Human Mesenchymal Stem Cells, Adipose Tissue

300645

GENERAL INFORMATION

Description

Human Mesenchymal Stem Cells (hMSCs) derived from adipose tissue are multipotent stromal cells capable of differentiating into various cell lineages, including adipocytes, osteoblasts, and chondrocytes. These cells are isolated from the stromal vascular fraction of adipose tissue, which is a rich source of mesenchymal stem cells compared to other tissues. Adipose-derived hMSCs are particularly valued in research due to their accessibility, ease of isolation, and higher yield, making them a crucial tool for studies in regenerative medicine, tissue engineering, and cellular therapy.

hMSCs are self-renewing multipotent cells that can be directed to differentiate into a wide variety of cell types in vitro. The direct differentiation of these cells into adipocytes, osteoblasts, and chondrocytes has been well-documented using specific differentiation media. Early passage hMSCs are cryopreserved using a specialized cryomedium, ensuring that post-thaw viability is maintained at a minimum of 92% to 95%, as confirmed by the Trypan Blue dye exclusion test. Each cryovial contains 1 x 10^6 cells, collected from healthy donors who provided informed consent for the donation of cell material.

Adipose tissue-derived hMSCs exhibit robust self-renewal capacities and can be expanded extensively in vitro without losing their differentiation potential. These cells undergo rigorous quality control testing to ensure their identification, purity, potency, viability, and appropriateness for intended in vitro research applications. Given their multipotency, immunomodulatory effects, and paracrine signaling capabilities, adipose tissue-derived hMSCs are widely used in various research applications, including drug screening, disease modeling, and understanding the mechanisms underlying stem cell differentiation. However, it is essential to note that these cells are not intended for therapeutic or in vivo applications.

What differentiates adipose-derived hMSCs from hMSCs derived from other tissues, such as bone marrow or umbilical cord, is their higher proliferation rate and a greater capacity for adipogenic differentiation. These cells also exhibit a more pronounced immunomodulatory effect, partly due to their unique secretome profile, which includes a higher expression of cytokines and growth factors involved in anti-inflammatory responses. Furthermore, adipose-derived hMSCs are more readily available and require less invasive procedures for isolation compared to bone marrow-derived hMSCs, making them a preferred choice for many researchers. Their distinct characteristics make adipose-derived hMSCs particularly suitable for studies focusing on metabolic disorders, immune regulation, and regenerative medicine.

Tissue	Adipose Tissue

Applications

Drug testing, regenerative medicine, disease research

CLASSIFICATION

Organism	Human
Sex	Unspecified
Growth properties	Adherent
Biosafety level	1

CHARACTERISTICS

Morphology	Well-spread spindle shaped, fibroblast-like morphology for at least within 5 passages. Fewer than 2% cells exhibit spontaneous myofibroblast-like morphology within each passage.
Cell type	Stem cell

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Citation

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NCBI TaxID	9606

EXPRESSION AND SUSCEPTIBILITY

Antigen expression

A comprehensive panel of markers, including CD73/CD90/CD105 (positive) and CD14/CD34/CD45/HLA-DR (negative), are used in flow cytometry analysis to identify cultivated MSCs (P2-P3) prior to cryopreservation. These markers are recommended by the ISCT MSC committee.

Viruses

Donor is negative for HBV (PCR), Treponema pallidum (PCR), and HIV-1/2 (IFA).
Cells are negative for HBV, HCV, HSV1, HSV2, CMV, EBV, HHV6, Toxoplasma gondii, Treponema pallidum, Chlamydia trachomatis, Ureaplasma urealyticum, and Ureaplasma parvum.

HANDLING AND CULTURE

Culture medium

Alpha MEM, w: 2.0 mM stable Glutamine, w/o: Ribonucleosides, w/o: Deoxyribonucleosides, w: 1.0 mM Sodium pyruvate, w: 2.2g/L NaHCO3

Incubation atmosphere	37°C, 5% CO_2, humidified atmosphere.

Supplements

Supplement the medium with 10% FBS, 2 ng/mL bFGF

Dissociation reagent	Trypsin-EDTA

Subculturing

For routine adherent cell culture: Aspirate the old culture medium from the adherent cells, and wash them with PBS to remove any remaining medium. After aspirating the PBS, add the appropriate volume of Trypsin/EDTA solution based on the culture vessel size (e.g., 1 ml for a T25 flask, 3 ml for a T75 flask) and incubate at room temperature or 37°C until the cells detach (5-10 minutes). Monitor detachment under a microscope, and gently tap the vessel if necessary to release the cells. Once detached, add complete medium to inactivate the Trypsin/EDTA, gently resuspend the cells, and transfer an aliquot of the cell suspension into a new culture vessel containing fresh medium. Place the vessel in an incubator set to 37°C with 5% CO_2, and change the medium every 2-3 days.

Seeding density	1 to 3 x 10^4 cells/cm^2
Fluid renewal	First fluid renewal after 24 hours, then every 2 to 3 days.

Thawing and culturing

Confirm that the vial remains deeply frozen upon delivery, as cells are shipped on dry ice to maintain optimal temperatures during transit.
Upon receipt, either store the cryovial immediately at temperatures below -150°C to ensure the preservation of cellular integrity, or proceed to step 3 if immediate culturing is required.
For immediate culturing, swiftly thaw the vial by immersing it in a 37°C water bath with clean water and an antimicrobial agent, agitating gently for 40-60 seconds until a small ice clump remains.
Perform all subsequent steps under sterile conditions in a flow hood, disinfecting the cryovial with 70% ethanol before opening.
Carefully open the disinfected vial and transfer the cell suspension into a 15 ml centrifuge tube containing 8 ml of room-temperature culture medium, mixing gently.
Centrifuge the mixture at 300 x g for 3 minutes to separate the cells and carefully discard the supernatant containing residual freezing medium.
Gently resuspend the cell pellet in 10 ml of fresh culture medium. For adherent cells, divide the suspension between two T25 culture flasks; for suspension cultures, transfer all the medium into one T25 flask to promote effective cell interaction and growth.
Adhere to established subculture protocols for continued growth and maintenance of the cell line, ensuring reliable experimental outcomes.

QUALITY CONTROL AND CRYOPRESERVATION

Sterility

Mycoplasma contamination is excluded using both PCR-based assays and luminescence-based mycoplasma detection methods.
To ensure there is no bacterial, fungal, or yeast contamination, cell cultures are subjected to daily visual inspections.

Freeze medium	As a cryopreservation medium, we use 80% FBS + 10% basal medium + 10% DMSO to maintain viability, or CM-1 (Cytion catalog number 800100) for superior cryoprotection, preventing unwanted differentiation while preserving pluripotency.

Storage conditions

For long-term preservation, place vials in vapor-phase liquid nitrogen at about −150 to −196 °C. Storage at −80 °C is acceptable only as a short interim step before transfer to liquid nitrogen.

Shipping conditions

Cryopreserved cell lines are shipped on dry ice in validated, insulated packaging with sufficient refrigerant to maintain approximately −78 °C throughout transit. On receipt, inspect the container immediately and transfer vials without delay to appropriate storage.

DONOR

Donor age	Please inquire
Ethnicity	Caucasian

LEGAL AND SAFETY

Safety precautions

When planning to store a cryovial in liquid nitrogen for future thawing, it is mandatory to adhere to stringent safety measures. Appropriate protective gloves and clothing are essential, and the use of a face mask or safety goggles is required during the transfer of frozen samples to or from the liquid nitrogen tank. This is to mitigate the risk of injury from potential cryovial explosions upon removal, which can result in the projection of sharp fragments.

Warranty

At Cytion, we stand behind the quality and viability of our products.
We guarantee that our cells will be viable at the start of culture for
60 days after shipment from our facilities.
We assure that all materials conform to the specifications described in the
Certificate of Analysis and/or Product Sheet.
For full details, please refer to our
Warranty Statement.

Material Transfer Agreement required	Yes