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ABSTRACT BOOK

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Abstract ID: 002

Optimisation of Extrusion-Based Production of Wharton's Jelly Mesenchymal Stem Cell-Derived Nanovesicles

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Extrusion is an efficient strategy for isolating extracellular vesicles (EVs) at high yield, while the standardised protocol remains undefined. This study systematically evaluated how key extrusion parameters influence the size and yield of extruded extracellular vesicles (eEVs) derived from Wharton's Jelly mesenchymal stem cells (WJ-MSCs). Three procedure parameters of extrusion techniques were examined: extrusion cycle number, resuspension buffer, and input cell number. Vesicle size distribution and concentration were determined using nanoparticle tracking analysis (NTA). The mean size of eEVs ranged from 189 to 223 nm across conditions, with mode sizes <200 nm. Increasing extrusion cycles beyond 10 times did not enhanceyield but slightly reduced size, while 10 times achieved the lowest coefficient of variation (CV%). eEVs resuspended in phosphate-buffered saline (PBS) showed smaller sizes (187.8 x 6.7 nm) and higher concentration (2.51 x 10^{11} particles/mL) compared to double-distilled H_2O (ddH_2O). The 2.5 x 10^6-cell condition yielded the highest particle concentration (2.59 x 10^{12} particles/mL) and greatest homogeneity (CV% = 0.20). Therefore, the optimal condition for producing uniform and high-yield WJ-eEVs was recommended as 10 extrusion cycles, ddH2O buffer, and 2.5 x 10^6 input cells, providing a standardised reference for reproducible eEVs fabrication.

Keywords: Extracellular vesicle; large-scale production; membrane-derived vesicle

Abstract ID: 003

Qualitative Framework for Morphometric and Cellular Quality Assessment of Human IPSC-Derived Brain Organoids

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Drug and medical device research are costly and time-intensive processes, yet most drug candidates ultimately fail in clinical trials. A major challenge in neurological drug development stems from traditional two-dimensional (2D) cell culture models, which fail to accurately recapitulate the intricate cellular architecture and complex connectivity of the human brain. Brain organoids, self-organising three-dimensional (3D) cultures derived from human induced pluripotent stem cells (iPSCs), offer a human-specific, accessible, and scalable platform for neurological research. In this study, we aim to establish a quantitative framework for the morphometric and cellular quality assessment of human iPSC-derived 3D brain organoids, integrating image-based analysis and immunohistochemical characterisation to enhance research reproducibility and reliability. Self-organising brain organoids were generated from iPSCs using an unguided differentiation protocol. Organoid development was monitored through brightfield microscopy, and morphological parameters were quantified using semi- automated image analysis (ImageJ). Mature organoids underwent cryosectioning for immunohistochemical characterisation. Key neural markers, including SOX2 and Ki67 (for proliferative progenitors) and TUJ1 (for early neurons), were used to assess cellular composition and tissue architecture. Morphometric analysis revealed distinct growth trajectories and shape characteristics that correlate with successful organoid maturation. Immunohistochemical characterisation confirmed the presence of organised neural rosettes with proliferative progenitor zones (SOX2+/Ki67+) and differentiated neuronal populations (TUJ1+). This work establishes reproducible morphometric benchmarks for quality assessment of brain organoids. Through the integration of quantitative image analysis with cellular characterisation, it provides a robust framework to enhance the consistency and reproducibility of organoid-based neurological research, thereby improving the reliability of disease modelling and drug screening applications.

Keywords: Brain organoids; cellular characterisation; induced pluripotent stem cells; morphometric analysis; neurodevelopment

Abstract ID: 004

Building the Human Peripheral Nerve *In Vitro*: Generation of IPSC-derived Neurons and Schwann Cells

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Drug discovery for peripheral nerve disorders remains limited by the lack of human-specific *in vitro* models that accurately replicate the cellular diversity and functional complexity of the peripheral nervous system. Traditional animal or primary cell models often fail to capture key aspects of human nerve biology, hindering translational progress. Human induced pluripotent stem cells (hiPSCs) offer a promising platform for generating multiple peripheral nervous system cell types. As a first step towards establishing a physiologically relevant model, this study focuses on the directed differentiation of two key peripheral nervous system components, neurons and Schwann cells. hiPSCs were seeded and differentiated in medium containing optimised combinations of stage specific small molecule inducers. The effects of the optimised differentiation protocols on cell development were assessed through morphological analysis and immunocytochemical detection of lineage-specific markers. Phase-contrast microscopy revealed distinct neuronal morphologies, including extended neurites and compact cell bodies, as well as elongated, spindle-shaped Schwann-like cells, indicating successful lineage commitment of both cell types. Immunofluorescence analysis confirmed the expression of key neuronal markers, SOX2, Nestin, TUBB3, and NeuN as well as key Schwann cell markers SOX10, Nestin, and Oct4, confirming the identity and maturity of the differentiated cells. This study demonstrates the successful generation of human iPSC-derived peripheral neurons and Schwann cells using optimised, stage-specific differentiation protocols. Both cell types exhibited distinct morphologies and lineage-specific markers, confirming successful differentiation. This work contributes to the broader goal of establishing physiologically relevant, humanised platforms for studying nerve injury, neurodegenerative diseases, and developing potential therapeutic strategies.

Keywords: Human induced pluripotent stem cells; *in vitro* model; neuron; peripheral nerve; Schwann cell

Abstract ID: 005

Low Pre-Surgery Inflammation Index Linked to Longer Need for Inotrope Support After CABG

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Prolonged inotropic support after coronary artery bypass grafting (CABG) signifies a complicated post-operative course. The role of the pre-operative systemic inflammatory state in predicting this outcome is not well defined. We investigated the relationship between the Systemic Immune-Inflammation Index (SII) and the duration of inotropic support. In a pilot observational study, we analysed data from 31 patients undergoing CABG. Patients were stratified into short (SIn, ≤49 hours) and long (LIn, ≥50 hours) inotrope groups based on the median support duration. The SII was calculated pre- and post-operatively in 18 patients. Spearman correlation and group comparisons (Mann-Whitney U, T-test) were used. The need for prolonged inotropic support was strongly correlated with longer mechanical ventilation ($r = 0.57$, $p = 0.0009$) and ICU stay ($r = 0.51$, $p = 0.0036$). Counter-intuitively, longer inotrope duration was significantly correlated with lower SII levels, both pre-operatively ($r = -0.56$, $p = 0.015$) and post-operatively ($r = -0.47$, $p = 0.049$). Group analysis confirmed that the LIn group had significantly lower median pre-op SII (372 vs. 808, $p = 0.044$) and post-op SII (852 vs. 1176, $p = 0.027$) compared to the SIn group. No traditional pre-operative risk factors differed significantly between groups. This pilot study identifies a potentially novel "High-Support, Low-Inflammation" phenotype. A lower pre-operative SII is associated with an increased needfor prolonged inotropic support, suggesting a blunted inflammatory state may be a predisposingrisk factor. This concept warrants further investigation in larger cohorts to validate SII as a potential pre-operative prognostic tool.

Keywords: CABG; coronary artery; inflammation; inotropic; SII

Abstract ID: 006

Characterisation of Secretome-Enriched Hyaluronic Acid-Gelatin Hydrogels for Enhanced Wound Healing Applications

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Biomaterials have led to growing interest in scaffolds that combine structural support with biologically active components. Despite the therapeutic promise of fibroblast-derived secretome, limited evidence exists on whether its protein composition and cellular protective effects are preserved once integrated into biomaterial scaffolds. In this study, we developed hyaluronic acid-gelatin hydrogels fortified with human dermal fibroblast secretome as astrategy to promote skin regeneration. The secretome which is rich in signaling molecules released by fibroblasts was collected from serum-free conditioned media after 72 hours. Total protein concentration quantified using the bicinchoninic acid (BCA) assay, while Western blotanalysis identified the presence of extracellular matrix proteins, including collagen type 1 andfibronectin, underscoring the therapeutic relevance of secretome. The comet assay was performed to assess DNA integrity in cells exposed to secretome. The reduction in DNA fragmentation observed in treated cells suggests that the secretome confers protective benefits, supporting its role in facilitating tissue repair. Comprehensive physicochemical analysis was conducted to characterise the hydrogel system. Scanning electron microscopy (SEM) demonstrated a highly porous architecture capable of supporting cell migration and nutrient exchange. These findings indicate that the incorporation of secretome into hyaluronic acid-gelatin hydrogels exhibit structural suitability, preserved bioactive protein content, and measurable cytoprotective activity, highlighting their promise as multifunctional scaffolds forwound-healing applications.

Keywords: 3D bioprinting; biomaterials; fibroblasts; secretome; wound healing

Abstract ID: 007

Proteomic Comparison of Wharton's Jelly Mesenchymal Stem Cell and Dermal Fibroblast Secretomes Highlights Therapeutic Potential for Atopic Dermatitis

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Atopic dermatitis (AD) is a chronic inflammatory skin disease driven by epidermal barrier disruption and immune dysregulation. Current therapeutic options, including corticosteroids and immunosuppressants, often provide only temporary improvement and may produce adverse effects, highlighting the need for safer and more effective alternatives. Cell-derived secretome, composed of bioactive proteins and signaling molecules, has emerged as a promising cell-free therapeutic approach due to its regenerative and immunomodulatoryproperties. Although both Wharton's Jelly-derived mesenchymal stem cells (WJ-MSCs) and dermal fibroblasts secrete factors involved in wound healing, the comparative composition of their secretomes remains insufficiently characterised. Flow cytometric analysis confirmed the mesenchymal identity of the isolated WJ-MSCs, showing strong expression of CD73, CD90, and CD105 with minimal hematopoietic marker expression. Dermal fibroblasts were validated through collagen type I immunostaining, demonstrating characteristic extracellular matrix protein distribution. Protein quantification using a Bicinchoninic Acid (BCA) assay indicated that WJ-MSC secretome contained slightly higher protein concentrations than fibroblast secretome, although the difference was not statistically significant. Proteomic analysis was performed to characterise and compare the secretomes of both cell types. Both WJ-MSCs and fibroblasts secreted proteins associated with wound repair, extracellular matrix remodeling, and immune modulation. However, the WJ-MSC secretome demonstrated a broader and more diverse protein profile, including more factors linked to pathways relevant to AD and skin regeneration. Fibroblasts also contributed distinct proteins with potential biological relevance. Overall, the findings suggest that the WJ-MSC secretome may provide enhanced regenerative and immunomodulatory benefits compared to fibroblast secretome, supporting its potential as a promising cell-free therapeutic strategy for improving skin regeneration and managing AD.

Keywords: Atopic dermatitis; fibroblasts; secretome; skin regeneration; Wharton's Jelly mesenchymal stem cells

Abstract ID: 009

Role of GABAB Receptor Modulation in Neuronal Cell Regeneration in Inflammed Postnatal Spinal Cord

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Demyelination, disrupts neuronal signaling and impairs endogenous regenerative processes yet the signaling mechanisms linking GABAB receptor activity to repair in the developing spinal cord remain unclear. This study investigates how GABAB receptor activation and inhibition influence regenerative and inflammatory responses in a lysophosphatidylcholine (LPC)-induced demyelinated postnatal rat spinal cord model. Postnatal day 10–15 rat spinal cords (n = 30) were assigned to six groups: Control, Control + Baclofen, Control + CGP55845, LPC, LPC + Baclofen, and LPC + CGP55845. Ex vivo slices underwent group-specific treatments and were processed forimmunohistochemistry to assess GABAB receptor expression, Ki-67 proliferative index, Olig2 lineage marker expression, Myelin sheath structure and interleukin-1β (IL-1β) levels. GABAB receptor modulation produced region-specific and cell-type-specific effects. Quantitative analysis shows GABAB receptor expression at central canal region in Baclofen treated group was significantly lower compared to CGP ($p = 0.0213$) and CGP + LPC CGP ($p = 0.0330$) groups, Baclofen-mediated receptor activation also enhanced proliferation and different level of significance at different region of the tissue, indicating a pro-regenerative influence on neuronal cells. In contrast, CGP55845 exhibited attenuating effects on these indices. These findings demonstrate that GABAB receptor signaling plays a significant role in early-life spinal cord repair and highlight GABAB receptor activation as a potential therapeutic strategy to support regeneration following demyelination.

Keywords: Demyelination; GABAB receptor; LPC; Olig2; proliferation

Abstract ID: 010

Efficiency and Stability of NILV versus Conventional Lentiviral System using Pgk-GFP and Reprogramming Factor Constructs

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Integrase-free lentiviral vectors (NILVs) offer a safer gene-delivery alternative by significantly reducing the risk of genomic integration, making them highly suitable for applications involving transient gene expression. This study aimed to compare the efficiency, expression profile, and stability of NILV and wild-type lentiviral vector (LV) systems using a PGK-GFP reporter, and synthesise, validate, and characterise plasmids carrying key reprogramming factors KLF4, SOX2, and OCT3/4 for future use in cellular reprogramming strategies. PGK-GFP, PGK-OCT3/4-SOX2-GFP, and PGK-KLF4-GFP plasmids were constructed and validated through restriction enzyme digestion and sequencing. LV and NILV virus particles were generated via the calcium phosphate co-precipitation method in HEK293T cells. Viral efficiency was evaluated by transducing U937 cells. GFP expression was monitored using confocal microscopy and quantified by flow cytometry, while Western blot analysis confirmed the intracellular expression of GFP and the delivered reprogramming factors. All plasmid constructs were successfully synthesised and sequence-verified. In 293T cells, both LV and NILV effectively expressed GFP and reprogramming-factor proteins. In U937 cells, LV-PGK-GFP demonstrated stable and progressively increasing GFPmean fluorescence intensity over time. Conversely, NILV-PGK-GFP exhibited a decline in signal after Day 4, consistent with episomal loss in dividing cells due to the absence of integrase activity. NILVs enabled efficient yet transient gene expression, while LVs provided stable, long-term expression. Successful validation of all reprogramming gene constructs highlights their potential for safe, non-integrating gene-delivery applications.

Keywords: Cell reprogramming; GFP expression; lentiviral vector; plasmid construction; transcription factors

Abstract ID: 011

Osteonano Scaffold: Innovating Bone Regeneration: No More Second Surgery After Bone Transplantation

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Effective bone regeneration demands biomaterials that integrate biology and mechanics within a single, resorbable platform.Autologous and allograft options are limited by donor-site morbidity, infection risk, and inconsistent integration, while many synthetic substitutes still require removal surgery. In line with SDG-3 (Health) and SDG-9 (Innovation), we introduce Osteonano, a fully biodegradable tri-component scaffold combining poly(lactic-co-glycolic) acid (PLGA), nano-calcium sulfate (nCS), and fucoidan (a marine polysaccharide to couple osteoconduction with pro-vascular and immunomodulatory cues. Evidence is scarce for a single resorbable scaffold that (i) provides osteoconduction with early mechanical support and (ii) degrades in step with bone regeneration to avoid second surgery; specifically, few studies integrate PLGA with calcium sulfate and validate the coupling of pore architecture andstiffness (via micro-CT and finite-element modelling) with hBMSC osteogenesis. **Objective**: To quantify and optimise the structure–mechanics of the PLGA–nCS–fucoidan scaffold so that (i) stiffness, strength, and load-sharing capacity are maintained during early healing, (ii) pore size and porosity that enable bone ingrowth are preserved, thereby preventing second-stage removal. Scaffolds (PLGA/Fu, PLGA/nCS, PLGA/nCS/Fu) were fabricated and assessed by confocal microscopy, SEM/EDX, and XRD; micro-CT quantified pore architecture, and finite-element modelling evaluated structure–mechanics. *In vitro* with hBMSCs, PLGA/nCS/Fu showed superior adhesion and proliferation and significantly higher osteogenic gene expression (RUNX2, COL1, ALP, OPN; OPN ≈ 1.5-fold vs. single-additive controls, $p < 0.05$). Micro-CT demonstrated bone-mimetic porosity supportive of vascular ingrowth, while modelling indicated a favourable stiffness–porosity balance. **Novelty/Uniqueness**: A two-in-one bioactive design that promotes bone formation and neovascularisation while tempering inflammatory responses, in a resorbable platform tailoredfor degradation-matched healing. **Contribution**: A single-procedure care pathway (no removal), reduced infection risk, and faster functional recovery. **Commercial potential**: Scalable formats for bone grafting, dental surgery, and load bearing as bioactive coatings on metal hardware or as early load-sharing fillers, leveraging familiar materials and established sterilisation routes. Osteonano bridges cells, scaffold microarchitecture, and system-level healing to deliver a biodegradable, angiogenic, and immuno-quiet solution for bone repair, positioning it for translation in orthopaedic applications.

Keywords: Bone scaffold; finite element modelling; fucoidan; immunomodulation; micro-CT; nano-calcium sulfate; PLGA

Abstract ID: 013

Molecular Docking-Based Assessment of *Melaleuca cajuputi* Subspecies *Cumingiana* Essential Oils as Antivirals Targeting HSV-1 Proteins in Vero Cells

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Herpes simplex virus type 1 (HSV-1) continues to pose a significant global burden, affecting an estimated 3.8 billion individuals worldwide. Current therapies are increasingly challenged by drug resistance and treatment-related adverse effects, underscoring the need for alternative antiviral candidates. This study evaluates the antiviral potential of *Melaleuca cajuputi* subspecies *cumingiana* essential oils through molecular docking against key HSV-1 proteins. Chemical constituents were identified using GC–MS, and twenty major and minor compounds were selected as ligands. Ten viral proteins implicated in entry and replication including glycoprotein D, glycoprotein B, thymidine kinase, and DNA polymerase were retrieved from the Protein Data Bank and used as receptor targets. Docking simulations conducted in PyRx identified several high- affinity interactions, with 2-isopropyl-10-methylphenanthrene showing the strongest binding to thymidine kinase (ΔG = –9.9 kcal/mol). Two hexahydro-naphthalene derivatives also demonstrated notable affinities (ΔG = –9.5 and –9.0 kcal/mol). Sesquiterpenoids such as α-cubebene, alloaromadendrene, and β-guaiene exhibited favorable interactions with viral enzymes (ΔG ≈ –7.9 to –8.2 kcal/mol), while monoterpenes including p-cymene, α-pinene, and 1,8-cineole showed moderate but relevant binding to glycoproteins and thymidine kinase (ΔG ≤ –7.0 kcal/mol). PyMOL was used to visualise binding poses and examine key intermolecular contacts, supporting structural interpretation of ligand–protein interactions. Collectively, these findings indicate that several constituents of *M. cajuputi* subspecies *cumingiana* may interfere with multiple stages of the HSV-1 life cycle. The results provide a basis for targeted in vitro validation and further mechanistic investigation of these essential oils as natural antiviral candidates.

Keywords: Essential oils; HSV-1; *Melaleuca cajuputi* subspecies *cumingiana*; molecular docking; vero cell

Abstract ID: 014

Assessment of SIKVAV and Palmitoyl-GDPH Bioinks on Human Dermal Fibroblasts Using Extrusion-Based 3D Bioprinting

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Tissue engineering and regenerative medicine have seen significant progress in creating complex three-dimensional (3D) constructs that closely mimic human tissues. Hydrogels play a central role in this advancement by enabling precise spatial arrangement of cells and biomaterials. Gelatin-based bioinks are widely used in wound healing due to their excellent biocompatibility, biodegradability, and ability to support extracellular matrix formation. However, the potential of the bioactive peptides such palmitic acid–glycine–aspartic acid–proline–histidine (palmitoyl–GDPH) and serine–isoleucine–lysine–valine–alanine–valine (SIKVAV) to enhance gelatin hydrogels for primary human dermal fibroblasts (HDFs) remains underexplored. In this study, gelatin–palmitoyl–GDPH and gelatin–SIKVAV hydrogels were fabricated at varying concentrations (GE_GNP_ELS_PAL12.5, GE_GNP_ELS_PAL25, GE_GNP_ELS_SIK5 and GE_GNP_ELS_SIK7) using extrusion-based 3D bioprinting at 24°C. Physicochemical analyses demonstrated favorable water absorption, stability, and biocompatibility, fulfilling essential requirements for wound healing applications. In vitro cytotoxicity studies showed >90% HDF viability over five days, while cell migration assays demonstrated complete scratch closure within 72 hours, confirming the hydrogels' capacity to support regeneration through enhanced proliferation and adhesion. Moreover, *in vivo* evaluation further supported these findings, where gross wound appearance indicated complete closure within 14 days, highlighting the hydrogels' effective contribution to wound repair. Overall, these results demonstrate that gelatin–palmitoyl–GDPH and gelatin–SIKVAV hydrogels serve as promising bioinks for 3D bioprinting, offering a robust platform for skin tissue engineering and regenerative medicine.

Keywords: 3D bioprinting; bioinks; gelatin; palmitoyl-GDPH; SIKVAV

Abstract ID: 015

Elucidating Phenotypic and Functional Alterations in Endothelial Cells Under TGF-β1 Stimulation

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Endothelial-to-mesenchymal transition (EndMT) is a key process contributing to vascular remodeling and endothelial dysfunction, during which endothelial cells lose their distinct characteristics and acquire mesenchymal-like properties. Transforming growth factor-beta 1 (TGF-β1) is a major inducer of EndMT, activating both Smad-dependent and alternative signaling pathways. This study aimed to establish an in vitro model of TGF-β1-induced EndMT using human coronary artery endothelial cells (HCAECs) and to characterise the resulting phenotypic and functional changes. HCAECs were treated with TGF-β1 at concentrations of 0, 20 and 50 ng/mL for 72 hours. Phenotypic alterations were examined using immunocytochemistry for endothelial markers (CD31, CD34, von Willebrand factor (vWF) and mesenchymal markers (CD105, CD73, CD90). Functional changes were evaluated throughWST-1 assay for metabolic activity, EdU assay for proliferation, and low-density lipoprotein (LDL) uptake assay to assess endothelial functionality. It is anticipated that TGF-β1 treatment will downregulate endothelial markers, LDL uptake, and metabolic activity while upregulating mesenchymal markers, indicating a functional transition toward a mesenchymal phenotype. The expression of CD90 still weakly observed at 20 ng/ml compared to other mesenchymal markers (CD105 and CD73), while at 50 ng/ml all the mesenchymal markers well were highly expressed. This study establishes a reproducible EndMT model for investigating underlying mechanisms and identifying therapeutic strategies for endothelial dysfunction.

Keywords: EndMT; endothelial cells; endothelial dysfunction; TGF-β1

Abstract ID: 016

Optimisation and Titration of Lentiviral Constructs for Reprogramming Endometriosis Fibroblasts into iPSCs

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Induced pluripotent stem cells (iPSCs) provide a powerful platform for modeling endometriosis and investigating disease mechanisms. In this study, lentiviral constructs encoding the reprogramming factors OCT4, SOX2, and KLF4 were validated and used for viral production, transduction, and titration. Plasmids were transformed in ampicillin-resistant Escherichia coli, extracted, and verified for purity and concentration. Functional validation in 293T cells demonstrated GFP expression under the microscope, confirming plasmid transcriptional activity; however, flow cytometry analysis did not reveal a distinct GFP-positive peak, suggesting low-level expression. Lentiviral particles were produced using the $CaPO_4$ precipitation method and applied to 293T cells, resulting in detectable GFP fluorescence microscopically, though further optimisation is required to improve transduction efficiency and enable accurate viral titration. These results establish that the constructs are functional and provide a foundation for generating patient-derived iPSCs. The next stage will focus on reprogramming fibroblasts from endometriosis patients and characterising their morphology, phenotype, and biomarker expression, ultimately creating a novel in vitro platform for studying endometriosis pathogenesis and therapeutic discovery.

Keywords: Endometriosis; GFP expression; iPSC generation; lentiviral constructs; transduction efficiency

Abstract ID: 018

Phoenixin's Potential Role in Intervening Neurodegenerative Disorder Progression

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In recent years, peptide treatment has emerged as a promising therapeutic strategy for neurodegenerative disorders due to their capability in decelerating disease progression by targeting disease specific pathological processes. Phoenixin (PNX) is a pleiotropic neuropeptide which has garnered attention due to its emergenceas a key player in numerous physiological functions. Recent evidence suggests a potential association between PNX and neurodegenerative diseases as PNX has shown to demonstrating neuroprotective effects through mitochondrial activity promotion and enhancing neuronal cell survival. PNX has also been implicated in enhancing memory function, suggesting it as a promising agent to be employed in targeted therapeutics for neurodegenerative diseases, such as Parkinsons' disease (PD). Using an *in vitro* model, thisstudy seeks to understand how PNX modulates protein linked to PD. The PD *in vitro* model constructed followed a prior research's protocol with some changes to fit the current study. Initially, the expression and localisation of PNX in a PD model was ascertained. In order to determine the neuropeptide's relationship to PD pathogenesis, PNX was introduced to the PD model and the dose-response was conducted via an 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. PNX was observed to be present in the PD model constructed, suggesting the neuropeptide to potentially be involved in mitigating disease progression in PD. This research will yield beneficial scientific output on the role of PNX in neurons as well as its potential as a therapeutic intervention.

Keywords: α-synuclein; neurodegenerative disorders; neuroprotection; Parkinson's disease; phoenixin

Abstract ID: 019

Preliminary Effects of Mesenchymal Stromal Cells on Cognitive, Physical and Physiological Functions in an Advanced Aging Mouse Model

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Rapid population aging globally imposes great pressure on healthcare systems, challenging elderly welfare. While laboratory mice serve as models of human aging, most studies employ systemic aging models or naturally aged mice between 18 and 24 months, which represent theearly phase of aging, limiting relevance to oldest-old adults. This pilot feasibility study investigated the preliminary effects of Wharton's Jelly mesenchymal stromal cells on cognitive, physical, and physiological parameters in 29-month-old C57BL/6J mice, approximately equivalent to 80-year-old humans, modelling advanced human aging. The treatment group received 25 million cells/kg intraperitoneally every two weeks for a total of three doses. Following treatment, the novel object recognition task, open field task, Morris water maze, rotarod performance, four-limb wire hanging test, and dual-energy X-ray absorptiometry were conducted. Due to sample size constraints ($n < 5$) and the inherent fragility of very old mice, all findings are reported descriptively. The treatment group exhibited no improvement in muscle or grip strength, and their spatial learning, memory acquisition, recognition memory, and gait velocity deteriorated. Despite the lack of functionalimprovement, treated mice showed physiological improvements, such as reduced fat mass, and improved retention of lean mass and bone mineral content, suggesting preservation of musculoskeletal integrity and overall improvement of metabolic health. Overall, the observations imply that functional decline in very old mice may become irreversible after reaching critical damage. These results support focusing the main study on a preventive treatment window during middle age to evaluate whether the intervention can delay or reversefunctional and physiological manifestations of aging.

Keywords: Advanced aging; body composition; cognitive function; mesenchymal stromal cells; physical function

Abstract ID: 020

Gelatin-Based Biomaterials Ink Loaded with Asiaticoside or Kelulut Honey for Enhanced Wound Healing

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Chronic wounds pose significant healthcare challenges due to delayed healing and infection risks. This study investigates the development of biomaterial inks composed of genipin- crosslinked gelatin, Kelulut honey (KH) or asiaticoside (ASI) as novel biomaterials aimed at wound healing applications. Hydrogels were formulated using gelatin (9% and 10% w/v) crosslinked with 0.1% genipin. MTT assays confirmed that KH (0.1% and 0.5% v/v) and ASI (0.05% w/v) supported cell viability, and these concentrations do not significantly affect viability. Physicochemical properties were evaluated, including swelling ratio, water vapor transmission rate (WVTR), contact angle, porosity, enzymatic degradation, and surface roughness. KH enhanced swelling, with 9GE_0.1KH reaching 742.07 ± 89.61% compared to 500% for the 9GE control, while ASI produced even greater swelling in 9GE_0.05ASI and 10GE_0.05ASI, both exceeding 1000% compared to the other groups. WVTR values for KH- modified hydrogels (1670.60–2438.92 g/m h) remained within the optimal wound healing range (1500–2500 g/m h). However, ASI reduced WVTR compared to control and KH groups while still maintaining acceptable levels. Contact angle measurements indicated improved hydrophilicity, with 9GE_0.1KH showing a contact angle of 42.14 ± 7.52 compared to 60 ± 11.66 for the 10GE formulation. Meanwhile, ASI concentrations may introduce some hydrophobicity due to higher contact angles compared to KH groups. Biodegradation rates were slightly higher in KH-modified hydrogels (0.079 ± 0.006 mg/h for 9GE_0.1KH), but all sample groups remained within acceptable limits without degrading too fast. These findings suggest that genipin-crosslinked gelatin-KH and gelatin-ASI hydrogels offer a promising scaffold for enhanced wound healing and potential applications in tissue engineering and three-dimensional (3D) bioprinting technologies.

Keywords: 3D bioprinting; asiaticoside; bioinks; kelulut honey; wound healing

Abstract ID: 021

Exosome-Mediated Modulation of Telomere Length and Cellular Senescence in *In Vitro* Aging of Wharton's Jelly Mesenchymal Stem Cells

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Telomeres, the protective caps at chromosome ends, progressively shorten with each cell division, ultimately leading to cellular senescence. Exosomes, small extracellular vesicles derived from mesenchymal stem cells (MSCs) and natural killer (NK) cells, have emerged as potential mediators of telomere maintenance through their cargo of bioactive molecules. However, the comparative effects of MSC- and NK-derived exosomes on telomere elongation remain largely unexplored. This study aims to investigate the impact of these exosomes on telomere length, cellular longevity, and regenerative potential in aging-related contexts. We hypothesise that exosomes from MSCs and NK cells possess distinct mechanisms influencing telomere dynamics, with MSC-derived exosomes playing a more prominent role in telomere elongation and cellular rejuvenation. To test this hypothesis, we conduct in vitro aging models using Wharton's Jelly derived MSCs (WJ-MSCs) at various passage numbers, assessing telomere length, and senescence markers following exosome treatment. Telomere length is quantified across early to late passages by qPCR to identify substantial attrition. Senescence is monitored by β-galactosidase staining and Senescence-Associated Secretory Phenotype (SASP) profiling, and when cultures reach approximately 50% senescent cells, standardised doses of WJ-MSC- and NK-derived exosomes are administered. Preliminary findings indicate that exosome treatment can partially restore telomere length, with NK-derived exosomes showing notable rejuvenating potential. These results suggest that exosome-based interventions may offer a cell-free strategy to delay replicative aging, providing mechanistic insights into telomere maintenance and informing the development of regenerative therapies and anti-aging applications.

Keywords: Cellular senescence; exosomes; *in vitro* aging; NK cells; telomere shortening; WJ-MSC

Abstract ID: 022

Physicochemical and Structural Characterisation of Kelulut Honey-Incorporated Hybrid Gelatin-PVA Hydrogel for Wound Healing Applications

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Wound healing is a complex biological process involving haemostasis, inflammation, proliferation, and remodelling to restore skin integrity. Conventional wound treatments often face limitations such as infection risk, frequent dressing changes, and delayed healing. Hydrogels have emerged as promising wound dressings due to their high-water content, biocompatibility, and ability to maintain a moist healing environment. In this study, a hybrid gelatin–PVA hydrogel incorporated with Kelulut honey was developed and characterised for its physicochemical and chemical properties (FTIR and SEM), aiming to create a hybrid and bioactive dressing material for enhanced wound healing applications. Kelulut honey-incorporated hybrid hydrogels were fabricated using gelatin and polyvinyl alcohol (PVA), cross-linked with genipin to improve mechanical strength and stability. The hydrogels were formulated with varying Kelulut honey concentrations (1%, 5%, and 10% v/v) to evaluate their physicochemical and chemical properties. Characterisation included swelling ratio, contact angle, degradation rate, and water vapour transmission rate (WVTR) to determine their suitability for wound healing applications. Fourier Transform Infrared (FTIR) analysis verified successful crosslinking and interactions between polymer and honey components, while Scanning Electron Microscopy (SEM) revealed a uniform, porous structure conducive to nutrient diffusion and cell infiltration. Kelulut honey incorporation enhanced the physicochemical properties of GE-PVA-based hydrogels, with GE-PVA-H1-GNP and GE-PVA-H5-GNP showing optimal swelling ratios (86.31 ± 14.27% and 91.19 ± 5.72%) and excellent WVTR values (468-510 g m^{-2} h^{-1}), ensuring ideal moisture balance for wound healing. The reduced contact angles of GE-PVA-H1 and GE-PVA-H1-GNP indicated improved hydrophilicity due to the polar compounds in Kelulut honey. All formulations exhibited stable degradation rates (0.01-0.1 g/h). FTIR analysis confirmed enhanced hydrogen bonding between honey and gelatin through a shifted O-H stretching band (~3289 cm^{-1}), while SEM images showed improved pore interconnectivity and uniform structure. These results suggest that Kelulut honey effectively improves the structural integrity, hydrophilicity, and moisture retention of GE–PVA hydrogels, making them promising for wound healing applications.

Keywords: Hydrogel; kelulut honey; wound healing

Abstract ID: 023

Biocompatible Hydrogel Patch for Atopic Dermatitis

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Atopic dermatitis (AD) is a chronic inflammatory skin disorder that arises from a combination of genetic predisposition, immune dysregulation, and environmental triggers, collectively impairing the skin barrier and resulting in persistent dryness and recurrent inflammation. Conventional topical therapies primarily alleviatesymptoms but are often constrained by side effects associated with long-term use, underscoring the need for safer and more biocompatible treatment approaches. This study aimed to develop a natural hydrogel patch that supports skin barrier restoration while maintaining high patient comfort. The patch was formulated usinggelatin, hyaluronic acid, locust bean gum, and cross-linked with genipin to improvemechanical robustness and stability. The optimised hydrogel exhibited physicochemical properties favourable for topical application, including a water vapour transmission rate of 1200-1500 g/m^2/day, a swelling ratio of 700-1000%, and a contact angle below 90 , reflecting effective moisture regulation and a hydrophilic surface. Mechanical analysis revealed a flexibility of 5-50 kPa, indicating a soft, conformable material suitable for adhering to dynamic areas of the skin without causing irritation or restricting movement. To evaluate therapeuticpotential, cytocompatibility and regenerative effects were assessed using human keratinocytes exposed to hydrogel leachates containing the bioactive formulations Derma-Clera and Ocaline PF. Live/Dead assays confirmed excellent biocompatibility, with cell viability exceeding 90% and maintenance of healthy morphology. Additionally, the bioactive-loaded hydrogels promoted keratinocyte proliferation, migration, and antioxidative protection. Collectively, these findings demonstrate that the developed natural hydrogel patch provides a promising platform for enhancing skin barrier repair in AD and represents a potential alternative to conventional topical treatments.

Keywords: Atopic dermatitis; hydrogel; natural biomaterials; tissue regeneration

Abstract ID: 024

Effects of Combining Electroacupuncture and Stem Cell Therapy in Alzheimer's Disease Rat Model

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Alzheimer's disease (AD) is characterised by progressive cognitive decline and irreversible neurodegeneration. Stem cells have emerged as a promising regenerative therapy due to their ability to promote neurogenesis, restore synaptic plasticity and improve memory and cognitive function. EA has gained recognition as non-pharmacological approach as stimulation has been shown to promote hippocampal neuroplasticity and cognitive enhancement. This study aimed to compare the synergistic effects of MSC and EA on long-term memory, working memory and blood-brain-barrier (BBB) permeability in an AD model. Sprague-Dawley rats were allocated into five groups: control, AD, AD+MSC, AD+MSC+EA and AD+EA. AD was induced using aluminium chloride for six weeks, while the Control group received saline. The AD+MSC group received hUC-MSC transplantation; the AD+EA group underwent EA stimulation; and the AD+MSC+EA group received both treatments. Behavioural performance was assessed using the Y-Maze at Day 0 (baseline), Day 14 (post-induction) and Day 42 (post-treatment); and Morris Water Maze (MWM) at Day 42. BBB permeability was evaluated using the Evans Blue assay. Y-Maze test showed a significant alternation in the AD group compared with Control, confirming successful disease induction. At Day 42, all treatment groups demonstrated improvement, with AD+MSC showing the greatest improvement, although not statistically significant. In the MWM probe trial, AD+MSC+EA spent the most time in the target quadrant, indicating the greatest memory retention. Evans Blue levels were highest in the AD group, while AD+MSC exhibited the lowest BBB leakage. Overall, these findings support the potential of multimodal therapy to enhance memory, restore neural function, and promote BBB stabilisation in Alzheimer's disease.

Keywords: Alzheimer's disease; electroacupuncture; stem cell

Abstract ID: 025

Stem Cell Therapy Combined with Electroacupuncture on Memory Enhancement in Alzheimer's Disease

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Alzheimer's disease (AD) is a progressive neurodegenerative disease and is the most common form of dementia, marked by amyloid beta (aβ) plaques and tau tangles and cognitive decline. The current treatments for AD are symptomatic based rather than curative. Stem cell therapy has been proven beneficial for various diseases including AD. Stem cell therapy is able to ameliorate AD by enhancing the aβ and tau clearance, promoting neurogenesis, modulating immune system and restoring neurotrophic signalling pathway. Electroacupuncture (EA) useselectrical stimulation to pairs of acupuncture needles which are inserted into specific points ofthe body. EA has been shown to improve AD through the enhancement of cognitive function, improvement of synaptic plasticity and reducing aβ and tau deposition. This project aims to investigate the synergistic effects provided by stem cell therapy combined with EA in AD rat models. Sprague-dawley rats (n = 40) are divided into 5 groups (Control, AD, AD+MSC, AD+MSC+EA and AD+EA). AD groups are given aluminium chloride (200mg/kg) via oral gavage daily for 42 days to induce AD. AD+MSC group were treated with human umbilical cord mesenchymal stem cells (hUC-MSC), AD+EA group were treated with EA and AD+MSC+EA group were treated with both MSC and EA treatments. Novel object recognition test is conducted on Day 0, Day 14 and Day 42 to assess the recognition memory function. The result showed significant decrease in recognition memory for AD group compared to control group and all treatment groups showed significant improvement compared to AD group with $p<0.05$. These findings indicate that the combined treatments effectively mitigate memory impairment in AD model.

Keywords: Alzheimer's disease; electroacupuncture; novel object recognition test recognition memory; stem cell therapy

Abstract ID: 026

Growth Dynamics and Differentiation of Dental Pulp and Wharton's Jelly Mesenchymal Stem Cells Across Multiple Early Passages

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Stem cells from human exfoliated deciduous teeth (SHED) and Wharton's jelly mesenchymal stem cells (WJMSC) are an important cell source for regenerative therapies. While both have been individually characterised, direct comparisons under identical conditions across early passages remain limited, particularly in growth kinetics and multilineage stability. The objective of this study is to compare the morphology, population doubling (PD), population doubling time (PDT) and multilineage differentiation of SHED and WJMSC from passage 1 to passage 5. SHED from pulp tissues and WJMSC from Wharton jelly were isolated via enzymatic digestion. Both were expanded under identical culture conditions. Morphology was assessed through phase-contrast microscopy. PD and PDT were calculated during P1-P5 expansion. Osteogenic, adipogenicity andchondrogenic differentiation were induced using standardised differentiation media, followed by histochemical staining. Both SHED and WJMSC showed fibroblast-like morphology across all passages. SHED showed strong proliferative activity of passages 1-4 with PD values of 5-6 by Day 21 but declined at passage 5. WJMSC showed higher peak PD values of 7-8 in passages 1-2 and maintained robust growth through Day 21. PDT analysis revealed that SHED doubled faster during its exponential phase (Day 3-9), whereas WJMSC had a longer exponential interval (Day 3-12). SHED showed stronger chondrogenic differentiation while WJMSC showed higher adipogenicity and osteogenic potential. In conclusion, SHED displayed stable early passage proliferation that is ideal for rapid expansion, while WJMSC provides superior total expansion yield. These findings can help guide the selection of the most suitable stem cell type for regenerative applications.

Keywords: Early passages; population doubling; population doubling time; SHED; WJMSC

Abstract ID: 027

Development of Microcarrier-Based 3D Culture for Induced Pluripotent Stem Cells Expansion for Stem Cell Therapy Manufacturing

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The clinical translation of human induced pluripotent stem cells (hiPSCs) requires large-scale cell production; however, conventional two-dimensional (2D) culture systems are inadequate to meet therapeutic demands. Three-dimensional (3D) microcarrier systems offer a promising approach, yet optimal parameters for microcarrier design and surface engineering to support hiPSC expansion and differentiation remain undefined.This study aims to develop a 3D cell culture platform using polycaprolactone (PCL) microcarriers to enable scalable hiPSC expansion for stem cell therapy biomanufacturing. Surface coating of PCL films was first optimised by comparing hiPSC attachment across three coating conditions: (i) poly-D-lysine (PDL) + vitronectin (VTN) + PDL; (ii) PDL + VTN, and (iii) VTN alone. The best-performing coating was applied to PCL microcarriers of three size ranges (small, intermediate, and large). hiPSC proliferation and self-renewal were assessed by CCK-8 analysis, while pluripotency was confirmed via immunocytochemistry. Results demonstrated that PCL coated with PDL + VTN achieved the highest hiPSC attachment and self-renewal. Similarly, large PCL microcarriers with the same coating promoted the greatest cell expansion while maintaining pluripotency marker expression. In conclusion, large-sized PCL microcarriers coated with PDL + VTN effectively support hiPSC self-renewal and preserve pluripotency. This optimised 3D culture system presents a robust and scalable platform, bridging the gap between cell biology, scaffold engineering, and biomanufacturing systems for regenerative medicine applications.

Keywords: 3D microcarriers; polycaprolactone; stem cells; stem cell expansion

Abstract ID: 028

Computational Docking of JR-AB2-011 to mTOR: Revealing A Potential Mechanism for mTORC2 Complex Activation in Duchenne Muscular Dystrophy (DMD)

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Duchenne muscular dystrophy (DMD) is a heterogeneous inherited muscle disorder characterised by progressive muscle wasting. Recent findings indicate that mechanistic target of rapamycin complex 2 (mTORC2) signalling is generally reduced in DMD, particularly through impaired function of Rictor, the essential non-catalytic subunit that provides structuralscaffolding and supports mTORC2-mediated cytoskeletal regulation. JR-AB2-011, a small molecule reported to disrupt Rictor–mTOR interactions, has emerged as a useful probe for investigating mTORC2 dynamics; however, its ligand-binding site and precise inhibitory mechanism remain undefined. In this study, molecular docking was performed using AutoDock Vina to evaluate potential JR-AB2-011 interaction sites on mTOR. Previous docking against Rictor identified several plausible pockets, but none were positioned to sterically disrupt Rictor–mTOR assembly, suggesting conformational modulation inhibition. Docking across the full mTOR monomer revealed a cluster of favourable poses within the 500–700 aa regions, corresponding to the HEAT domain, with many contacts to LEU599 and LEU629. This HEAT domain mediates protein–protein interactions and contributes to mTORC2 structural stability. Additional lower-affinity pockets were identified near the FAT–FRB interface and within the kinase domain, although these sites displayed weaker predicted binding energies. Predicted binding sites predominantly localised to moderately flexible but structurally supported regions based on B-factor analysis, indicating that JR-AB2-011 may influence local conformational dynamics and thereby modulate mTORC2 activity. Overall, thefindings suggest that JR-AB2-011 may interact with both Rictor and mTOR, with the HEAT domain emerging as a particularly plausible target region. Experimental validation including assays in Rictor-knockout systems and cryo-EM structural studies are needed to clarify the inhibitor's mechanism of action.

Keywords: DMD; mTORC2; mTOR; JR-AB2-011; molecular docking

Abstract ID: 029

Establishing an *In Vitro* Aging Brain Model for The Study of MSC-EV Effect on Brain Aging

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Brain aging is driven by interconnected biological processes, including blood–brain barrier (BBB) dysfunction, chronic neuroinflammation, neuronal senescence, and epigenetic and metabolic decline. These alterations contribute to cognitive frailty and increased vulnerability to neurodegenerative disorders. However, existing in vitro models fail to concurrently recapitulate multiple hallmarks of brain aging. This study aims to develop a multicellular in vitro aging neurovascular unit (NVU) model that reproduces two key features of brain aging BBB breakdown and neuronal senescence and to conduct a preliminary evaluation of the rejuvenating potential of mesenchymal stromal cell–derived extracellular vesicles (MSC-EVs). The NVU will be constructed using human brain endothelial cells, astrocytes, pericytes,neurons, and microglia. BBB integrity will be assessed through transendothelial electrical resistance (TEER) measurements and FITC-dextran permeability assays, while neuronal–glialnetwork integrity will be characterised by immunocytochemical analysis of βIII-tubulin, NeuN, Synapsin-1, PSD-95, CD68, and Iba1. Cellular aging will be induced via replicative exhaustion combined with chronic low-dose hydrogen peroxide (H_2O_2) exposure and validatedusing senescence-associated β-galactosidase activity, p16 and p21 expression, reactive oxygen species production, SASP cytokines (IL-6, IL-8, TNF-α), mitochondrial bioenergetics profiling (Seahorse XF), and epigenetic alterations. MSC-EVs will be characterised by nanoparticle tracking analysis and flow cytometry and applied to the aging NVU to assess their effects on BBB permeability, tight junction protein expression (Claudin-5, Occludin), neuronalregeneration markers, inflammatory modulation, and cellular metabolic recovery. It is anticipated that this model will exhibit elevated senescence burden, compromised BBB integrity, mitochondrial dysfunction, and enhanced pro-inflammatory signaling, while MSC-EV treatment is expected to restore BBB function, attenuate senescence, and improve bioenergetic and epigenetic profiles. This integrated platform provides a valuable tool for studying brain aging and screening potential rejuvenation therapies.

Keywords: Bioenergetics; blood brain barrier; epigenectics; MSCs-EVs; neuro-glial network

Abstract ID: 030

Fin-Fold Amputation Technique Promotes Fin Regeneration in Zebra fish Larvae: A Preliminary Findings

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Zebrafish, known as *Danio* rerio, is a small freshwater fish widely used in biomedical research and represents a powerful alternative vertebrate model for studying tissue repairs due to its genetically similar to human. Although zebrafish adults are extensively used in regenerative studies, early life stage zebrafish larvae show comparable regenerative responses, making them an ideal model to study wound healing and tissue regrowth. Their rapid development, transparency and ability to regenerate damaged tissue allow real-time imaging without invasive procedures. However, current methodologies for caudal fin regeneration vary and often face reproducibility challenges. As a preliminary phase prior to therapeutic testing, this study aimed to optimise the microsurgical protocol for fin-fold amputation in zebrafish larvae at 48 hours post-fertilisation (48 hpf), corresponding to the early onset of wound healing. Establishing technical consistency is essential to ensure uniform wound margins and reliable regeneration analysis. Using the fin-fold approach, caudal fins were amputated just distal to the notochord tip. Both the amputated and non-amputated control groups were maintained in E3 medium and fin regrowth was monitored at 24-, 48- and 72-hours post-amputation (hpa) using compound microscope. Image-based quantification using imageJ demonstrated consistent increases in fin length and area throughout 72 hpa. No mortality or post-surgical abnormalities were recorded throughout the experiment, indicating the fin-fold technique is safe and reproducible for early larval stages. These preliminary results confirm that fin-fold amputation activates early regenerative events that can be measured consistently. Overall, this preliminary work contributes to methodological refinement in zebrafish regeneration research by establishing a clear method and imaging workflow suitable for high-throughput tissue regeneration studies.

Keywords: *Danio rerio;* fin regeneration; fin-fold amputation; tissue regeneration; zebrafish larvae

Abstract ID: 032

Enhancing MSC-Exosome Production Through Hypoxic Priming

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Mesenchymal stromal cells (MSCs) naturally reside in low-oxygen niches, where hypoxia supports their survival and function. Replicating this environment in vitro has been shown to enhance MSC activity, and emerging evidence suggests it may also improve MSC-derived exosome production. However, the effects of different hypoxic levels on exosome yield and composition remain not well characterised. In this study, we aimed to address this gap by examining how different hypoxic conditions influence MSC-derived exosome yield and characteristics. MSCs were cultured under normoxia (21% O_2) and two hypoxic conditions (1% and 3% O_2). Cell viability was assessed using standard assays. Conditioned media were collected, and exosomes were isolated and evaluated for particle concentration and size using nanoparticle tracking analysis, and for protein content using quantitative assays. MSC viability improved significantly under 3% hypoxia compared with normoxia. Exosome particle concentrations were higher in 3% hypoxia. Particle sizes remained consistently below 150 nm across all conditions. Protein content was higher inthe 3% hypoxia group compared with normoxia and 1% hypoxia. Hypoxic priming at 3% O_2 enhances MSC viability, exosome yield and protein concentration, without altering size distribution, suggesting that moderate hypoxia represents an effective strategy to improve MSC-exosome production for therapeutic applications.

Keywords: Cell viability; exosomes; hypoxia priming; mesenchymal stromal cells; particle concentration

Abstract ID: 033

Comparative LC-MS/MS and Molecular Network Analysis of Shed and WJ-MSC Exosomes for Osteogenic-Angiogenic Regeneration

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Mesenchymal stem cell derived exosomes (MSC-Exos) are emerging as potent cell-free therapeutic agents for bone regeneration; however, comparative profiling of exosomes derived from stem cells from human exfoliated deciduous teeth (SHED) and Wharton's Jelly mesenchymal stem cells (WJ-MSCs) remains limited. This project will address this gap by integrating liquid chromatography-tandem mass spectrometry (LC-MS/MS) proteomic profiling with molecular network analysis to characterise and compare the osteogenic and angiogenic regulatory potential of SHED and WJ-MSC-derived exosomes. Exosomes will be isolated and characterised in accordance with MISEV 2023 standards using transmission electron microscopy, nanoparticle tracking analysis, and exosomal markers such as CD63, CD81, and CD9 and common negative markers include calnexin. LC-MS/MS will be employed to identify and quantify exosomal protein cargo, while bioinformatic tools including STRING, Cytoscape, KEGG, GO enrichment and TargetScan will construct molecular interaction networks and highlight key pathways involved in bone vascular regeneration. Functional in vitro assays using osteoblasts and endothelial cells will evaluate alkaline phosphatase (ALP) activity, mineralisation, vascular endothelial growth factor (VEGF) expression, cell migration, and tube formation following exosome treatment. Anticipated research outcomes include identifying distinct exosomal protein and miRNA signatures for each MSC source, predicting critical molecular pathways mediating osteogenic–angiogenic coupling, and determining whether SHED and WJ-MSC derived exosomes exert complementary or source specific regenerative functions. This study is expected to generate mechanistic insights that advance the development of standardised, scalable, and clinically translatable exosome-based therapies for bone tissue engineering.

Keywords: Bioinformatics; exosomes; LC-MS/MS; SHED; WJ-MSC

Abstract ID: 035

Influence of Oral Health Behavior and Status on Oral Health Related Quality of Life among Coastal Communities in Indonesia

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Coastal populations may encounter unique environmental and sociocultural challenges that can affect their oral health and overall well-being. Poor oral hygiene behavior and inadequate oral health status are associated with impaired oral functions, psychological discomfort, and a decline in oral health related quality of life (OHRQoL). However, scientific evidence addressing these issues in coastal communities in Indonesia remains limited. This study aims to analyse the influence of oral health behavior and oral health status on OHRQoL among adults living in Indonesian coastal areas. A cross-sectional study will be carried out in a coastal village of Kebumen Regency, Indonesia. Oral health behavior will be assessed using a structured questionnaire, oral health status will be evaluated through Patient-Reported Outcome Measures (PROMs) and OHRQoL will be measured using the Oral Health Impact Profile (OHIP-14). The collected data will be analysed using appropriate statistical tests to determine the potential effects and relationships between variables. The expected findings will provide a better understanding of the determinants of OHRQoL in coastal communities, contributing to the development of targeted oral health promotion strategies and equitable public health interventions to improve quality of life in geographically vulnerable populations.

Keywords: Coastal community; oral health behavior; oral health status; OHRQoL; public health dentistry

Abstract ID: 036

The Influence of Motivation and Work Environment on Work Engagement of Dental Therapist at Dental Hospital Prof. Soedomo

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High level of work engagement can improve the performance of dental therapists. Factors influencing work engagement in dental therapist are motivation and work environment. Dental therapists collaborate with dentists as professionals in dental and oral health services at the dental hospital. This study aimed to determine the influence of motivation and work environment on work engagement of dental therapists. This study will use a mix methods explanatory sequential design. This study will be conducted at Prof. Soedomo Dental Hospital, involving all dental therapists. The quantitative study will use a Likert scale questionnaire and the qualitative study will use interview. The result of this study are expected to assess the influence of motivation and work environment on the level of work engagement of dental therapists at Prof. Soedomo Dental Hospital.

Keywords: Dental therapist; motivation; work environment; work engagement

Abstract ID: 037

Tannic Acid and Chitosan on Wound Healing Process

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Wound healing is a complex biological process involving the phases of inflammation, proliferation, and tissue remodeling. Disruptions in these phases, such as infection, oxidative stress, or dysregulated immune responses, can delay tissue repair and increase the risk of complications. Tannic acid and chitosan are natural compounds that demonstrate significant potential in supporting wound healing through complementary mechanisms. Tannic acid, a polyphenolic compound with strong antioxidant, anti-inflammatory, and antimicrobial activities,helps reduce oxidative damage, stabilise inflammatory responses, and prevent pathogen colonisation. Meanwhile, chitosan, a biocompatible biopolymer with hemostatic, antibacterial, and immunomodulatory properties, enhances fibroblast migration, stimulates collagen deposition, and accelerates re-epithelialisation. The combination of tannic acid and chitosan is essential to achieve a synergistic effect that cannot be obtained when each compound is used individually. Tannic acid contributes to creating a stable wound environment by suppressing inflammation and controlling microbial growth, whereas chitosan strengthens tissue repair and provides a structural matrix that supports regeneration. Chitosan also acts as a carrier matrix that improves the stability of tannic acid and modulatesits release, ensuring prolonged therapeutic effectiveness. Without this combination, each component provides only partial benefits and cannot optimally support all phases of wound healing. Therefore, tannic acid–chitosan–based formulations offer a promising and safe therapeutic approach to accelerate wound healing, particularly in chronic or complicated wounds. This combination supports a more balanced inflammatory responses, enhances local tissue repair, and represents an important advancement in the development of modern wound biomaterials.

Keywords: Chitosan; tannic acid; wound healing

Abstract ID: 038

Transplantation of PBMC-Harvested Mitochondria for Improving the Bioenergetics in Cardiomyocytes

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Aging is a major risk factor of cardiovascular diseases (CVDs), driving pathological changes that manifests as heart failure, arterial diseases, and atherosclerosis. Structural alterations in theaging heart include left ventricular hypertrophy, endocardial thickening, left atrial dilation, reduced chamber size, increased mass-to-volume ratio, myocardial stiffness, and maladaptive fibrosis. Another hallmark of cardiac aging is the self-perpetuating cycle wherein elevated reactive oxygen species (ROS) and ensuing oxidative stress alter mitochondrial DNA and mitochondrial dynamics, disrupting the electron transport chain (ETC) and causing excessive electron leakage therefore resulting mitochondrial dysfunction which further exacerbate ROS production. Mitochondrial-targeting antioxidants (e.g., MitoQ, MitoTEMPO, SkQ1) reduce ROS but do not resolve underlying mitochondrial dysfunction or bioenergetic failure. Mitochondrial transplantation has emerged as a promising strategy, with studies demonstrating cardiac performance and restored cellular bioenergetics following delivery of healthy mitochondria. However, this approach often requires invasive tissue harvesting, such as from the pectoralis muscle limiting clinical practicality. This research aims to explore Peripheral Blood Mononuclear Cells (PBMCs)-derived osteoclasts as an accessible source of highly active mitochondria for transplantation into mature cardiomyocytes. PBMCs from healthy donors will be differentiated into osteoclasts using M-CSF and RANKL. Isolated mitochondriawill be co-incubated with mature cardiomyocytes to allow transfer. Enhanced mitochondrial bioenergetics within recipient cardiomyocytes, will be assessed via Seahorse Real-Time ATP Assay, while mitochondrial viability and transplant efficiency will be validated through live imaging and PCR respectively. This approach provides a non-invasive therapeutic strategy forheart diseases.

Keywords: Cardiomyocytes; mitochondrial dysfunction; mitochondrial-targeted antioxidant; mitochondrial transplantation; oxidative stress