MCT EXOSOMES

The power of injectable autologous exosomes

M·C·T
Meta Cell Technology

M·C·T
Meta Cell Technology

Regeneration starts with MCT System

MCT is a certified medical device that enhances autologous products such as PRP, SVF, or stem cell concentrates while releasing the patient's exosomes—all in a single session. Using the photothermal biomodulation technique, it extracts and maximizes the number of exosomes available from the patient: **MCT System provides you with high-quality MCT Exosomes, naturally**.

MCT EXOSOMES

Safe, injectable, and autologous naïve exosomes.

MCT Exosomes extracted by photothermal biomodulation. Patient-specific and ready to inject for effective regeneration.

Autologous

Injectable

Safe

Certified

Effective

Science-based

ATP

ATP

ATP

ATP

Exosomes are tiny extracellular vesicles, that play a crucial role in cell-to-cell communication, participating in various physiological processes. They deliver signals, such as microRNAs and growth factors, to promote regenerative effects at cellular level.

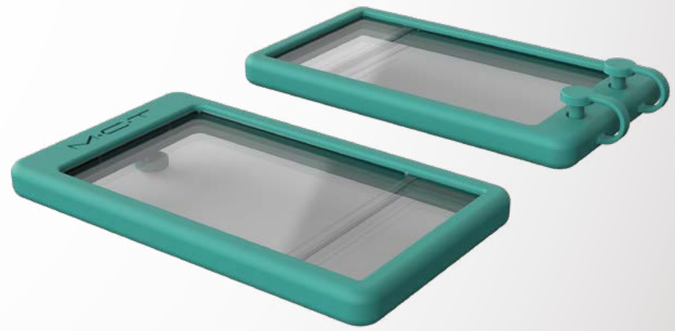
MCT System

A medical device that delivers the benefits of photothermal biomodulation to the doctor's office.

MCT Unit®

- Electromagnetic and thermal energy techniques for enhancing autologous products.
- Precise wavelength, temperature and time control.
- One-touch presets for: PRP, Cells and Exosomes.
- User-friendly interface.

MCT Kit®



- Patented device developed for photothermal conditioning.
- Medical grade polymer for optimal scattering and transmittance.
- Excellent surface/volume energy exposure ratio for effective target stimulation.
- Up to 10 mL of any autologous sample.

3

easy steps to get
MCT EXOSOMES
ready for injection

Step 01

Obtain the autologous material

Step 02

Insert it into the MCT Kit®

Step 03

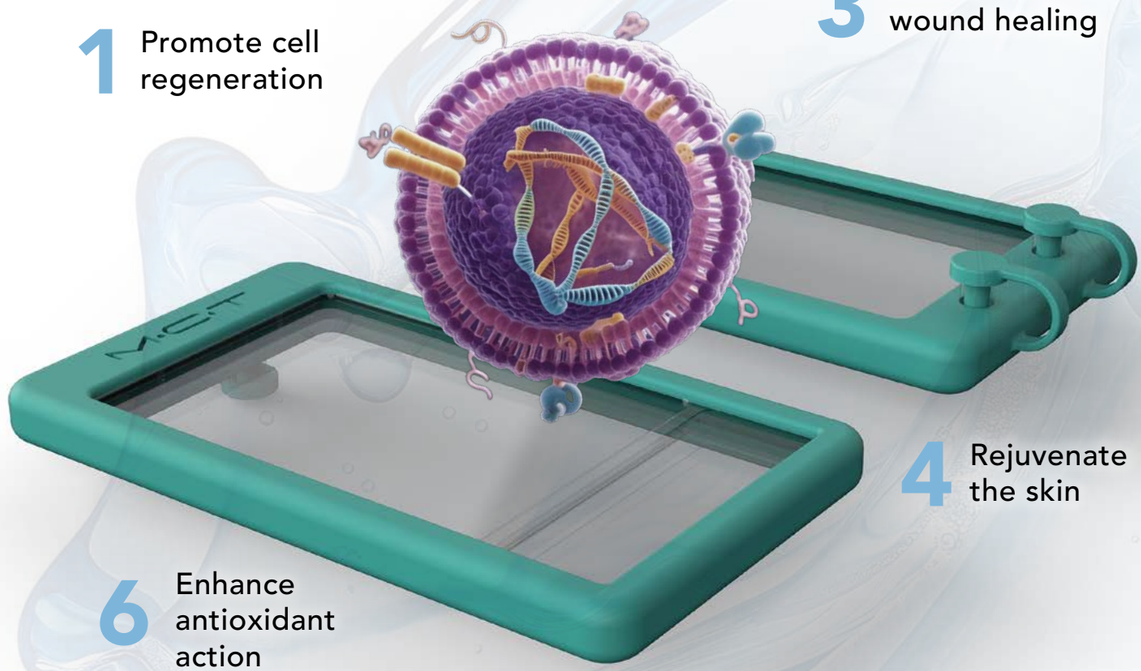
Set up the MCT Unit®

Clinical Benefits

1 Promote cell regeneration

2 Boost collagen & elastin production

3 Accelerate wound healing



4 Rejuvenate the skin

5 Reduce inflammation

6 Enhance antioxidant action

Doctors use MCT Exosomes:

Aesthetics

Face, neck, décolleté, and hand rejuvenation, acne scarring

Dermatology

Psoriasis, rosacea, hypo and hyperpigmentation

Trichology

Androgenetic alopecia, alopecia areata, seborrheic dermatitis

Gynecology

Lichen sclerosus, vaginal rejuvenation

Regenerative medicine

Chronic non-healing wounds (diabetic foot ulcers), acute wounds, burns, post-surgical recovery

Orthopedics

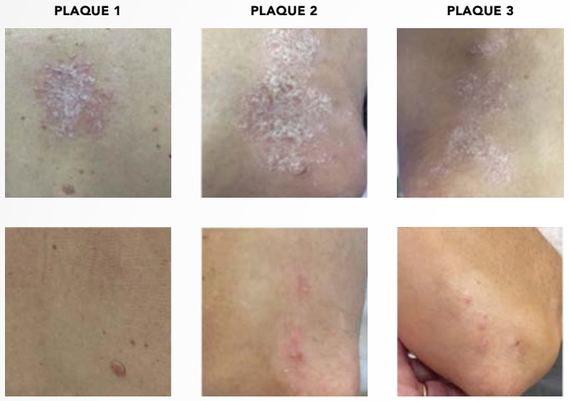
Osteoarthritis, musculoskeletal, injuries

One solution, multiple medical specialities.

Clinical Success Stories

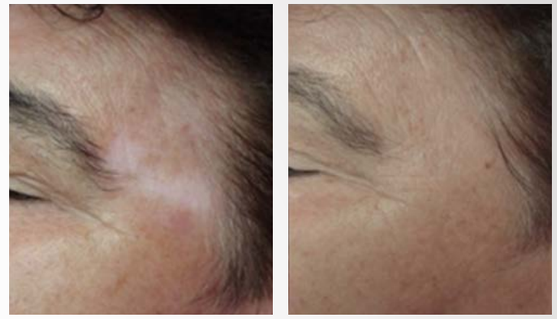
Psoriasis Vulgaris

Psoriasis vulgaris, the most common form of psoriasis, is a chronic autoimmune skin condition causing red, scaly, and often itchy plaques, commonly on elbows, knees, scalp, and lower back. Lesions occur due to an accelerated skin cell turnover caused by immune system dysregulation. The patient diagnosed with psoriasis vulgaris, presenting three distinct plaques, underwent three sessions of MCT Exosomes derived from PRP. Each treatment was spaced three weeks apart, with no additional therapies or emollients used during the treatment.



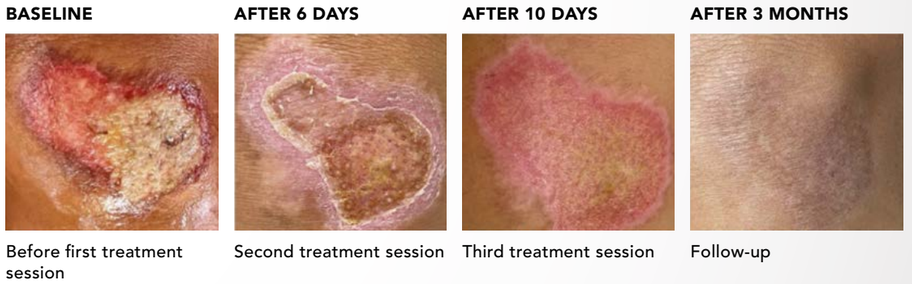
Hypopigmentation Due to Nerve Neuralgia

Hypopigmentation caused by nerve neuralgia is a loss or reduction of skin pigmentation in areas affected by nerve damage or chronic nerve pain. Neuralgia, which results from irritation or injury to a nerve, can disrupt the normal function of the nerve fibers, including those that regulate melanocytes. This disruption reduces melanin production in the affected area, leading to lighter skin patches. The patient with hypopigmentation following post-facial nerve neuralgia underwent three sessions of MCT Exosomes obtained from PRP, spaced three weeks apart.



Wound Healing

A laceration wound is a tear or cut in the skin or underlying tissues caused by trauma from a sharp or blunt object. The patient with a laceration wound on the skin area above the wrist underwent three treatment sessions of MCT Exosomes obtained from PRP, leaving a five-day interval between sessions.



Androgenetic Alopecia & Seborrheic Dermatitis

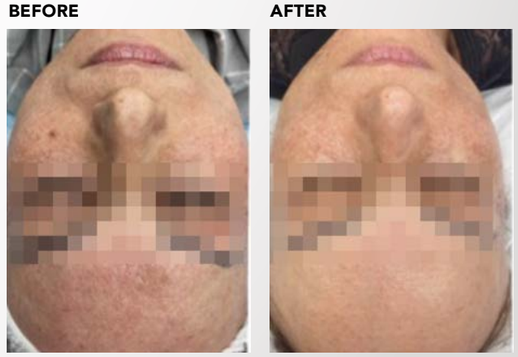
Androgenetic alopecia is caused by sensitivity to dihydrotestosterone leading to gradual thinning or balding. Seborrheic dermatitis is a chronic skin condition causing red, scaly and greasy patches on areas with high oil production. The patient diagnosed with both conditions underwent three sessions of MCT Exosomes derived from PRP, with a three-week interval between sessions.

Alopecia Areata

Alopecia areata is an autoimmune disorder that causes sudden, patchy hair loss on the scalp, face and other body areas. It occurs when the immune system mistakenly attacks hair follicles, disrupting the hair growth cycle. The patient diagnosed with alopecia areata underwent three sessions of MCT Exosomes derived from PRP, with a three-week interval between sessions.

Riehl Melanosis

Riehl melanosis is a rare form of pigmented contact dermatitis that presents as hyperpigmentation, primarily affecting the face and neck. It is characterized by dark brown to grayish pigmentation, often with a reticulated (net-like) pattern, and is typically associated with chronic exposure to certain allergens or irritants. These can include cosmetics, fragrances, hair dyes, or ultraviolet (UV) light. The patient diagnosed with Riehl melanosis underwent three sessions of MCT Exosomes obtained from PRP, leaving a three-week interval between sessions.



MCT System leverages the patient's own biology:

IMPROVES CELLS AND PRP PERFORMANCE

SIMULATES 2x ATP PRODUCTION

GENERATES 3x GROWTH FACTORS

RELEASES NAÏVE AUTOLOGOUS EXOSOMES

Why Choose MCT Injectable Autologous Exosomes for Safe, Deep, and Effective Results

MCT EXOSOMES
Medical level

MCT injectable autologous exosomes ensure immune compatibility and proven results, delivering impactful regeneration for your patients.

SOURCE
Same patient

CERTIFICATION
Certified to the highest international medical device standards

USE
Injectable

RESULTS
Deep and long-lasting regenerative effects

NON-AUTOLOGOUS
Cosmetic level

Non-autologous exosomes from animals, plants, or humans are only approved for topical use.

SOURCE
Animal, plants and other humans

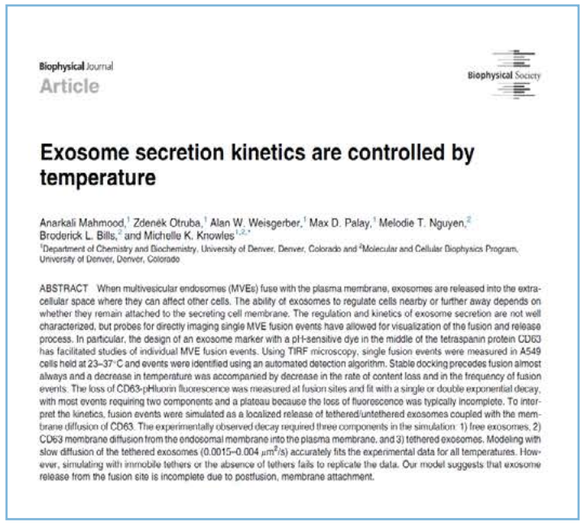
CERTIFICATION
Cosmetic

USE
Topical

RESULTS
Temporary and superficial effects

The Science Behind of MCT System

SAFE
EFFECTIVE
CERTIFIED



Biophysical Journal
Article

Biophysical Society

Exosome secretion kinetics are controlled by temperature

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ABSTRACT When multivesicular endosomes (MVEs) fuse with the plasma membrane, exosomes are released into the extracellular space where they can affect other cells. The ability of exosomes to regulate cells nearby or further away depends on whether they remain attached to the secreting cell membrane. The regulation and kinetics of exosome secretion are not well characterized, but probes for directly imaging single MVE fusion events have allowed for visualization of the fusion and release process. In particular, the design of an exosome marker with a pH-sensitive dye in the middle of the tetraspanin protein CD63 has facilitated studies of individual MVE fusion events. Using TIRF microscopy, single fusion events were measured in A549 cells held at 23–37° C and events were identified using an automated detection algorithm. Stable docking precedes fusion almost always and a decrease in temperature was accompanied by decrease in the rate of content loss and in the frequency of fusion events. The loss of CD63-pHluorin fluorescence was measured at fusion sites and fit with a single or double exponential decay, with most events requiring two components and a plateau because the loss of fluorescence was typically incomplete. To interpret the kinetics, fusion events were simulated as a localized release of tethered/untethered exosomes coupled with the membrane diffusion of CD63. The experimentally observed decay required three components in the simulation: 1) free exosomes, 2) CD63 membrane diffusion from the endosomal membrane into the plasma membrane, and 3) tethered exosomes. Modeling with slow diffusion of the tethered exosomes (0.0015–0.004 μm^2/s) accurately fits the experimental data for all temperatures. However, simulating with immobile tethers or the absence of tethers fails to replicate the data. Our model suggests that exosome release from the fusion site is incomplete due to postfusion, membrane attachment.

KEYPOINTS

- Multivesicular endosome (MVE) fusion with plasma membrane is a constitutive process through which exosomes are released.
- This process is enhanced in the presence of calcium ions (Ca2+) and physiological temperatures (37°C).
- Exosome cargo release is temperature-dependent, as it modulates docking, fusion and post-fusion events.

KEYPOINTS

- Mesenchymal stem cells (MSC) constitutionally express opsins for light responsiveness.
- Blue light promotes proangiogenic activity of MSC Exosomes in vitro and in vivo.
- Therapeutic effects of exosomes are improved by blue light simulation.

Yang et al. Stem Cell Research & Therapy (2019) 10:358
https://doi.org/10.1186/s13287-019-1472-x

Stem Cell Research & Therapy

RESEARCH Open Access

Exposure to blue light stimulates the proangiogenic capability of exosomes derived from human umbilical cord mesenchymal stem cells

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Abstract

Background: The therapeutic potential of mesenchymal stem cells (MSCs) may be attributed partly to the secreted paracrine factors, which comprise exosomes. Exosomes are small, saucer-shaped vesicles containing miRNAs, mRNAs, and proteins. Exosomes derived from human umbilical cord mesenchymal stem cells (hUC-MSCs) have been reported to promote angiogenesis. However, the efficacy of exosome-based therapies is still limited both in vitro and in vivo. The present study aimed to develop a new optical manipulation approach to stimulate the proangiogenic potential of exosomes and characterize its mechanism underlying tissue regeneration.

Methods: We used blue (455 nm) and red (638 nm) monochromatic light exposure to investigate the processing of stimuli. Exosomes were prepared by QIAGEN exoEasy Maxi kit and confirmed to be present by transmission electron microscopy and immunoblotting analyses. The proangiogenic activity of blue light-treated human umbilical vein endothelial cells (HUVECs), when co-cultured with hUC-MSCs, was assessed by EdU (5-ethynyl-2′-deoxyuridine) incorporation, wound closure, and endothelial tube formation assays. The in vivo angiogenic activity of blue light-treated MSC-derived exosomes (MSC-Exo) was evaluated using both murine matrigel plug and skin wound models.

Results: We found that 455-nm blue light is effective for promoting proliferation, migration, and tube formation of HUVECs co-cultured with MSCs. Furthermore, MSC-Exo stimulated in vivo angiogenesis and their proangiogenic potential were enhanced significantly upon blue light illumination. Finally, activation of the endothelial cells in response to stimulation by blue light-treated exosomes was demonstrated by upregulation of two miRNAs, miR-135b-5p, and miR-499a-3p.

Conclusions: Blue (455 nm) light illumination improved the therapeutic effects of hUC-MSC exosomes by enhancing their proangiogenic ability in vitro and in vivo with the upregulation of the following two miRNAs: miR-135b-5p and miR-499a-3p.

Keywords: Mesenchymal stem cells, Exosomes, Angiogenesis, Light exposure, microRNAs

KEYPOINTS

- Blood is one of the richest and most accessible sources of exosomes, with platelet-derived plasma comprising most of blood extracellular vesicles (EVs).
- Platelet exosomes are enriched with essential biomolecules: growth factors, cytokines, chemokines, lipids and nucleic acids, as well as anti-inflammatory and pro-angiogenic factors.
- These exosomes play key roles in angiogenesis, maintaining vascular integrity, and regulating inflammation, making them valuable for tissue regeneration applications.

Received: 22 May 2021 | Revised: 13 August 2021 | Accepted: 31 August 2021
DOI: 10.1111/cpr.13123

REVIEW

Cell Proliferation WILEY

Platelet-rich plasma-derived extracellular vesicles: A superior alternative in regenerative medicine?

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Abstract

Platelet-rich plasma (PRP), due to its promising therapeutic properties, has been used in regenerative medicine for more than 30 years and numerous encouraging outcomes have been obtained. Currently, by benefiting from new insights into PRP mechanisms and the excellent performance of extracellular vesicles (EVs) in the field of tissue repair and regeneration, studies have found that a large number of EVs released from activated platelets also participate in the regulation of tissue repair. A growing number of preclinical studies are exploring the functions of PRP-derived EVs (PRP-EVs), especially in tissue regeneration. Here, we summarize the latest progress in PRP-EVs as a superior alternative cell-free therapeutic strategy in regenerative medicine, clarify their underlying molecular mechanisms, and discuss the advantages and limitations of the upcoming clinical applications. This review highlights the potential of PRP-EVs to replace the application of PRP or even become a superior alternative in regenerative medicine.

Contents lists available at ScienceDirect
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Review

The novel mechanisms and applications of exosomes in dermatology and cutaneous medical aesthetics

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ARTICLE INFO

Keywords:
Skin
Exosomes
Dermatology
Medical aesthetics
Tissue regeneration
Therapeutic applications

Chemical compounds studied in this article:
Gelatin (PubChem CID: 441411)
Methacryloyl (PubChem CID: 53627882)
Alginate (PubChem CID: 91666318)
Pluronic F127 (PubChem CID: 24751)
Polyethylenimine (PubChem CID: 9331)
Pullulan (PubChem CID: 20850299)
Polyurethane (PubChem CID: 13254)
Hyaluronic Acid (PubChem CID: 28047767)
UK5099 (PubChem CID: 6438504)

ABSTRACT

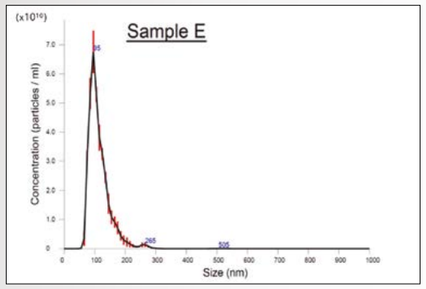
Exposure to the external environment may lead to instability and dysfunction of the skin, resulting in refractory wound, skin aging, pigmented dermatosis, hair loss, some immune-mediated dermatoses, and connective tissue diseases. Nowadays, many skin treatments have not achieved a commendable balance between medical recovery and cosmetic needs. Exosomes are cell-derived nanoscale vesicles carrying various biomolecules, including proteins, nucleic acids, and lipids, with the capability to communicate with adjacent or distant cells. Recent studies have demonstrated that endogenic multiple kinds of exosomes are crucial orchestrators in shaping physiological and pathological development of the skin. Besides, exogenous exosomes, such as stem cell exosomes, can serve as novel treatment options to repair, regenerate, and rejuvenate skin tissue. Herein, we review new insights into the role of endogenic and exogenous exosomes in the skin microenvironment and recent advances in applications of exosomes related to dermatology and cutaneous medical aesthetics. The deep understanding of the mechanisms by which exosomes perform biological functions in skin is of great potential to establish attractive therapeutic methods for the skin.

KEYPOINTS

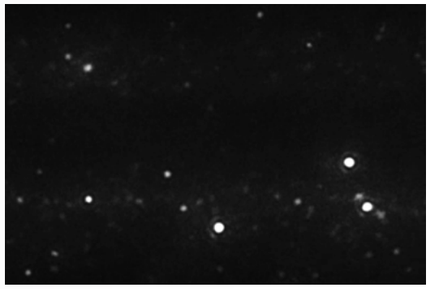
- Exosomes from stem cells and other cell types offer therapeutic potential in regenerative medicine and aesthetics.
- Considered biochemical cocktails, exosomes play a key role in skin physiology and pathology.
- Their main applications in cosmetic dermatology are scar prevention and reduction, pigmentation regulation, and hair growth.

Our R&D: MCT Exosomes

Quantifying MCT Exosomes by Nanoparticle Tracking Analysis (NTA)



NTA analysis of MCT Exosomes. Representative particle size and concentration measurements of MCT Exosomes obtained from PRP. Error bars indicate +/-1 standard error of the mean.



Representative video image of MCT Exosomes in motion captured using NTA with a light-scattering detection model.*

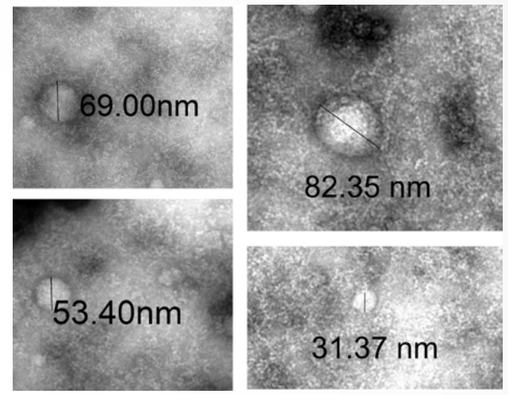
Mean size of MCT Exosomes measured by NTA: **109,2 nm.**

One kit produces 299,3 billion exosomes/mL

* NTA uses a laser to track particles in a liquid, measuring their Brownian Motion to calculate size and quantity. Discover MCT Exosomes under NTA laser:

A closer look: MCT Exosomes revealed under Transmisson Electron Microscope

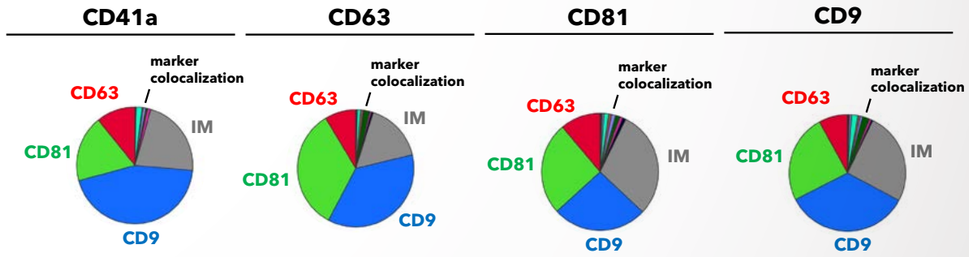
MCT Exosomes were precisely characterized using high-resolution Transmission Electron Microscopy (TEM). Images revealed their distinct spherical morphology, clearly differentiating them from other extracellular vesicles, and enabled accurate size measurement. The bilayer membrane structure was also observed, underscoring MCT Exosomes' stability and efficient cargo encapsulation. TEM analysis also highlighted the exceptional purity of the sample, ensuring their potential for advanced therapeutic applications.



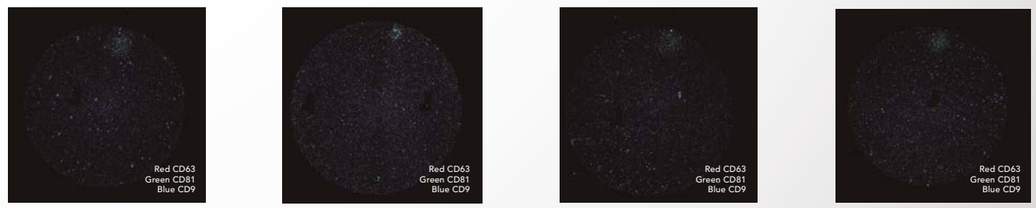
Transmission Electron Microscopy images of MCT Exosomes obtained from Platelet-Rich Plasma. Exosomes were negatively stained with uracyl acetate. Cup-shaped structures with a lipid bilayer and 30-150 nm size were identified as exosomes.

MCT Exosomes verified by science and defined by protein markers

The single-particle interferometric reflectance imaging sensor (SP-IRIS) technique confirmed the presence of specific protein exosome markers (CD41a, CD63, CD81 and CD9) on MCT Exosome's surface. These findings underscored the reliability of MCT Exosomes for therapeutic applications, as their surface protein markers aligned with the gold standard in exosome identification.



Fluorescence profiling of colocalization of tetraspanins CD63, CD81, CD9, IM (immunofluorescence), along with their combinations. Analysis used CD41a, CD63, CD81, and CD9 as capture probes.



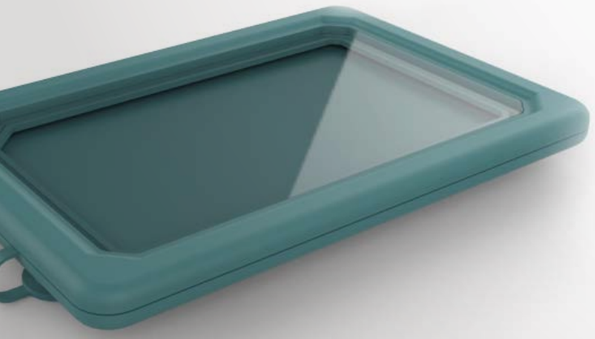
Images of interferometric imaging chips obtained with three capture antibodies against the exosomal markers CD81, CD63 and CD9 to evaluate the MCT Exosome's tetraspanin expression profile. Images provided quantitative and qualitative insights into the expression and distribution of key tetraspanins, confirming the identity and purity of MCT Exosomes.

Exceptional clinical outcomes. Delivered with confidence.

- High profitability
- User-friendly
- Therapeutical versatility
- Standardized protocols
- Globally trusted
- Evidence-based

Safe and effective. Focused on better patient care.

- Natural product
- Long-lasting effects
- Safety granted
- No chemical additives



The Power of Injectable Autologous Exosomes

IMMUNE COMPATIBILITY

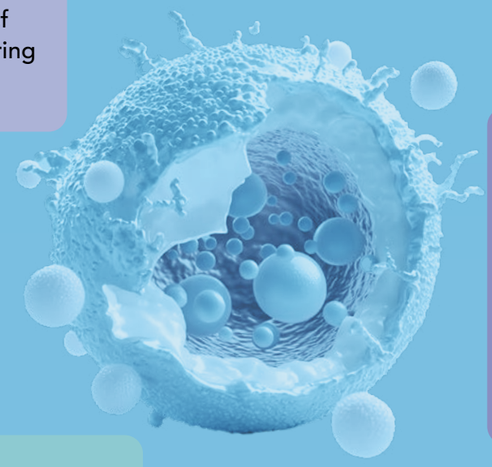
Derived from the patient's own cells, autologous exosomes null the risk of immune rejection, ensuring safety and effectivity.

ENHANCED CELLULAR REGENERATION

Rich in growth factors and bioactive molecules, autologous exosomes stimulate cell regeneration and tissue repair, promoting faster recovery and healing.

ANGIOGENESIS

Exosomes encourage the formation of new blood vessels, improving oxygen and nutrient supply to damaged tissues, accelerating recovery.



GUARANTEED VIABILITY

Using autologous exosomes ready for injection avoids the complexities of storage and conservation, ensuring a pure and more effective therapeutic product.

ANTI-INFLAMMATORY BENEFITS

Autologous exosomes help reduce pro-inflammatory cytokines, which decreases tissue inflammation and promotes the recovery of physiological behavior.

ANTI-AGING POTENTIAL

Autologous exosomes stimulate collagen and elastin production, enhancing skin texture and reducing wrinkles. This makes them ideal for advanced anti-aging solutions, especially when combined with laser treatments.

References

Yang K, Li D, Wang M, Xu Z, Chen X, Liu Q, Sun W, Li J, Gong Y, Liu D, Shao C, Liu Q, Li X. Exposure to blue light stimulates the proangiogenic capability of exosomes derived from human umbilical cord mesenchymal stem cells. Stem Cell Res Ther. 2019.

Yim N, Ryu SW, Choi K, Lee KR, Lee S, Choi H, Kim J, Shaker MR, Sun W, Park JH, Kim D, Heo WD, Choi C. Exosome engineering for efficient intracellular delivery of soluble proteins using optically reversible protein-protein interaction module. Nat Commun. 2016.

Chung H, Dai T, Sharma SK, Huang YY, Carroll JD, Hamblin MR. The nuts and bolts of low-level laser (light) therapy. Ann Biomed Eng. 2012.

Mahmood A, Otruba Z, Weisgerber AW, Palay MD, Nguyen MT, Bills BL, Knowles MK. Exosome secretion kinetics are controlled by temperature. Biophys J. 2023.

Jaiswal JK, Andrews NW, Simon SM. Membrane proximal lysosomes are the major vesicles responsible for calcium-dependent exocytosis in nonsecretory cells. J Cell Biol. 2002.

Ruan S, Erwin N, He M. Light-induced high-efficient cellular production of immune functional extracellular vesicles. J Extracell Vesicles. 2022.

Wu J, Piao Y, Liu Q, Yang X. Platelet-rich plasma-derived extracellular vesicles: A superior alternative in regenerative medicine? Cell Prolif. 2021.

Beltrán B, Sánchez MAR, Melamed G, Pinto H. Efficacy and safety of photothermal-bioactivated plateletrich plasma for facial rejuvenation. J Cosmet Dermatol. 2023.

Mercuri SR, Di Nicola MR, Bianchi VG, Paolino G. Adult-Onset Linear Morphea (en coupe de sabre) of the Face Successfully Treated with Photoactivated Low-Temperature Platelet-Rich Plasma: A Valid Therapeutic Option. Medicina (Kaunas). 2023.

Torreggiani E, Perut F, Roncuzzi L, Zini N, Baglio SR, Baldini N. Exosomes: novel effectors of human platelet lysate activity. Eur Cell Mater. 2014.

Guo SC, Tao SC, Yin WJ, Qi X, Yuan T, Zhang CQ. Exosomes derived from platelet-rich plasma promote the re-epithelization of chronic cutaneous wounds via activation of YAP in a diabetic rat model. Theranostics. 2017.

Tao SC, Guo SC, Zhang CQ. Platelet-derived Extracellular Vesicles: An Emerging Therapeutic Approach. Int J Biol Sci. 2017.

Puhm F, Boilard E, Machlus KR. Platelet Extracellular Vesicles: Beyond the Blood. Arterioscler Thromb Vasc Biol. 2021.

Gupta AK, Wang T, Rapaport JA, Talukder M. Therapeutic Potential of Extracellular Vesicles (Exosomes) Derived From Platelet-Rich Plasma: A Literature Review. J Cosmet Dermatol. 2024.

Kimiz-Gebologlu I, Oncel SS. Exosomes: Large-scale production, isolation, drug loading efficiency, and biodistribution and uptake. J Control Release. 2022.

Rui S, Yuan Y, Du C, Song P, Chen Y, Wang H, Fan Y, Armstrong DG, Deng W, Li L. Comparison and Investigation of Exosomes Derived from Platelet-Rich Plasma Activated by Different Agonists. Cell Transplant. 2021.

Notes

M·C·T
Meta Cell Technology

mctmetacelltech

metacelltech

At Meta Cell Technology, we provide regenerative medicine professionals with high-quality therapeutic systems to harness cellular power. As an ISO 13485-accredited company, we adhere to international standards, ensuring reliable delivery from our facility near Barcelona, Spain, through our global distributor network.

CE 0051

MEDICAL DEVICES ISO ISO 13485:2016 QUALITY MANAGEMENT

OMPI ORGANIZACIÓN MUNDIAL DE LA PROPIEDAD INTELECTUAL

www.metacelltech.com