ATCC® Normal Human Umbilical Cord-Derived Mesenchymal Stem Cells, when grown in Mesenchymal Stem Cell Basal Media supplemented with Mesenchymal Stem Cell Growth Kit for Adipose and Umbilical-derived MSCs - Low serum components, provide an ideal cell system to propagate mesenchymal stem cells in low serum (2% FBS) conditions. When maintained under optimal growth conditions, ATCC Normal Human Umbilical Cord-Derived Mesenchymal Stem Cells have been shown to be multipotent, capable of differentiating down the adipogenic, osteogenic, and chondrogenic lineages.

The cells are cryopreserved at the second passage to ensure the highest viability and plating efficiency. ATCC® Primary Cell Solutions™ cells, media, supplements and reagents are quality tested together to guarantee optimum performance and reliability.

Components: One vial of Umbilical Cord-Derived Mesenchymal Stem Cells; Normal, Human (ATCC® PCS-500-010™) containing a minimum of 5 x 10^6 viable cells (provided).

Also Required:
A. One bottle of Mesenchymal Stem Cell Basal Medium (ATCC PCS-500-030) plus one Mesenchymal Stem Cell Growth Kit for Adipose and Umbilical-derived MSCs - Low serum (ATCC PCS-500-040) that contains the following growth supplements: MSC Supplement (composed of FBS, rh FGF basic, rh FGF acidic, and rh EGF) and L-alanyl-L-glutamine.
B. Optional media supplements
   1. Gentamicin-Amphotericin B Solution (ATCC PCS-999-025)
   2. Penicillin-Streptomycin-Amphotericin B Solution (ATCC PCS-999-002)
   3. Phenol Red (ATCC PCS-999-001)
C. Reagents for subculture
   1. D-PBS (ATCC 30-2200)
   2. Trypsin-EDTA for Primary Cells (ATCC PCS-999-003) containing 0.05% Trypsin and 0.02% EDTA. Note: Do not use other Trypsin-EDTA concentrations with ATCC PCS-500-010.
   3. Trypsin Neutralizing Solution (ATCC PCS-999-004)

**Cell Characteristics**

**Tissue:** Umbilical

**Morphology:** spindle-shaped, fibroblast-like

**Growth Properties:** adherent

**Batch-Specific Information**

Refer to the Certificate of Analysis for batch-specific test results.

**SAFETY PRECAUTION**

ATCC highly recommends that protective gloves and clothing always be used and a full face mask always be worn when handling frozen vials. It is important to note that some vials leak when submersed in liquid nitrogen and will slowly fill with liquid nitrogen. Upon thawing, the conversion of the liquid nitrogen back to its gas phase may result in the vessel exploding or blowing off its cap with dangerous force creating flying debris.

**Unpacking & Storage Instructions**

1. Check all containers for leakage or breakage.
2. Remove the frozen cells from the dry ice packaging and immediately place the cells at a temperature below -130°C, preferably in liquid nitrogen vapor, until ready for use.

**Preparation of Complete Growth Medium**

1. Obtain one Mesenchymal Stem Cell Growth Kit for Adipose and Umbilical-derived MSCs - Low serum from the freezer; make sure that the caps of all components are tight.
2. Thaw the components of the growth kit just prior to adding them to the basal medium.
3. Obtain one bottle of Mesenchymal Stem Cell Basal Medium (485 mL) from cold storage.
4. Decontaminate the external surfaces of all growth kit component vials and the basal medium bottle by
spraying them with 70% ethanol.

5. Using aseptic technique and working in a laminar flow hood or biosafety cabinet, transfer the indicated volume of each growth kit component, as indicated in Table 1, to the bottle of basal medium using a separate sterile pipette for each transfer.

Table 1. Mesenchymal Stem Cell Growth Kit for Adipose and Umbilical-derived MSCs - Low serum Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Volume</th>
<th>Final Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC Supplement</td>
<td>10 mL</td>
<td>2% FBS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 ng/mL rh FGF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>basic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 ng/mL rh FGF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>acidic</td>
</tr>
<tr>
<td>L-Alanyl-L-Glutamine</td>
<td>6 mL</td>
<td>2.4 mM</td>
</tr>
</tbody>
</table>

Antimicrobials and phenol red are not required for proliferation but may be added if desired. The recommended volume of either of the optional components (GA solution or PSA solution) to be added to the complete growth media is summarized in Table 2.

Table 2. Addition of Antimicrobials/Antimycotics and Phenol Red (Optional)

<table>
<thead>
<tr>
<th>Component</th>
<th>Volume</th>
<th>Final Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin-Amphotericin B</td>
<td>0.5 mL</td>
<td>Gentamicin: 10 µg/mL Amphotericin B: 0.25 µg/mL</td>
</tr>
<tr>
<td>Solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penicillin-Streptomycin-</td>
<td>0.5 mL</td>
<td>Penicillin: 10 Units/mL Streptomycin: 10 µg/mL Amphotericin B: 25 ng/mL</td>
</tr>
<tr>
<td>Amphotericin B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenol Red</td>
<td>0.5 mL</td>
<td>33 µM</td>
</tr>
</tbody>
</table>

6. Tightly cap the bottle of complete growth medium and swirl the contents gently to assure a homogeneous solution. Do not shake forcefully to avoid foaming. Label and date the bottle.

7. Complete growth media should be stored in the dark at 2°C to 8°C (do not freeze). When stored under these conditions, complete growth media is stable for two weeks.

Handling Procedure for Frozen Cells and Initiation of Culture

1. Refer to the batch specific information for the total number of viable cells recovered from this lot of ATCC® PCS-500-010.

2. Using the total number of viable cells, determine how much surface area can be inoculated to achieve an initial seeding density of 5,000 cells per cm².

3. Prepare the desired combination of flasks. Add 5 mL of complete growth medium per 25 cm² of surface area. Place the flasks in a 37°C, 5% CO₂ humidified incubator and allow the media to pre-equilibrate to temperature and pH for 30 minutes prior to adding cells.

4. While the culture flasks equilibrate, remove one vial of ATCC® PCS-500-010 from storage and thaw the cells by gentle agitation in a 37°C water bath. To reduce the possibility of contamination, keep the O-ring and cap out of the water. Thawing should be rapid (approximately 1 to 2 minutes).

5. Remove the vial from the water bath as soon as the contents are thawed, and decontaminate by dipping in or spraying with 70% ethanol. All operations from this point onward should be carried out under strict aseptic conditions.

6. Add the appropriate volume of complete growth medium [volume = (1 mL x number of flasks to be seeded)] 1 mL] into a sterile conical tube. Using a sterile pipette, transfer the cells from the cryovial to the conical tube. Gently pipette the cells to homogenize the suspension. Do not centrifuge.

7. Transfer 1.0 mL of the cell suspension to each of the pre-equilibrated culture flasks prepared in steps 1 to 3 of Handling Procedure for Frozen Cells and Initiation of Culture. Pipette several times, then cap and gently rock each flask to evenly distribute the cells.

8. Place the seeded culture flasks in the incubator at 37°C, 5% CO₂ atmosphere. Incubate for at least 24 hours before processing the cells further.

Maintenance

1. Before beginning, pre-warm complete growth media in a 37°C water bath. This will take between 10 and 30 minutes, depending on the volume. If using a small volume of medium (50 mL or less), warm only the volume needed in a sterile conical tube. Avoid warming complete growth media multiple times.
Product Sheet

Umbilical Cord-Derived Mesenchymal Stem Cells; Normal, Human (ATCC® PCS-500-010™)

Please read this FIRST

Storage Temp.
-130°C or below

Biosafety Level
1

Intended Use

This product is intended for research use only. It is not intended for any animal or human therapeutic or diagnostic use.

Citation of Strain

If use of this culture results in a scientific publication, it should be cited in that manuscript in the following manner: Umbilical Cord-Derived Mesenchymal Stem Cells; Normal, Human (ATCC® PCS-500-010™)

Quality Control Specifications

Growth
Each lot of ATCC PCS-500-010 is tested to ensure the cells can be passaged at least three times (i.e., ≥ 10 population doublings) after thaw in complete growth media (Mesenchymal Stem Cell Basal Medium plus one Mesenchymal Stem Cell Growth Kit–Low serum) and support differentiation. Viability: ≥ 70% when thawed from cryopreservation

Sterility Testing
Bacteria and Yeast: Negative
Mycoplasma: Negative

Viral Testing
Hepatitis B: Negative
Hepatitis C: Negative
HIV-1: Negative
HIV-2: Negative

Specific Staining
Positive for CD29, CD44, CD73, CD90, CD105, and CD166 (greater than 95% of the cell population expresses...
these markers by flow cytometry).

Negative for CD14, CD31, CD34, and CD45 (less than 5% of cell population expresses these markers by flow cytometry). Each lot of PCS-500-010 is tested to ensure in vitro differentiation.

---

**Biosafety Level: 1**

Appropriate safety procedures should always be used with this material. Laboratory safety is discussed in the current publication of the *Biosafety in Microbiological and Biomedical Laboratories* from the U.S. Department of Health and Human Services Centers for Disease Control and Prevention and National Institutes for Health.

**Human Material Precaution**

All tissues used for isolation are obtained under informed consent and conform to HIPAA standards to protect the privacy of the donor’s personal health information. It is best to use caution when handling any human cells. We recommend that all human cells be accorded the same level of biosafety consideration as cells known to carry HIV. With infectious virus assays or viral antigen assays, even a negative test result may leave open the possible existence of a latent viral genome.

**ATCC Warranty**

The viability of ATCC® products is warranted for 30 days from the date of shipment, and is valid only if the product is stored and cultured according to the information included on this product information sheet. ATCC lists the media formulation that has been found to be effective for this strain. While other, unspecified media may also produce satisfactory results, a change in media or the absence of an additive from the ATCC recommended media may affect recovery, growth and/or function of this strain. If an alternative medium formulation is used, the ATCC warranty for viability is no longer valid.

**Disclaimers**

This product is intended for laboratory research purposes only. It is not intended for use in humans.

While ATCC uses reasonable efforts to include accurate and up-to-date information on this product sheet, ATCC makes no warranties or representations as to its accuracy. Citations from scientific literature and patents are provided for informational purposes only. ATCC does not warrant that such information has been confirmed to be accurate.

This product is sent with the condition that you are responsible for its safe storage, handling, and use. ATCC is not liable for any damages or injuries arising from receipt and/or use of this product. While reasonable effort is made to insure authenticity and reliability of strains on deposit, ATCC is not liable for damages arising from the misidentification or misrepresentation of cultures.

Please see the enclosed Material Transfer Agreement (MTA) for further details regarding the use of this product. The MTA is also available on our Web site at [www.atcc.org](http://www.atcc.org).

Additional information on this culture is available on the ATCC web site at [www.atcc.org](http://www.atcc.org).

© ATCC 2018. All rights reserved. ATCC is a registered trademark of the American Type Culture Collection. [08/13]