his work as an independent researcher.

Fundamentally, one non-neutralizing antibody molecule bound to a virus particle will result in immediate inactivation of the virus by the inclusion of the formed antigen-antibody complex in aggregates via the prompt action of C1q.

The regular over-neutralization phenomenon in the conventional neutralization test was not understood but could later be explained by the simple aggregation of the test virus. Viruses can thus be inactivated in vitro by antibodies in three ways: 1) by the slowly progressing binding to neutralizing antibodies, 2) by simple aggregation of the test virus particles synergistically by all different specific antibodies, and 3) by aggregation caused by the complement component C1q of all complexes of virus bound to predominating non-neutralizing antibodies. Aggregation reactions are principally prompt.

The lines for elaborating very sensitive assays demonstrating antigens and antibodies, including rapid hybrid ELISAs incorporating prompt aggregation reactions, are outlined.

The reasons for the prompt aggregation reactions are recognized but so far unexplained specific forces attracting and binding 1) antigenic determinants on the infectious agent and antigen-binding sites on their antibodies, and 2) the Fc region of antibodies sensitized by being bound to their antigenic determinant on an infectious agent and binding sites on the C1q component of complement.

The acquired, adaptive immune defense against infectious agents must take place on mucous membranes, where the secretory IgA antibodies, constructed especially to promote aggregation of infectious agents, predominate, and where the C1q component of complement must be anticipated to play an important role in aggregating antigen-antibody complexes.

For decades, vaccine producers have followed a trend making sub-unit vaccines, giving rise to the formation of especially neutralizing antibodies, but without attention to the important role of non-neutralizing antibodies inactivating agents by aggregation, as demonstrated in the in vitro studies. Further investigations are urgently needed to clarify the formation and the effector mechanisms of the fundamental attractive binding forces specified above and of the importance of virus aggregation reactions in vivo, which might give new information on how to produce better vaccines against infectious agents.

BOOK OF ABSTRACTS

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5th Edition of International Conference on

Tissue Engineering and Regenerative Medicine

5th Edition of Euro-Global Conference on

Biotechnology and Bioengineering

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18-20

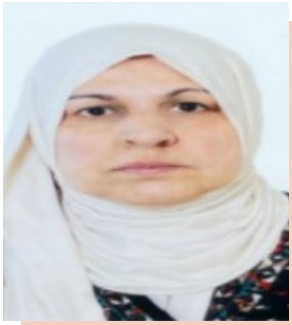
2025

ORAL PRESENTATIONS

Prof. Dr. Abdulsada A. Rahi[1*], Assist Prof. Dr. Magda A. Ali[1*], Dr. Zaid A. Rahi[3]

[1]Wasit University, College of Science, Iraq

[2]Ministry of Health, Iraq



Production of nanoliposomal amphotercin B topical gel as effective treatment for human Cutaneous Leishmaniasis (CL) disease

Human Cutaneous Leishmaniasis (CL) is the disease caused by leishmania sp.parasite and it endemic in Iraq and other world countries. This study comprised 78 cases of suspected CL disease. Before treatment, 66 (84.6%) cases were positive and 12 (15.4%) cases were negative among the three treatment groups. The reduction in the percentage of cases with positive microscopical examination was more pronounced in the case of Pentostam (sodium stibogluconate) during the first three weeks, but nanoliposomal amphotericin B 0.4% becomes more effective as the percent of cases with positive microscopical examination decreases.

Using the nested-PCR reaction, the molecular technique revealed 60 (76.9%) positive and 18 (23.1%) negative examples from 78 skin lesion samples. The best results were found with Nanoliposomal amphotercin B 0.4% topical gel, followed by pentostam 3 (20%), and finally flagyl 3 (12%) injections, when nested PCR exams were compared between the three therapy groups during weeks of follow up.

The study found a highly significant difference in mean recovery time between treatment groups ($p< 0.001$). The mean recovery time for the nanoliposomal amphotericin B 0.4% group was 2.87±0.67 (1-4) weeks, which was the shortest time ever documented. The mean recovery time in the flagyl group was 5.08±1.55 (1-8) weeks, which was the longest duration ever documented. The Pentostam group had a mean recovery time of 4.00 ±1.13 (2-6) weeks, which was comparable to nanoliposomal amphotericin B 0.4% and flagyl.

In comparison to flagyl and pentostam groups, there was a significant change (reduction) in lesion size (cm) in the nanoliposomal amphotericin B 0.4% group; however, changes in mean size were equivalent in the majority of weeks of follow up ($p>0.05$). Lesion sizes shrank after three and four weeks.

Keywords: Leishmaniasis, Human, Diagnostic Methods, Kala-azar, PCR Methods, Nanobiotechnology

Biography of Abdulsada Abdulabbas Rahi

Prof. Dr. Abdulsada Abdulabbas Rahi is currently working as Dean of Science College of Wasit University, Iraq. Dr Rahi received his Postdoctoral degree on Medical Parasitology from the University of Tehran of Medical Sciences (TUMS), Iran. Dr Rahi completed his PhD on Biotechnology of Leishmaniasis from Al-Nahrain University, Iraq. Dr Rahi completed his Masters on Medical Microbiology from the University of Al-Anbar, Iraq. He then worked at the Institute Wasit University/ Iraq, served as Professor at the University in Medical Biotechnology. Dr. Rahi has authored several publications (67 Published papers) in various reputed journals. His publications reflect his research interests in Biotechnology and Medical Parasitology. Dr. Rahi is also an Associate Editor of the Journals: Journal of Applied Sciences and Dr. Scientist is serving as a member or fellow in Association of American Society for Microbiology (ASM). He is currently in charge of ongoing scholarly project Nanobiotechnology. Dr. Rahi is awarded Golden Prize by 10th International Exihibition of Inventions and Innovation Forum and 3rd World Inventions and Innovation Forum in China / Foshan and in SiriLanka, 2020. Dr. Rahi is awarded Golden Prizes from Germany 2021,2023 and INTARG Poland 2023, 2024. Also, Dr. Rahi is awarded Scientific Day's Prize for Medical Researchs, 2014 by Iraqi Ministry of Higher Education and Scientific Research. Dr. Rahi is awarded Silver Prize by International Exihibition of Inventions and Innovation Forum in Germany / Nuremberg, 2021. Dr. Rahi is supervised PhD and MSc students and Scientific referee.

Biography of Magda Abdulkalek Ali Al-Rubaie

Assist Prof. Dr. Magda Abdulkalek Ali Al-Rubaie is currently working as academic staff of Science College of Wasit University, Iraq. Dr. Al-Rubaie received her doctoral degree on Medical Parasitology/Leishmaniasis from the Tehran University of Medical Sciences (TUMS), Iran. Dr. Al-Rubaie completed her Masters on Medical Microbiology from the Faculty of Medicine/University of Al-Anbar, Iraq. She then worked at the Faculty of Medicine at Wasit University/Iraq. Dr. Al-Rubaie has authored several publications (60 Published papers) in various reputed journals. Her publications reflect her research interests in Biotechnology and Medical Parasitology. Dr. Al-Rubaie is Scientist is serving as a member or fellow in Association of American Society for Microbiology (ASM). Dr. Al-Rubaie is awarded Golden Prize by 10th International Exihibition of Inventions and Innovation Forum and 3rd World Inventions and Innovation Forum in China/Foshan, 2018 and in Sir Lanka, 2020. Also, Dr. Al-Rubaie is awarded Scientific Day's Prize for Medical Researchs, 2014 by Iraqi Ministry of Higher Education and Scientific Research. Dr. Al-Rubaie is awarded Golden and Silver Prizes by International Exihibition of Inventions and Innovation Forum in Katowice, Poland, 2023-2024 and in Germany/Nuremberg, 2021 respectively. Dr. Al-Rubaie is supervised PhD and MSc students and Scientific referee.

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Smart hydrogel bandage with pH-responsive colorimetric indication for real-time wound monitoring

The development of intelligent wound dressings has significantly advanced the field of wound care by offering both therapeutic benefits and diagnostic insights. This study focuses on a smart hydrogel bandage designed to provide real-time visual monitoring of wound healing progression through pH-responsive colorimetric changes, eliminating the need for embedded electronic sensors. The hydrogel is formulated using a biocompatible combination of natural and synthetic polymers, integrated with a pH-sensitive dye. The material visibly changes colour in response to shifts in pH within the wound environment. Since wound pH can indicate the presence of infection, inflammation, or delayed healing, this visual feedback allows for early detection of complications and timely intervention by caregivers or clinicians. To evaluate the functionality of the hydrogel, multiple characterization techniques were employed. FTIR and XRD analyses confirmed the hydrogel's molecular structure and stability, while SEM imaging revealed a porous morphology suitable for moisture retention and gas exchange. Mechanical tensile testing demonstrated sufficient flexibility and strength, making the dressing suitable for various wound types and body locations.

Further, swelling and degradation studies confirmed the hydrogel's capacity for fluid absorption and its biodegradable nature, ensuring minimal wound disturbance during dressing changes. Antimicrobial testing showed effective inhibition of common wound pathogens, supporting the hydrogel's therapeutic role. Overall, this smart hydrogel bandage offers a cost-effective, user-friendly, and scalable solution for wound care. Its ability to visually indicate wound healing status, combined with favourable mechanical and antimicrobial properties, makes it especially valuable for home-care settings and low-resource environments. This work represents a promising step toward accessible, intelligent, and personalized wound management.

Keywords: Smart Hydrogel, pH-Responsive, Colorimetric Indicator, Wound Healing, Antimicrobial, Biocompatibility, Real-Time Monitoring.

Biography

Mr. Abhishek Upadhyay completed his Master's in Biotechnology from Parul University, India, in 2024. He received hands-on research training at premier National institutes, including CSIR-IICT Hyderabad, enhancing his expertise in biomedical sciences. He worked at the Translational Tissue Engineering Lab, IIT Mandi, as a NIDHI-EIR fellow, focusing on wound healing and scaffold testing. Currently, he is serving as PTS-3 (Scientific Technical Staff) at AIIMS-Gorakhpur in the Department of Pulmonary Medicine. His first research article was published in Medical Oncology, and his interests lie in tissue engineering, biomaterials, and translational regenerative medicine.

Akpa Eric Essoh

Biotechnology Teaching and Research Unit; Laboratory of Biotechnology, Agriculture and Valorization of Biological Resources; Biosciences Faculty; Felix Houphouet-Boigny University, Abidjan, 22 BP 582 Abidjan 22, Côte d'Ivoire

Toward biocontrol of avian pathogenic microorganisms in Côte d'Ivoire with selected probiotics belonging to lactic acid and acetic acid bacteria

Excessive use of antibiotics as treatment or preventive agent, as well as growth promoters in animal husbandry, particularly in poultry farming, is one of the most important causes of the emergence of pathogenic bacteria that are increasingly resistant to antibiotics. In animals, this situation is at the origin of therapeutic failure in treatment of various pathologies, notably salmonellosis, colibacillosis and aspergillosis; three pathologies that are responsible for huge economic losses associated with reduction in zootechnical performance of chickens and decline in their general state of health. Among potential sources of contamination feed and poultry litter are cited. The objective of our study is to use probiotic lactic acid bacteria as an alternative to antibiotics in poultry farms in order to prevent pathologies cited above and improve zootechnical performance of the animals, and thus contributes to health and food safety in Côte d'Ivoire. Furthermore, this work plans to improve sanitary conditions of poultry farms by treating the litter with selected acetic bacteria.

Numerous samples collected from feed (164) for farm chickens and litter (360) in the District of Abidjan were submitted to microbiological analysis. They revealed that all litter samples and most of the feed in farms were contaminated with Avian Pathogenic *Escherichia coli* (APEC), *Salmonella* and *Aspergillus.* These potential pathogenic microorganisms were submitted to antagonistic analysis against 267 strains of lactic acid bacteria from cocoa bean fermentation and cassava ferment, and 58 strains of acetic acid bacteria. In addition to those antagonistic effects, other criteria like: acidifying power, tolerance to acidity and resistance to bile salts, were analyzed to select potential best acetic acid starter on one hand; on the other hand, lipolytic and proteolytic enzymes assay were added to the criteria cited above for lactic acid bacteria selection as probiotic candidate.

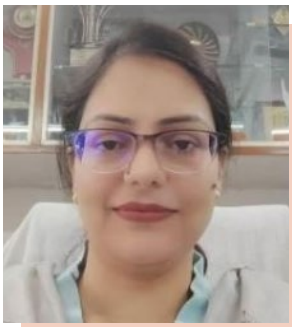
Result allowed selection of five lactic acid bacteria strains including three *Lactobacillus plantarum*, one *Leuconostoc mesenteroides* and one *Enterococcus faecium* as best potential probiotics; and four acetic acid bacteria strains as best starters. These strains presented high surviving rates and maintained their studied functional properties after freeze-drying and conservation. In addition, the five (5) selected probiotics are effective and improve zootechnical performances of chickens without using antibiotics. Given these advantages, the selected strains could be popularized as potential alternatives to antibiotics to improve sanitary quality

of poultry farms in Côte d'Ivoire and elsewhere. These strains can also be used as probiotics in agro-food industries.

Keywords: Probiotic, Lactic Acid Bacteria, Acetic Acid Bacteria, Poultry Feed, Litter.

Biography

Dr Akpa Eric Essoh graduated as MS in Biochemistry in 1994 at University of Cocody, Abidjan, Côte d'Ivoire. Since 2001, he holds a PhD in Agricultural Sciences and Biological Engineering from Gembloux Agrobiotech, University of Liège, Belgium. He carried out his research work at Bioindustries laboratory of Prof. Philippe Thonart and then at Agri-Food Industries Technology laboratory of Prof. Claude Deroanne in Gembloux. Dr. Akpa completed two years of Posdoctoral studies at Molecular Biology and Organic Chemistry laboratories in a European Union multidisciplinary project at Radboud University Nijmegen, the Netherlands, under supervision of Prof. Jan van Hest. Dr. Akpa is currently Lecturer and Researcher at Felix Houphouet-Boigny University, Abidjan, Côte d'Ivoire. He has published more than 50 research articles in scientific journals and made numerous scientific communications.



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Aluminium mediated expression of dehydration stress protein and ability of al-acclimatized immobilized *Nostoc muscorum*: A strategy to combat abiotic stress and its potential as a biofertilizer

In the present study engineered cyanobacteria based biofertilizer using the concept of acclimatization and immobilization has been for the very first time introduced and attempted. The cyanobacterium Nostoc muscorum (*N. muscorum*) was well acclimatized to Al metal by initially subjecting the cells to very low dose (0.1 µM) of Al and subsequent transfer every 15 days to the higher concentrations (1, 10, 20, 30, 40 and 60 µM) of Al with regular growth study at each step of cells transfer to the higher concentration and immobilized in calcium alginate beads and were examined for their growth in terms of content of chlorophyll a, heterocyst frequency and ammonia excretion. Growth was more pronounced in Al- acclimatized immobilized state than under free state. Heterocyst frequency and ammonia excretion were considerably higher under immobilized state than under free-living conditions. Results also showed the ameliorative role of Al- acclimatization in *N. muscorum* exposed to UV stress. Air dried Al- acclimatized immobilized cells stored under light, temperature, air and dust retained the ability to regenerate the viable colonies for upto months. From the experiments performed, it is witnessed that calcium alginate does not cause any opposing effect on regeneration potential and N2–fixing capability of *N. muscorum* and the air- dried beads are appropriate to store and easy to transport. We also hypothesize that Al may induce dehydrin-like proteins in N. muscorum providing defense against the deleterious oxidative damage caused by other toxic metals. In the present study, protein extracted from Al (1-80 µM) treated N. muscorum was analyzed by the SDS-PAGE, which showed dose-dependent significant upregulation of various proteins resembling the dehydrin-like proteins noticed in higher plants under drought or dehydration stress upto 40 µM. The RT-PCR results indicated a significant increase in DHN mRNA transcript levels in Al-treated cells (40 µM) when compared to the control cells. The higher expression level of mRNA transcript was found 0.6-fold higher than the control, respectively. Further, this result prompted us to investigate the precise mechanism(s) of defense in the Al-acclimatized *N. muscorum.* The cells of *N. muscorum* acclimatized with Al (40 µM) when exposed to Cd (8µM) showed a reduction of about 75% in the MDA level compared to the cells exposed to Cd alone. Further, proline, known to be induced during stress, was also increased by ~25% in the Al-acclimatized Cd exposed N. muscorum as compared to the cells exposed to Cd alone. Our results perhaps for the first time demonstrated that dehydrin-like proteins induced by Al stress could provide tolerance to *N. muscorum* from deleterious effects of other toxic metals. Thus the present study

will provide stress tolerant biofertilizer with improved storage capability and portability enabling more sustainable and efficient production for sustainable agriculture.

Key words: Aluminium, Dehydrin, Acclimation, Tolerance.

Biography

Dr. Alvina Farooqui, Professor of Biotechnology presently working as Head, Department of Bioengineering has 16 years of teaching experience in the field of Bioprocess engineering and Fermentation Biotechnology and 12 years of Research experience in the field of Cyanobacterial Biotechnology, and Stress biochemistry Dr. Alvina has 65+ research articles in peer reviewed journals, 15 Book chapters, 3 edited books and 5 international patents and two national patents to her credit. Have guided 9 PhDs and 15+ PG dissertations. Her research group at Integral University Lucknow India is actively involved in exploiting various potential of cyanobacteria commonly called as blue green algae.

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Selective MRI contrast with magnetite nanoparticles in malignant tumors: Hopes and challenges

In an experiment on rats, it was demonstrated that biocompatible standardized magnetite nanoparticles (ICNB) can be effectively used in MRI. It was proven that ICNB nanoparticles significantly enhance MRI imaging. The methodology for the safe intravenous administration of ICNB excludes the use of magnetite nanoparticles as an independent contrast agent for MRI. It was established that 24 hours after intravenous administration of ICNB, magnetite nanoparticles selectively accumulate in malignant tumor tissues with statistical significance, thereby increasing the brightness of the image. By the 4th day of the study, a statistically significant reduction in the brightness of the tumor and muscle images was observed, which was caused by the excretion of magnetite nanoparticles from the rat's body. The mechanism of action of ICNB nanoparticles induces reversible changes associated with a temporary increase in hydrogen proton mobility in the extracellular fluid. This inevitably modifies the metabolism of malignant cells, offering hope for the discovery of new approaches to targeted therapy for malignant tumors.

Keywords: Nanoparticles, ICNB, MRI, Malignant tumor, Contrast

Biography

Prof. Andrey Belousov is Doctor of Medicine. Author a new medicine products – nanotechnology preparations based on magnetite nanoparticles (Fe_3O_4) of the size 6-12 nm: the peroral form - Micromage-B (the biologically active additive officially registration in Ukraine); Magnet-controlled sorbent brand of MCS-B for extracorporal detoxication of biological liquids (officially registration in Ukraine and was allowed for medical practice); Nanobiocorrector for intravenous application–ICNB (Intracorporal Nanosorbent). The published more 310 scientific works on results application of nanotechnology preparation in experimental and practical medicine. A. Belousov - the Head of Laboratory Applied Nanotechnologies of Belousov, DM, Professor of Department Anaesthesiology, Intensive Care Kharkiv National Medical University, Ukraine.

Dr. Anine Crous*, Mr. Brendon Roets

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Photobiomodulation-enhanced tenocytic differentiation of adipose-derived stem cells

Tendon tissue engineering is the branch of regenerative medicine that focuses on repairing, regenerating or replacing aged or damaged tendon tissue. This approach commonly makes use of various stem cells differentiated into tenocytes with the use of growth factors and biomaterials. Adipose-Derived Stem Cells (ADSCs) have emerged as a valuable cell source in regenerative medicine due to their multipotency and accessibility. This study explores the Potential of Photobiomodulation (PBM) to enhance tenocytic differentiation of ADSCs and address limitations in conventional in vitro models. Immortalized ADMSCs were irradiated using 525 nm, 825 nm, and their combination wavelengths, with a 5 and 10 J/cm^2 fluency. Prior to irradiation, stem cell characterization was performed using CD44, CD90 and CD166 expression, using immunofluorescence. Following differentiation, morphology (May-Grünwald-Giemsa staining), cell viability (live-dead staining and cytotoxicity), and proliferation (ATP quantification) were assessed. Tenogenic differentiation was evaluated using PCR (Scleraxis, Tenomodulin, Collagen I, Tenascin-C and Biglycan) and immunofluorescence (Scleraxis, Collagen I and Biglycan). Results demonstrated expression of stem cell markers. Following tenogenic induction, no significant morphological alterations were observed, while cell viability, proliferation, and tenogenic marker expression were enhanced. These findings highlight the tenogenic ability of the ASC52Telo cell line and PBM as a potential strategy to enhance tenogenic differentiation.

Biography

Dr. Anine Crous is a senior lecturer and NRF Y-rated researcher at the University of Johannesburg's Laser Research Centre. Her research encompasses photobiomodulation, stem cells, photodynamic therapy, and cancer stem cells, with an emphasis on 3D cell culture and organoid models. She has published over 30 academic works and supervises master's, PhD, and postdoctoral researchers. Dr. Crous serves as Membership Director of WALT and Chair of OPTICA's Therapeutic Laser Applications group. She has received multiple research grants and is recognized for her leadership in basic science focussing on regenerative medicine and stem cell-based therapies, advancing innovative approaches in personalized healthcare.

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Waste-to-value: microbial engineering and fermentation optimization for sustainable and cost-effective bioplastic and biochemical production from agro-industrial waste

Waste-derived biomass streams offer a promising resource for the cost-effective production of high value-added bioproducts in a circular bioeconomy. As part of the CBE project PROMOFER, this work outlines a comprehensive strategy to convert agro-industrial and lignocellulosic wastes—such as wastewater, low-value starches, whey permeate, and agricultural residues—into Polyhydroxybutyrate-co-Valerate (PHBV), a biodegradable bioplastic, and 2,3-Butanediol (2,3-BDO), a platform chemical for biobased polyurethane. The process begins with the transformation of waste into volatile fatty acids (VFAs) and sugar-rich hydrolysates through acidogenic fermentation and enzymatic pretreatment. These feedstocks are then utilized by microbial strains (Cupriavidus necator, Bacillus megaterium, Bacillus spp.), which have been enhanced through random mutagenesis and metabolic engineering. Key modifications include removal of energy-wasting pathways and upregulation of biosynthetic enzymes to improve PHBV accumulation and 2,3-BDO production.

In addition to improving biosynthetic performance, a central objective of this strategy is to increase microbial tolerance to common fermentation inhibitors. These include VFAs—such as acetic, propionic, and butyric acid—as well as toxic by-products from biomass pretreatment, including furfural, Hydroxymethylfurfural (HMF), and phenolic compounds. Enhanced resistance to these compounds leads to greater process stability and higher fermentation yields.

Fermentation processes are scaled and optimized to meet the specific needs of target applications. PHBV is produced in fed-batch systems under controlled conditions to meet performance requirements for packaging and agricultural uses. 2,3-BDO production is optimized through statistical design of media and digital process modeling, enabling large-scale manufacturing for bio-based synthetic leather. These improvements are crucial to reducing overall production costs and enhancing the commercial viability of biobased alternatives.

Environmentally friendly downstream processing completes the value chain. PHBV is extracted using green solvents and enzymatic methods, while 2,3-BDO is recovered through membrane-based and aqueous two-phase extraction systems designed for minimal environmental impact.

This waste-to-value approach developed in PROMOFER provides a scalable, economically competitive, and sustainable platform for the industrial production of bioplastics and biochemicals, replacing fossil-based counterparts in key sectors.

Biography

Ms. Arantxa Garcia graduated with a degree in Biotechnology from the University of Valencia in 2023. She currently works as a researcher in the Biotechnology Department at AIMPLAS (Plastics Technology Centre) in Valencia, Spain. Her research focuses on microbial fermentation processes for the production of bioplastics and bioplastic-derived monomers, as well as the bioprospecting of plastic-degrading microorganisms.

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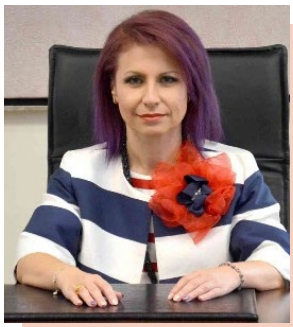
Effect of maltogenic amylase, highperformance maltogenic amylase enzymes, and bacillus coagulans probiotic bacteria on the shelf life and other properties of baked bread and tortilla

The research project involves studying the effect of addition of maltogenic enzyme to improve the shelf life and other desirable properties of baking goods (white bread and tortillas). Maltogenic enzyme breaks down long chains of amylopectin in starch to shorter chains that can hold more efficiently water moisture in bread and tortilla. Holding moisture prevents stalling caused by crystallization of amylopectin to longer chains. Preventing stalling prolongs the shelf-live and improves freshness. it was found that the addition of as small as 100 ppm maltogenic amylase is enough quantity to cause the desired improvement in contrast to the addition of as high as % level concentration of chemical additives other than enzymes to bring the same improvements. The requirement of adding as small quantity as 100 ppm enzymes can be achieved without altering the conventional industrial bread and tortilla baking process, thus avoiding the introduction of expensive new equipments or prolonging baking time. the experimental analysis performed on the baked bread and tortillas are: texture analysis, ball kneading test, moisture content and sensory tests. Sensory tests include aroma, spring back, foldability, softness, mouthfeel, and how appetizing the bread or tortilla test. The results of these tests indicate that shelf life of bread increased to 21 days and 35 days for tortilla. Also, improvements were detected in softness, moisture content, foldability, and test.

Another research project was performed by adding probiotic bacteria to the baking goods. Bacillus coagulans LBSC was used. This bacteria has been found to provide several health benefits, such as alleviating gastrointestinal conditions. The research study involves determining stability (i.e. bacteria survival rate), and effect on sensory attributes in tortillas, tortilla chips, and chocolate. This bacteria is a spore forming bacteria, so it can survive heat treatment during baking process in tortilla. The addition of this bacteria was done using conventional process without the need for additional equipment's. It was found that the survival rate is 42% for tortilla and 98% for tortilla chips and chocolate. Tortilla surviving rate of 42% is due to heat treatment during baking process, while tortilla chips, and chocolate process involve no heat treatment. Also, it was found that food with added probiotic bacteria were rated similar in sensory attributes when compared to their corresponding controls where no probiotic bacteria was added.

Biography

Dr. Assad Alammar received his PhD degree in analytical chemistry from Glasgow University, UK. He underwent Post Doctoral researchstudies for four years in University of Massachusetts, USA. He worked for several industrial establishments as a Laboratory quality Control Manager in USA. For the last seven years he has been working as Laboratory quality Control Manager in Specialty Enzymes and Probiotics, Chino, California, USA. he published 42 full peer reviewed research papers in American and European Journals.



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Evaluating interleukin-2 and its receptors as indicators of acute renal graft rejection

Introduction: Interleukin-2 (IL-2) is a cytokine that exerts its actions via binding to a variety of Interleukin-2 Receptors (IL-2R), thereby stimulating T-cell response. Acute Renal Graft Rejection (AR) is known to be mediated by CD8+ T-cells, through the IL-2 pathway. The aim of this study was to determine whether IL-2 and IL-2R could work as prognostic biomarkers of AR.

Methods: IL-2, IL-2R and Cystatin-C levels were measured in the serum of 50 patients who underwent a kidney transplant, once pre-operatively and at four different time points post-operatively (second, sixth, 14th day and third month). Of the total number of patients, ultimately 10 (20%) had an episode of AR.

Results: No statistically significant difference in IL-2 levels was found between those who experienced AR and those who did not, at any of the studied time points. On the other hand, measurement of IL-2R levels on the sixth and 14th day post-operatively showed that people with AR had a statistically significant increase in its value compared to patients who did not have an AR episode ($p=0.027$ and $p=0.019$, respectively). In addition, comparing the values of IL-2R with that of Cystatin-C in different time periods, it was found that there is a significant positive linear correlation on the second and sixth postoperative day between the values of the associated parameters ($r=0.280$, $p=0.049$ and $r=0.372$, $p=0.008$ respectively).

Conclusion: The measurement of IL-2R from the sixth to 14th postoperative day could be used as a reliable prognostic biomarker of AR, however additional studies and standardised diagnostic thresholds are required before the routine clinical application is feasible.

Biography

Athina Gompou is the director of the Department of Nephrology and Renal Dialysis at IASO Thessaly, Larissa, Greece. She was a resident and after that a specialized doctor in the Department of Nephrology, Transplantation Unit in Laiko General Hospital of Athens, the capital of Greece. Her approach with new patients starts with kindness and her knowledge about nephrology are huge.

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IL-1β-induced oxidative stress and ferroptosis in osteoarthritis-derived chondrocytes: Targeting ferroptosis inhibition through genetic therapy

Problem Statement: Osteoarthritis (OA) is a degenerative joint disease characterized by cartilage breakdown and chronic inflammation. Interleukin-1 Beta (IL-1β), a key pro-inflammatory cytokine in OA, disrupts iron metabolism, leading to excess intracellular iron and Reactive Oxygen Species (ROS) generation. This imbalance may contribute to ferroptosis, an iron-dependent form of regulated cell death driven by lipid peroxidation. The role of ferroptosis in OA remains underexplored, particularly in relation to the enzyme ACSL4, which facilitates lipid peroxidation.

Objective: This study aimed to (1) establish an in vitro OA model using IL-1β to induce ferroptosis in chondrocytes and (2) investigate the effect of ACSL4 gene silencing via CRISPR-Cas9 to inhibit ferroptosis.

Methods: Primary human chondrocytes derived from OA patients were treated with IL-1β at concentrations ranging from 2 to 14 ng/ml for 24, 48, and 72 hours. Cell viability was assessed using the AlamarBlue assay, and morphological changes were evaluated microscopically. A CRISPR-Cas9 construct with sgRNA targeting ACSL4 was developed and transfected into chondrocytes. Transfection efficiency was analyzed by flow cytometry using Green Fluorescent Protein (GFP) markers, and successful gene targeting was confirmed through Sanger sequencing.

Results: IL-1β treatment induced a dose- and time-dependent reduction in cell viability, along with noticeable morphological changes, confirming oxidative stress-induced damage. No significant difference was observed in cytotoxicity between OA and non-OA chondrocytes at 48 hours, supporting the use of OA-derived chondrocytes for modeling. CRISPR-mediated ACSL4 silencing was successful, as confirmed by both fluorescence intensity shifts in flow cytometry and sequencing.

Conclusion: This study successfully established an in vitro OA model and demonstrated the potential of targeting ferroptosis via ACSL4 silencing. The findings support further exploration of genetic therapies aimed at modulating ferroptosis as a novel approach for OA treatment.

Biography

Dr. Atiqah Aziz is a dedicated Senior Research Officer at the Tissue Engineering Unit (TEG) within the National Orthopaedic Centre of Excellence for Research & Learning (NOCERAL), Department of Orthopaedic Surgery, Faculty of Medicine in Kuala Lumpur. With a diverse and interdisciplinary academic journey, she has effectively bridged various scientific fields to advance research in regenerative medicine and tissue engineering. At NOCERAL, her multidisciplinary expertise has been pivotal in exploring new alternative treatments for Osteoarthritis (OA). It was here that she developed a strong interest in gene therapy using CRISPR technology to combat cell death in OA.

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A data-driven framework for reactive musculoskeletal modeling: Integrating proteomics, biomechanics, and machine learning

Reactive, predictive Musculoskeletal (MSK) models that integrate high-throughput proteomic, biomechanical, and physiological data offer a powerful tool for forecasting tissue adaptation under altered mechanical loading. Spaceflight—and its ground-based analogs such as rodent hindlimb unloading, human 6° head-down tilt, and limb offloading protocols—accelerates MSK deconditioning, providing an efficient testbed for model calibration. To address the lack of integrated, data-driven platforms in current MSK simulations, we have developed a modular framework that leverages longitudinal serum proteomics, analog biomechanical metrics, and vascular–bone intervention outcomes to train machine-learning algorithms capable of predicting multi-protein responses, ocular pressure shifts, and bone density changes. These initial modules establish the foundation for a reactive, in silico MSK platform.

Methods: In partnership with the University of Central Florida (UCF), we assembled a multi-source dataset—longitudinal serum proteomics from rodent hindlimb unloading studies, public E-PROT-10 data, and a simulated primer dataset—to train a Random Forest–based, multi-output regression pipeline in scikit-learn. Model interpretability was achieved via SHAP, and performance was evaluated using R^2 and MAE. Concurrently, at Embry-Riddle's Biomechanics and Aerospace Laboratory (ERBal), we conducted a 6° head-down tilt study in healthy volunteers to quantify sex-based differences in Intraocular Pressure (IOP). AdventHealth Innovation Labs is contributing data from one-limb rest protocols and vascular–bone interventions, expanding the mechanical stimuli represented in the model. We are also integrating participant genetic profiles to account for inter-individual variability.

Results: Across 15 muscle-related proteins, the pipeline achieved a mean R^2 of 0.70 and MAE of 0.18. Top-performing proteins (FABP3, Lipocalin-2, Annexin A1) exceeded R^2=0.85. In the IOP study, female participants exhibited ~20% greater IOP elevation than males ($p<0.01$), suggesting hormonal or anatomical influences. Genetic integration is ongoing and expected to enhance model specificity.

Conclusion: These initial modules offer a reactive, data-driven foundation for predictive MSK modeling. By layering multi-domain datasets—proteomic, mechanical, ocular, vascular, and genetic—this framework supports individualized, in silico evaluation of countermeasures for spaceflight and rehabilitation applications.

Biography

Dr. Christine Walck is an Assistant Professor of Mechanical Engineering at Embry-Riddle Aeronautical University and Principal Investigator of the Biomechanics and Aerospace Laboratory (ERBaL). A former mechanical engineer at the U.S. Naval Research Laboratory, she brings expertise in unmanned systems, biomechanics, and musculoskeletal modeling. Her research integrates proteomics, imaging, and human performance data to optimize rehabilitation and spaceflight health. Dr. Walck is also committed to project-based learning, blending real-world challenges with engineering education to prepare students for complex systems work in both academic and clinical contexts.

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Decoding pediatric appendicitis disease: Glycosylation insights via HPLC and mass spectrometry

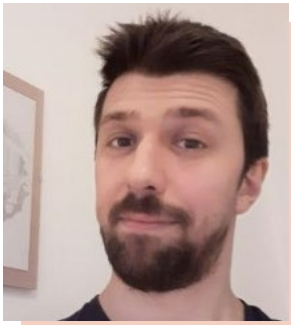
N-glycosylation, an asparagine-linked glycosylation process, plays a vital role in cellular interactions, angiogenesis, immune response, and effector functions. Altered N-glycosylation impacts tumor growth and both acute and chronic inflammatory processes. IgG, the second most abundant glycoprotein in serum, shows altered glycosylation patterns during inflammation, suggesting that IgG glycan modifications may serve as potential biomarkers for appendicitis. Appendicitis is a common acute inflammatory condition in both children and adults, but current laboratory markers such as C-Reactive Protein (CRP), White Blood Cell Count (WBC), Absolute Neutrophil Count (ANC), and Red Blood Cell Count (RNC) lack specificity in detecting appendicitis-related inflammation. Specifically, increased levels of agalactosylated IgG glycans are a known feature of various inflammatory conditions, potentially including appendicitis. Identifying pediatric appendicitis remains challenging due to the absence of specific biomarkers, which makes diagnosis reliant on clinical symptoms, imaging such as ultrasound, and nonspecific lab indicators (e.g., CRP, WBC, ANC). In this study, we analyzed the IgG derived N-glycome in pediatric patients with appendicitis compared with healthy controls.

The N-glycome was analysed by high-performance liquid-chromatography combined with mass spectrometry. IgG was isolated from serum samples by protein G column. The IgG derived glycans were released by enzymatic deglycosylation and fluorescent tags were attached to each glycan moiety, which made necessitates the sample clean-up for the further reliable quantitation. Overall 38 controls and 40 serum samples diagnosed with pediatric appendicitis were analysed by HILIC-MS methods. Multivariate statistical tests were performed with area percentage under the peak data derived from the integrated peaks, which were obtained from the chromatograms.

Our results represented, the altered N-glycome of IgG in pediatric appendicitis is similar with other observations. The glycosylation pattern reported so far for IgG is characterized by decreased galactosylation and sialylation, and an increase in fucosylation.

Biography

Dalma Dojcsák, 4th years PhD student from the University of Miskolc, Hungary. She is graduated as a biochemical engineer at the University of Debrecen, Hungary in 2021, then she started PhD studies at the University of Miskolc in the Bioanalytical research group leaded by Dr. Csaba Váradi to study Nglycosylation alterations in different inflammatory diseases. She will attain my PhD degree during the autumn of 2025.



Davide Frumento
Roma Tre University, DISFOR, Rome, Lazio, Italy
University of Milan, Penitentiary Campus Milan, Lombardia, Italy

Flu vaccines available in Italy for the youth population

In recent years, research focused on influenza prevention has led to the development of various vaccine formulations aimed at providing increasingly safe and effective products tailored for different age groups. This initiative seeks to optimize health outcomes, achieve economic savings, and ensure adequate protection for the entire community. The present Health Technology Assessment (HTA) report aims to evaluate the introduction of the live attenuated influenza vaccine, Fluenz Tetra®, for the 2021/2022 season within the Italian population aged between 2 and 18 years. Consequently, this research exclusively examines the currently available vaccines, specifically the Quadrivalent Vaccines Produced in Eggs (QIVe) and the Quadrivalent Vaccine Produced in Cell Culture (QIVc), while the Quadrivalent Live Attenuated Vaccine (Q/LAIV) was addressed separately. A critical assessment of the existing scientific evidence has been conducted to provide readers with an overview of immunogenicity, efficacy, effectiveness, and safety data. To this end, systematic reviews and meta-analyses have been analysed, and in the absence of such secondary research, studies published since the 2017/2018 season have been evaluated. It is important to note that the recommendations for the 2021/2022 season indicate that vaccination is advised for all individuals aged 6 months and older without contraindications, prioritizing children under 5 years due to their heightened risk of developing severe influenza. Furthermore, the significance of immunizing children aged 6 months to 6 years is emphasized to reduce the circulation of the influenza virus among adults and the elderly. Currently, many regions offer free vaccinations to healthy children and adolescents in close collaboration with general practitioners and paediatricians.

Biography

Davide Frumento worked on type 1 diabetes-related enteropathy (Milan University/Harvard University). He researched adherence to antiretroviral therapy among HIV patients and efficacy of new-generation anti-HCV medications (Genoa University). He explored the delayed onset effects of SIRT6 inhibition in in vitro and in vivo models of Multiple Sclerosis (Genoa University). He investigated anti-influenza and anti-meningococcal vaccination strategies (Genoa University). He worked on Organic Synthesis research, characterizing pyrazolo[3,4-d] pyrimidine tyrosine kinase inhibitors (Genoa University). He is an Adjunct Professor in Epigenetics, researching generational trauma (RomaTre University). He is an Adjunct Professor in Organic Chemistry (University of Milan).

Dr. Dheeraj Chitara

Department of Biotechnology, School of Sciences, JECRC University, Jaipur, Rajasthan, India

Proteins under pressure: Rethinking folding pathways through big data and atomistic modelling

Understanding protein folding in vivo demands models that go beyond idealized, dilute conditions. The cellular environment is crowded, complex, and dynamically structured by intricate water networks. In this study, we employ large-scale atomistic simulations, powered by newly developed big data and cloud-based algorithms, to reveal how molecular crowding and water network restructuring reshape the protein folding landscape. Our analyses show that crowding compacts unfolded ensembles and shifts folding pathways toward native-like conformations through entropic stabilization. At the same time, confined water networks emerge as active modulators, reorganizing hydration shells and altering kinetic barriers. Water is not a passive medium, it acts as a critical architect of the folding process. By leveraging high-throughput, cloud-enabled computation, we capture previously inaccessible intermediate states and dynamic fluctuations across large conformational ensembles. These results challenge classical folding paradigms and offer a new, data-driven perspective on how proteins navigate their rugged energy landscapes in biologically relevant environments. Our approach paves the way for more predictive models of proteostasis, misfolding diseases, and the design of next-generation biomaterials under realistic conditions.

Biography

Dr. Dheeraj Chitara, Ph.D., is an Assistant Professor at JECRC University in Jaipur, Rajasthan, India. He completed his M.Sc. in Bioinformatics from Pondicherry Central University, Puducherry, after earning his undergraduate degree from Jai Narain Vyas University, Jodhpur. He received his Ph.D. in Bioinformatics from the Indian Institute of Information Technology (IIIT), Allahabad, India. With a strong academic background, He has contributed significantly to the fields of Cloud Computing, structural bioinformatics, molecular dynamic simulations, and computational biology. His work has been widely recognized, with several research publications, patents, and book chapters to his name. He has also played a pivotal role in the development of innovative technologies, securing patents in health monitoring devices and drug delivery systems. His research includes collaborative work on immunomodulators, cardiovascular diseases, and the use of artificial intelligence in drug discovery.

Elcio Meira da Fonseca Junior*, Elaine Cristina Pacheco de Oliveira

Institute of Biodiversity and Forests, Federal University of Western Para, Santarem, Para, Brazil

Amazonian plant biotechnology: Bridging regional science and industry

The Amazon Rainforest, a globally significant biodiversity hotspot, holds a vast and invaluable reservoir of plant genetic resources with immense potential for innovative biotechnological applications aligned with a sustainable bioeconomy. Despite its natural richness, much of this potential remains underutilized, particularly in terms of value addition, technological innovation, and the development of biobased products with industrial, pharmaceutical, and ecological relevance. This presentation aims to demonstrate how plant biotechnology focused on Amazonian species can effectively connect locally generated scientific knowledge with the dynamic demands of global markets. Recent advances in plant tissue culture technologies have proven critical for the conservation, propagation, and sustainable use of native species with high ecological and commercial value. Key techniques include large-scale micropropagation, somatic and zygotic embryogenesis for clonal propagation and genetic improvement, synthetic seed production as a scalable and transportable alternative for plantlets, and the *in vitro* biosynthesis of high-value secondary metabolites for applications in the nutraceutical, cosmetic, and pharmaceutical industries. These strategies enable the development of bio factories and the use of bioreactors, ensuring genetic uniformity, traceability, and environmental sustainability in value chains based on Amazonian biodiversity. Results from ongoing research at the Laboratory for the Study of Amazonian Ecosystems: Plant Biotechnology and Bioeconomy will be presented, highlighting species of strategic importance such as *Myrciaria dubia* Mc. Vaugh (camu-camu), internationally recognized as the tropical fruit with the highest vitamin C content, also rich in flavonoids and essential minerals; *Euterpe oleracea* Mart. (açai), known for its high nutritional value and bioactive compounds with antioxidant and anti-inflammatory properties; and *Caryocar villosum* (Aubl.) Pers (piquia), a promising source of carotenoids and unsaturated fatty acids for functional food development. Additional examples include *Dipteryx odorata* (Aubl.) Willd. (cumaru), widely used in the production of aroma compounds and bio actives with high market value, and sustainable alternatives to *Aniba rosaeodora Duke* (rosewood), which are essential to reduce extraction pressure on endangered species while promoting innovation in natural perfumery and green cosmetics. The presentation also addresses the role of Plant Growth-Promoting Microorganisms (PGPMs), which contribute significantly to improved seedling development, ex vitro acclimatization, and enhanced tolerance to abiotic stress—factors that are critical for the successful scaling of plant tissue culture systems. Furthermore, biotechnological strategies aimed at enhancing the climate resilience of Amazonian species will be discussed, particularly in the context of forest conservation and ecosystem service

stability. Finally, the transfer of scientific knowledge to productive sectors will be explored through sustainable value chain models, seedling and bioactive certification protocols, support for smallholder inclusion, technical training for local communities, and the strengthening of public-private partnerships. Amazonian plant biotechnology thus emerges as a transformative tool for connecting regional scientific excellence with global industrial innovation, promoting a bioeconomy that is inclusive, resilient, and deeply aligned with biodiversity conservation and climate change adaptation. In this context, we are seeking strategic partners to scale these innovations and maximize the global impact of Amazonian biotechnology.

Biography

Dr. Elcio Meira da Fonseca Junior is an Associate Professor at the Federal University of Western Para (UFOPA), Brazil. He holds a bachelor's degree in Biological Sciences (UNIMONTES), and PhD in Plant Physiology from the Federal University of Viçosa (UFV) and completed postdoctoral fellowship in Mycorrhizal Associations at UFV. He researches focuses on plant responses to abiotic stress and the tissue culture of Amazonian species. Dr. Fonseca Junior conducts research to advance plant biotechnology and the bioeconomy in Northern Brazil, promoting the conservation and sustainable use Amazonian biodiversity through innovative approaches.

Frank Denis Torres-Huaco

Environmental Engineering Academic and Professional School, Engineering Faculty, Continental University, Arequipa, Peru

Establishing the fundamentals for a self-sustainable and cost-efficient tannery effluent treatment system: Towards the production of industrial application enzymes based on bioremediation process

The tannery industry produces approximately 24 billion square feet of leather annually, with an estimated worth of $45 to $50 billion. It has a significant impact on the economies of developing countries, providing income and employment. This industry is tightly linked to agriculture, as bovine hides account for almost 65% of the raw materials. Moreover, this industry has high water consumption and, therefore, produces abundant effluent containing many contaminants. Among these contaminants are heavy metals, such as chromium, lead, nickel, cadmium, and copper. Thus, tannery effluents pose a greater danger to the population and the environment.

In Peru, the tannery industry is a significant economic activity, providing over 64,000 direct jobs, which represent almost 1% of Peru's GDP. As of 2023, there are 6,339 registered factories, of which 95% are classified as micro-factories (<10 workers); big factories (>250 workers) represent less than 0.3% of all factories. The great majority of factories (over 91%) are located in the cities of Lima, Trujillo, and Arequipa. In Arequipa city, the tannery industry is comprised of small and medium-sized factories concentrated in the Rio Seco Industrial Park (PIRS) in the Cerro Colorado district, approximately 20 minutes by car from the downtown area. Leather production is based on methods using chromium salts and vegetal extracts; the former method is the most widely used due to its cost-effectiveness.

The oxidation lagoon is the main tannery effluent treatment process used in Arequipa; however, it is overflooded by the effluent volume, forming streams that contaminate the surrounding area. These streams flow to the Añashuayco ravine, which empties into the Chili River, used for irrigation that produces food for local and regional consumption.

Studies on the effectiveness of bioremediation systems based on microbial and plant agents have been published. Both systems showed promising results, removing between 80% and 98% of the chromium, and reducing and improving physicochemical parameters. However, these methods face important challenges due to industry characteristics, scale, variation in effluent production, personnel training, cost, and environmental considerations, and are viewed as only cost-driven processes, making their implementation difficult.

Our work focuses on establishing the fundamentals for an ex-situ tannery effluent bioremediation system based on a land farming model using *Medicago sativa*, which shows effective chromium removal. We are testing the ultrasound pulse as a pretreatment and sterilization method. The bioremediation system, which combines both methods, can be adapted to variations in effluent volume, offering promising low operation costs and resistance to environmental changes due to the characteristics of the bioremediation agent. Furthermore, we are investigating the coupling of the bioremediation system to lacasse enzyme production by native fungal and bacterial species using plant biomass, thereby converting this process into a production system. The lacasse enzymes have a major industrial application in the textile sector, which is an important economic industry. Thus, our goal is to propose and implement a biotechnological production system that gives aggregated value to tannery effluents.

Biography

Dr. Torres-Huaco studied Biology at the Universidad Nacional de San Agustín (Peru). He received his PhD degree in Molecular Biology at Campinas State University (Brazil) in 2013. He joined the research group of Prof. Stephen Hyslop at the Faculty of Medical Sciences, same institution. After completing a four-year postdoctoral fellowship, he obtained the position of Research Professor at Continental University (Peru) and later held the position of Research Coordinator of the Engineering Faculty at the same institution. One of his main research interests is in the study of biorremediation mechanisms and developing sustainable tannery and municipal effluent treatment systems.

Hitesh Rana

Ph.D. Scholar, Animal Stem Cell Lab, College of Animal Biotechnology, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab, India

Expression dynamics of mesenchymal stem cell markers in canine adipose-derived stromal vascular fraction during culture

The Stromal Vascular Fraction (SVF) is a heterogeneous cell population derived from adipose tissue that has gained attention for its potential in regenerative medicine. This study investigated the expression dynamics of Mesenchymal Stem Cell (MSCs) markers, CD90, CD105, and CD44 during in vitro expansion of canine SVF. The SVF was enzymatically isolated from theperiovarian fat of healthy dogs and cultured from Passage 0 (P0) to Passage 3 (P3). Immunocytochemical localization of CD90 and CD105 markers was performed. Quantitative analysis of the percentage of marker positive cells revealed a 3% decrease in CD90-positive and a 10.5% decrease in CD105-positive cells from P0 to P3. In flow cytometry, the percentage of CD44+ and CD90+ cells in the P1 passage was 10.9% and 76.9%, respectively, with 20.7% of double positive CD45- cells. In the P3 passage, CD44+ and CD90+ cells were 4.1% and 87.7 %, respectively with 1.5% of double positive CD45- cells. The percentage of double marker positive cells (representing enriched MSCs fraction) was reduced drastically by 83.7% within two passages that is from P1 to P3 from 20.7% to 1.5%. These findings indicate a gradual phenotypic shift during serial passaging, which could impact the therapeutic potential of SVF-derived MSCs. A reduction in hematopoietic lineage negative (CD45-) and stem cell marker (CD44+, CD90+, and CD105+) positive cells may reflect a loss of regenerative capability over time. Notably, the CD90 was abundantly expressed in canine SVF in all fat samples. This study underscores the importance of utilizing freshly isolated or early-passage SVF for cell-based therapies to maximize stem cell functionality and ensure therapeutic efficacy. Our findings provide valuable insights into the phenotypic stability of canine adipose tissue derived SVF.

Biography

Hitesh Rana is a PhD student working in the Animal Stem Cell Lab at the College of Animal Biotechnology, Guru Angad Dev Veterinary and Animal Sciences University, Punjab, India. His research focuses on the isolation and characterization of Stromal Vascular Fractions (SVFs) derived from canine adipose tissue. He investigates their immunomodulatory properties through in vitro and in vivo assays to assess their potential therapeutic applications. His work involves evaluating the regenerative capabilities of SVFs, particularly in wound healing and lymphoma treatment. This includes studying their safety profile, efficacy, and mechanisms of action in modulating the immune response. By employing advanced techniques such as immunocytochemistry, quantitative PCR, and flow cytometry, he analyze cellular markers and gene expression patterns that contribute to tissue repair and immune

regulation. Beyond his laboratory work, he is passionate about translational research and the development of innovative stem cell-based therapies for veterinary and biomedical applications. He aims to bridge the gap between fundamental research and clinical implementation, contributing to the advancement of regenerative medicine.

Jaber Haj Ali
Consulting Medical Lab, State of Palestine

Combining old and new concepts in targeting telomerase for cancer therapy: Transient, Immediate, Complete and Combinatory Attack (TICCA)

Telomerase can overcome replicative senescence by elongation of telomeres but is also a specific element in most cancer cells. It is expressed more vastly than any other tumor marker. Telomerase as a tumor target inducing replicative immortality can be overcome by only one other mechanism: Alternative Lengthening of Telomeres (ALT).

This limits the probability to develop resistance to treatments. Moreover, telomerase inhibition offers some degree of specificity with a low risk of toxicity in normal cells. Nevertheless, only one telomerase antagonist reached late preclinical studies. The underlying causes, the pitfalls of telomerase-based therapies, and future chances based on recent technical advancements are summarized in this review. Based on new findings and approaches, we propose a concept how long-term survival in telomerase-based cancer therapies can be significantly improved: the TICCA (Transient Immediate Complete and Combinatory Attack) strategy.

Biography

Dr. Jaber Haj-Ali has earned his PhD with distinction in Medical Sciences at Charité University Medicine, Berlin, Germany, following MSc in Hematology and a BSc in Laboratory Medicine. Dr. Jaber is also been the founder and director of the Consulting Medical Laboratory at Nablus, Palestine, since 2002. Dr. Jaber has been awarded several times for his distinguished researches, published in prestigious scientific journals, including research on the influence of pesticides on telomere length, and researches on cancer therapy.

Jayeeta Giri

Molecular and Cellular Biology Laboratory, ICMR-National Institute for Research in Reproductive and child Health, Indian Council of Medical Research (ICMR), JM Street, Parel, Mumbai, 400012, India

Understanding the mesenchymal stem cells' role in uterine and intestinal tissue regeneration

Introduction: Among the other tissue-resident adult stem cells, Mesenchymal Stem Cells (MSCs) are well characterized by their immune-modulatory and regenerative functionality.

Impairment of tissue regeneration leads to fibrosis/scar formation. To understand the mechanism of scar-free tissue repair by resident adult stem and immune cells, we selected intestine and endometrium tissues. These are the extremely regenerative organs in the human body. The intestine redevelops its lining, epithelium, every 3-4 days. The endometrium (the inner lining of the uterus) suffers monthly shedding and regeneration, pivotal for successful reproduction. We aim to identify the role of tissue- resident MSCs in the regulation of intestinal and endometrial homeostasis.

Methods: We created colitis-mediated intestinal damage in mice and exogenously delivered MSCs to these colitis mice. We studied the immune phenotype of intestinal macrophage/B or T cells. To characterize intestinal MSCs, we collected MSCs from mice intestines with a standard collagen digestion method and characterized them based on MSCs-specific markers. We measured R-spondin- 3/Wnt5a expression, the two morphogens with known function in epithelial stem cell biology. We also measured Collagen 1 and 5 expression, components of fibrosis.

To identify the role of MSCs in endometrium regeneration, MSCs, and stromal cells were collected from the menstrual blood of healthy women. Endometrial stromal cells were treated with MSCs- condition media. Stromal cell proliferation, random and collective migration were assayed using standard biochemical assays. MSC-CM-treated stromal cells' ability to reform the endometrial tissue was measured by tissue decellularization/recellularization technique.

Conclusion: MSCs derived secretome (MSC-CM) reduces tissue inflammation and induces tissue regeneration in the intestine and endometrium.

Significance: MSC-CM can be a novel cell-free therapy against uterine/endometrium damage.

Biography

Dr. Jayeeta Giri has 11 years of research experience in the field of immunology, stem cell biology. After finishing her PhD. in the field of Biochemistry/Immunology from India she joined the laboratory of Dr. Jacques Galipeua, who is a world-renowned leader of stem cells therapy. She did her postdoctoral research from the University of Wisconsin Madison, Carbon Cancer center, USA. After gaining immense knowledge in the field of stem cells in regenerative medicine for more than 3 years, she went back to India and joined ICMR-NIRRCH to start her research career as an independent scientist with prestigious India Alliance DBT/Wellcome Trust Fellowship.

Jingjing You

School of Medical Sciences & Save Sight Institute, University of Sydney, Sydney, NSW, Australia

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Bioengineering human cornea for global supply

The fight against corneal blindness is a significant global challenge. Impacting all age groups, corneal disease and injury represent the 3rd most common cause of blindness affecting approximately 6.2 million people worldwide. Corneal transplantation, which uses donor corneal tissue, remains the current standard therapy. However, an acute global shortage of donor corneal tissue continues to prevent access to treatment. Worldwide, donor corneas are available for only 1 in 70 patients, with 53% of the world's population being unable to directly access required tissues. In order to address tissue shortages, attempts have been made to develop artificial corneas using synthetic materials and natural derived materials, and the journey of bioengineering human cornea has been ongoing for more than a decade.

To date, there have been significant breakthroughs in technology and material innovation in tissue engineering, making viable bioengineered human corneas seem feasible. However, addressing the global supply issue is another challenge that has been rarely discussed. This talk aims to review the current challenges and breakthroughs in human corneal bioengineering, elucidating the various cellular, material, and engineering approaches used in both research and industry. Additionally, it will address how these innovations can be scaled up for production and transportation to meet global demand, discussing each step in the process of scaling up the production and distribution of bioengineered corneas for worldwide supply.

Biography

Dr. Jingjing You received her PhD in 2012 from the University of New South Wales, Australia. She conducted postdoctoral research under Prof. Gerard Sutton at Save Sight Institute. In 2016, she began corneal bioengineering with Prof. Sutton and became a principal investigator in 2019. Currently, she is a senior lecturer, lead of the Multidimensional Biomedical Research Group, and co-lead of the Biovision Group at the University of Sydney. She is committee member of BIENCO (Bioengineering Human Cornea), a national consortium in Australia. She has secured over A$40 million in funding, holds 8 intellectual properties, and has over 40 publications.

Jitendra Singh*, Soumen Kumar Maiti

Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati, Assam-781039, India

Bio-fermentation for enhanced dihydroxyacetone production from crude glycerol using gluconobacter oxydans NBRC 14819

In the present study, bioconversion of glycerol using Gluconobacter oxydans NBRC 14819 to a high value-added product, Dihydroxyacetone (DHA), was examined with a perspective of medium optimization using One factor at A Time (OFAT) approach. As per previous literature, glycerol, yeast extract, $MgSO_4.7H_2O$, (NH4)2SO_4, KH_2PO_4, and $CaCO_3$ were revealed as the feasible components that could augment the high productivity. OFAT led to the screening of a range of these potential media components. the Crude glycerol is the main byproduct released after transesterification and an inexpensive carbon source used as substrate in this study, consisting of 84.57% glycerol, 7.6% ash, 2.54% methanol, 3.19% water content, and 2.1% Matter Organic Non-Glycerol (MONG). Culturing *Gluconobacter oxydans* using crude glycerol as a substrate can be challenging due to impurities that may adversely affect metabolism and DHA yield. An inhibitory effect was observed at an initial glycerol concentration of 100 g/l. Yeast extract provides specific growth factors and amino acids essential for DHA production from glycerol, that are absent in other nitrogen sources like peptone and corn steep liquor. Different yeast extract concentrations did not significantly alter the maximum DHA production, but it did lead to an increase in the specific growth rate. ammonium salt by itself was inadequate for fermentation, but when paired with yeast extract, it yielded a slight increment in the DHA production. the maximum DHA production from crude glycerol (50 g/L) is 38.89 g/L, with a product yield of 0.78, while pure glycerol achieves a maximum yield of 0.83. the findings from this study will aid future media optimization efforts using artificial neural networks, enabling the evaluation of optimal media component dosages in a time-efficient manner. implementing a fed-batch strategy along with real-time monitoring in the bioreactor could potentially lead to even higher DHA production.

Biography

Mr. Jitendra Singh studied B. tech from Shobhit University, Meerut in 2012-2016 session. He obtained post-graduation degree from Dr. A.P. J. Abdul Kalam Technical University, Lucknow in 2019. He is currently pursuing his PhD under the supervision of Dr. Soumen Kumar Maiti at Indian Institute of Technology, Guwahati and has published 3 review paper.

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Time to change to time: Single amino acid resolution anti-tumor platform tag-tack is standby

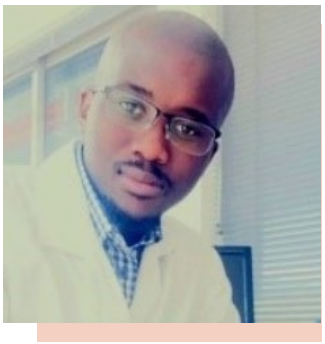
In order to shorten drug's evolution time than personal cancer's evolution time, a Tag-Tack platform was designed and constructed to make introcytoplastic missense proteins to be druggable in 6 months.

We screened 8 human ScFVs for 6 introcytoplastic missense proteins(TP53 p.R248Q, KRAS p.G13D, BRAF p.V600E, IDH1 p.R132C, PIK3CA p.E545K, EML4-ALK v3a fusion), and cloned them into Tag-tack platform to be Tag-Tacker. 6 cell-lines harboring the former 6 introcytoplastic missense proteins were target killed by those 8 Tag-Tackers, while no tagging protein cell-lines were alive. Based on those in vtro cell line's results, an out of treatment patient having BRAF p.K601E mutation was successfully treatmented by lesion injection of BRAF p.K601E Tagtacker's Compassionate using.

Tag-tack, a single amino acid resolution anti-tumor platform Which can make any introcytoplastic missense proteins to be druggable in 6 months is standby!

Biography

Dr. Jun Bai studied clinical medicine at the Fourth Military Medical university, Xi'an, China and graduated as Bachelor degree in 1997, MS in 2000, and PhD in 2004. Diretor of Medical Oncology department, Shaanxi Provincial People's Hospital, Xi'an, Shaanxi, China.



Moloantoa K. M*, Tokota, D. O, Nomsuka B. Y

Discipline of Microbiology, College of Agriculture, Engineering and Science., School of Life Sciences., University of Kwa-Zulu Natal, Westville Campus, Durban, South Africa

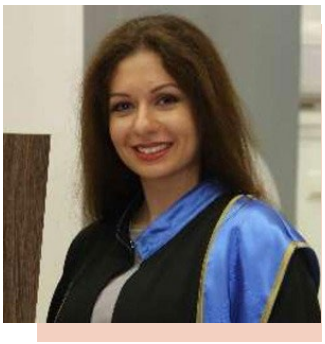
Assessing nitrate contamination from WWTPs effleunts and capacity of indigenous bacterial consortia for the in-situ complete denitrification

Rising levels of global pollution pose significant threats to water and land ecosystems. Accumulation of ammonia (NH4+) and nitrate (NO3-) in water lead to issues such as eutrophication and increased risks of colorectal cancer in humans and animals. It is therefore crucial to develop effective solutions to mitigate these impacts from potential sources. Conventional Wastewater Treatment Plants (WWTPs) often face resource limitations, which impair their ability to effectively remove nitrogen compounds like NH_4^+ and NO_3^-. This failure to fully treat primary contaminants, such as organic matter and nitrogen, leads to the release of secondary contaminants in effluent streams. Specifically, incomplete denitrification processes in these treatment plants result in elevated levels of ammonium (NH_4^+) and nitrate (NO_3^-), contributing to environmental pollution. Biological denitrification processes facilitated by isolates or microbial consortia has proven to be efficient and sustainable alternatives to traditional chemical treatments, converting NO3_ into harmless nitrogen gas (N2). The current research focuses on the evaluating the effectiveness of indigenous bacterial consortia enriched from WWTPs in achieving complete denitrification under in-situ conditions. Through comprehensive physio-chemical and molecular analysis, significant concentrations of NO_3- in the WWTP effluents were found to be beyond the acceptable limits. Denitrifying bacterial consortia were enriched from water samples and subjected to denitrification kinetics in batch experiments. From initial concentrations of 500 mg/L of NO_3-N, 100 % removal of both NO_3 and NO_2 were achieved within 24 hours when using glucose as a sole Carbon source. Alternative carbon source from brew waste was applied and optimized to lower the costs of application. Results obtained revealed that the waste was usable for bacterial growth but contributed to the surge of dissolved NO3 in the cultures. Data curated in this study will contributes to the development of greater project to tackle NO3 contamination form WWTPS in KZN and ultimately contributing to improving environmental and human health outcomes.

Keywords: Bacterial Consortia, Bioremediation, Denitrification, Environmental Health, Nitrate Pollution and Wastewater Treatment.

Biography

Dr. Moloantoa is an environmental microbial-biotechnologist with over ten years of training and practice in industrial wastewater bioremediation using bacteria. He is experienced in microbiology, molecular biology, biotechnology and biogeochemistry where he has published 12 research articles and presented at 15 research conferences. Dr. Moloantoa has been involved in various projects including development of water treatment bioreactors, water testing kits and biological control agents (BCAs) against plant pathogens. As an academic, he has been involved in teaching and learning for over ten years in different institutions till his appointment as a lecturer at the University of KwaZulu Natal in 2022.



Kyriaki-Evangelia Aslani

Postdoctoral Researcher, Department of Mechanical Engineering, University of the Peloponnese, Patras, Greece

From physics to bioengineering: The effect of micromagnetorotation on blood flows under strong magnetic fields

This presentation concerns the investigation of Micropolar Magnetohydrodynamic (MHD) blood flows, with and without the effects of Micromagnetorotation (MMR). MMR refers to the magnetic torque caused by the misalignment between the magnetization of magnetic particles in the fluid and the external magnetic field, which influences the internal rotation (microrotation) of these particles. Blood can be modeled as a micropolar fluid containing magnetic particles due to the magnetization of erythrocytes. In this context, various types of MHD micropolar blood flows—such as 2D plane Poiseuille blood flow, blood flow through a simple 3D artery, through 3D stenosis, and through a 2D aneurysm—are discussed with respect to the effect of MMR. Key flow features, including streamlines, vorticity, velocity, and microrotation, are analyzed under different conditions: degrees of stenosis and aneurysm, hematocrit levels, and magnetic field strengths. The numerical results were obtained using two newly developed transient OpenFOAM solvers: epotMicropolarFoam and epotMMRFoam. The findings indicate that micropolar effects become more pronounced as vessel size decreases. Furthermore, when MMR is neglected—that is, when blood is modeled as a classical MHD micropolar fluid without magnetic particles—the magnetic field has little influence on blood flow, regardless of its strength, due to the minimal impact of the Lorentz force. Conversely, MMR substantially alters blood flow, particularly at higher hematocrit levels, leading to reductions of up to 50% in velocity and vorticity, and up to 99.9% in microrotation. At the same time, vortices and disturbances in the flow are significantly dampened. These findings underscore the critical role of MMR—previously overlooked—in modifying flow behavior in arteries, and suggest that it should be taken into account in future MHD micropolar blood flow studies, both numerical and experimental.

Biography

Dr. Kyriaki-Evangelia Aslani is a Postdoctoral Researcher at the Department of Mechanical Engineering, University of the Peloponnese, Greece. She holds a PhD from the Department of Mechanical Engineering of the University of West Attica, Greece. Her doctoral thesis entitled Biological flows under the influence of high magnetic fields based on micropolar theory was awarded the grade Excellent with distinction. In June 2023, she received the Most Performing Young Researcher Award from the ModTech Association. Her research interests include micropolar-ferromagnetic fluids, magnetohydrodynamics, biological flows, and the thermodynamics of irreversible processes. She is the author (or co-author) of more than 20 papers published in reputable journals and conferences. She has more than 440 citations according to Scopus (h-index: 9).

Laurie Mans[1,2*], Marissa Vacher[1,2], Céline van der Valk[1,2], Angelic van der Aar[1,2]

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Innovative educational strategies in tissue engineering: Integrating research into higher education

The rapid advancements in tissue engineering demands an adaptive educational curriculum to prepare the next generation of professionals for impactful careers in science and innovation. At the University of Applied Sciences, we adjust our educational curriculum by integrating applied research into the educational program. The integration is accomplished by a cross-talk driven approach between curriculum developers and lectures that are directly participating in research projects. This ensures that students gain hands-on experience, work with real-work case studies and are taught by educators that are actively participating in tissue engineering-related research projects.

This cross-talk-driven approach has already shaped our current curriculum including cell culturing practicals, tissue engineering courses, short research projects and specialized minors such as Regenerative Medicine and Disease, Immunology and Food, Health, and Innovation. Building on this foundation, we are currently developing a new interdisciplinary minor: organ on-chips. This minor will integrate knowledge of complex cell culture systems, high-throughput organ-on-chip technology, chemical analysis of pharmaceuticals and their metabolites, and bioinformatics, providing students with interdisciplinary insights drawn directly from our research facilities.

This session will illustrate the cross-talk between applied science research projects and educational strategies for tissue engineering. Afterwards there will be time for an interactive discussion about how students can obtain the most relevant education and which hands-on training will equip them for one of the most innovative frontiers in biomedical research.

Biography

Laurie Mans, is lecturer at the biomedical department of the University of Applied Science Leiden. She develops and teaches courses in molecular biology, cell biology and tissue engineering. In addition to her teaching role, she is also a researcher at the knowledge centre, Leiden Centre of Applied Biology, where she focuses on setting up and supervising research projects that utilize cell culture techniques and cell biology assays in collaboration with academia, companies and public organizations. A key aspect of her work is integrating this research into the educational programs at the University of Applied Sciences Leiden.

Dr. Madhu Gupta

Associate Professor, Department of Pharmaceutics, School of Pharmaceutical Sciences, Delhi Pharmaceutical Sciences and Research University, Opposite Sainik Farm Gate No. 1, Pushp Vihar, New Delhi-110017, India

Polysaccharide-based biopolymers for modulating inflammation, angiogenesis, and ECM remodeling in chronic wound healing

Polysaccharides elicit enormous and promising applications due to their extensive obtainability, innocuousness, and biodegradability. Various outstanding features of polysaccharides can be employed to fabricate biomimetic and multifunctional hydrogels as efficient wound dressings. These hydrogels mimic the natural extracellular matrix and also boost the proliferation of cells. Owing to distinctive architectures and abundance of functional groups, polysaccharide-derived hydrogels have exceptional physicochemical properties and unique therapeutic interventions. Hydrogels designed using polysaccharides can effectively safeguard wounds from bacterial attack. This review includes wound physiology and emphasises on numerous polysaccharide-based hydrogels for wound repair applications. Polysaccharide hydrogels for different wound types and diverse therapeutic agents loaded in hydrogels for wound repair with recent patents are portrayed in the current manuscript, debating the potential of fascinating hydrogels for effective wound healing. More research is required to engineer multifaceted advanced polysaccharide hydrogels with tuneable and adjustable properties to attain huge potential in wound healing.

Biography

Dr. Madhu Gupta is working as an Associate Professor in Delhi Pharmaceutical Sciences and Research University, New Delhi. She is pioneer scientist in the field of nanotechnology and drug delivery field. Dr. Madhu Gupta has research experience pertaining to drug delivery to nanoformulations for placental extract, regenerative medicine, magical molecule delivery, bioligands for targeting of bioactives and drug moiety, biopolymers, she is exploring the area of fungal infection, wound healing, diagnostic devices, PK-PD modelling, herbal delivery and psoriasis. Dr. Gupta recognized among the top 2% of scientists globally in the year 2023-24, list that often comes from data compiled by Stanford University researchers, published in collaboration with Elsevier and other academic databases. She has over 100 research publications to her credit published in journals of high scientific impact and contributed 30 chapters in various renowned books and to several international and national books.

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Keratin-TMAO wound dressing promote tissue recovery in diabetic rats via activation of M2 macrophages

Impaired wound healing is a major medical specially in diabetic condition. Scientists worldwide are looking for new ways to treat wounds. Many different natural materials such as fibroin, chitosan, collagen or keratin have gained attention for their biomedical properties. In this context, keratin-based biomaterials have gained much attention for their biocompatibility, biodegradability and ability to promote cell growth. In this study we examined keratin dressing supplemented with trimethylamine N-oxide (FKDP-0.1%TMAO) as a wound dressing in rats with pharmacologically induced diabetes. An experimental keratin dressing was formulated from rat fur and subsequently enriched with 0.1% trimethylamine N-oxide. In vivo experiments were carried out using male Sprague–Dawley rats with pharmacologically induced diabetes. In vitro examination showed that obtained dressing is safe, non-toxic and support HaCaT growth ($p<0.05$). In vivo experiments showed that obtained wound dressing accelerate wound healing on days 4, 7, 14 and 21 post-injury ($p<0.05$). Histopathological examination showed that FKDP-0.1%TMAO treated wounds faster undergoes epithelialization, the epidermis was thicker and has less blood extravasation compared to control wounds. Moreover in FKDP-0.1%TMAO predominate macrophages, whereas neutrophils predominated in the control wound. Immunofluorescence examination revealed that in FKDP-0.1%TMAO dressed wounds predominant M2 macrophages population (CD163+) whilst the control wound was dominated by pro-inflammatory M1 (CD80+) macrophages. In conclusion, obtained FKDP-0.1%TMAO is safe, non toxic and accelerate full-thickness wound healing in diabetic rats. Furthermore, the ability of the FKDP+0.1%TMAO dressing to modulate the immune response, reducing inflammation, highlights its potential use in the treatment of chronic wounds.

Biography

Marek Konop is an Associate Professor in the Department of Experimental Physiology and Patho-physiology at the Medical University of Warsaw. He works in the field of experimental dermatology and regenerative medicine, especially in the role of biomaterials like keratin and silk in diabetic wound models, collaborating with many international institutions. His Ph.D. and further research have focused on skin wound healing. He has published more than 35 research articles in SCI (E) journals.

María Alejandra Torres Amaya

Grupo de Ingeniería de Tejidos, Universidad Nacional de Colombia, Bogotá, Colombia

Advancing tissue engineering: 3D endothelial culture models as ethical and translational alternatives to animal testing

The development of Three-Dimensional (3D) culture systems has transformed tissue engineering by offering more physiologically relevant models compared to traditional Two-Dimensional (2D) cultures. Beyond their scientific contribution, 3D models represent an ethical and innovative alternative to animal experimentation, aligning with the 3Rs principle (Replacement, Reduction, Refinement).

In this presentation, we highlight the optimization of a 3D endothelial culture system based on Human Coronary Artery Endothelial Cells (HCAECs) grown on type I collagen scaffolds. This model reproduces essential structural and functional properties of the vascular endothelium, enabling the study of host–pathogen interactions, inflammatory signaling, and endothelial dysfunction. Using Aggregatibacter actinomycetemcomitans as a case study, the model demonstrated increased adhesion and migration of monocytes, along with significant upregulation of MCP-1, IL-6, IL-8, and TGF-β1, key mediators of pro-atherogenic processes.

The findings support 3D tissue-engineered platforms as powerful tools for understanding complex pathophysiological mechanisms without resorting to animal testing. Moreover, these models provide a translational bridge between basic research and clinical applications, contributing to the development of safer therapeutic strategies.

By integrating tissue engineering with microbiology and cardiovascular biology, this work emphasizes not only the scientific robustness but also the societal impact of 3D culture systems as next-generation alternatives to animal experimentation. This perspective strengthens the role of bioengineering in advancing biomedical research, regenerative medicine, and ethical innovation.

Keywords: Tissue Engineering, 3D Culture, Endothelial Dysfunction, Animal-Free Models, Translational Research.

Biography

María Alejandra Torres Amaya is a Microbiologist with expertise in tissue engineering and forensic genetics. She completed her Master's degree in Microbiology at Universidad Nacional de Colombia, focusing on endothelial 3D models for studying host–pathogen interactions. She has advanced research in tissue banking, extracellular matrix preservation, and AI-assisted histology. Her interdisciplinary work promotes ethical and innovative approaches in regenerative medicine and biomedical research.

Vega M. V[1,2*], Castillo G[1,2], Calabroni A[1,2], Dávalos, V[2], Raffo F[3], Moschen F[4], Servin, M. R[5], Frutos O[6], Fracesquett J[7], Kerkhoff D[7], Nardin C[1,4]

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[7]Horizontina Faculty, Brasil

A firm step towards water sustainability: Success in the potential irrigation effluent and cloning

In the face of the growing threat of climate change and water scarcity, the cloning of economic importance native species superior phenotypes emerges as a strategic tool. Using this technique, a uniform, efficient propagation is guaranteed, selecting individuals with a higher resilience to irrigation with treated effluents. This innovation allows wastewater to be transformed into a valuable resource for the restoration of degraded environments, since it provides essential nutrients, reduces water consumption and mainly prevents contamination of water bodies, at the same time it provides water and nutrients that contribute to increasing plant productivity. Our work has focused on developing a state-of-the-art protocol for the juvenile material micropropagation from species such as Neltuma alba and *Handroanthus heptaphyllus*.

To achieve this objective, a sampling of selected parent trees was carried out in the Humid and Dry Chaco Ecoregion in Argentina. From these trees, 2 cm long microstakes were extracted, each with a lateral bud. These were cultured in tubes with MS medium, supplemented with IBA and BAP in different concentrations, following protocols already established by Castillo de Meier et al. (1999), Castillo and Vega (2006a and b), Ribeiro Barboza et al. (2020), and Dalzotto et al. (2021). At 10 days after planting, the elongated buds were transferred to a basal medium with a pH adjusted to 5.8. Each treatment included a sample of 30 offspring, and each experiment was replicated three times. The data obtained were analyzed using a Completely Randomized Design, applying an ANOVA through the SAS Cary statistical package, NC.9.4 (2023).

In this first phase, more than 90% rooting was achieved in the clones derived from the selected phenotypes. Root emission began to be observed 12 days after subculture. The rooted in vitro stems developed between 3 and 4 roots, with a length of 15 to 25 mm. These clones were transplanted into 50 ml plastic pots with soil, irrigated with 2% captan and acclimatized under a polyethylene tunnel. Statistical analysis detected significant differences ($p \leq 0.001$) between treatments. Based on research conducted by Pastich Gonçalves (2019), Yovera Sullón (2022), and Calabroni et al. (2024), we are preparing for a crucial second stage: the implementation of effluent irrigation. These studies showed that the use of effluents reduces freshwater consumption and enriches the soil with vital nutrients such as nitrogen and phosphorus. This translates into more vigorous plant establishment and accelerated growth, with increases of 20-30% in height and diameter compared to those irrigated with mains water. In addition, the selected clones have demonstrated exceptional adaptability and remarkable nursery survival (less than 40% mortality), underlining their resilience and great potential. This synergy between advanced biotechnology and the principles of the circular economy represents more than just an idea; It is a concrete and scalable way to address the water crisis, restore degraded landscapes and forge more resilient and prosperous territories.

Biography

Dr. María Victoria Vega is a plant biotechnologist, professor, and researcher at the National University of Formosa. She holds a Master's degree in Plant Biotechnology from University of Andalucía (Spain) and earned her Ph.D. in Natural Resources from Northeast National University (Argentina). With solid academic training, she leads scientific research with a strong focus on sustainability and biodiversity. She specializes in vitro propagation, morphometric and molecular characterization, and germplasm conservation of native species. She currently directs projects funded by the Pérez Guerrero Trust Fund – PNUD. Her work integrates biotechnology, ecological restoration, and sustainable development, while she actively mentors students and young researchers, fostering science with purpose and impact.

Panagiotis Mallis

Hellenic Cord Blood Bank, Biomedical Research Foundation Academy of Athens, Greece

Characterization of CD10+ CD49a+ mesenchymal stromal cells subpopulation: Emerging evidence for their role in immunomodulation

Background: MSCs represent a heterogenous population of cells, which can be derived either from fetal (e.g. Wharton's Jelly from umbilical cord, placenta, etc.) or adult human sources (e.g. bone marrow, adipose tissue, etc.). Recentrly, in our laboratory were able to isolate and characterize the CD10+ CD49a+ MSCs subpopulation from MSCs derived from Wharton's Jelly (WJ) and Adipose Tissue (AT) sources. The CD10+CD49a+ MSCs possess advanced properties regarding the immunomodulation of immune responses, hence could be potentially used with greater potential in human immune disorders, including the autoimmune diseases and Graft Versus Host Disease (GvHD).

Aim: The aim of this study was to comprehensive characterize the CD10+CD49a+ WJ and AT-MSCs, in terms of isolation, expansion, trilineage differentiation and CD marker expression and their immunomodualatory properties.

Methods: MSCs derived from the human Wharton's Jelly (WJ, n=5) tissue and adipose tissue (AT, n=5) were isolated and expanded. Then, 4 x 106 MSCs were sorted for the CD10+ and CD49a+ using the FACS Aria flow cytometer. The sorted CD10+ CD49a+ MSCs population derived from WJ and AT, was further expanded, and differentiated to osteocytes, chondrocytes and adipocytes. Furthermore immunophenotypic assessment regarding the expression of CD73, CD90, CD105, CD340, CD29, CD44, HLA-ABC, HLA-DR, CD34, CD45, CD11b was performed in BD FACS Canto II flow cytometer. Finally, for the immunomodulatory evaluation, both MSCs subpopulations were initially stimulated with IFN-γ (100 ng/ ml) for 48h, in a culture medium consisted only from a-MEM and 1% L-glutamine. The supernantants were retrieved, and quantification of IL-1Ra, IL-6, IL-10, IL-13, TGF-β1, VEGF-a, FGF, PDGF, and IDO was performed using commercial ELISA kits. The expression of HLA-G1, G5, and G7 was also evaluated, through the performance of mRNA isolation and RT-PCR and further confirmation by indirect immunofluorescence and flow cytometry. In addition co-culturing with M1 macrophages was performed to verify the exerted immunomodulation of either CD10+ CD49a+ WJ and AT-MSCs.

Results: CD10+ CD49+ were successfully isolated either from WJ or AT-MSCs, however the significant difference was observed in the percentage of enriched MSCs subpopulation. Specifically, the presence of CD10+CD49a+ in WJ-MSCs was 90% while in AT-MSCs was in 40%. CD10+CD49a+ MSCs from both sources, successfully differentiated to osteocytes, chondrocytes and adipocytes.CD10+CD49a+ WJ and AT-MSCs characterized by positive expression for CD73, CD90, and CD105 (>95%) and negative for CD34, CD45, and HLA-DR (<2%). CD10+CD49a+ WJ-MSCs expressed the CD340 more than 80% whereas the AT-MSCs subpopulation >60%, which was found statistically significant. Stimulated CD10+CD49a+ WJ and AT-MSCs secreted high levels of IL-1Ra, IL-6, IL-10, IL-13, TGF-β1, FGF, VEGF, PDGF, and IDO after 48h. CD10+CD49a+ WJ expressed all the HLA-G isoforms, whereas the CD10+CD49a+ AT-MSCs only the HLA-G1. Finally, M1 macrophages successfully adapted the M2 phenotype after co-culturing with CD10+CD49a+ WJ and AT-MSCs.

Conclusion: Based on the above results, WJ-MSCs is a more attractive source for the isolation of the aforementioned MSCs subpopulation compared to the AT-MSCs. However, both exert significant immunomodulatory properties for regulating properly the immune responses, thus can be used in the human immune disorders.

Biography

Panagiotis Mallis gained his bachelor's degree (BSc) in Biomedical Sciences from the University of West Attica in 2010. In 2013, he received his master's diploma (MSc) and in 2018, received his PhD in Tissue Engineering and Regenerative Medicine from the Medical School of National and Kapodistrian University of Athens. Currently, Mallis Panagiotis is an affiliate scientist of the Hellenic Cord Blood Bank (HCBB). Panagiotis Mallis has extensive experience in mesenchymal stromal cell (MSCs) isolation and in vitro manipulation. His current research involves the investigation of MSCs' immunoregulatory/immunosuppressive properties and their application in tissue engineering and regenerative medicine approaches.

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Studies of halotolerant PGPR inoculants for sustainable agriculture

Salinity of soil is an emerging problem of agriculture that reduces plant growth. Salt affected soils are widely distributed throughout the world. Salinity is a presence of salt content in soil. Addition of salts, metals and xenobiotic chemicals to the soil severely reduce biogeocycling thus reducing the fertility of soils. In such stress conditions Plant growth promoting rhizobacterial inoculants may improves saline soil fertility and induces plant growth promotion. There are five major classes of plant growth promoting substances i.e. Auxin, Gibberellic acid, Cytokinins, Ethylene and abscisic acid. Plant growth promoters may play an important role in the plant growth promotion in such conditions. The present study is an attempt to evaluate the effect of halotolerant PGPR on growth of Sugar cane and saline soil properties by pot assay method. Halotolerant PGPR cultures were isolated from saline soil from Baramati region. The selected isolates were characterized on the basis of morphological and biochemical tests. The isolates identification was done based on Bergey's Manual of Determinative Bacteriology. Identified cultures are *Azotobacter* spp, *Rhizobium* spp, *Azospirillum* spp. These cultures are salt tolerant upto 2 % NaCl and having nitrogen fixation, alkaline phosphatase, IAA, siderophore and exopolysaccharide production activity. Soil pot assays have shown the applicability of PGPR isolates in bioremediation of saline soil in restoring the fertility of soils. A four-factorial design was prepared for experimental set up to test the effect of PGPR inoculum on soil properties as well as plant growth. Common sugar cane (*Saccharum officinarum*) was selected as the experimental plant species. Application of soil based PGPR after growing Sugar cane in saline soil resulted in increased physical properties of soil and also crop growth as compared to non inoculated soils. Change in pH, EC and SAR obtained with PGPR inoculation could be attributed to microbial activities in such soils. Improved growth of Sugar cane has suggested that halotolerant PGPR enriched soils with carbon, nitrogen, other nutrients and physicochemical properties.

Biography

Prof Dr. Sunil Pawar is working as a professor in Microbiology at Department of Microbiology and P G research center T C college (Empowered Autonomous college) Baramati, affiliated to Savitribai Phule Pune University, Pune MS India presently He is working as a chairman in Microbiology Savitribai Phule Pune University, Pune MS India. He is a member of academic council as well as Faculty of science, Savitribai Phule Pune University, Pune MS India. He has completed four research students and seven research students are working with him. He has also completed one Postdoctoral fellow. He has a teaching experience of 34 years at UG as well as PG level. He has completed three Major Research Projects and three Minor projects funded by various agencies of Govt. Of India.

He has received Rs. 70, 00000 grants from different funding agencies in last fifteen years. He has published more than 20 papers in national and international reputed journals. He is actively participated in several national and international conferences.

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In vivo immunomodulation properties of canine adipose stromal vascular fraction and xanthosine

This study investigated the in vivo immunomodulatory properties of canine Adipose Tissue-Derived Stromal Vascular Fraction (AD-SVF) and xanthosine. AD-SVF, rich in mesenchymal stem cells, possesses inherent regenerative and anti-inflammatory capabilities. Xanthosine, a naturally occurring purine derivative, has demonstrated diverse biological activities. Our research aimed to characterize their individual effects on the canine immune response in murine and canine studies. Findings revealed that both AD-SVF and xanthosine independently exhibit significant immunomodulatory potential. These properties suggest their promising therapeutic applications in managing inflammatory conditions, enhancing tissue repair, and modulating immune responses in canine patients.

Biography

Dr. Ratan Kumar Choudhary is serving as a senior scientist at the ICAR-National Research Centre on Camel, Bikaner, Rajasthan, India. Previously he worked at the College of Animal Biotechnology, Guru Angad Dev Veterinary and Animal Sciences University, Punjab, India. His long-term research goal is to develop stem cell-based therapies for pets and dairy animals, including cows, buffalo, goat, and camels. He has been recognized with numerous awards and fellowships for his research work and has published five books and more than 60 papers in international peer-reviewed journals. Dr. Choudhary is an active member of various international scientific societies and organizations, contributing significantly to the field of stem cells in veterinary sciences.

Ravish Seeruthun
KCL, United Kingdom

Stem cell-derived β-cells for type 1 diabetes: A review of progress, challenges, and future directions

Background: Type 1 Diabetes Mellitus (T1D) is a chronic autoimmune disorder marked by the destruction of pancreatic β-cells, resulting in lifelong insulin dependency and associated complications. Traditional treatments, including insulin therapy, pancreas, and islet transplantation, are limited by donor scarcity, procedural risks, and suboptimal glycaemic control. As such, stem cell-derived β-cell replacement therapy has emerged as a promising strategy to restore endogenous insulin production and offer a potential cure.

Methods: This review synthesises recent literature on the differentiation of human Embryonic Stem Cells (ESCs) and Induced Pluripotent Stem Cells (iPSCs) into functional β-like cells. Key areas explored include: molecular pathways of β-cell maturation, the use of islet-like microenvironments, challenges in achieving functional equivalence to native β-cells, and approaches to prevent immune rejection and tumourigenesis.

Results: Advancements in stepwise differentiation protocols and transcriptional control have yielded β-like cells that increasingly resemble mature human β-cells in phenotype and insulin secretion. Techniques such as islet clustering and metabolic conditioning have improved functional outcomes. However, issues remain, including incomplete maturation (e.g., persistent MAFB expression over MAFA), limited glucose responsiveness, and vulnerability to immune rejection. Strategies such as encapsulation, regulatory T cell (Treg) therapy, and purification methods to reduce tumour risk are under active investigation, though many remain in early experimental stages.

Conclusion: Whilst the field has made significant strides towards generating functional β-cells from stem cells, full clinical translation is hindered by scientific and practical barriers. Further research is required to enhance cellular maturity, ensure long-term graft survival, and safely navigate ethical and immunological challenges. Nonetheless, current progress indicates that stem cell-based β-cell therapy could transform the management of T1D in the foreseeable future.

Biography

Dr. Seeruthun studied Medicine at University of Leicester, UK and graduated with an MBChB. During his medical school training, he also intercalated at King's College London where he studied Physiology BSc and graduated with honors. He is now working as an FY1 at the SEHCST in Belfast, Northern Ireland.

Rithik Samanthula

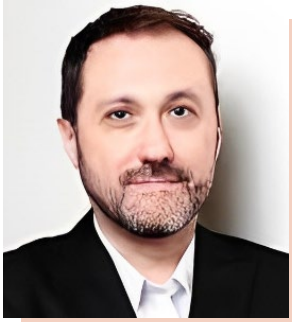
Thomas Jefferson High School for Science and Technology, Alexandria, VA, United States

Application of convolutional neural networks in classification of GBM for enhanced prognosis

The lethal brain tumor Glioblastoma has the propensity to grow over time. To improve patient outcomes, it is essential to classify GBM accurately and promptly in order to provide a focused and individualized treatment plan. Despite this, deep learning methods, particularly Convolutional Neural Net-works (CNNs), have demonstrated a high level of accuracy in a myriad of medical image analysis applications as a result of recent technical break-throughs. The overall aim of the research is to investigate how CNNs can be used to classify GBMs using data from medical imaging, to improve prognosis precision and effectiveness. This research study will demonstrate a suggested methodology that makes use of the CNN architecture and is trained using a database of MRI pictures with this tumor. The constructed model will be assessed based on its overall performance. Extensive experiments and comparisons with conventional machine learning techniques and existing classification methods will also be made. It will be crucial to emphasize the possibility of early and accurate prediction in a clinical workflow because it can have a big impact on treatment planning and patient outcomes. The para-mount objective is to not only address the classification challenge but also to outline a clear pathway towards enhancing prognosis precision and treatment effectiveness.

Biography

Rithik is a high school student at Thomas Jefferson High School for Science and Technology (TJHSST) with a strong passion for AI, neuroscience, and healthcare. He conducted independent research where he authored the paper Application of Convolutional Neural Networks in Classification of GBM for Enhanced Prognosis. This work was published in Advances in Bioscience and Biotechnology and also featured in the International Educational Journal for Science and Engineering. Rithik's work focuses on using machine learning to address complex problems in biomedical science, and he is continuing to explore the intersection of AI and medicine through advanced research initiatives.



Roberto Gramignoli, PhD, MS

UOSD Cell Factory - IRCCS Istituto Giannina Gaslini, Genova, Italy

Department of Laboratory Medicine, Division of Pathology, Karolinska Institutet, Stockholm, Sweden

Amniotic epithelial cells and released mediators in support of regenerative effects, oncological treatments, and immune acceptance in allogeneic settings

The placenta is a non-controversial and readily available source of cells for regenerative medicine. The epithelial cells isolated from full-term amnion membrane contain several properties qualifying such cells as multipotent stem cells, with pluripotent characteristics and immunomodulatory capacities. Human Amnion Epithelial Cells (AEC) have been reported to engraft and reverse congenital disorders, boosting the innate capacity of regeneration and reversing inflammation and fibrosis in several organs. In addition to intact AEC, therapeutic potential is efficiently supported by the AEC secretome.

We profiled surfaceome in primary human AEC and identified molecular pathways critical for immune-modulation and enhanced regenerative effects. We quantified the level of expression of non-polymorphic HLA-G and -E molecules, both as membrane-bound and soluble forms. Furthermore, purinergic mediators, hydrolyzed by classical and alternative nucleotidase pathways, reinforced immune-modulatory effects generated by intact AEC or secreted vesicles. Analysis of crago components and soluble mediators also qualifies these alternative medicinal products.

Immunomodulation and enhanced immune response were measured on purified immune effector cells (T-, B-, NK-cells, and macrophages), where the regulatory and anti-inflammatory switch was observed. Repair and supportive effects were validated in preclinical models of liver, kidney, and vocal fold damage.

Conclusions: Primary human AECs are characterized by immunological tolerance and long-term acceptance upon transplantation. Modulation and regenerative effects offered by intact AEC or secreted mediators may lead to new therapeutic interventions and enhanced regenerative effects in patients with acute or chronic disorders. Immune evasive capacity could be a game changer, and the modulation, rather than suppression, of innate and adaptive immune cells may result in enhanced cell treatments for regenerative purposes, autoimmune disorders, and tumors treated with augmented immune response.

Biography

Roberto Gramignoli has been working as a Senior Researcher and Group Leader at Karolinska Institutet, and recently appointed as Head of Division for Cell Therapies at Gaslini Hospital in Italy. He is specialized in Medical Genetics and advanced medicinal products, in addition to a PhD in Molecular and Translational Medicine. During his post-graduate studies at Univ. of Pittsburgh (PA-USA) he identified and proposed new solutions for roadblocks limiting clinical Hepatocyte Transplantation. Due to the paucity of human hepatocytes, he investigated alternative sources, such as iPS and placental stem cells. Working with his Mentor, Dr Strom, they became the first group to get approval for isolation and clinical infusion of human hepatocytes and Amnion Epithelial Stem Cells (AEC). Over the past years, he has accumulated evidence on the potential of AEC in several models of congenital liver diseases and as supporting therapy in fulminant hepatic failure. Based on safety and efficacy, in addition to AEC immunomodulatory and anti-inflammatory effects, they are in the process of starting a phase I/IIa clinical trial for liver disease and creating the first placenta stem cell bank.

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Actinobacteria as eco-friendly biopesticides: A sustainable approach to pest management

Actinobacteria, a phylogenetically and metabolically diverse group of Gram-positive bacteria, have garnered substantial attention for their potential applications in sustainable agriculture, particularly as biopesticides. These microorganisms are prolific producers of secondary metabolites with antimicrobial, antifungal, and insecticidal activities, making them integral to biologically based pest management strategies. Among the Actinobacteria, genera such as Streptomyces, *Micromonospora,* and *Saccharopolyspora* have been extensively studied for their capacity to suppress phytopathogens through the biosynthesis of bioactive compounds, including antibiotics, lytic enzymes, siderophores, and volatile organic compounds.

The efficacy of Actinobacteria as biocontrol agents is mediated by multiple mechanisms, including the direct inhibition of pathogen growth via metabolite production, degradation of pathogen structural components through extracellular enzymes, and indirect mechanisms such as Induced Systemic Resistance (ISR) and enhanced rhizosphere competence. In addition to their pest-suppressive properties, Actinobacteria promote plant health by improving nutrient bioavailability and producing phytohormones, thereby conferring dual benefits in agricultural systems.

Advances in genomics, metabolomics, and bioengineering have further elucidated the molecular mechanisms underlying the biocontrol activities of Actinobacteria, facilitating the identification of novel strains with superior pesticidal capabilities. Their application within integrated pest management (IPM) frameworks presents a viable alternative to chemical pesticides, addressing environmental and health concerns associated with synthetic agrochemicals. This review critically examines the potential of Actinobacteria as biopesticides, emphasizing their ecological benefits, mode of action, and scalability in sustainable agricultural practices.

Keywords: Actinobacteria, Pesticides, Pest Management, Agriculture Sustainability.

Biography

Dr. Saba Siddiqui is a Professor and Head at Integral University, renowned for her expertise in Botany and Agricultural Microbiology. With a distinguished academic background, she earned a Ph.D. in Botany from Awadh University, complemented by multiple Gold Medals for academic excellence. Dr. Siddiqui has an illustrious career spanning over a decade, contributing significantly to teaching and research. Her work focuses on sustainable agricultural practices, particularly in biopesticides and biofertilizers, integrating microbiological innovations to enhance crop health and soil fertility. She has authored 23 research papers, two books, and holds four patents, reflecting her impact on scientific advancements. Honoured with numerous accolades, including international recognition as an Honorary Professor in Uzbekistan, Dr. Siddiqui's interdisciplinary research bridges microbiology and environmental sustainability. Her ongoing projects aim at fostering climate-resilient agriculture, underscoring her commitment to addressing global agricultural challenges.

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Transcriptional and hormonal regulation of industrially important metabolites biosynthesis in plants and microalgae

Secondary metabolites produced from plants and microalgae are being used as food additives, flavors, and industrially important pharmaceuticals. The improved production of these metabolites through genetic engineering and use of phytohormones (elicitation) has unlocked a new area of research that could have significant economic benefits for the pharmaceutical and therapeutic industry. Two strategies will be discussed:

Firstly, the transcriptional regulation to increase the concentration of artemisinin biosynthesis in medicinal plant; Artemisia annua. Artemisinin is antimalarial, only produced from A. annua; however, its natural content is low, making its cost high. Different transcription factors have been used to increase artemisinin concentration. The role of YABBY TFs as positive regulators of artemisinin biosynthesis through activating CYP71AV1 and /DBR2 promoters will be discussed.

Secondly, the use of methyl jasmonic acid to increase the concentration of Eicosapentaenoic Acid (EPA) and Docosahexaenoic Acid (DHA) and their precursor FAs in Tribonema minus will be discussed. EPA, and DHA are primary ω-3 PUFAs found in microalgae. The precursors of EPA and DHA which are A-Linolenic Acid (ALA), and Linoleic Acid (LA), are not produced by the human body, and their bioconversion rates to EPA and DHA are very low, necessitating their acquisition from natural resources. Today, microalgae have become the major focus of researchers, and are being exploited for these metabolites of human importance. The role of methyl jasmonate as a positive regulator of EPA, and DHA production in T. minus will be discussed. Also, the effect of methyl jasmonate on the expression of important FA regulating genes including Malonyl-Coa Acp Transacylase (MCAT), ß-Ketoacyl Synthase (KAS), and Fatty Acid Desaturase (FAD) will be discussed. The present study is important in providing eco-friendly and cost-effective approaches to increase essential metabolites in plants and microalgae, and could offer the potential for industrial and commercial production if cultivated on a large scale.

Biography

Sadaf Ilyas Kayani studied molecular biology at Quaid-e-Azam University, Islamabad, and graduated as MS in 2015. For Ph.D. studies, she joined the research group of Professor Kexuan Tang at Plant Biotechnology Research Center, School of Agriculture and Biology, Shanghai Jiao Tong University, China. She received Ph.D. degree in June 2021. In August 2021, she joined School of Food and Biological Engineering, Jiangsu University, China, as a postdoctoral fellow, supervised by Professor Shuhao Huo. After postdoctoral fellowship, she obtained the position of an Associate Professor at the same institution. She has published about 30 research articles in SCI journals, and participated as Principal Investigator in National and province level projects.

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Conservation of exotic and endangered terrestial and aquatic animals through biotechnology

The biodiversity of animals in the ecosystem is important to balance the impact of environmental imbalance. In the paper, it discusses the methods and techniques of biotechnology that is being used to conserved and preserved exotic and endangered terrestrial and aquatic animals that could saved genetic materials for future reconstruction of extinct species or even the most endangered one. It also reveals some important behaviors from the wild to understand specie specific characteristics in breeding and rearing of the species.

Biography

Dr. Sanny Babera studied Agriculture major in Animal Science at Central Luzon State University in the Philippines and graduated MS degree in Agriculture at Ramon Magsaysay Technological University now the President Ramon Magsaysay State University. He has served as the Campus Director for Extension and Training then granted scholarships from the Department of Science and Technology of the Philippines to pursue his doctorate degree in 2014. He received his PhD degree in Animal Science specialized in reproductive physiology in 2018 at the Central Luzon State University and published his papers in an international journal indexed in SCOPUS and Web of Science.

Dr. Serag Saleh*, Dr. Vlad Illie

Department of Plastic and Reconstructive Surgery, St Vincent's Hospital, Sydney, NSW, Australia

Current techniques for the ex-vivo perfusion of free tissue flaps – Systematic review and meta-analysis

Background: Access to healthy living tissue in the lab has always been an essential substrate for experimentation across the breadth of medical research. Historically originally limited to live animal studies using small mammals such as rats, and subsequently more anatomically and physiologically analogous animals such as pigs, recent developments in cellular technologies have allowed for the in-vitro production of human tissue, such as the development of spheroid and organoid technologies, which allow for the study of 3D cell structures in a microenvironment that mimics the in-vivo environment. However, they remain unable to completely recreate in-vivo conditions, including issues of scale and maintaining macroscopic tissue architecture.

The advent of technology such as Extracorporeal Membrane Oxygenation (ECMO) offers the potential for the effective perfusion of large volumes of donor tissue in the lab, which addresses these issues. There is substantial literature looking at subnormothermic perfusion using alternative pump methods with synthetic or substitute perfusates in non-human tissues – however there is a paucity of data assessing the application of this technology to human tissue in a normothermic context with human blood products.

Method: A literature review was conducted using the MEDLINE and EMBASE databases, identifying 11 articles comprising a total of 135 specimens (5 human, 130 animal) across 1 systematic review, 1 case series and 7 technical studies. Of these, 1 studies examined human tissue and 2 studies used ECMO as perfusion method. The studies were stratified by tissue type, perfusate, pump type and temperature.

Results: Across all perfusion methods, tissue survived for a range of 12 hours to 7 days, with mean maximum survival of 17 hours in porcine studies and 7 days in the human study. Mean maximum survival 4 days on ECMO perfusion, 17 hours on centrifugal pump and 6 hours on gravity-assisted pump.

Biography

Dr. Serag Saleh is a Plastic and Reconstructive Surgery Registrar at St Vincent's Hospital in Sydney. He graduated with MD from the University of New South Wales in 2019, with Master of Surgery from University of Sydney in 2021, and is currently undertaking a PhD in autologous free flap reconstruction at UNSW. His research interest is in the application of new technologies including ECMO, additive manufacturing and artificial intelligence in translational studies in the field of biofabrication and regenerative medicine.

Dr. Serag Saleh*, Dr. Vlad Illie

Department of Plastic and Reconstructive Surgery, St Vincent's Hospital, Sydney, NSW, Australia

Human model for the ex-vivo perfusion of free tissue using extracorporeal membrane oxygenation

Background: The Deep Inferior Epigastric Perforator (DIEP) flap is the gold standard for autologous reconstruction of the breast following mastectomy. It recruits analogous, redundant and accessible adipocutaneous tissue from the abdomen based on a reliable and consistent blood supply, and necessarily requires the elevation of bilateral abdominal flaps, which offers the opportunity for the routine production of healthy and well-vascularised tissue that would otherwise represent medical waste.

This project aims to validate a reliable lab-based human model for normothermic perfusion using human blood products. This would provide a higher fidelity substrate for research applications and incredible scope for the detailed study of novel flap techniques as well as broader potential applications in oncology, tissue therapeutics or biofabrication.

Method: We present a case series of 5 consecutive patients undergoing unilateral autologous breast reconstruction using DIEP flap or cosmetic abdominoplasty, with the redundant abdominal flap placed on ex-vivo ECMO perfusion until tissue demise. Tissue viability was assessed using clinical, biochemical and histopathological parameters, alongside demographic and technical factors that influenced flap longevity.

Results: Mean survival time was 3.8 days (max 8 days), with mechanical venous congestion the primary cause of demise in 80% of cases, and progressive venous congestion in 20%.

Conclusion: The preliminary results in this study demonstrate that extracorporeal normothermic perfusion of human free tissue flaps is feasible, with current results in line or exceeding the currently reported survival data in the literature across all forms of ex-vivo tissue perfusion. Ongoing technical improvements of the experimental setup will undoubtedly improve these outcomes further.

Biography

Dr. Serag Saleh is a Plastic and Reconstructive Surgery Registrar at St Vincent's Hospital in Sydney. He graduated with MD from the University of New South Wales in 2019, with Master of Surgery from University of Sydney in 2021, and is currently undertaking a PhD in autologous free flap reconstruction at UNSW. His research interest is in the application of new technologies including ECMO, additive manufacturing and artificial intelligence in translational studies in the field of biofabrication and regenerative medicine.

Sofia Frantisakova[1], Pablo Salort[2], Luca Rybaltovszki[3]

[1]President, Biotech Society, University of Edinburgh, Edinburgh UK

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[3]Third Year Representative, Biotech Society, University of Edinburgh, Edinburgh UK

Bridging academia and industry: The role of student societies in shaping biotech careers

Despite the rapid growth and innovation in biotechnology and pharmaceutical sectors, a persistent disconnect remains between academic training and the needs of industry. University curricula often equip students with the skills necessary for academic research but offer few structured pathways toward industry roles. As a result, many graduates find themselves uncertain about how to transition from education into employment.

The University of Edinburgh's Biotech Society was foundedtoaddressthischallenge. Our mission is to bridge the gap between academia and industry by exposing students to real-world biotech applications, connecting them withprofessionals, andfosteringindustry-relevantskilldevelopment from the earliest stages of their academic journey.

This presentation will introduce the Biotech Society, outlining our objectives, initiatives, and the challenges we aim to overcome. We will highlight our work in launching workshops, organising career talks, andcreatingopportunitiesfor students to interact with key voices in the biotech and pharmaceutical sectors. These efforts have created a dynamic space for students to engage with the field beyond traditional academic boundaries.

We will also reflect on student feedback and our collaborative experiences with industry figures, making a case for why academic institutions and biotech companies must take shared responsibility in preparing the next generation of talent. This talk calls on the wider biotech community to partner more actively with student-led organisations and invest in programmes that build practical bridges between science education and industry employment.

Biography of Sofia Frantisakova

Sofia Frantisakova is a final-year Neuroscience student at the University of Edinburgh and President of the Edinburgh Biotech Society, which she founded to bridge students with biotech startups, researchers, and investors. Formerly in medicine, she pivoted to neuroscience to pursue translational mental health research, with a focus on PTSD, emerging biopharma, and psychedelic-assisted therapies as well as an interest in VC for emerging biopharma startups. Through roles in strategy consulting and research, she advances ecosystem-building and biotech innovation. At ECBB 2025, she represents Edinburgh's student-led biotech society and is passionate about bridging academia and industry.

Biography of Pablo Salort

Pablo Salort is a third-year Biological Sciences with Management student at the University of Edinburgh and currently Secretary of the Edinburgh Biotechnology Society. Passionate about neuroscience and biotechnology, he is committed to bridging the gap between academic research and industry to drive real-world impact. Through the society, he aims to provide students with exposure to alternative career paths and foster engagement with UK innovation through initiatives like a debate club, speaker events, and a hackathon.

Biography of Luca Rybaltovszki

Luca Rybaltovszki is a third-year Neuroscience student at the University of Edinburgh and a committee member of the Edinburgh Biotech Society, where she works to foster dialogue between students, researchers, and the biotech industry. With a strong interest in the neuroscience of psychiatric personality disorders, she is passionate about translational research and innovation in mental health. Through her involvement with the Hungarian Youth Association, she advocates for youth voices in science and policy, having spoken at the EU Youth Forum on polarised communication. At ECBB 2025, she represents Edinburgh's student-led biotech community and champions cross-sector collaboration and youth engagement.

Soheila Naderi Gharahgheshlagh[1*], Amir Bajouri[4], Noorahmad Latifi[1,2], Tayyeb Ghadimi[1,2], Mohammadreza Ghasemi[2], Amir Saraee[2], Mohammad Taghi Johataei[3], Peiman B. Milan[3]

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[4]Department of Regenerative Medicine, Cell Science Research Center, Royan Institute for Stem Cell Biology and Technology, ACECR, Tehran, Iran

Clinical trials of autologous epidermal cell transplantation in hypopigmented burn scar spot treatment

Background and Aim: Postburn permanent depigmentation, which occasionally results from deep partial-thickness and full-thickness burn injuries, remains a serious psychological problem for the affected people. To date, there has not been an available standard treatment for the postburn hypopigmentation disorder. This study aimed to evaluate the effect of non-cultured autologous skin cell suspension for re-pigmentation in hypopigmented burn scar spots.

Methods: In the current clinical trial, five patients with three depigmented sites were enrolled to obtain a partial thickness normo-pigmented skin specimen from the patients' thigh junction with an area of one-tenth to one-third of the recipient site area. The epidermal cell suspension was prepared by processing the autologous skin specimen. So as to prepare the cell implantation site, fractional CO2 laser was utilized with three different formats: ablative mode, fractional CO2 laser with depth 4, and fractional CO2 laser with depth 5. Later, the necrotic tissue was debrided, and a bed with dew bleeding was created. Finally, the cells were placed in the hypopigmented sites. An experienced dermatologist and patients defined the re-pigmentation score and self-assessment score at regular follow-up visits for up to 1 month after treatment, respectively.

Results: The results showed a re-pigmentation with a mean score of 30% after 1month post-transplantation. Although the re-pigmentation score in the patients was significant after cell transplantation (P=0.000), no significant differences were seen in the use of three different formats of fractional CO2 laser. Moreover, the number of situated cells per cm2 positively influenced the re-pigmentation score. Additionally, a higher response to treatment was observed in the depigmented areas on the face and hands.

Conclusion: The current study demonstrated a significant re-pigmentation after autologous epidermal cell transplantation on the depigmented burn scar areas as a promising treatment in postburn patients.

Keywords: Autologous, Cell Transplantation, Hypopigmentation, Burn Scar.

Biography

Dr. Soheila Naderi Gharahgheshlagh is working on an integrated multidisciplinary regenerative medicine approach and advanced methodologies to create advanced wound dressings. Her research interests focus on Marine and fish-derived materials for developing regenerative constructs. She has presented at many national and international conferences in the field of tissue engineering and has acted as a referee for high-profile peer-reviewed journals.

Soulmaz Sarkari*, Thais Girão-Silva, Albrecht Elsässer

Experimental cardiology, Faculty VI Medicine and Health Sciences, Carl von Ossietzky University of Oldenburg, Germany

Optimizing melt-electrospun PLGA fibers with CuSO4 to improve endothelial cell support

Background: Melt electrospinning is a promising solvent-free technique for fabricating microfibrous scaffolds with controlled fiber design. However, its application is limited by the poor electrical conductivity of many polymers, including Poly (Lactic-Co-Glycolic Acid) (PLGA). This limitation hampers fiber diameter control and the production of fine fibers (Nano-scale), both of which are critical factors for cell viability and healing outcomes.

Objective: This study aimed to enhance the melt-electrospinnability of PLGA by increasing its electrical conductivity through the incorporation of Copper(Ii) Sulfate ($CuSO_4$), thereby enabling the production of finer fibers with improved support for endothelial cells.

Methods: Various concentrations of $CuSO_4$ (0, 1.5, 2, 3, 4, and 7% w/w) were incorporated into PLGA 50:50 (MW: 30-40 kDa) by thoroughly pre-melting the polymer with the salt. Fiber fabrication was performed using the melt electrospinning with R-GEN 100 bioprinter (REGENHU). Fiber morphology and diameter were assessed by optical microscopy and measured using Image J. The best fiber samples were selected to evaluate cell viability and fiber stability. Endothelial cells EAhy926 were seeded on the fibers at a concentration of (4x104 cells/cm2) and cultured for 3 days. Cells were fixed with 4% PFA, stained with DAPI, and analyzed by fluorescence microscopy. Fiber stability was monitored through optical microscopy over time in the incubator.

Results: $CuSO_4$ addition reduced fiber diameters from approximately 46 µm in neat PLGA to 7.6 µm with 1.5% $CuSO_4$, reaching the smallest diameter of 2.5 µm in the sample with 3% $CuSO_4$. Higher $CuSO_4$ concentrations, starting from 4%, led to a slight increase in fiber diameter. PLGA composited with 3% $CuSO_4$ was selected for stability and cell viability tests. Fibers containing 3% $CuSO_4$ demonstrated superior morphological stability during incubation, in contrast to neat PLGA, which exhibited swelling and loss of structural integrity. Furthermore, the reduction in fiber diameter promoted by the salt created a more favorable surface for endothelial cell attachment, resulting in nearly a two-fold increase compared to the neat PLGA.

Conclusion: Incorporation of $CuSO_4$ into PLGA significantly enhances its melt-electrospinnability by increasing electrical conductivity, enabling the production of finer and more stable fibers. Importantly, the effect is concentration-dependent, with 3% as the optimal dose, while higher concentrations slightly increase fiber diameter, likely due to particle agglomeration or changes in melt rheology. Fiber stability is essential in biomedical applications, as scaffold integrity over time directly influences cell behavior, mechanical support, and tissue-regeneration outcomes. Notably, the 3% $CuSO_4$ fibers significantly supported endothelial cell attachment, emphasizing the importance of fiber diameter in cell-scaffold interactions. These findings provide a practical and effective way to overcome the limitations of using non-conductive polymers in melt electrospinning, underscoring the potential of this approach for vascular tissue engineering.

Biography

Soulmaz is a PhD student in Internal Medicine (Experimental cardiology) at Carl von Ossietzky University of Oldenburg, Germany, focusing on the development of cardiovascular scaffolds. She holds a Master's and Bachelor's degree in Biomedical Engineering – Biomaterials from Islamic Azad University, Iran. Her research experience includes the fabrication of scaffolds using 3D-bioprinting and electrospinning techniques with multiple materials, including polymers, composites, and antibacterial hydrogels for wound healing applications. Her academic interests center on biomaterials and tissue regeneration within the field of cardiovascular medicine.

Dr. T. Usharani[1*], Dr. B. Palanisamy[2], Dr. M. Venkatesh Perumal[3]

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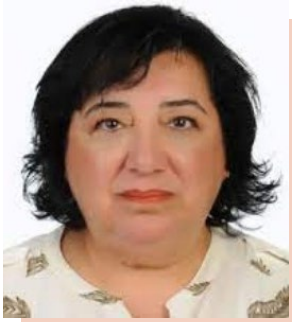
[3]Assistant Professor, Department of Chemistry Ramco Institute of Technology NorthVenganallur Village, Rajapalayam - 626 117, Virudhunagar, Tamil Nadu, India

Spirulina as a bioengineered solution: CO_2 capture and conversion into functional edible biomaterials

The current global landscape highlights an escalating environmental crisis driven by pollution and climate change. Among the primary contributors, Carbon Dioxide (CO_2) stands out as the most significant greenhouse gas, with atmospheric concentrations reaching unprecedented levels. While traditional Carbon Capture and Storage (CCS) technologies have been widely explored, their high economic costs, infrastructural demands, and uncertainties regarding long-term environmental safety limit their scalability and acceptance. An emerging, eco-sustainable alternative lies in the utilization of microalgae as biological platforms for CO_2 sequestration. Through the natural process of photosynthesis, microalgal cell factories like Spirulina platensis can effectively capture atmospheric or flue gas-derived CO_2 and convert it into high-value biomass. This biomass serves as a renewable resource, offering potential for bioenergy generation, nutraceutical development, and therapeutic applications. Spirulina, a cyanobacterium rich in proteins, vitamins, and antioxidants, represents a particularly promising candidate due to its high growth rate, adaptability to diverse environments, and GRAS (Generally Recognized As Safe) status. It not only captures CO_2 efficiently but also generates a nutrient-dense biomass. In biomedical engineering, this biomass can be processed and encapsulated into edible delivery systems such as capsules or tablets, offering dual benefits: environmental carbon reduction and enhanced human health through supplementation. Moreover, spirulina's capacity to metabolize waste streams—such as industrial flue gases and nutrient-rich wastewater—positions it as a sustainable biotechnological solution at the intersection of environmental engineering and healthcare innovation. Genetic engineering strategies further enhance its productivity and compound-specific yields, allowing for precision-tuned biomass tailored to nutraceutical and pharmaceutical needs. This integrated approach—recycling CO_2 into spirulina biomass and transforming it into bioactive edible capsules—presents a compelling, circular solution for addressing climate change while promoting human well-being.

Biography

Dr. T. Usharani studied Chemical Engineering at the St.Josephs college of Engineering, Anna University, Chennai and graduated as UG: B.Tech and PG: M.Tech in 2008 and 2011. She then joined the Lecturer in Erode Sengunthar Engineering College,Erode,Tamilnadu, India. She received her PhD degree in 2021 at the same institution, she obtained the position of Professor at the Erode Sengunthar Engineering College, Erode,Tamilnadu, India. She has published more than 10 research articles in SCI(E) journals.



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Biomimetic gellan gum hybrid hydrogels for extracellular matrix simulation in mouse embryonic stem cell culture

In regenerative medicine, the selection of the optimal stem cell type is pivotal due to their diverse differentiation potentials and interactions with the Extracellular Matrix (ECM). Although Gellan gum-based hydrogels have been extensively studied with various cell types, their application with Mouse Embryonic Stem Cells (mESCs), which exhibit unique characteristics, remains underexplored. This study focuses on evaluating gellan gum-based hydrogels, in conjunction with silk fibroin and sodium alginate, as substrates for mESC culture to better replicate ECM conditions and address the limitations of existing systems. Hydrogels were synthesized with Gellan Gum concentrations of 0.3%, 0.5%, 0.75%, and 1%, combined with 3% silk fibroin and 4.2% sodium alginate respectively. Comprehensive evaluations included swelling kinetics in phosphate buffer solution (pH 7.4) and acetic buffer solutions (pH 1.2), cytocompatibility assessed through Lactate Dehydrogenase (LDH) and MTT assays, thermal properties analyzed via Differential Scanning Calorimetry (DSC), and surface morphology characterized using Scanning Electron Microscopy (SEM). Results demonstrated that hydrogels with 0.5% and 0.75% Gellan Gum concentrations exhibited optimal swelling behavior, cytocompatibility, and mechanical properties. Specifically, Gellan Gum-silk fibroin hydrogels effectively supported cell viability, while Gellan Gum-sodium alginate hydrogels displayed enhanced stability. DSC analysis revealed that silk fibroin decreased the peak thermal transition temperature, whereas sodium alginate increased it. SEM imaging indicated that higher Gellan Gum concentrations improved scaffold rigidity, with silk fibroin contributing to enhanced flexibility and surface smoothness. These findings suggest that gellan gum-based hydrogels have significant potential for mimicking ECM in tissue engineering applications. Future research should evaluate them in vivo biocompatibility, and investigate their long-term stability, degradation characteristics, and potential for incorporating bioactive molecules.

Keywords: Gellan Gum, Silk Fibroin, Sodium Alginate, Hydrogels, Mouse Embryonic Stem Cells, Extracellular Matrix, Biomimetic.

Biography

Prof. Dr. Terin Adali studied Chemistry at the Middle East Technical University, Turkey and graduated as MS in 1997. She then joined the research group of Prof. Yilmaz at the Eastern Mediterranean University, Department of Chemistry. She received her PhD degree in 2007 at the same institution. She is currently working in the Faculty of Medicine, Medical Biochemistry at the position of a Professor at the Girne American University. She has published more than 20 research articles in SCI (E) journals.

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Investigation and optimization of dna isolation efficiency using ferrite-based magnetic nanoparticles

DNA isolation is a crucial step in many molecular biological applications for diagnostic and research purposes. however, traditional extraction requires toxic reagents and commercially available kits are expensive, this leading to the recently wide-spread method, the Magnetic Nanoparticle (MNP)-based DNA isolation. different ferrite containing MNPs were examined and compared in their plasmid DNA isolation efficiency. among the tested MNPs, one has never been used for the extraction of plasmid molecules, marking a novel application. pDNA isolation process was optimized for each type of nanoparticle and the best protocol was selected based on different criteria: DNA quantity, quality and integrity through the evaluation by UV-Vis spectrophotometry, agarose gel electrophoresis, restriction endonuclease reactions and quantitative PCR. With the best-performing magnetic nanoparticle, which excelled in all aspects, further tests were performed to recover genomic DNA from bacterial cells and a protocol was developed.

Biography

Tímea Gerzsenyi studied medical biotechnology at University of Debrecen, Hungary and graduated as MSc in 2020. She joined the Stem Cell Research Group at the same University for 1 year, then moved on to do her PhD at the University of Miskolc, in nanobiotechnology. She is a 3rd year PhD student and teaches biotechnology to chemical engineering students as well as supervises bachelor students in their thesis work. Tímea won a scholarship in the New National Excellence Program (2023) and the Cooperative Doctoral Program (2024) of the Ministry for Innovation and Technology.

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Revolutionizing large-scale MSC manufacturing: 3D FloTrix technology with dissolvable microcarriers and automation for the future of cell therapy

CytoNiche has developed 3D RecomTrix recombinant collagen dissolvable microcarriers for large-scale manufacturing of adherent cells, critical for allogeneic cell therapies like Mesenchymal Stem Cells (MSCs) and cell-free therapies like exosomes. The 3D FloTrix Technology integrates these microcarriers into automated, closed single use bioreactors and cell processing systems to address scalability and purification challenges in cell therapy production. Over 100 billion MSCs could be produced in a single batch with 3D RecomTrix recombinant collagen microcarriers using serum-free xeno-free cell culture medium in a three-stage scale up to 4 X 50L single-use bioreactors. Cells could be washed, concentrated, and formulated with 3D FloTrix vivaPREP ULTRA and automatically filled and finished. 3D FloTrix has powered the first approved MSC drug in China in achieving industrial-scale cell yields with a 3-stage process, compacted facility footprint (<100 m^2), and 80% reduction in workforce. CytoNiche aims to advance cell therapy manufacturing by offering a scalable, cost-effective solution that improves product quality and accessibility, benefiting sectors from regenerative medicine to vaccine production. This technology addresses critical bottlenecks in adherent cell processing, positioning it as a versatile tool for sustainable biopharmaceutical innovation.

Biography

Dr. Yan studied Chemical and Biomolecular Engineering at National University of Singapore and graduated as a Bachelor in 2012. She then joined Professor Du Yanan's laboratory at Tsinghua University to research on 3D cell culture and biomaterials. She received her Master's degree and PhD degree from Biomedical Engineering at Tsinghua University in 2015 and 2018 respectively. She then co-founded Beijing CytoNiche Biotechnology Co., Ltd. to develop and commercialize a novel 3D macroporous dissolvable microcarrier for large-scale cell expansion. She has published nearly twenty research articles in SCI (E) journals and books, as well as applied for over 60 patents.

Yapi Ellélé Aimé Marius[1*], N'Krumah Tanoh Amany Serge Raymond[2], Gnagne Théophile[3]

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Use of biofertilizers in agriculture: The case of hygienized human excreta in cocoa production in the village of Blanfla (Bouafle, Côte d'Ivoire)

Introduction: Ecological sanitation involves the use of hygienized human excreta as fertilizer in agriculture. This study aimed to establish the effects of hygienized urine and feces on cocoa production in the village of Blanfla in the Bouaflé Department of Côte d'Ivoire.

Methods: To this end, 539 people from 100 households were trained in the use of Urine-Diverting Dry Toilets (UDDTs) and in fertilizing cocoa plantations with hygienized excreta from UDDTs. The study ran from 2014 to 2017, during which time 6 months were spent building the TSDUs and 1.5 months were monitoring their use.

Results: For 2 years, three categories of plantations (young, mature and old) with a total surface area of 285 ha were fertilized by the application of almost 445 m3 of urine and 100 tonnes of hygienized feces. The quantity of biofertilizer applied to the three groups of plantations almost doubled the annual cocoa production (RP=1.95). In all three plantation categories, crop production was significantly associated with BF application (r =0.993; p=0.007/r =0.975; p=0.025) but not with temperature or rainfall.

Conclusion: The use of hygienized urine and feces as biofertilizers through the ecological sanitation approach should be popularized, as it increases agricultural productivity and farmer incomes.

Biography

Yapi Ellélé Aimé Marius has been a Researcher at the Institute National d'Hygiène Publique (INHP) in Côte d'Ivoire since June 2022. He holds a Master's degree in Environmental Sciences and Management from the Université d'Abobo Adjamé (now Université Nangui Abrogoua). D. in Environment, Health and Development from the Université Félix Houphouët Boigny (UFHB) in Abidjan-Cocody in 2019. He is also a project coordinator and consultant in the fields of environment, sustainable development, and public health, where he tackles various research topics in these disciplines. He is the author of 12 scientific publications.

Yunhan Liu[1], Yi Min Khoong[1,2,*], Wenzheng Xia[1], Ruoqing Xu[1], Anissa Anindya Widjaja[3], Hsin Liang[1], Shenying Luo[1], En Yang[1], Xin Huang[1], Tao Zan[1]

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Interleukin 11 drives dermal fibroblast activation in mechanical stretch-mediated skin expansion

Skin expansion is a commonly used method to generate additional skin for the repair of tissue abnormalities in many circumstances, including post-traumatic scars, congenital defects, and skin defects following tumor excision. This is accomplished by inducing skin regeneration using mechanical stretch (MS). However, the primary obstacles associated with this procedure are the lengthy treatment duration, attributable to the limitations of skin regeneration speed. The prolonged period may lead to problems such as skin necrosis and suboptimal skin texture.

Therefore, it is essential to improve our understanding of the pathophysiological mechanisms related to skin expansion, particularly the processes involved in dermal regeneration, given that dermal fibroblasts are the primary cellular constituents of the dermis, and MS facilitates their activation. The precise function of interleukin 11 (IL11) in skin growth is not fully understood, however it has been recognized as a cytokine responsive to mechanical stimulation.

This study indicated that the expression of IL11 and the IL11 receptor alpha subunit was significantly elevated in dermal fibroblasts of expanded skins (ESs), and that diminished IL11 expression was associated with inadequate regeneration of ESs. Inhibition of IL11 signaling led to reduced MS-induced fibroblast proliferation, extracellular matrix synthesis, and myofibroblast activation in vitro, along with compromised skin regeneration during skin expansion in vivo. We identified that WNT5B acted as a downstream regulator of IL11-induced cell activation in the presence of MS. The administration of recombinant IL11 through intradermal injection in mice markedly increased fibroblast activation and inhibited the decrease in dermal thickness during skin expansion.

In conclusion, our study's findings indicate that IL11 signaling is crucial for fibroblast activation induced by MS, making it a potential target for clinical applications to enhance skin regeneration during skin expansion.

Biography

Dr. Yi Min Khoong obtained her medical degree (MBBS) from Wuhan University, China. She went on to pursue MSc in Surgery (Plastics) at Shanghai Ninth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine. During her postgraduate training, her research focused on flap vascularization, the mechanisms underlying skin expansion, and imaging techniques for flap monitoring. She is currently a Clinical Fellow in Oral & Maxillofacial Surgery at NHS Fife. She has published 22 articles in peer-reviewed SCI-indexed journals, including 5 as first/joint first author. Her current interests lie in translational research bridging clinical plastic surgery and regenerative medicine.

Yin Ying Ho*, Shuwen Chen, Esther Peh, Yi Fan Hong, Jun Ping Quek, Huibin Zhang, Sean Chia, Zach Pang, Say Kong Ng, Andre Choo, Ying Swan Ho

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Mass spectrometry-based approaches for process optimisation and product quality applications in biomanufacturing

The Mass Spectrometer (MS) is a versatile instrument suited for the analysis of biomolecules such as proteins, peptides, polysaccharides, small molecules/metabolites and nucleic acids. This presentation describes how MS-based approaches can be utilised for in-depth characterisation of biomanufacturing processes, enabling insights into the nutrient requirements and metabolic behaviour of mammalian cells, which subsequently guide the design of optimal bioprocesses. In addition, we will also describe how MS-based approaches can be applied for quality-control of mRNA therapeutics and other nucleic acid products. These include the qualitative and quantitative assessment of mRNA drug substance modified by capping, poly-A tail and base modifications and the characterization of lipid raw materials used in lipid nanoparticles for mRNA encapsulation. Most recently, we have developed a MS based analytical workflow that facilitates the structural elucidation of unknown adducts caused by interactions between the mRNA and lipid nanoparticles, with potential downstream impact on mRNA drug product efficacy. These workflows demonstrate the utility of MS-based workflows in addressing challenges in process optimisation and quality-control processes in biomanufacturing.

Biography

Yin Ying is trained analytical chemist with 15 years of experience in multi-omics research, particularly the characterisation of biomolecules including proteins, polysaccharides and small olecules/metabolites using LCMS-based approaches. She completed her BSc (Hons) degree in Chemistry at the University of Adelaide, Australia, in 2010 and received her PhD degree in plant biochemistry and proteomics at the University of Melbourne, Australia, in 2018. She joined as a research scientist at BTI, A*STAR focusses on advancing LCMS-based workflows for process optimisation and determination of product attributes in new biotherapeutic modalities such as LNP-mRNA products.

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5th Edition of International Conference on

Tissue Engineering and Regenerative Medicine

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POSTER PRESENTATIONS

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Innovative educational strategies in tissue engineering: Bridging theory and practice in higher education

The rapid advancements in tissue engineering and regenerative medicine demand a comprehensive and adaptive educational approach to prepare the next generation of professionals. At Leiden University of Applied Sciences, we offer several modules that integrate state-of-the-art scientific knowledge with practical training, equipping students with the skills and critical thinking required to excel in this dynamic field. We aim to keep these modules continually updated to reflect the latest developments, ensuring that the content remains relevant and aligned with current scientific and industry needs.

This poster highlights the design and implementation of two key modules: BKTIS (5 European Study Credits) and Min-RMD (15 European Study Credits). These modules emphasize active learning strategies, foster collaboration with industry and academic experts, and incorporate real-world case studies. Core activities include protocol development for 3D cell culture, critical validation of in vitro models, and advanced analytical techniques, all set within the broader objective of reducing reliance on animal models for disease modelling, drug screening, and novel applications in regenerative medicine.

We aim to engage attendees in discussions on advancing educational strategies for tissue engineering by sharing insights into our module development and outcomes. Through open dialogue, we seek to integrate global best practices and innovative ideas to further refine our approach. This session invites educators, researchers, and industry experts to collaborate in shaping a curriculum that meets the cutting-edge needs of regenerative medicine and tissue engineering.

Biography

Dr. Céline van der Valk studied biomedical sciences at the University of Leiden in 2007, and obtained her Phd in the field of neuro-immunology at the university of Utrecht in 2015. She has been a lecturer at the Leiden university of applied science for 8 years, and worked as a scientist at the Food, Health and Innovation lab on the generation of multiple 3D culture systems.

BOOK OF ABSTRACTS

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