



**1st Asia Pacific
Regenerative
Medicine
Congress
(APREMIC) 2026**



SCIENCE FOR A
HEALTHIER TOMORROW

PROCEEDINGS BOOK

**1st Asia Pacific Regenerative
Medicine Congress (APREMIC) 2026**

Advances in Regenerative Medicine



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Greetings from President of Indonesia Society Regenerative Medicine



It is my great pleasure to welcome you to the Proceedings of the 1st Asia Pacific Regenerative Medicine Congress (APREMIC) 2026.

APREMIC 2026 provides an important platform for clinicians, researchers, scientists, and industry partners to share knowledge, exchange ideas, and discuss the latest advances in regenerative medicine. Through this congress, we hope to strengthen collaboration across disciplines and countries, particularly within the Asia-Pacific region.

The abstracts collected in these proceedings represent a diverse range of research in regenerative medicine, from basic and translational research to clinical applications. We hope that these contributions will stimulate further discussion, inspire new research, and encourage meaningful collaborations toward the advancement of regenerative medicine.

I would like to express my sincere appreciation to all authors, speakers, reviewers, participants, partners, and the organizing committee for their valuable contributions and support in making APREMIC 2026 possible.

I hope that the knowledge shared and connections established during APREMIC 2026 will continue to inspire further research, collaboration, and meaningful advances in regenerative medicine.

Sincerely

Dr. Dr. Dr. dr. Jonny, SpPD-KGH, M.Kes., M.M., DCN, D.ABRM, FISN
President of Indonesia Society Regenerative Medicine (INASRM)



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Message from the Chair of the Organizing Committee



The successful implementation of APREMIC 2026 would not have been possible without the collaboration and commitment of many parties. From the scientific community and invited speakers to participants, reviewers, partners, and the organizing committee, each contribution has played an important role in bringing this congress to life.

We are particularly grateful to all participants who shared their scientific work through the abstract submission process. Their contributions have enriched the congress through a diverse range of oral and poster presentations, reflecting the ongoing development of regenerative medicine research and practice across the region.

I would like to express my sincere appreciation to all authors, speakers, reviewers, participants, partners, and the organizing committee for their valuable contributions and support in making APREMIC 2026 possible.

I hope that the knowledge shared and connections established during APREMIC 2026 will continue to inspire further research, collaboration, and meaningful advances in regenerative medicine.

Dr. dr. Cosmos O. Mangunsong, SpM(K), D.ABRM
Chair of the Organizing Committee
APREMIC 2026

Message from the Scientific Committee



It is a great privilege to contribute this foreword to the Compilation of Scientific Works from the 1st APREMIC 2006, which brings together scientific ideas, research findings, and innovations in the rapidly evolving field of stem cell and regenerative medicine.

As a neurosurgeon with a particular interest in stem cell therapy and neuroregenerative medicine, I have witnessed an important transformation in our understanding of neurological injury. Conditions once considered to have very limited potential for recovery are now being explored through advances in stem cell biology, neuroregeneration, secretome and extracellular vesicles, molecular medicine, and tissue engineering.

For neurosurgeons, the challenge extends beyond treating structural abnormalities through surgery. The future of neuroscience lies in our ability not only to repair anatomy, but also to preserve neural tissue, promote neuroplasticity, and ultimately restore neurological function. Stem cell and regenerative medicine may provide an important bridge toward this goal.

However, scientific enthusiasm must always be balanced by evidence-based medicine, patient safety, ethical research, and scientific integrity. Translation from laboratory discoveries into clinical practice requires rigorous preclinical studies, well-designed clinical trials, and careful evaluation of long-term safety and efficacy.

I hope this collection will encourage stronger collaboration among scientists, clinicians, universities, research institutions, and biotechnology communities across the Asia-Pacific region and inspire further high-quality research in regenerative medicine.

From surgery to regeneration, from repairing structure to restoring function. May our scientific efforts ultimately bring greater hope, better functional recovery, and improved quality of life to our patients.

Dr. dr. Zainy Hamzah, SpBS., F.N-Onk., F.N-TB., D.ABRM

Scientific Committee

Editorial Board of APREMIC 2026



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CONGRESS DAY 1: WORKSHOP
Thursday, July 2nd, 2026

Time	Residence on Five		
	Meeting Room I	Meeting Room II	Meeting Room III
08.00 – 08.30	Registration		
08.30 – 11.30	Beyond Conventional Regenerative Medicine: Integrated Cell & Immune Therapy Ecosystem <i>Supported by Regenic</i> Sandy Qlintang, MD, MBIomed Harry Murti, PhD Irene Natalia, MD, MBIomed Yanuarso, MD, SpOT Dr. Lisa Hasibuan, MD, SpBP-RE	Advances in Cell Therapy and Deep Regulation: Translating Science into Clinical Excellence <i>Supported by Daewoong</i> Adeline Devita, MD Dr. Jonny, MD, SpPD-KGH Afrianti Shandi, MD, SpBP-RE Gurmeet Singh, MD, SpPD-KP	Accelerating Advanced Cell Therapies: Strategic Approaches to CMC and Global Development <i>Supported by PT Naleya Genomik Indonesia</i> Dr. Dan Zhang Dr. Karin Yo
11.30 – 13.00	Lunch Break		
13.00 – 16.00	Stem Cells and Secretome for Retinal Regeneration: From Scientific Principles to Clinical Applications <i>Supported by ProSTEM</i> Prof. Dr. Henry Klassen, MD Prof. Dr. Budu, MD, SpM Dr. Cosmos O. Mangunsong, MD, SpM	Preparation and Clinical Application of Platelet-Rich Plasma (PRP) <i>Supported by PT Sadeva Eternabio Persada</i> Dr. Hasnain Haider-Shah, MD, CM Satria Prawira Putra, MD, SpOT Jonathan Kurnia Wijaya, MD, SpDVE Evan, MD, SpOT	i-Cell Klosome: The Next Frontier in Regenerative Aesthetic Medicine <i>Supported by PT Natura Cantik Harmoni</i> Dewi Ema Anindia, MD
16.00 – 16.30	Closing Remarks		

CONGRESS DAY 2: SYMPOSIUM
Friday, July 3rd, 2026

Time	Grand Ball Room	Krakatau 3
07.00 – 08.00	Registration	
08.00 – 08.15		
08.15 – 08.30	Keynote Lecture: Scaling Stem Cell Therapies From Lab Discovery to GMP and Clinical Application	
08.30 – 08.45	Plenary Session 1: Shaping the Future of Regenerative Medicine in Indonesia Sandy Qlintang, MD, MBIomed Supported by Regenic	
08.45 – 10.15	Grand Ball Room / Krakatau 3	
08.45 – 09.05	Symposium 1: Future of Tissue Engineering in Ophthalmology: From Stem Cells to Retinal Repair Chair: Dr. Cynthia Retna Sartika Regenerative Medicine in Clinical Ophthalmology: Current Perspectives and Future Directions Prof. Dr. Budu President of PERDAMI (Indonesian Ophtalmologist Association)	Oral Presentation 1 Moderator: Dr. Zainy Hamzah Regulatory Effects Of IL-33 On Adipose-Derived Mesenchymal Stem Cell Function And Senescence Presented by Wafa Khalil
09.05 – 09.25	MSC and Its Derived Products in Ocular Disease: Perspective from Retinitis Pigmentosa Dr. Cosmos O. Mangunsong INASRM Jakarta Eye Center	Revisiting Pigment Restoration in Vitiligo: Clinical Outcomes of MSC-Derived Secretome Therapy-A Case Series Presented by Sukmawati Tan

CONGRESS DAY 2: SYMPOSIUM
Friday, July 3rd, 2026

Time	Grand Ball Room	Krakatau 3
09.25 – 09.45	Retinal Progenitor Cells for Treatment of Retinitis Pigmentosa Prof. Dr. Henry Klassen University of California, Irvine	The Effect of Intravitreal Mesenchymal Stem Cell Secretome on TNF-α Expression and Retinal Ganglion Cell Density in a Rat Model of Traumatic Optic Neuropathy Presented by Bellarinda Alfiani Clinical Pregnancy Outcomes Following Endometrial Platelet-Rich Plasma Administration in Women Undergoing In Vitro Fertilization (IVF): A Preliminary Retrospective Cohort Study Presented by Naylah Muna
09.45 – 10.15	Discussion and Q&A Session	Discussion and Q&A Session
10.15 – 10.30	Coffee Break	
10.30 – 11.30	Opening Ceremony By MC Indonesian National Anthem Traditional Dance Performance Prayer Welcoming Speech from Chairman of APREMIC 2026 Dr. Cosmos O. Mangunsong Welcoming Speech from President of INASRM Dr. Jonny Official opening Flag ceremony	
11.30 – 13.00	Lunch Break	
13.00 – 14.30	Symposium 2: Unlocking the Full Potential of Regenerative Therapies: Biology, Barriers, and Clinical Translation Chair: Prof. Dr. Ahmad Faried Quiescence to Senescence Regenerative Medicine In Low-Resource Settings–Current Barriers And Future Opportunities Dr. Hisham Hakim American Spine Center Dubai	Oral Presentation 2 Moderator: Dr. Zainy Hamzah Regenerative Medicine In Low-Resource Settings–Current Barriers And Future Opportunities Presented by Naylah Muna
13.20 – 13.40	Metabolic Reprogramming and Signal Transduction in Regeneration: NAD⁺-Dependent Sirtuin–PARP Axis and Peptide-Mediated Cellular Pathways Erwin Brian Tan, MD Philippine Regenerative & Integrative Medical Association	Global Research Landscape (1995–2026) and Efficacy of Adipose-Derived Stromal Vascular Fraction in Chronic Wound Healing- A Systematic Bibliometric Analysis and Clinical Network Meta-Analysis Presented by Tungki Pratama Umar
13.40 – 14.00	Integrated Regenerative Medicine Platform: Leveraging Stem Cells, Secretome, and NK Cells for Advanced Therapeutic Innovation Dr. Jonny Jonny President of INASRM Supported by Daewoong	Ultrasound-Guided Hydrodissection with Umbilical Cord Mesenchymal Stem Cell Secretome Administration for Deep Branch Ulnar Neuropathy Following Prolonged Finger Immobilization - A Case Report Presented by Teinny Suryadi
14.00 – 14.30	Discussion and Q&A Session Marked Pain Reduction and Functional Recovery Following Secretome Injection in Refractory Adhesive Capsulitis After Previous Prolotherapy: A Case Report	Presented by Eka Esti Pramastuti

CONGRESS DAY 2: SYMPOSIUM
Friday, July 3rd, 2026

Time	Grand Ball Room	Krakatau 3
14.30 – 16.00	Symposium 3: Restoring Failing Organs: Clinical Translation in Chronic Disease Chair: Agus Aulia, MD The use of secretome in CKD : Are We Ready for Regenerative Nephrology? Dr. Jonny Jonny President of INASRM Supported by Regenic	Oral Presentation 3 Moderator: Dr. Zainy Hamzah Paradoxical Post-Injection Pain in Anti-Inflammatory Interleukin-1 Receptor Antagonist/ Autologous Conditioned Serum Therapy for Acute Musculoskeletal Injuries: A Case Series Presented by Ratri Dwi Indriani
14.50 – 15.10	In Vitro Differentiation of Bone Marrow Mesenchymal Stem Cells into Human Male Gametes Prof. Dr. Islam Aldababshekh I.D Stem Cells and Genome Institute	Effectiveness Of Autologous Platelet-Rich Plasma Injection On Changes In Anti-Mullerian Hormone, Antral Follicle Count, And Oocyte Yield In Poor Ovarian Responders Undergoing In Vitro Fertilization Presented by Caroline Tirtajasa
15.10 – 15.30	Regenerative Medicine for Neurodevelopmental Disorder - A New Frontier Dr. Syed Salman Gilani American Society of Regenerative Medicine	Clinical Improvement Following Ultrasound-Guided Mesenchymal Stem Cell-Derived Secretome Therapy in a Patient with Partial Anterior Cruciate Ligament Tear Refractory to Hyaluronic Acid Injection: A Case Report Presented by I Gusti Ngurah Putra Eka Santosa
15.30 – 16.00	Discussion and Q&A Session	Administration of Mesenchymal Stem Cell Secretome in Acute Kidney Injury: A Case Report
16.00 – 16.20	Coffee Break	
16.20 – 17.00	Symposium 4: Next-Generation Regenerative Platforms: From Cell-Free Systems to Precision Therapeutics Chair: Yanuarso, MD	
16.20 – 16.40	Bone Marrow Aspirate (BMA) and Bone Marrow Aspirate Concentrate (BMAC): From Niche Biology to Standardized Orthobiologics Dr. Tomas Mosaner Brazilian Association of Musculoskeletal Regenerative Medicine Orthoregen	
16.40 – 17.00	Are Mitochondria-Containing EVs the Next Breakthrough in Regenerative Medicine? Dr. Pezhman Hafez Yakin Health Management Malaysia Tissue Engineering & Regenerative Medicine Society of Malaysia (TESMA)	
17.00 – 17.20	Epigenomic Reprogramming, Genetic Architecture, and Artificial Intelligence: A First-in-Class Female Precision Platform Bridging Reproductive Longevity and Athletic Resilience Dr. Saima Ajaz Harley Street Longevity Club Kings College Hospital	
17.20 – 17.50	Discussion and Q&A Session	
17.50 – 18.00	Closing	
18.30 – 21.00	Faculty Meeting	

CONGRESS DAY 3: SYMPOSIUM
Saturday, July 4th, 2026

Time	Grand Ball Room	Krakatau 3
07.00 – 07.45	Registration	
07.45 – 08.00	Keynote Lecture: Unifying Regenerative Medicine Across the World: The ABRM Global Standard	
08.00 – 08.15	Plenary Session 2: Translating Global Standard into Clinical Reality Adeline Devita, MD Supported by Daewoong	
08.15 – 08.35	Symposium 5: Designing the Right Therapies to the Right Patients Chair: Agus Aulia, MD Translating Stem Cells into Brain Repair: Clinical Advances in Parkinson's Disease and Stroke Prof. Dr. Chris Paulus Executive Director of ABRM	Oral Presentation / Grand Ball Room Krakatau 3
08.35 – 08.55	Redefining Neuro-Oncology Through Regenerative Medicine: Stem Cells, Secretome, and Precision Therapeutics Prof. Dr. Ahmad Faried Universitas Padjadjaran Bandung, Indonesia	
08.55 – 09.15	A Multi-Pillar Regenerative Neuro-Restoration Platform for Central Nervous System Injury and Neurodegenerative Disease: The Brockwell International Model Background Dr. Hasnain Haider-Shah Brockwell Healthcare International USA	
09.15 – 09.35	Emerging Regenerative Strategies for Neurodegenerative Diseases: From Stem Cells to Next-Generation Therapeutics Prof. Dr. Mohammed Al Jumaily United Kingdom/United Arab Emirates	
09.35 – 10.00	Discussion and Q&A Session	
10.00 – 10.15	Coffee Break	
10.15 – 10.30	Keynote Lecture: Transforming Indonesia's Healthcare: National Strategies and Policy Support for Regenerative Medicine Development. Prof. Amin Soebandrio Komite Sel Punca Indonesia	
10.30 – 12.15	Symposium 6: Regenerative Surgery From Bench to Blade Chair: Yanuarso, MD Poster Presentation	
10.30 – 10.50	Advances in Regenerative Therapy for Osteoarthritis: From Secretome to Clinical Application Dr. Bintang Soetjahjo President of IOA (Indonesian Orthopedic Association/PABOI) REJASELINDO Sebelas Maret University	
10.50 – 11.10	Orthopaedic Regenerative therapy: Sacroiliac Joint Pain, Exosomes with shock wave therapy (SWT) Dr. Atheer Ramahi Ortho Dar AB/Achima Care Sweden	

CONGRESS DAY 3: SYMPOSIUM
Saturday, July 4th, 2026

Time	Grand Ball Room	Krakatau 3
11.10 – 11.30	Regenerative Management of Advanced Knee Osteoarthritis using autologous PBSC and Arthroscopic debridement. Dr. Khalid Mahmud Shah Pakistan Arthroscopy & Sports Surgery Society	
11.30 – 11.50	Evidence and Controversies in Regenerative Orthopaedic Surgery: Insights from Clinical Trials and Meta-Analyses Dr. Nameer Haider Georgetown University Medical Center	
11.50 – 12.15	Discussion and Q&A Session	
12.15 – 13.15	Lunch Break	
13.15 – 14.00	Mini Symposium	
13.15 – 13.30	The New Innovation Therapy of Hydrogen Prof. Dr. Theresia Indah Budhy Supported by Dr. Water+	
13.30 – 13.45	Intra-articular Regenerative Injections Alif Noeriyanto Rahman, MD Supported by PT Sel Regeneratif Biotek	
13.45 – 13.55	Q&A Session	
14.00 – 15.45	Symposium 7: Engineered Cell Therapies Across Systems: Opportunities and Challenges Chair: Zainy Hamzah, MD	
14.00 – 14.20	Innovation in Regenerative Medicine Achieving Both Safety and Functionality through Organoids and Cell-Free Therapy Dr. Sawako Hibino Osaka University Graduate School of Medicine	
14.20 – 14.40	Urine-Derived Stem Cells: Challenges in Isolation, Biological Identity, and Therapeutic Potential in CKD-Associated Fibrosis Dr. Jonny Jonny President of INASRM Supported by ProSTEM	
14.40 – 15.00	Next-Generation CAR-T and Engineered Immune Cells for Solid Tumors: Overcoming the Barriers Dr. Mana Alshehri Kingdom of Saudi Arabia	
15.00 – 15.20	Intracellular vesicles derived from dental pulp stem cells promote tissue repair and reverse aging Prof. Dr. Adam Ye Center of Regenerative Medicine, Wuhan University Noel Martin Visiting Chair, The University of Sydney Australia	
15.20 – 15.45	Discussion and Q&A Session	
15.45 – 16.00	Coffee Break	
16.00 – 16.10	Opening by MC	
16.20 – 16.25	National Anthem “Indonesia Raya”	
16.25 – 16.35	Speech by Chairman of INASRM Dr. Jonny Jonny	

CONGRESS DAY 3: SYMPOSIUM
Saturday, July 4th, 2026

Time	Grand Ball Room	Krakatau 3
16.35 – 16.45	Speech by ABRM Representative Prof. Dr. Chris Paulus	
16.45 – 17.25	Inauguration Ceremony	
17.25 – 17.45	Announcement of Best Oral and Poster Presentation Appreciation Session	
17.45 – 17.55	Group Photo Session	
17.55 – 18.00	Closing by MC	
17.55 – 18.00	Closing by MC	

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TABLE OF CONTENTS

Greetings from President of Indonesia Society Regenerative Medicine Dr. Dr. Dr. dr. Jonny, SpPD-KGH, M.Kes., M.M., DCN, D.ABRM, FISN.....	ii
Message from the Chair of the Organizing Committee Dr. dr. Cosmos O. Mangunsong, SpM(K), D.ABR.....	iii
Committe Member.....	iv
CONGRESS DAY 1: WORKSHOP	v
CONGRESS DAY 2: SYMPOSIUM.....	vi
CONGRESS DAY 3: SYMPOSIUM.....	x
Regenerative medicine in low-resource settings: Current barriers and future opportunities..... Md Ashikul Islam ^{1,*} , AQM Ashraful Haque ²	1
Global research landscape (1995–2026) and efficacy of adipose-derived stromal vascular fraction in chronic wound healing: A systematic bibliometric analysis and clinical network meta-analysis..... Tungki Pratama Umar ^{1,*} , Dessy Agustini ²	1
Ultrasound-guided hydrodissection with umbilical cord mesenchymal stem cell secretome for deep branch ulnar neuropathy following prolonged finger immobilization: A case report Teinny Suryadi ^{1,*} , Maria Veronica Tita Putri ² , Linda Rachmat ³ , Jevon Andra Saputra ³ , Anwar Suhaimi ⁴ , Wahida Ratnawati ⁵ , Yonghyun Yoon ⁶ , Jeimylo de Castro ⁷ , King Hei Stanley Lam ⁸	1
Marked pain reduction and functional recovery following secretome injection in refractory adhesive capsulitis after previous prolotherapy: A case report..... Md Ashikul Islam ^{1,*} , AQM Ashraful Haque ²	2
Paradoxical post-injection pain in anti-inflammatory interleukin-1 receptor antagonist/ autologous conditioned serum therapy for acute musculoskeletal injuries: A case series Md Ashikul Islam ^{1,*} , AQM Ashraful Haque ²	2
Clinical improvement following ultrasound-guided mesenchymal stem cell-derived secretome therapy in a patient with partial anterior cruciate ligament tear refractory to hyaluronic acid injection: A case report..... Ratri Dwi Indriani ^{1,*} , Muhammad Nazhif Haykal ¹ , Agus Setiyana ² , Muzaiwirin ²	2
Mesenchymal stem cell secretome as a therapeutic approach in acute kidney injury: A case report..... I Gusti Ngurah Putra Eka Santosa ^{1,*} , Ni Putu Dewi Indriyani ²	3
Autologous platelet-rich plasma therapy for bilateral grade III knee osteoarthritis..... Vinu Rajendran	3
Innovative engineering strategies to advance chimeric antigen receptor T (CAR-T) cell therapy for renal cell carcinoma: Therapeutic advances and implications for cancer rehabilitation..... Jonny Jonny ^{1,2,*} , Muhammad Rizky Hidayatullah ¹ , Kemas Muhammad Habil Sabilirohim ³ , Adinda Nezma Meidina ⁴	4

TABLE OF CONTENTS

Regenerative potential of secretome injection in partial medial patellofemoral ligament tear: A case report.....	4
Alvin Wiharja ¹ , Amung Ma'Mun ^{1,*}	
Comparative efficacy of regenerative therapies for venous leg ulcer healing: A systematic review and network meta-analysis.....	4
Rizki Fadillah ^{1,†} , Dwi Wicaksono ²	
Spinal cord and brain injury. Could paralysis be cured? Mesenchymal stem cell derived exosome in animal study and case series.....	5
Bambang Darwono ^{1,†} , Indah Hidajati ^{2,3} , Mawar Subangkit ³	
Exploring regenerative therapy in tendinopathy.....	5
Md Ashikul Islam ^{1,*} , AQM Ashraful Haque ²	
From cartilage to intervertebral disc: Early clinical outcomes of regenerative cell-based and exosome-based therapy in degenerative musculoskeletal disorders.....	6
Juliana Gozali ^{1,2,*} , Sry Suryani Widjaja ^{1,2} , William Wiryawan ^{1,3} , Benny ^{1,3} , Perthyan Aulia Nasution ⁴ , Kristiani Sitorus ⁵ , Mutiara ^{1,2}	
Umbilical cord mesenchymal stem cell derived secretome injection as a conservative modality for achilles tendon partial tear: A case report.....	6
Prayuda ^{1,*} , Ni Putu Yenny Kendarini ² , Sandra Surya Rini ¹ , Dewa Ayu Kartika Tejawati ¹ , Pande Ketut Kurniari ¹ , Gede Kambayana ¹	
Regenerative medicine for frailty reversal: Emerging strategies to promote healthy aging and longevity.....	6
Jonny Jonny ^{1,2} , Sanindita Kusumastuti ^{1,*}	
State of the art treatment utilizing platelet-rich plasma and minced cartilage with 3D hyaluronic acid scaffold in knee osteochondral defect: A case report.....	7
Evan Lim ^{1,2,*} , Michael Andreas Sundah ³ , Caleb Reuben ²	
Secretome-based regenerative therapy in chronic ulcers: Mechanisms and clinical applications.....	7
Sukmawati Tansil Tan ^{1,*} , Cornelia Kartika Matthew ²	
Regenerative potential and clinical outcomes of autologous fat grafting in irradiated breast reconstruction: A systematic review and proportional meta-analysis.....	7
Karnissa Rizkia Adhania	
Intranasal extracellular vesicle-based therapy for traumatic brain injury: A systematic review of neuroregenerative mechanisms, delivery strategies, and translational barriers.....	8
Muhammad Zain Ardiansyah ^{1,†,*} , Queenesa Amabel Sunjaya ¹ , Ahmad Faried ² , Muhammad Azhary Lazuardy ² , Muhammad Adam Pribadi ² , Muhammad Rainda Farhan ² , Faza Amada Putri ^{3,†} , Zahirah Mentari Supriyono ^{4,†} , Moh Basofi Muzaky ^{5,†} , Nada Balqis MY Wulan ^{6,†}	
AI-driven multi-omics for precision regenerative aging: A systematic literature review with narrative synthesis of biological age biomarkers, senescence pathways, and therapeutic stratification in older adults.....	8
Muhammad Zain Ardiansyah ^{1,†,*} , Muhamad Yahri Zacky ^{1,†} , Jeffrey Natan Dwi Putra Butar Butar ^{1,†} , Yuni Susanti Pratiwi ^{2,3} , Lazuardhi Dwipa ⁴ , Khaira Nafisa Sukma ⁵	

TABLE OF CONTENTS

Neuroprotective-supportive strategies for preserving cognitive function in prostate cancer patients receiving androgen axis-targeted therapy: A systematic review and meta-analysis.....	9
Muhammad Zain Ardiansyah ^{1,†,*} , Muhamad Yahri Zacky ^{1,†} , Lunetta Lindi Subroto ^{1,†} , Ahmad Faried ² , Muhammad Azhary Lazuardy ² , Muhammad Adam Pribadi ² , Muhammad Rainda Farhan ² , Akmal Hisyam ^{3,†}	
Application of allogeneic UC-MSC secretome to promote wound healing in mixed-grade burn injury: A case report.....	9
Afriyanti Sandhi ^{1,*} , Clara Dwi Retno Kumororini ² , Ayesha Riandra ² , Alya Ishafahanie ²	
Ultrasound-guided umbilical cord mesenchymal stem cell-derived secretome as an adjunct to conservative treatment for closed metatarsal fractures in a patient with type 2 diabetes mellitus: A case report.....	10
Erwin Dharmawan, Prayuda, Ni Putu Yenny Kendarini, Sandra Surya Rini, Dewa Ayu Kartika Tejawati, Pande Ketut Kurniari, Gede Kambayana	
Autologous platelet-rich plasma derived exosome injection as a conservative modality for common extensor tendon partial tear: A case report.....	10
Ni Putu Yenny Kendarini ^{1,*} , Prayuda ¹	
HAF-EVs and pancreatic histomorphology in a d-galactose-induced aging rat model: A preclinical study with relevance to metabolic rehabilitation.....	10
Michael Jansen Politan ¹ , Veronika Maria Sidharta ^{1,*} , Laurentius Aswin Pramono ¹	
Potential role of secretome as an adjuvant therapy in systemic lupus erythematosus with recurrent infections during immunosuppressive therapy: A case report.....	11
Adi Kurniawan ^{1,*} , Riska Sunita ² , Nirmala ²	
Safety and Efficacy Exosome Injection for Knee Osteoarthritis: A Systematic Review of Randomized Control Trial.....	11
Mirza Koeshardiandi	
Combination of exosome and dextrose prolotherapy 12.5% injection in knee osteoarthritis: A case series.....	12
Mirza Koeshardiandi	
Autonomic and sensory functional recovery in chronic lumbar spinal stenosis following targeted mesenchymal stem cell-derived secretome injections: A case report.....	12
Wahyu Bimantoro	
Therapeutic potential of umbilical cord mesenchymal stem cell secretome on secondary intention complex wound healing acceleration: A case report.....	12
Ratna Damayanti	
Clinical and ultrasonographic changes following intra-articular mesenchymal stem cell secretome injection in patients with knee osteoarthritis: A case series.....	13
Ida Ayu Ratih Wulansari Manuaba	



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Regenerative medicine in low-resource settings: Current barriers and future opportunities

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Background: This study aimed to quantify awareness, barriers, knowledge levels, and attitudinal disposition toward regenerative medicine among patients attending a tertiary-level physical medicine and rehabilitation facility with limited resource.

Methods: A cross sectional study was conducted at manikganj medical college hospital between July 2025 and June 2026 (n = 77). Consecutive eligible adult patients with the history of regenerative intervention were enrolled. Semi-structured questionnaire was administered. Data were analyzed using SPSS v26.0 with descriptive statistics, independent t-tests, chi-square tests, one-way ANOVA, and Pearson correlation.

Results: The mean age was 50.4 ± 17.5 years (range 18–79); 59.7% were male and 49.4% resided in rural areas. Overall awareness of regenerative medicine was documented in 49.4% of participants (n = 38). Infrastructure deficit emerged as the dominant barrier (66.2%; n = 51), skilled personnel shortages (51.9%) and direct cost barriers (50.6%). The composite accessibility score was 5.04 ± 2.99. Treatment interest was expressed by 59.7% (n = 46). Male sex was significantly associated with treatment interest ($\chi^2 = 5.657$; p = 0.017). Overall attitude score averaged 16.51 ± 8.55; neutral-to-optimistic future expectations were reported by 59.8% of participants (levels 3–5).

Conclusion: Substantial infrastructural, financial and personnel barriers significantly impede regenerative medicine integration in low-resource settings. But the patient's eagerness to receive treatment and their unwavering hope of getting better are the greatest opportunities.

Keywords: implementation barriers, patient awareness, regenerative medicine, resource-limited settings.

Global research landscape (1995–2026) and efficacy of adipose-derived stromal vascular fraction in chronic wound healing: A systematic bibliometric analysis and clinical network meta-analysis

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Background: Adipose-derived stromal vascular fraction (SVF) possessed a great regenerative potential for chronic wounds. This study mapped the global scientific evolution of SVF from 1995 to 2026 and quantitatively evaluated its clinical efficacy in human trials.

Methods: Current study employed dual methodology: a bibliometric mapping (Vosviewer and bibliometrix/biblioshiny) analyzed global publication for co-authorship, co-occurrence,

citation, and factorial correspondence profiles. Meanwhile, a random-effects network meta-analysis (NMA) in Rstudio evaluated human research on complete wound closure using SVF (enzymatic/eSVF and SVF-gel/non-enzymatic SVF).

Results: From 189 retrieved articles, 134 were included for bibliometric mapping and nine clinical studies were analyzed via random-effects NMA. Co-authorship analysis revealed a fragmented network topography. Meanwhile, keyword overlay visualization presented chronological paradigm shift from laboratory mechanistics (2018–2020) through preclinical validation, and clinical frontier (2024–2026). Citation analysis revealed a robust downstream impact (489 total citations), while factorial correspondence analysis presented two distinct domains: an experimental ecosystem and a clinical application cluster on safety. Following assessment of nine advanced therapies on human studies, non-enzymatic SVF demonstrated the highest clinical superiority (P-score = 0.9523), causing a statistically significant increase in the odds of complete wound closure compared to conventional care (Log OR = 4.11; 95% CI: [2.41, 5.82]), followed by lipotransfer (Log OR = 2.92), and eSVF+platelet-rich plasma (PRP) (Log OR = 2.77). Meanwhile, eSVF has a Log OR of 1.61.

Conclusion: SVF research showed a successful transition from bench to bedside. Among all modalities, SVF-gel/non-enzymatic SVF yields the highest clinical superiority for achieving complete chronic wound closure.

Keywords: bibliometric analysis, chronic wound healing, network meta-analysis, stromal vascular fraction

Ultrasound-guided hydrodissection with umbilical cord mesenchymal stem cell secretome for deep branch ulnar neuropathy following prolonged finger immobilization: A case report

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Background: Deep branch ulnar neuropathy is a rare compressive neuropathy that may occur after trauma or prolonged immobilization and is often associated with perineural fibrosis. Ultrasound-guided hydrodissection has emerged as a minimally invasive treatment for peripheral nerve entrapment, while umbilical cord mesenchymal stem cell secretome (UC-MSC secretome) has been proposed to exert anti-inflammatory and neurotrophic effects that may support peripheral nerve regeneration.



Methods: A 38-year-old woman presented with severe pain localized to the first and second interdigital web spaces and inability to actively extend the fifth finger after 6 weeks of immobilization for a minimally displaced distal phalanx fracture involving the DIP joint. Examination demonstrated clawing of the fourth and fifth digits, intrinsic hand muscle atrophy, a positive Froment's sign, and a 15° extension lag of the fifth DIP joint. Baseline pain severity was 7/10 on the Visual Analog Scale (VAS), and the Disabilities of the Arm, Shoulder and Hand (DASH) score was 14.2.

Results: Musculoskeletal ultrasound demonstrated enlargement of the deep branch of the ulnar nerve with surrounding perineural fibrosis, consistent with focal compressive neuropathy. Ultrasound-guided hydrodissection of the deep branch of the ulnar nerve was performed using 1.5 mL of UC-MSC secretome. Pain improved immediately from 7/10 to 3/10 on the Visual Analog Scale (VAS), accompanied by improved active extension of the fifth finger. At 1 week, pain decreased to VAS 1/10. At 1 month, pain had resolved completely (VAS 0/10), the DASH score improved to 3.3, and the nerve cross-sectional area decreased from 8.0 mm² to 6.0 mm².

Conclusion: This case supports the hypothesis that the combination of ultrasound-guided hydrodissection and UC-MSC secretome may facilitate peripheral nerve repair. This minimally invasive strategy warrants further prospective studies to clarify safety, efficacy, and durability in focal compressive neuropathies and define appropriate patient selection criteria.

Keywords: deep branch ulnar neuropathy, perineural fibrosis, ultrasound-guided hydrodissection, umbilical cord MSC secretome.

Marked pain reduction and functional recovery following secretome injection in refractory adhesive capsulitis after previous prolotherapy: A case report

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Background: Adhesive capsulitis is a disabling shoulder disorder characterized by pain, progressive stiffness, and restricted range of motion, often resulting in significant functional impairment. Although conservative treatment is the first-line approach, some patients remain symptomatic. Secretome therapy has emerged as a potential regenerative treatment because of its anti-inflammatory and tissue-repair properties.

Methods: This case report describes a 62-year-old woman with refractory adhesive capsulitis who had persistent right shoulder pain and limited range of motion despite physiotherapy and other conservative treatments. Under ultrasound guidance, prolotherapy was administered into the glenohumeral joint, rotator interval, subacromial-subdeltoid bursa, and subscapularis bursa. One month later, the patient received two serial ultrasound-guided secretome injections (3 mL secretome diluted with 0.9% saline to a total volume of 20 mL), administered three weeks apart at the same anatomical sites. Clinical outcomes were evaluated using the Shoulder Pain and Disability Index (SPADI), Numeric Rating Scale (NRS), shoulder range of motion (ROM), and patient-reported satisfaction.

Results: One month after prolotherapy, only minimal improvement was observed, with the SPADI score decreasing from 61.5% to 57.7% and the NRS pain score from 8 to 7, without meaningful improvement in ROM. Following two serial secretome injections, the SPADI score further improved to 45.4%, pain decreased to an NRS score of 5, and shoulder ROM improved clinically. The patient also reported greater satisfaction with secretome therapy than with prolotherapy.

Conclusion: In this case, serial ultrasound-guided secretome therapy demonstrated greater improvements in pain, function, ROM, and patient satisfaction than preceding prolotherapy,

suggesting that secretome may represent a promising regenerative treatment for refractory adhesive capsulitis. Further controlled studies are warranted to confirm its efficacy and safety.

Keywords: prolotherapy, refractory adhesive capsulitis, secretome therapy, ultrasound-guided injection

Paradoxical post-injection pain in anti-inflammatory interleukin-1 receptor antagonist/autologous conditioned serum therapy for acute musculoskeletal injuries: A case series

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Background: Interleukin-1 drives tissue degradation in musculoskeletal diseases. Interleukin-1 receptor antagonist, delivered via autologous conditioned serum, competitively blocks this pathway to control inflammation. However, human studies in acute conditions are limited, and post-injection flare-ups remain underreported. This case series analyzes severe, transient post-injection pain following autologous conditioned serum injection in acute musculoskeletal injuries and evaluates final outcomes.

Methods: Case one was a male with axial, radicular low back pain. Case two was a female with acute ankle ligament strain. Case three was a male with acute first interphalangeal joint pedis arthritis. All received ultrasound-guided injections of autologous conditioned serum into target areas. Progressions, pain scores, and follow-up ultrasounds were monitored.

Results: Paradoxically, all patients experienced severe localized pain with high pain score and restricted movement lasting 7-10 days immediately after the injection. In case one, evaluations at 4 weeks demonstrated good improvement in axial pain but less resolution in radicular pain. Conversely, the rest achieved excellent clinical recovery. Case two showed complete resolution of joint effusion and clearer ligamentous structures. Case three achieved a pain score of one, full joint mobility, and complete elimination of hypervascularization on ultrasound.

Conclusion: Although autologous conditioned serum therapy can trigger a substantial paradoxical flare-up lasting over a week, it ultimately yields successful clinical resolution. Potential factors contributing to this severe pain reaction may include serum processing methods, which require several hours incubation at 37°C, or inappropriate patient selection. Nevertheless, it remains a highly viable therapeutic option for acute musculoskeletal trauma.

Keywords: acute musculoskeletal injuries, autologous conditioned serum, interleukin-1 receptor antagonist, paradoxical post-injection pain

Clinical improvement following ultrasound-guided mesenchymal stem cell-derived secretome therapy in a patient with partial anterior cruciate ligament tear refractory to hyaluronic acid injection: A case report

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Background: Partial anterior cruciate ligament (ACL) tears may remain symptomatic despite conservative treatment, including rehabilitation and intra-articular hyaluronic acid injection. Mesenchymal stem cell (MSC)-derived secretome has emerged as a promising cell-free regenerative therapy.

Methods: We report the clinical outcome of ultrasound-guided secretome therapy in a patient with a refractory partial ACL tear. A 44-year-old woman presented with persistent right knee pain after a motorcycle accident despite rehabilitation, knee support, and hyaluronic acid injection. Physical examination showed positive anterior drawer and Lachman tests with a negative McMurray test. Baseline scores were VAS 7, WOMAC 72, and KOOS 25. MRI demonstrated a partial-thickness ACL tear at the tibial attachment with MCL and PCL sprains. Ultrasound-guided injection of 1.5 mL MSC-derived secretome, diluted with normal saline to 10 mL, was administered twice at four-week intervals. The injectate was distributed as 4 mL around the ACL, 4 mL intraarticular, and 2 mL around the MCL. Clinical outcomes were evaluated using VAS, WOMAC, and KOOS before and after treatment.

Results: Both injections were completed without complications. The VAS score decreased from 7 to 4 (42.9%), the WOMAC score improved from 72 to 38 (47.2%), and the KOOS increased from 25 to 75. These findings indicate clinically meaningful improvements in pain and functional outcomes, with improved tolerance for daily activities.

Conclusion: Ultrasound-guided MSC-derived secretome therapy was associated with clinically meaningful improvements in pain and function in a patient with a partial ACL tear refractory to conventional conservative treatment. These findings support prospective studies to determine its efficacy, optimal treatment protocol, and long-term safety.

Keywords: hyaluronic acid refractory, MSC-derived secretome, partial anterior cruciate ligament tear, ultrasound-guided injection

Mesenchymal stem cell secretome as a therapeutic approach in acute kidney injury: A case report

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Background: Acute kidney injury (AKI) causes rapid loss of renal function and is associated with inflammation, ischemia, and tubular injury. It may complicate dengue hemorrhagic fever (DHF), in which plasma leakage, hypotension, and direct renal effects contribute to kidney injury. Current management is primarily supportive, including fluid resuscitation, hemodynamic monitoring, and dialysis, but these approaches don't directly promote renal regeneration. Mesenchymal stem cell (MSC) secretome may provide a cell-free regenerative strategy through paracrine mechanisms that reduce inflammation and support tubular repair. However, clinical evidence in human AKI remains limited, with most data derived from preclinical studies.

Methods: This case report describes a male patient with DHF-associated AKI developed progressive renal dysfunction and required emergency hemodialysis on the seventh day of hospitalization. Following hemodialysis, ten consecutive doses of MSC secretome were administered. Clinical status, renal function, and biochemical parameters were monitored during follow-up. Progressive clinical and biochemical improvement was observed, with serum creatinine decreasing from 9.4 to 2.3 mg/dL and urea from 182 to 97 mg/dL.

Results: Fatigue and weakness decreased, activity tolerance improved, and the patient progressively resumed light activities. However, standardized functional outcomes and formal rehabilitation measures were not assessed. Renal recovery may have resulted from

spontaneous AKI recovery and hemodialysis, with a potential contribution from the MSC secretome. Therefore, causality cannot be established.

Conclusion: This case highlights the importance of cautious interpretation of outcomes, informed consent, and multidisciplinary management when regenerative therapies are combined with standard care. Further clinical studies are needed to determine the therapeutic value of MSC secretome in AKI.

Keywords: acute kidney injury, dengue hemorrhagic fever, MSC secretome, renal regeneration

Autologous platelet-rich plasma therapy for bilateral grade III knee osteoarthritis

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Background: Platelet-rich plasma (PRP) therapy is increasingly used in regenerative medicine for knee osteoarthritis (OA), with established benefits in mild-to-moderate disease. However, evidence regarding its effectiveness in advanced OA, particularly bilateral Kellgren–Lawrence Grade III knee OA, remains limited. Objective of the study is to evaluate the effectiveness of standardized autologous PRP regenerative therapy in reducing pain and improving functional outcomes in patients with bilateral Grade III knee OA.

Methods: A prospective interventional study was conducted in a tertiary care center involving 29 patients with bilateral Grade III knee OA. Each participant received four intra-articular PRP injections in both knees at intervals of 4–5 weeks. PRP was prepared under standardized MARSPILL criteria using a closed double-spin system, yielding 7–8 mL leukocyte-rich PRP with 2–3-fold platelet concentration. Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores were assessed at baseline and at 3, 6, and 12 months after completion of therapy. Adverse events and quality control parameters of PRP preparation were also documented.

Results: The mean baseline WOMAC total score of 58.28 ± 7.7 significantly improved to 27.48 ± 9.9 at 3 months, 26.31 ± 6.9 at 6 months, and 29.59 ± 7.3 at 12 months ($P < 0.001$ for all comparisons with baseline). Significant improvements were also observed in WOMAC pain and functional difficulty subscales throughout follow-up. Maximum clinical benefit was noted at 6 months, with sustained improvement up to 1 year. The mean platelet count increased from $1.89 \pm 0.34 \times 10^5/\text{mm}^3$ in whole blood to $4.03 \pm 0.89 \times 10^5/\text{mm}^3$ in PRP preparations. Seven patients (24.1%) experienced transient post-procedure pain lasting less than 1 week, with no major adverse events reported.

Conclusion: Standardized intra-articular autologous PRP therapy administered in four sessions significantly reduced pain and improved functional activity in patients with bilateral Grade III knee OA for up to 12 months. PRP may serve as a safe temporizing regenerative therapy and bridge to definitive surgical intervention in advanced OA.

Keywords: grade III knee osteoarthritis, intra-articular injection, platelet-rich plasma therapy, WOMAC score



Innovative engineering strategies to advance chimeric antigen receptor T (CAR-T) cell therapy for renal cell carcinoma: Therapeutic advances and implications for cancer rehabilitation

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Background: Renal cell carcinoma (RCC) remains a major global health challenge, where tumor burden and treatment-related effects may compromise physical function, activity, and quality of life. Chimeric antigen receptor T-cell (CAR-T) therapy has emerged as a promising cellular therapy for RCC, however its application to solid tumors is challenging due to limited tumor infiltration, T-cell exhaustion and an immunosuppressive tumor microenvironment (TME). Advances in CAR-T engineering may overcome these therapeutic barriers, improve treatment efficacy, and facilitate more comprehensive patient care, creating a more favorable clinical context for rehabilitation.

Methods: This systematic review summarized engineering strategies to improve CAR-T therapy for RCC and their potential implications for functional cancer care and rehabilitation. PubMed, ScienceDirect, Google Scholar, and SAGE were searched from database inception through June 2026 in accordance with PRISMA guidelines. Original preclinical studies and early-phase clinical trials were included, with methodological quality, risk of bias, therapeutic strategies, and outcomes synthesized qualitatively.

Results: Of 406 screened records, 10 studies met the inclusion criteria, comprising nine preclinical studies and one phase I clinical trial. Strategies included CAR-T construct optimization, TME remodeling, and combination therapy. Construct optimization involved allogeneic gene-edited CD70-targeted, armored anti-PD-L1-secreting, optimized costimulatory domain/CD4-CD8 composition, and B7-H3-targeted CAR-T cells. TME remodeling employed oncolytic adenoviruses expressing decorin or CCL5/IL-12, while combination approaches incorporated lenvatinib or cabozantinib. These strategies enhanced cytotoxicity, persistence, cytokine secretion, tumor infiltration, and tumor growth control while reducing T-cell exhaustion and immunosuppressive TME features. The phase I CTX130 trial demonstrated favorable safety with antitumor activity in advanced clear-cell RCC.

Conclusion: Collectively, improved therapeutic efficacy and safety may help optimize the clinical course of patients with RCC and create a more favorable context for functional recovery and rehabilitation. Integrating rehabilitation assessment into future CAR-T clinical studies may further clarify how advances in cellular therapy can translate into improved functional outcomes and patient-centered cancer care.

Keywords: cancer rehabilitation, CAR-T cell therapy, cellular engineering strategies, renal cell carcinoma

Regenerative potential of secretome injection in partial medial patellofemoral ligament tear: A case report

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Background: The medial patellofemoral ligament (MPFL) is the primary soft-tissue stabiliser of the patella, providing roughly 50–60% of the restraining force against lateral displacement in early knee flexion. Partial MPFL tears can cause chronic anterior knee pain and are usually managed conservatively with physiotherapy and bracing. Regenerative biologic therapies (e.g. platelet-rich plasma, mesenchymal stem cell products) are being explored for stubborn cases.

Methods: A 51-year-old female presented with one year of left anterior knee pain, worsening over the preceding 6 months. There was no clear trauma. Examination showed medial patellar tenderness and a patellar apprehension sign. MRI revealed a partial tear of the left MPFL and patellar chondromalacia. She had previously received three ultrasound-guided PRP injections without significant relief. Then, the patient received ultrasound-guided secretome injections (2 vials each) targeted to the peri-ligamentous MPFL region and the knee joint. Adjunctive therapy included a structured rehabilitation program focusing on quadriceps/VMO strengthening.

Results: Outcome for the patient demonstrated progressive improvement in knee pain and perceived stability. In addition to symptomatic relief, post-intervention evaluation using health-related fitness parameters for older adults showed results within normal ranges. The patient achieved normal functional performance in lower limb strength (sit-to-stand test), flexibility (sit-and-reach), and functional mobility (timed up-and-go), indicating adequate muscular strength, joint flexibility, and balance for her age group. Clinically, she reported improved tolerance for daily activities, increased walking endurance, and reduced reliance on analgesics. No adverse events or complications were observed.

Conclusion: In this case of chronic partial MPFL tear unresponsive to PRP, secretome injections were associated with symptomatic improvement. Secretome (MSC-derived paracrine factors) may offer a novel, minimally invasive adjunct in managing partial MPFL injuries. This case highlights secretome injection as a promising adjunct in MPFL injury rehabilitation management, warranting further study. Further research is needed to standardise protocols and confirm long-term efficacy.

Keywords: knee rehabilitation, patellofemoral ligament, partial MPFL tear, secretome injection

Comparative efficacy of regenerative therapies for venous leg ulcer healing: A systematic review and network meta-analysis

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Background: Compression therapy is the cornerstone of venous leg ulcers treatment, yet a large proportion of ulcers remain unhealed at 24 weeks, motivating adjunctive regenerative



approaches. Several regenerative therapies such as platelet-rich plasma/fibrin (PRP), amniotic/placental membranes, and bioengineered skin substitutes or grafts have each been evaluated and summarised in separate meta-analyses. However, their relative efficacy remains unquantified.

Methods: A network meta-analysis (NMA) was done to assess relative efficacy of each intervention for achieving complete closure of venous leg ulcers. NMA was conducted according to PRISMA guidelines. We systematically searched across PubMed, Embase, Scencedirect, Scopus and Cochrane library from inception. Language was limited to English and Indonesia. Primary endpoint assessed was the wound complete closure. NMA analysis was done using netmeta in R.

Results: Thirty-seven randomised comparisons informed a connected eleven-node network (heterogeneity $I^2 \approx 43\%$). PRP significantly increased the odds of complete closure versus compression alone (OR 3.23, 95% CI 1.85–5.64), as did amniotic membrane (OR 2.70, 95% CI 1.10–6.66). The remaining therapies showed point estimates favouring treatment but with confidence intervals crossing unity, reflecting small, frequently single-trial nodes: bilayer skin (OR 4.11, 95% CI 0.60–28.16), autograft (OR 2.79, 95% CI 0.78–10.06), dermal substitute (OR 2.65, 95% CI 0.75–9.32), allograft (OR 2.48, 95% CI 0.74–8.27), cultured keratinocyte (OR 2.30, 95% CI 0.44–12.18), bioengineered skin (OR 1.78, 95% CI 0.44–7.28), and allogeneic dermal substitute (OR 1.51, 95% CI 0.37–6.16); xenograft was near-null (OR 0.94). By P-score, PRP ranked among the highest with the most precise estimate; standard care ranked lowest.

Conclusion: PRP and amniotic membrane significantly improve complete wound closure when added to compression for venous leg ulcers, with PRP supported by the strongest and most precise evidence. Other regenerative and skin-graft therapies show consistent but statistically uncertain benefit, limited by sparse, single-trial data. Adequately powered randomised trials, particularly head-to-head comparisons of active regenerative therapies, are needed to confirm these signals and refine the comparative ranking.

Keywords: network meta-analysis, regenerative therapies, venous leg ulcers, wound complete closure

Spinal cord and brain injury. Could paralysis be cured? Mesenchymal stem cell derived exosome in animal study and case series

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Background: A long dogma in neuroscience that in chronic phase of spinal cord injury (SCI) and stroke, there are currently no effective treatment option, within 1 to 2 years lesion has ceased to progress and continuing deficit are stabilized, and nothing regenerated. These approaches directly target tissue injury and promote neuron regeneration. The mesenchymal stem cell (MSC) nano size exosome may offer a cell-free regenerative strategy through paracrine effects, pass blood brain barrier that reduce fibrotic scar tissue, engage in complex circuits regulating adult neurogenesis aid cell neuron regeneration. The exosome contains growth factors, cytokines and miRNA that modulate immunity, support neuron survival and regeneration.

Methods: Most data come from animal models (rabbits and macaca) and these promising mechanisms, robust clinical translational evidence in human. These cases report describe 5 cases SCI and 3 cases Stroke, all treated intrathecal exosome injection.

Results: Male 48 paraplegic 9 months Thoracic SCI, male 69 tetraplegic 4 months cervical SCI, and male 17 tetraplegic cervical SCI 1 month, all walk again after several injections. Male 40 hemiplegic brain stroke 1,5 years, male 77 hemiplegic brain stroke 8 years, male 44 brain stem stroke 4 months, improving and walk after several injections. The improvement occurred related to the severity of SCI or stroke, age and duration time of injury.

Conclusion: These cases highlighted the need for careful outcome monitoring and informed consent when combining regenerative therapies with the standard care. Expanding multidisciplinary management is essential, and well-designed clinical studies are necessary to establish the true therapeutic value of MSC exosome in SCI and stroke.

Keywords: intrathecal injection, mesenchymal stem cell exosomes, paralytic neuroregeneration, spinal cord and brain injury

Exploring regenerative therapy in tendinopathy

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Background: This study aimed to evaluate the efficacy of platelet-rich plasma (PRP) intervention on pain intensity, functional outcomes, grip strength recovery and patient satisfaction in patients with ultrasound-confirmed lateral epicondylitis (LE).

Methods: A single-centre quasi-experimental study was conducted at manikganj medical college hospital (january 2025–december 2025). Seventy-three patients (male: n=32, 43.8%; female: n=41, 56.2%) with clinically and sonographically confirmed LE received one to three ultrasound-guided PRP intervention. Outcome measures—visual analogue scale (VAS) for pain, patient-rated tennis elbow evaluation (PRTEE), and hand-held dynamometric grip strength—were assessed at baseline, one month, three months, and six months. Paired t-tests and descriptive statistics were performed using spss v26.0 (ibm corp.).

Results: Mean symptom duration was 13.58 ± 7.13 months. In addition to PRP intervention all the patients received a comprehensive rehabilitation program including shock wave therapy, stretching exercises and elbow brace. Pain VAS declined significantly from 8.11 ± 1.35 at baseline to 5.51 ± 1.65 at one month, 4.74 ± 1.56 at three months, and 3.03 ± 1.85 at six months, representing a 62.7% aggregate reduction ($p < 0.001$). PRTEE score improved from 66.88 ± 13.94 to 36.32 ± 13.53 at six months (45.7% reduction; $p < 0.001$). Grip strength increased from 23.71 ± 7.03 kg to 33.64 ± 10.10 kg at six months (41.9% improvement; $p < 0.001$).

Conclusion: This study highlighted that when rehabilitation meets regeneration (PRP Intervention), it demonstrates clinically significant and statistically robust improvements of pain, elbow function and grip strength in patients with TE within a resource-limited institutional setting, supporting its integration into structured tendinopathy management pathways.

Keywords: functional outcomes, lateral epicondylitis, platelet-rich plasma (PRP), tendinopathy rehabilitation



From cartilage to intervertebral disc: Early clinical outcomes of regenerative cell-based and exosome-based therapy in degenerative musculoskeletal disorders

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Background: Degenerative musculoskeletal disorders, including advanced knee osteoarthritis (OA) and lumbar disc degeneration, are major causes of chronic pain, disability, and impaired quality of life.

Methods: This case series evaluated the early clinical and radiological outcomes of autologous platelet-rich plasma (PRP)-derived exosome therapy and Injectable Concentrated Conditioned Serum (ICCS) in two patients with degenerative musculoskeletal disorders. Case 1 involved a 64-year-old male with bilateral Kellgren–Lawrence Grade IV knee OA who received bilateral intra-articular PRP-derived exosome injections at baseline and Week 4. Clinical outcomes were assessed using the Visual Analog Scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Knee Injury and Osteoarthritis Outcome Score (KOOS), walking distance, serial magnetic resonance imaging (MRI), and weight-bearing radiographs.

Results: By Week 7, VAS improved from 7 to 2, WOMAC from 51 to 10, KOOS from 15 to 27.5, and walking distance increased from approximately 50 m to 500 m. Serial MRI demonstrated reduced inflammatory changes, while follow-up radiographs showed reduced joint-space narrowing and subchondral sclerosis. Case 2 involved a 31-year-old female with chronic low back pain secondary to L4–L5 and L5–S1 disc bulging with degenerative disc disease who underwent a single image-guided ICCS injection. The Oswestry Disability Index improved from 25 to 3 by Week 7, accompanied by reduced edema on follow-up MRI. No treatment-related adverse events were observed.

Conclusion: Regenerative orthobiologic therapy was associated with encouraging short-term clinical and radiological improvements. PRP-derived exosome therapy may improve symptoms and function while potentially delaying total knee replacement in advanced knee OA, whereas ICCS showed promising outcomes in lumbar disc degeneration. Larger prospective studies are warranted.

Keywords: degenerative musculoskeletal disorders, injectable concentrated conditioned serum, knee osteoarthritis and disc degeneration, PRP-derived exosomes

Umbilical cord mesenchymal stem cell derived secretome injection as a conservative modality for achilles tendon partial tear: A case report

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Background: Achilles Tendon Partial Tear represents a significant clinical challenge. While traditional management focuses on conservative physical therapy and pharmacological intervention, regenerative medicine has emerged as a promising non-surgical alternative. Utilizing the paracrine signaling potential through secretomes, clinicians can target biological environment to promote tissue repair.

Methods: A 47-year-old female presented with pain in left heel since three months following a slip while walking down the stairs and worsened within three weeks. Patient reported significant functional limitations. Swelling present in the left ankle, tenderness, range of motion were restricted due to pain, Painful Heel Raises (+), Thompson Test (-), Matles Test (-), Achilles Tendon Rupture Score (ATRS) score: 32. MRI and Ultrasonography (USG) provided definitive evidence of a partial Achilles tendon tear. The patient underwent a targeted injection USG guided with regimen: 1.5 cc of secretome, three times every week.

Results: Post-treatment evaluation patient reported a complete disappearance of spontaneous pain without analgetic, while very mild pain remained occasional during stair climbing. Clinical examination revealed the resolution of localized edema, ROM recovered significantly with ATRS score 79. Ultrasound showed no tear at achilles tendon after 6 months.

Conclusion: Secretome provide a potent conservative treatment for Achilles Tendon Partial Tear, that offers the benefits of regenerative medicine in an accessible and targeted manner.

Keywords: Achilles tendon partial tear, tendon regeneration, umbilical cord MSC secretome, ultrasound-guided injection

Regenerative medicine for frailty reversal: Emerging strategies to promote healthy aging and longevity

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Background: Frailty is an age-related syndrome characterized by decreased physiological reserve and increased vulnerability to adverse clinical outcomes, including increased incidence of falls, hospitalization, disability, and mortality. Increasing evidence suggests that chronic low-grade inflammation (inflammaging), immunosenescence, stem cell exhaustion, and impaired tissue repair play pivotal roles in frailty development. Therefore, regenerative medicine has emerged as a promising therapeutic strategy by targeting the underlying biological mechanisms of aging rather than treating individual diseases.

Methods: This literature review summarizes current evidence regarding regenerative medicine approaches for frailty management. Several preclinical and early clinical studies have demonstrated that regenerative therapies, particularly mesenchymal stem cell (MSC)-based interventions, are associated with attenuation of systemic inflammation, reflected by reduced circulating pro-inflammatory cytokines such as interleukin (IL)-6 and tumor necrosis factor (TNF)- α , accompanied by increased anti-inflammatory mediators including IL-10 in several studies. Regenerative therapies have also been reported to improve immune homeostasis, including stabilization of the CD4/CD8 T cell ratio, which is frequently altered in older adults and has been associated with frailty and immunosenescence. These immunomodulatory



effects were accompanied by improvements in frailty-related outcomes, including lower frailty scores, enhanced physical performance, and better quality of life. The regenerative effects are thought to be mediated predominantly through paracrine mechanisms involving the secretion of growth factors, cytokines, chemokines, and extracellular vesicles that suppress excessive inflammation, promote tissue repair, stimulate angiogenesis, modulate immune responses, and enhance endogenous regenerative capacity.

Conclusion: Current evidence found that regenerative medicine was a promising approach to delay or reverse frailty by addressing the biological hallmarks of aging. Nevertheless, larger randomized clinical trials with standardized treatment protocols and long-term follow-up are required to confirm their clinical efficacy and establish their role in healthy aging and longevity.

Keywords: frailty reversal, healthy aging and longevity, mesenchymal stem cells, regenerative medicine

State of the art treatment utilizing platelet-rich plasma and minced cartilage with 3D hyaluronic acid scaffold in knee osteochondral defect: A case report

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Background: Osteochondral defect (OCD) poses an imminent threat due to its probability to progress into osteoarthritis if left untreated. Although microfracture has long been considered the first-line therapy, there has been advancements in treatment especially in regenerative medicine that ensures wellbeing of patients including active patients. Therefore, this study aims to report the outcome in patient treated with platelet-rich plasma (PRP) and minced cartilage as a newly developed treatment.

Methods: This is an observational study that involves 1 patient that is evaluated at 6 months post-operatively. This patient is treated using platelet-rich plasma (PRP), minced cartilage, and was given additional hyaluronic acid (HA) scaffold. Structural outcome of the knee was evaluated through Magnetic Resonance Imaging (MRI) examination and assessed using Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) 2.0 to determine the healing and defect repair. We also assess the functional outcome using the International Knee Documentation Committee (IKDC) form, which was completed pre-operatively and at 6 months post-operatively.

Results: The outcome demonstrated a significant reduction of pain subjectively based on the patient's complaints. Structural evaluation using the MOCART 2.0 for the patient at 6 months post-operatively has a near perfect score reaching 95 out of 100. The functional outcome based on IKDC score showed significant improvement with a score of 49.43 pre-operatively to 98.5 at 6 months post-operatively.

Conclusion: This report shows a significant outcome in both structural and functional outcome. Therefore, this shows that PRP and minced cartilage that is combined with 3D HA scaffold should be the standard treatment for knee osteochondral defect due to its effectiveness in stimulating bone growth and defect healing.

Keywords: 3D hyaluronic acid scaffold, knee osteochondral defect, minced cartilage, platelet-rich plasma

Secretome-based regenerative therapy in chronic ulcers: Mechanisms and clinical applications

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Background: Chronic ulcers represent a significant clinical challenge due to persistent inflammation, impaired angiogenesis, tissue hypoxia, and delayed healing. Mesenchymal stem cell (MSC)-derived secretome has emerged as a promising cell-free regenerative therapy. This review aims to summarize the mechanisms and clinical applications of secretome therapy in chronic ulcer management.

Methods: A narrative review was conducted using published evidence and clinical reports evaluating MSC-derived secretome therapy in chronic ulcers, including diabetic foot ulcers, pressure ulcers, venous stasis ulcers, Morbus Hansen ulcers, and scleroderma-associated ulcers. Mechanisms of action, administration methods, and clinical outcomes were analyzed. Secretome contains growth factors, cytokines, chemokines, and extracellular vesicles that promote wound healing through immunomodulation, angiogenesis, fibroblast proliferation, collagen synthesis, and re-epithelialization.

Results: Clinical reports demonstrated enhanced granulation tissue formation, accelerated wound closure, reduced inflammation, and improved skin regeneration across various chronic ulcer etiologies. Secretome was administered through intralesional injection, topical gel application, or combination therapy, with favorable safety profiles and minimal reported adverse effects. MSC-derived secretome represents a promising regenerative adjunctive therapy for chronic ulcers.

Conclusion: By modulating the wound microenvironment and promoting tissue repair, secretome may improve healing outcomes in refractory wounds. Further controlled clinical trials are required to establish standardized treatment protocols and confirm long-term efficacy.

Keywords: cell-free regenerative therapy, chronic ulcers, secretome-based therapy, wound healing mechanisms

Regenerative potential and clinical outcomes of autologous fat grafting in irradiated breast reconstruction: A systematic review and proportional meta-analysis

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Background: Radiotherapy-induced tissue damage remains a major challenge in breast reconstruction and increases the risk of complications and reconstructive failure. Although autologous fat grafting (AFG) has shown promising regenerative effects and clinical outcomes, evidence in irradiated breast reconstruction remains limited. This study aimed to systematically assess the regenerative potential and clinical outcomes of AFG in irradiated breast reconstruction.



Methods: A systematic review and proportional meta-analysis were conducted according to PRISMA guidelines. Five electronic databases were searched from inception to May 2026. Studies involving adult women with prior radiotherapy who underwent breast reconstruction with adjunctive AFG were included. Risk of bias and study quality were assessed using RoB 2 and MINORS. Pooled proportions with 95% confidence intervals (CI) were estimated using a random-effects model with logit transformation and heterogeneity was evaluated using I² statistics.

Results: Twelve studies involving 438 patients were included in the qualitative synthesis and seven in the quantitative synthesis. The pooled prevalence of capsular contracture, implant failure, and major complications was 12% (95% CI, 8—17%; I² = 0%), 5% (95% CI, 2—16%; I² = 52.2%), and 4% (95% CI, 2—8%; I² = 0%), respectively. Narrative synthesis demonstrated improvements in capsular contracture severity, tissue quality, pain, and histological remodelling. High patient satisfaction and favorable cosmetic outcomes were consistently reported. Local recurrence was uncommon across the included studies.

Conclusion: AFG appears to demonstrate promising regenerative potential and favorable clinical outcomes in irradiated breast reconstruction. Nevertheless, further high-quality studies are required to validate these findings and strengthen the current evidence.

Keywords: autologous fat grafting, irradiated breast reconstruction, proportional meta-analysis, regenerative potential

Intranasal extracellular vesicle-based therapy for traumatic brain injury: A systematic review of neuroregenerative mechanisms, delivery strategies, and translational barriers

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Background: Traumatic brain injury (TBI) remains a major neurotrauma burden with limited effective regenerative therapies. Secondary injury after TBI involves neuroinflammation, neuronal apoptosis, blood–brain barrier disruption, glial dysfunction, impaired neurogenesis, and persistent neurofunctional deficits. Extracellular vesicles (EVs) and exosomes have emerged as cell-free regenerative candidates capable of transferring proteins, lipids, miRNAs, and other bioactive molecules to modulate the injured neural microenvironment. Intranasal administration offers a non-invasive nose-to-brain delivery route that may improve central nervous system targeting while avoiding invasive intracranial procedures. This systematic review aimed to evaluate preclinical evidence on intranasal EV/exosome-based therapy for TBI, focusing on neurofunctional recovery, neuroregenerative mechanisms, delivery strategies, and translational barriers.

Methods: A systematic literature search was conducted in PubMed and Scopus using terms related to traumatic brain injury, extracellular vesicles or exosomes, and intranasal or nose-to-brain delivery. Eligible studies were original preclinical investigations using intranasally administered EVs, exosomes, microvesicles, or engineered EVs in TBI models and reporting neurological, functional, histological, or molecular outcomes. Reviews, editorials, non-TBI studies, biomarker-only studies, and studies using non-intranasal delivery routes were excluded. Data were synthesized narratively according to TBI model, EV source, delivery timing, therapeutic dose, biological mechanism, functional outcomes, and translational limitations.

Results: Eleven preclinical studies met the inclusion criteria. EV sources included mesenchymal stem/stromal cells, adipose-derived stem cells, bone marrow mesenchymal stem cells, glial progenitor cells, microglia, platelet concentrate supernatants, and engineered EV platforms. Across studies, intranasal EV/exosome therapy was associated with improved motor and cognitive recovery, reduced neuroinflammation, decreased apoptosis, attenuated brain tissue damage, enhanced neurogenesis, and modulation of glial responses. Reported mechanisms included regulation of NF-κB, NLRP3-p38/MAPK, PI3K/AKT, BDNF-ERK-CREB, miR-124-3p/IRE1α, miR-145-5p/SP1/NF-κB, tau acetylation, and glymphatic or meningeal lymphatic function. However, substantial heterogeneity was observed in animal models, EV sources, engineering strategies, dosing regimens, administration timing, follow-up duration, and outcome measures.

Conclusion: Intranasal EV/exosome-based therapy demonstrates promising preclinical potential as a regenerative neurosurgical strategy for TBI by modulating secondary injury pathways, protecting neural cells, and improving neurofunctional recovery. Nevertheless, clinical translation remains constrained by inconsistent EV characterization, heterogeneous dosing and timing protocols, limited long-term safety data, and the absence of human validation. Future studies should prioritize standardized EV production, rigorous dose optimization, long-term safety assessment, and translationally aligned preclinical designs.

Keywords: exosomes, extracellular vesicles, intranasal delivery, neuroregeneration, regenerative neurosurgery, traumatic brain injury.

AI-driven multi-omics for precision regenerative aging: A systematic literature review with narrative synthesis of biological age biomarkers, senescence pathways, and therapeutic stratification in older adults

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Background: Biological aging is a multidimensional process that does not always correspond to chronological age and plays a crucial role in frailty, chronic diseases, mortality, and functional decline among older adults. Advances in multi-omics technologies, including genomics, epigenomics, transcriptomics, proteomics, and metabolomics, provide opportunities to identify biological age biomarkers more comprehensively. However, biological data heterogeneity, the complexity of cross-omics integration, and limited clinical validation remain major barriers to implementation. This systematic literature review aims to analyze the role of artificial intelligence-driven multi-omics integration in supporting precision regenerative aging through biological age estimation, senescence pathway identification, and therapeutic stratification in older adults.

Methods: A systematic literature search was conducted in PubMed, Scopus, and Web of Science using keywords related to biological aging, precision aging, multi-omics, artificial intelligence, elderly care, geriatric medicine, and risk prediction. Studies were selected based on their relevance to aging biomarkers, multi-omics integration, AI applications, and implications for risk stratification and precision aging-based interventions.

Results: The findings indicate that epigenetic biomarkers, particularly DNA methylation age, are associated with frailty, mortality, and chronic diseases. Multi-omics integration may improve the accuracy of biological age estimation compared with single-biomarker approaches, while AI enables the modeling of nonlinear and multidimensional biological patterns. In the context of regenerative aging, this approach may help identify dominant mechanisms such as inflammaging, mitochondrial dysfunction, and cellular senescence, thereby supporting more personalized geroscience interventions.

Conclusion: Despite its promise, clinical implementation still requires data standardization, longitudinal validation, algorithmic bias assessment, and real-world evidence of clinical benefit. Therefore, AI-driven multi-omics integration may serve as a foundation for precision regenerative aging through prediction, risk stratification, personalized intervention, and longitudinal data-driven monitoring.

Keywords: artificial intelligence, biological aging, multi-omics, precision aging, regenerative aging, systematic literature review.

Neuroprotective-supportive strategies for preserving cognitive function in prostate cancer patients receiving androgen axis-targeted therapy: A systematic review and meta-analysis

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Background: Cognitive impairment is an increasingly recognized survivorship concern among patients with prostate cancer receiving androgen deprivation therapy (ADT) and androgen receptor pathway inhibitors (ARPIs). As cancer care emphasizes functional preservation, neuroprotection, and personalized recovery, the effectiveness of interventions for maintaining neurocognitive function remains uncertain.

Methods: This systematic review and meta-analysis evaluated pharmacological and non-pharmacological interventions aimed at preserving neurocognitive function in adults receiving ADT and related androgen axis-targeted therapies. Following PRISMA 2020 guidelines, PubMed/MEDLINE, Scopus, EBSCOhost, and CENTRAL were searched from 2016 to May 2026 for randomized and interventional studies reporting neurocognitive outcomes. Risk of bias was assessed using the Cochrane Risk of Bias 2 tool, and quantitative synthesis was performed using a random-effects model.

Results: Fifteen full-text studies involving 3,940 participants were included in the qualitative synthesis. Eleven randomized controlled trials formed the core neurocognitive evidence base, with ten outcome datasets eligible for meta-analysis. The pooled random-effects model showed no significant overall neurocognitive benefit compared with controls (SMD = 0.06; 95% CI: -0.81 to 0.94; $p = 0.885$), with substantial heterogeneity ($I^2 = 76.3\%$). Sensitivity analyses, including leave-one-out analysis, multilevel meta-analysis, cluster-robust variance estimation, and exploratory meta-regression, supported estimate stability and did not identify consistent moderators. Current evidence does not demonstrate a significant overall neurocognitive benefit of available strategies in patients receiving ADT or ARPIs.

Conclusion: These findings highlight the need for standardized cognitive endpoints, adequately powered trials, and biologically informed neuroprotective-supportive approaches integrating cognitive monitoring, physical activity, sleep management, psychosocial support, and individualized treatment selection.

Keywords: androgen deprivation therapy, androgen receptor pathway inhibitors, neurocognitive function, neuroprotection, prostate cancer, supportive oncology.

Application of allogeneic UC-MSC secretome to promote wound healing in mixed-grade burn injury: A case report

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Background: Mid-dermal burns, with limited epithelial cell survival, hinder spontaneous healing. Standard treatments, like skin grafts face challenges, especially when donor skin is insufficient. The secretome of umbilical cord mesenchymal stem cells (UC-MSCs), rich in growth factors such as VEGF-A, FGF, and PDGF, plays essential role in tissue repair and regeneration, critical for burn healing. This study aims to evaluate the effect of UC-MSC secretome on burn wounds. The objective of this study is to evaluate the effects of secretome as an adjunct to standard therapy in mixed-grade burn injuries, focusing on acceleration of the healing process, reduction in hospital stay duration, and minimization of pain intensity.

Methods: The patient is a 50-year-old male with 40% total body surface area (TBSA) burn, comprising mixed-grade second- and third-degree injuries. The secretome was injected at a dosage of 0.1 cc per 0.5 cm of the lesion. An occlusive dressing with hyaluronic acid or silver sulfadiazine was applied every three days. The patient was assessed weekly after each injection for healing progress and pain intensity.

Results: One week after the first dose of secretome, granulation tissue formed, and the patient reported reduced pain without needing additional analgesics. Mobility improved, and no adverse events were observed. Following the second dose, complete epithelialization was achieved, and the patient was discharged for outpatient care after 6 weeks. Mild pain and stinging at the injection site resolved within 24 hours.



Conclusion: Allogeneic UC-MSC secretome for burn wounds has potential as a complementary therapy in burn treatment to promote the healing process, reduce hospital stay, and decrease pain.

Keywords: allogeneic secretome therapy, mixed-grade burn injury, UC-MSC secretome, wound healing acceleration.

Ultrasound-guided umbilical cord mesenchymal stem cell-derived secretome as an adjunct to conservative treatment for closed metatarsal fractures in a patient with type 2 diabetes mellitus: A case report

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Background: Delayed fracture healing is a well-recognized complication of type 2 diabetes mellitus (T2DM), while clinical evidence supporting regenerative therapies remains limited.

Methods: We reported the clinical and serial imaging outcomes of adjunctive umbilical cord mesenchymal stem cell (UC-MSC)-derived secretome in a 47-year-old woman with T2DM who presented three weeks after an inversion injury with pain, swelling, tenderness, and restricted ankle motion. Radiography demonstrated proximal second and third metatarsal fractures, and ultrasonography revealed talocrural joint effusion with cortical discontinuity. In addition to standard conservative management, the patient received a single ultrasound-guided perifracture injection of 1.5 mL UC-MSC-derived secretome. Clinical assessment, serial ultrasonography, and follow-up MRI were performed to monitor recovery.

Results: Four weeks after treatment, spontaneous pain resolved without analgesics, with only mild discomfort after prolonged walking. Edema subsided, ankle range of motion normalized, and serial ultrasonography demonstrated progressive restoration of cortical continuity. Follow-up MRI showed residual bone marrow edema with a faint fracture line at the second metatarsal and mild marrow edema at the third metatarsal, findings consistent with ongoing fracture healing without associated tendon or ligament injury. No injection-related adverse events or procedure-related complications were observed.

Conclusion: This case suggested that adjunctive UC-MSC-derived secretome was associated with favorable clinical recovery and serial imaging findings consistent with progressive fracture healing in a patient with T2DM receiving conservative treatment. Further controlled studies are warranted to establish its efficacy.

Keywords: closed metatarsal fractures, type 2 diabetes mellitus, UC-MSC secretome, ultrasound-guided perifracture injection

Autologous platelet-rich plasma derived exosome injection as a conservative modality for common extensor tendon partial tear: A case report

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Background: Partial tears of the common extensor tendon, often associated with recalcitrant tennis elbow, present a distinct therapeutic challenge. When conventional conservative therapies fail, regenerative medicine utilizing autologous Platelet-Rich Plasma (PRP)-derived exosomes offers a novel non-surgical option to stimulate endogenous tissue repair.

Methods: A 65-year-old male presented with chronic right lateral elbow pain for one year, which worsened over the past four months, significantly limiting his daily activities and grip strength. Provocative tests (Cozen's, Mill's, and Maudsley's) were positive. Ultrasonography (USG) confirmed a partial tear of the common extensor tendon. After showing optimal resistance to standard medical therapy and physical rehabilitation for three months, the patient underwent a USG-guided injection of 4 cc autologous PRP-derived exosomes.

Results: At the 2-month post-injection follow-up, the patient reported complete pain resolution, fully recovered grip strength, and subsequent USG evaluation demonstrated complete healing of the tendon tear.

Conclusion: Autologous PRP-derived exosome injection serves as a potent conservative modality for common extensor tendon partial tears, providing enhanced regenerative pathways and tissue remodeling for patients refractory to standard conservative management.

Keywords: autologous PRP-derived exosomes, common extensor tendon partial tear, tendinopathy conservative management, ultrasound-guided injection.

HAF-EVs and pancreatic histomorphology in a d-galactose-induced aging rat model: A preclinical study with relevance to metabolic rehabilitation

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Background: Aging is associated with pancreatic structural decline and impaired glycemic regulation, both of which may contribute to sarcopenia, reduced exercise capacity, and poorer metabolic rehabilitation outcomes. Through muscle-pancreas metabolic crosstalk, interventions targeting pancreatic health may have relevance to rehabilitation in older adults. Human amniotic fluid extracellular vesicles (hAF-EVs) have emerged as a promising cell-free therapy with potential tissue-protective effects. This experiment aimed to evaluate the effect of hAF-EVs on pancreatic islet histomorphology in a D-galactose-induced aging rat model and to explore its potential relevance to metabolic rehabilitation in aging.

Methods: This in vivo experimental study involved 28 male Sprague-Dawley rats allocated into four groups: normal control, sham control, aging model, and therapy group. Aging was induced with D-galactose for 8 weeks, followed by intraperitoneal hAF-EVs administration for 4 weeks in the therapy group. Pancreatic tissues were stained with hematoxylin and eosin. Islet size was categorized as <100 µm, 100–200 µm, and >200 µm, while islet shape was



categorized as circular, circular-irregular, and irregular. Histomorphological findings were analyzed as indicators of pancreatic structural alteration in aging.

Results: The study showed D-galactose exposure was associated with a greater proportion of enlarged and irregular islets. In the therapy group, a higher proportion of normal-sized islets and fewer irregular islets were observed compared with the aging model group, indicating a more favorable histomorphological profile. These findings suggest that hAF-EVs may attenuate age-related pancreatic structural deterioration. Although direct rehabilitation outcomes were not measured, the observed histological changes may be relevant to metabolic conditions that influence sarcopenia and physical rehabilitation in aging. hAF-EVs were associated with improved pancreatic islet histomorphology in a D-galactose-induced aging rat model.

Conclusion: These findings provide preliminary preclinical support for the potential relevance of hAF-EVs to metabolic rehabilitation in aging, particularly through mechanisms related to glycemic regulation and muscle–pancreas crosstalk. Further studies are needed to directly evaluate functional outcomes such as exercise capacity, muscle performance, and sarcopenia.

Keywords: aging, pancreas, hAF-EVs, histomorphology, metabolic rehabilitation, sarcopenia

Potential role of secretome as an adjuvant therapy in systemic lupus erythematosus with recurrent infections during immunosuppressive therapy: A case report

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Background: Systemic lupus erythematosus (SLE) is a chronic autoimmune disease requiring long-term immunosuppressive therapy, which may increase the risk of recurrent infections and limit treatment options. Mesenchymal stem cell (MSC) secretome has emerged as a cell-free regenerative therapy with potential immunomodulatory properties through the release of cytokines, growth factors, extracellular vesicles, and other bioactive molecules. Preclinical studies suggest that MSC secretome may suppress Th1/Th17-mediated inflammation, enhance regulatory T-cell function, and restore immune homeostasis; however, clinical evidence in SLE remains limited.

Methods: We reported a 40-year-old woman with SLE presenting with inflammatory polyarthritis, alopecia, and recurrent oral ulcers. Laboratory evaluation demonstrated positive antinuclear antibodies (ANA, 1:320 speckled pattern) and positive anti-double-stranded DNA antibodies. Initial treatment with methotrexate, hydroxychloroquine, methylprednisolone, folic acid, vitamin D3, and calcium improved her arthritis, but recurrent upper respiratory tract infections and recurrent skin abscesses developed after three months, requiring methotrexate discontinuation. Following resolution of the infections, lupus-related arthralgia recurred with a baseline Visual Analog Scale (VAS) pain score of 7–8. Because the patient declined further immunosuppressive therapy, adjuvant MSC secretome (1.5 mL subcutaneously once weekly for six weeks) was administered with vitamin D3 and omega-3 supplementation.

Results: Joint pain markedly improved (VAS 7–8 to 0–1), oral ulcers resolved, and functional capacity improved. During six months of follow-up, no recurrent infections or treatment-related adverse events were observed.

Conclusion: Although causality cannot be established from a single case, these findings suggest that MSC secretome may represent a promising adjunctive therapy for selected patients with SLE, warranting further prospective controlled studies.

Keywords: immunomodulatory therapy, MSC secretome, recurrent infections, systemic lupus erythematosus

Safety and Efficacy Exosome Injection for Knee Osteoarthritis: A Systematic Review of Randomized Control Trial

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Background: Knee osteoarthritis (KOA) is a leading cause of chronic pain and disability worldwide, and current treatments are primarily aimed at symptom relief rather than cartilage regeneration. Mesenchymal stem cell (MSC)-derived exosomes have emerged as a promising cell-free regenerative therapy due to their anti-inflammatory, immunomodulatory, and chondroprotective properties. This systematic review aimed to evaluate the safety and clinical efficacy of intra-articular exosome injections for the treatment of knee osteoarthritis.

Methods: A comprehensive literature search was conducted in PubMed, ScienceDirect, Google Scholar, and Wiley using a PICO-based strategy to identify randomized controlled trials and comparative clinical studies evaluating exosome therapy for KOA.

Results: Two randomized controlled trials met the eligibility criteria. One study demonstrated dose-dependent improvements in pain, stiffness, physical function, and total WOMAC scores, with the greatest clinical benefit observed in the high-dose exosome group, accompanied by reduced joint effusion, decreased inflammation, and evidence of cartilage thickening on magnetic resonance imaging. In contrast, another placebo-controlled trial using a single low-dose placental MSC-derived extracellular vesicle injection found no significant differences in pain, functional outcomes, or imaging findings compared with placebo, despite confirming an excellent safety profile. Both studies reported no serious treatment-related adverse events.

Conclusion: The available evidence suggests that intra-articular MSC-derived exosome therapy is a safe and potentially effective regenerative treatment for knee osteoarthritis; however, clinical outcomes appear to depend on exosome source, dosage, and treatment protocol. Larger, high-quality randomized controlled trials with standardized manufacturing processes, optimized dosing regimens, and long-term follow-up are required to establish the therapeutic role of exosome therapy in routine clinical practice.

Keywords: intra-articular injection, knee osteoarthritis, MSC-derived exosomes, randomized controlled trials

Efficacy of secretome injection combined with dorsal root ganglion pulsed radiofrequency in the management of L3 nerve root injury following posterior lumbar stabilization for lumbar disc herniation: A case report

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Background: Persistent postoperative lumbar radiculopathy following lumbar decompression and posterior stabilization remains a challenging clinical condition, particularly when complicated by instrumentation failure and nerve root injury.



Methods: We report the case of a 63-year-old man with a one-year history of severe right-sided low back pain radiating to the right lower extremity following lumbar laminectomy and pedicle screw fixation for lumbar disc herniation. Postoperative imaging demonstrated pedicle screw loosening with compression of the right L3 nerve root, resulting in severe neuropathic pain, progressive lower limb weakness, and inability to ambulate independently. Initial evaluation revealed a Numeric Rating Scale (NRS) score of 8/10 at rest and 10/10 during standing or walking, with an Oswestry Disability Index (ODI) of 74%, indicating crippling disability. The patient was diagnosed with severe right L3 lumbar radiculopathy secondary to postoperative pedicle screw failure and underwent fluoroscopy-guided pulsed radiofrequency (PRF) of the right L3 dorsal root ganglion combined with periradicular secretome injection as a regenerative neuromodulation strategy.

Results: At three months, the patient experienced marked clinical improvement, with NRS decreasing to 2/10 at rest and 4/10 during walking, while the ODI improved to 36%, reflecting a transition from crippling to moderate disability. Functional recovery enabled independent indoor ambulation with a single cane, elimination of wheelchair dependence for routine activities, reduced analgesic requirements, and improved quality of life.

Conclusion: This case suggests that the combination of dorsal root ganglion PRF and secretome injection may represent a promising minimally invasive therapeutic option for refractory postoperative lumbar radiculopathy following spinal stabilization, warranting further investigation in prospective clinical studies.

Keywords: dorsal root ganglion pulsed radiofrequency, nerve root injury, periradicular secretome injection, postoperative lumbar radiculopathy

Combination of exosome and dextrose prolotherapy 12.5% injection in knee osteoarthritis: A case series

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Background: Knee osteoarthritis (KOA) is a progressive degenerative joint disease characterized by chronic pain, functional impairment, and reduced quality of life. Although dextrose prolotherapy has demonstrated efficacy in improving pain and joint function, its regenerative capacity remains limited, while exosome therapy has emerged as a promising biologic treatment capable of modulating inflammation and promoting cartilage repair.

Methods: This case series describes the clinical outcomes of combining a single intra-articular exosome injection with six sessions of ultrasound-guided 12.5% dextrose prolotherapy in two women with advanced KOA (Kellgren–Lawrence grades III and IV). Baseline assessments demonstrated moderate-to-severe pain, substantial functional disability, and impaired quality of life. The first patient had a baseline WOMAC score of 57/96, Lequesne Index of 12, and EQ-5D-5L index of 0.58, whereas the second patient had a WOMAC score of 87/96, Lequesne Index of 18, and EQ-5D-5L index of 0.34.

Results: Following treatment, both patients experienced clinically meaningful reductions in pain and improvements in physical function. At three months, the first patient's WOMAC score improved to 24/96, accompanied by increased walking tolerance, resolution of post-activity swelling, and improvement in EQ-5D-5L index to 0.82. The second patient's WOMAC score improved to 42/96, knee flexion increased from <70° to approximately 100°, wheelchair dependence was eliminated for routine activities, and EQ-5D-5L index improved to 0.68.

Conclusion: These findings suggest that combining exosome therapy with serial dextrose prolotherapy may provide synergistic benefits by simultaneously modulating the intra-articular

inflammatory environment and enhancing periarticular connective tissue regeneration, resulting in meaningful improvements in pain, function, and quality of life in patients with advanced knee osteoarthritis. Further prospective controlled studies are warranted to establish the long-term efficacy and comparative effectiveness of this multimodal regenerative approach.

Keywords: advanced knee osteoarthritis, exosome therapy, dextrose prolotherapy, multimodal regenerative therapy

Autonomic and sensory functional recovery in chronic lumbar spinal stenosis following targeted mesenchymal stem cell-derived secretome injections: A case report

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Background: Chronic lumbar spinal stenosis (LSS) frequently leads to debilitating neurological deficits, including profound sensory loss and autonomic dysfunctions such as neurogenic bladder and gastrointestinal disturbances. Conventional conservative treatments often fail to restore these long-standing deficits. This case report evaluated the efficacy of Umbilical Cord Mesenchymal Stem Cell (UC-MSC)-derived secretome in restoring autonomic and sensory functions in a patient with multi-level LSS.

Methods: A 48-year-old female with L3–S1 canal stenosis, presenting with a seven-year history of neurogenic bladder and chronic gastrointestinal malabsorption, underwent regenerative therapy. Two targeted injections of UC-MSC-derived secretome were administered: a fluoroscopy-guided transforaminal injection at the L5–S1 level, followed by an intradiscal injection two weeks later.

Results: Post-intervention, the patient demonstrated significant autonomic recovery, including the restoration of gastric hunger sensations and improved fecal sphincter control with the ability to pass flatus without leakage. Urinary function progressed from total catheter dependency toward initiated spontaneous voiding. Sensory perception showed a dermatomal recovery pattern; nociception returned first to the waist and knees, eventually reaching the ankles and toes. Furthermore, previously lost physiological pain responses, such as premenstrual syndrome discomfort, were successfully restored. Targeted secretome therapy effectively facilitates neural repair and restores autonomic-sensory signaling in chronic LSS cases where conventional therapies were ineffective.

Conclusion: This intervention represented a promising regenerative approach for complex spinal neurological deficits.

Keywords: autonomic recovery, lumbar spinal stenosis, neurogenic bladder, regenerative medicine, UC-MSC secretome.

Therapeutic potential of umbilical cord mesenchymal stem cell secretome on secondary intention complex wound healing acceleration: A case report

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Background: Complex skin and soft-tissue defects caused by infection present significant challenges in wound management. The reconstruction of these wounds often involves various surgical methods; however, these options are not always feasible due to the patient's condition or other constraints. In such cases, secondary intention healing may serve as an alternative. Cell-derived products, such as the SCs derived secretome, bypass many of these safety concerns while retaining the regenerative and paracrine benefits of the parent cells, offering a potentially safer and more controllable approach for wound healing and tissue regeneration.

Methods: This cases report two patients, which are, a 69-year-old male with stable hypertension and complex wounds on the left lateral leg and a 30-year-old male, an active smoker with complex wound after debridement because of gas gangrene infection on the right lateral arm. UC-MSCs secretome (0.2 mL/cm²) was administered via subcutaneous injection every ten days at the wound edges, alongside standard wound care based on the TIME framework. Wound surface area was calculated as length × width (cm²) and photographic progression were documented every 10 days.

Results: After the intervention, the patients showed progressive clinical improvement. The improvement occurred significantly after 10 days and these wound healing progression was steady and by day 20, the wound reach complete epithelialization. These cases indicating that UC-MSCs secretome therapy demonstrated substantial benefit in accelerating wound healing time in a complex infectious wounds underwent secondary intention wound healing after debridement.

Conclusion: Multimodal interventions, including anti-inflammatory, pro-angiogenic, and regenerative, may help accelerate the active healing phase and hold promise as a safe, effective adjunct in complex infectious wound management.

Keywords: complex wound healing, infectious wound management, secondary intention healing, UC-MSC secretome

that secretome therapy may primarily exert anti-inflammatory and immunomodulatory effects rather than inducing short-term structural regeneration, as evidenced by the persistence of osteophytes.

Conclusion: Intra-articular secretome injection was associated with consistent clinical improvement and favorable ultrasonographic changes, particularly reduced bursitis, synovitis, and effusion. These preliminary findings support further controlled studies with larger sample sizes and longer follow-up.

Keywords: intra-articular injection, knee osteoarthritis, MSC secretome, musculoskeletal ultrasonography

Clinical and ultrasonographic changes following intra-articular mesenchymal stem cell secretome injection in patients with knee osteoarthritis: A case series

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Background: Knee osteoarthritis (OA) is a major cause of pain and disability worldwide. Mesenchymal stem cell (MSC)-derived secretome has emerged as a promising regenerative therapy. However, evidence regarding its clinical and ultrasonographic outcomes remains limited.

Methods: This case series included five patients with Kellgren–Lawrence grade II–III knee OA who received a single intra-articular secretome injection into the more symptomatic knee. Outcomes assessed before and after treatment included the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), erythrocyte sedimentation rate (ESR), and musculoskeletal ultrasonography evaluating effusion, synovitis, pes anserine bursitis, medial collateral ligament (MCL) abnormalities, tendinosis, and osteophytes.

Results: WOMAC scores improved in all patients, decreasing from 49–63 at baseline to 29–45 after treatment, with reductions in pain, stiffness, and functional limitation. Ultrasonography demonstrated complete resolution of pes anserine bursitis in all cases and disappearance or reduction of joint effusion in four patients. Synovitis improved in most patients, while MCL abnormalities improved in two cases. Osteophytes remained unchanged. ESR decreased in three patients, remained stable in one, and increased slightly in one. The consistent improvement in clinical symptoms alongside reductions in inflammatory ultrasonographic findings suggests



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