

# OMENTAL ADIPOCYTE CARE MANUAL

## Maintenance and Differentiation from Preadipocytes to Adipocytes

### INSTRUCTION MANUAL (ZBM-7)

## SHIPPING CONDITIONS

### Human Omental Adipocyte/Preadipocyte Cells

Orders are delivered via Federal Express courier. All US and Canada orders are shipped via Federal Express Priority service and are usually received the next day. International orders are usually received in 3-4 days.

**Must be processed upon shipment receipt.**

## STORAGE CONDITIONS

**Media:** Short Term 4°C                      6 months                      -20°C

***All Zen-Bio Inc products are for research use only. Not approved for human or veterinary use or for use in diagnostic or clinical procedures.***

## LIMITED PRODUCT WARRANTY

This warranty limits our liability to replacement of this product. No other warranties of any kind, expressed or implied, including without limitation implied warranties of merchantability or fitness for a particular purpose, are provided by Zen-Bio, Inc. Zen-Bio, Inc. shall have no liability for any direct, indirect, consequential, or incidental damages arising out of the use, the results of use, or the inability to use this product.

Zen-Bio, Inc warrants its cells only if Zen-Bio media are used and the recommended protocols are followed. Cryopreserved omental preadipocytes are assured to be viable when thawed and maintained according to Zen-Bio protocols.

## ORDERING INFORMATION AND TECHNICAL SERVICES

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# HUMAN OMENTAL ADIPOCYTES

## Maintenance and Differentiation from Preadipocytes to Adipocytes

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# Introduction

## Cultured human omental adipocytes

Omental preadipocytes can be cultured as growing precursor cells or differentiated into adipocytes using medium supplemented with adipogenic and lipogenic hormones. This instruction manual describes procedures required to induce human preadipocytes to differentiate into mature adipocytes as well as culturing methods for human preadipocytes and adipocytes. The process of differentiating preadipocytes to adipocytes has been patent protected by Zen-Bio under US patent number 6153432.

## Precautionary Notes

**This product is for research use only. It is not intended for human, veterinary, or in vitro diagnostic use.** Proper precautions and biological containment should be taken when handling cells of human origin, due to their potential biohazardous nature. **Always wear gloves and work behind a protective screen when handling primary human cells.** All media, supplements, and tissue cultureware used in this protocol should be sterile.

Human preadipocyte viability depends greatly on the use of suitable media, reagents, and sterile plastic wear. If these parameters are not carefully observed, limited differentiation may occur and cell growth may be slow.

## Materials Provided for Each Catalog Item

**Note:** Zen-Bio recommends that the Human Preadipocytes and Adipocytes be processed immediately upon receipt.

### ❖ Human Omental Preadipocytes

(Cat# OP-2096; OP-2048; OP-2024; OP-2012; SA-2006; OP-75; OP-25)

- Approximately 100 %confluent

### ❖ Human Omental Adipocytes

(Cat# OA-1096; OA-1048; OA-1024; OA-1012; OA-1006; OA-75; OA-25)

### ❖ Cryopreserved Omental Preadipocytes (catalog # OP-F)

- Frozen vial containing  $1 \times 10^6$  viable omental preadipocytes (store in liquid nitrogen upon receipt)
- 50 ml Omental Preadipocyte Medium (cat# OM-PM)

# Omental Media Compositions

## **Omental Adipocyte Medium**

**(cat # OM-AM)**

DMEM / Ham's F-12 medium (1:1, v/v)  
HEPES pH 7.4  
Fetal bovine serum  
Biotin  
Pantothenate  
Human insulin  
Dexamethasone  
Penicillin  
Streptomycin  
Amphotericin B

## **Omental Preadipocyte Medium**

**(cat # OM-PM)**

DMEM/Ham's F-12 medium (1:1, v/v)  
HEPES pH 7.4  
Fetal bovine serum  
Penicillin  
Streptomycin  
Amphotericin B

## **Omental Differentiation Medium**

**(cat # OM-DM)**

Adipocyte medium (OM-AM)  
Isobutylmethylxanthine  
PPAR $\gamma$  agonist

## **Omental Basal Medium**

**(cat #OM-BM)**

DMEM/Ham's F-12 medium (1:1, v/v)  
HEPES pH 7.4  
Biotin  
Pantothenate

**NOTE: All media contains 3.15g/L D-glucose.**

**All media are also available as serum-free  
and/or phenol red free.**

**Please inquire for custom media requests.**

## **MEDIA EXPIRATION DATES:**

- **If placed at 4°C upon arrival, the media is stable until the expiration date on the bottle label.**
- **If stored at -20°C upon arrival, it is stable for 6 months. Add fresh antibiotics when you are ready to use.**

# Maintenance of Omental Preadipocytes

Your human omental preadipocytes have arrived in our patented CellPorter™ packaging system. Upon receiving the plates, please follow the instructions carefully to ensure your safety and the optimal performance of these cells.

1. Check the seal for each plate. Discard any plate where the vacuum seal has been compromised during shipment. Please be aware that these cells are of human origin. Please treat them as potentially infectious since we cannot test for all pathogens. **ALWAYS WEAR GLOVES AND USE PROTECTIVE MEASURES WHEN HANDLING HUMAN PRIMARY CELLS.**
2. Place the package into a sterile environment. **THIS IS VERY IMPORTANT SINCE BREAKING THE VACUUM SEAL MAY POTENTIALLY INTRODUCE CONTAMINATION INTO THE PLATE.** Use scissors to snip open the bag at any end. The vacuum seal should be released at this time. You may notice some bubbling of the media in the plate at this time. This is normal and will not affect cell performance.
3. In a sterile environment, remove the plate from the bag, taking care to not disturb the cover top from the plate. Open the lid and remove the white liner using sterile forceps or a hemostat and discard. Carefully remove the clear adhesive seal by grabbing the edge with sterile forceps or hemostat and lifting the film slowly towards the other end. Discard adhesive film in appropriate biohazard waste container. Replace lid on plate.
4. The excess media added to each well for shipping should be removed before incubation in a humidified atmosphere CO<sub>2</sub> incubator. Depending upon the plate configuration, please use the chart below to determine media volumes to remove from each well.

| Cultureware             | Total shipping volume per well | Removal volume per well |
|-------------------------|--------------------------------|-------------------------|
| 96 well plates          | 300 µl/well                    | 150 µl                  |
| 48 well plates          | 1.3 ml/well                    | 0.8 ml                  |
| 24 well plates          | 3.0 ml/well                    | 2.0 ml                  |
| 12 well plates          | 5.8 ml/well                    | 3.8 ml                  |
| 6 well plates           | 8.8 ml/well                    | 5.8 ml                  |
| 75cm <sup>2</sup> flask | 260ml/flask                    | 240 ml                  |
| 25cm <sup>2</sup> flask | 72 ml/flask                    | 65 ml                   |

5. Keep the plates at 37°C with 5% CO<sub>2</sub> in a humidified incubator until ready for use. Differentiation into adipocytes should be initiated immediately (see page 7). If cells are to be maintained as preadipocytes, they should be fed with Omental Preadipocyte Medium (OM-PM) every other day.
6. Preadipocytes are flat, phase-dark spindle-shaped cells. The cells have a similar appearance in culture to fibroblasts or smooth muscle cells. The majority of the preadipocytes will differentiate into adipocytes using Omental Differentiation Medium (cat# OM-DM) and Omental Adipocyte Medium (cat# OM-AM) as described in this manual. The differentiation efficiency varies depending on the donor. Please see the Certificate of Analysis that came with your order for information specific to the cells you have received.

# Maintenance of Omental Adipocytes

Your adipocytes have arrived in our patented CellPorter™ packaging system. Upon receiving the plates, please follow the instructions carefully to ensure your safety and the optimal performance of these cells.

1. Check the seal for each plate. Call Zen-Bio if there is any problem with the shipment. Please be aware that these cells are of human origin. Please treat them as potentially infectious since we cannot test for all pathogens. **ALWAYS WEAR GLOVES AND USE PROTECTIVE MEASURES WHEN HANDLING HUMAN PRIMARY CELLS.**
2. Place the package into a sterile environment. **THIS IS VERY IMPORTANT SINCE BREAKING THE VACUUM SEAL MAY POTENTIALLY INTRODUCE CONTAMINATION INTO THE PLATE.** Use scissors to snip open the bag at any end. The vacuum seal should be released at this time. You may notice some bubbling of the media in the plate at this time. This is normal and will not affect cell performance.
3. In a sterile environment, remove the plate from the bag, taking care to not disturb the cover top from the plate. Open the lid and remove the white liner using sterile forceps or a hemostat and discard. Carefully remove the clear adhesive seal by grabbing the edge with sterile forceps or hemostat and lifting the film slowly towards the other end. Discard adhesive film in appropriate biohazard waste container. Replace lid on plate.
4. The excess media added to each well for shipping should be removed for incubation in a CO<sub>2</sub> incubator. **When changing medium, do not remove all the liquid as the cells will detach and float.** Depending upon the plate configuration, please use the chart below to determine media volumes to remove from each well.

| Cultureware             | Total shipping volume per well | Removal volume per well |
|-------------------------|--------------------------------|-------------------------|
| 96 well plates          | 300 µl/well                    | 150 µl                  |
| 48 well plates          | 1.3 ml/well                    | 0.8 ml                  |
| 24 well plates          | 3.0 ml/well                    | 2.0 ml                  |
| 12 well plates          | 5.8 ml/well                    | 3.8 ml                  |
| 6 well plates           | 8.8 ml/well                    | 5.8 ml                  |
| 75cm <sup>2</sup> flask | 260ml/flask                    | 240 ml                  |
| 25cm <sup>2</sup> flask | 72 ml/flask                    | 65 ml                   |

5. Keep the plates at 37°C with 5% CO<sub>2</sub> in a humidified incubator until ready for use.
6. The adipocytes should be fed with Omental Adipocyte Medium (OM-AM) if not used within 5-7 days of arrival. When feeding, we recommend you remove and replace approximately half of the volume of each well.
7. The adipocytes should remain healthy and responsive for at least three weeks after induction of differentiation. Unless otherwise stated on the plate, cultured adipocytes will be 2-3 weeks old upon receipt. Human differentiated adipocytes do not replicate and cannot be trypsinized without cell lysis. Different lots will vary due to patient variation. When large numbers of a particular lot are needed, please contact Zen-Bio to reserve a lot for any specific orders.

## Differentiation of Omental Preadipocytes into Adipocytes

1. Omental preadipocytes are plated to be confluent in Omental Preadipocyte Medium (cat# OM-PM) and shipped the same day via overnight delivery. **Differentiation should be initiated within 24 hours after receiving the cells.** Please contact Zen-Bio, Inc. to coordinate the shipping date with your schedule.
2. To start the process, aspirate the entire volume of Omental Preadipocyte Medium from all wells. Add the appropriate volume of Omental Differentiation Medium (catalog # OM-DM) to the wells (see Table 1. Feeding Volumes). Incubate plate for 7 days at 37°C and 5% CO<sub>2</sub>.
3. After 7 days, cells should be fed by removing some of the media and replacing with fresh Omental Adipocyte Medium (catalog # OM-AM (See Table 1. Feeding Volumes). **Caution: Do not dry the wells. Add new medium gently. If using an automatic feeder, set the slowest flow rate possible.**

**Table 1. Feeding Volumes**

| Format        | Plating      | Change OM-PM to OM-DM |              | Change OM-DM to OM-AM |              | Change OM-AM to OM-AM |              |
|---------------|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
|               | <u>IN</u>    | <u>OUT</u>            | <u>IN</u>    | <u>OUT</u>            | <u>IN</u>    | <u>OUT</u>            | <u>IN</u>    |
| 96 well plate | 150 µl /well | 150 µl /well          | 150 µl /well | 90 µl /well           | 120 µl /well | 90 µl /well           | 90 µl /well  |
| 48 well plate | 500 µl /well | 500 µl /well          | 500 µl /well | 300 µl /well          | 400 µl /well | 300 µl /well          | 300 µl /well |
| 24 well plate | 1.0 ml/well  | 1.0 ml/well           | 1.0 ml /well | 0.6 ml/well           | 0.8 ml/well  | 0.6 ml/well           | 0.6 ml/well  |
| 12 well plate | 2.0 ml/well  | 2.0 ml/well           | 2.0 ml/well  | 1.2 ml/well           | 1.6 ml/well  | 1.2 ml/well           | 1.2 ml/well  |
| 6 well plate  | 3.0 ml/well  | 3.0 ml/well           | 3.0 ml/well  | 1.8 ml/well           | 2.4 ml/well  | 1.8 ml/well           | 1.8 ml/well  |
| T-75 flask    | 20 ml/flask  | 20 ml/flask           | 20 ml/flask  | 12 ml/flask           | 16 ml/flask  | 12 ml/flask           | 12 ml/flask  |
| T-25 flask    | 7 ml/flask   | 7 ml/flask            | 7 ml/flask   | 4.2 ml/flask          | 5.6 ml/flask | 4.2 ml/flask          | 4.2ml/flask  |

**Table 2. Summary Culture area, Zen-Bio Recommended Cultureware**

| Multi-well Plate Format                              | 6           | 12          | 24          | 48          | 96          |
|--|-------------|-------------|-------------|-------------|-------------|
| <b>Greiner Bio-One Cellstar, cm<sup>2</sup>/well</b> | <b>9.62</b> | <b>3.87</b> | <b>1.94</b> | <b>1.02</b> | <b>0.35</b> |
| Cat#   | 657160      | 665180      | 662160      | 677180      | 655180      |
| <b>Costar/Corning, cm<sup>2</sup>/well</b>           | <b>9.50</b> | <b>3.80</b> | <b>1.90</b> | <b>0.95</b> | <b>0.32</b> |
| Cat#   | 3516        | 3513        | 3526        | 3548        | 3595        |
| <b>Nunc, cm<sup>2</sup>/well</b>                     | <b>9.60</b> | <b>3.50</b> | <b>1.90</b> | <b>1.10</b> | <b>0.33</b> |
| Cat#   | 152795      | 150628      | 143982      | 150687      | 167008      |

## Plating Procedure for Cryopreserved Omental Preadipocytes (Catalog # OP-F)

**Please note: Primary cells can be very sensitive to brands of cultureware. Zen-Bio does not currently recommend the use of Falcon brand plates or flasks. Our scientists are using Nunc, Costar/Corning, or Greiner bio-one CellStar tissue culture treated plates and flasks. Please contact us if you have any questions.**

1. Remove cells from liquid nitrogen and place immediately into a 37°C water bath and agitate while in bath. Be careful not to submerge the cap of the vial into water. Do not leave the vials in water bath after most of the content has thawed. Rinse the vials with 70% ethanol before taking them to the culture hood.
2. Upon thawing, transfer the cells to a sterile conical bottom centrifuge tube containing 10 ml of Omental Preadipocyte Medium (cat # OM-PM). Centrifuge: 1,200 rpm (282 X g) / 20°C / 5 minutes. Aspirate the supernatant. TAKE CARE TO NOT ASPIRATE ANY OF THE CELL PELLET.
3. The cell vial contains a minimum of  $2.0 \times 10^6$  viable cells; however, we recommend performing a cell count to determine a more exact number of cells. Resuspend the cell pellet in 2 ml Omental Preadipocyte medium, dilute an aliquot in 0.4% trypan blue solution. We suggest withdrawing an aliquot of 50  $\mu$ l of cells and mixing with 100  $\mu$ l of the trypan blue solution, resulting in a dilution factor of 3. Count live (unstained) cells on a hemacytometer.
4. Plate approximately 40,625 cells /  $\text{cm}^2$  using the media volumes from the table below. Refer to the manufacturer's specifications for the specific cultureware brand you are using.

| FORMAT        | VOLUME PER WELL | TOTAL VOLUME PER FORMAT* |
|---------------|-----------------|--------------------------|
| 96 well plate | 150 $\mu$ l     | 14.4 ml                  |
| 48 well plate | 500 $\mu$ l     | 24.0 ml                  |
| 24 well plate | 1 ml            | 24.0 ml                  |
| 12 well plate | 2 ml            | 24.0 ml                  |
| 6 well plate  | 3 ml            | 18.0 ml                  |
| 10 cm dish    | 15 ml           | 15.0 ml                  |
| T-75 flask    | 20 ml           | 20.0 ml                  |
| T25 flask     | 7 ml            | 7.0 ml                   |

**\*We recommend preparing slightly larger volumes to allow for loss due to foam and pipet error.**

5. Plate cells in desired format and place in a humidified 37°C incubator with 5%  $\text{CO}_2$ . Do not agitate the plate, as cells will not plate evenly.
6. Twenty-four hours after plating, check the plates for confluence. If they are not completely confluent, leave for an additional 24 hours maximum before inducing differentiation. If the cells are not confluent after 48 hours, DO NOT INDUCE DIFFERENTIATION (differentiation will be poor). Contact Zen-Bio immediately.
7. To differentiate the cells please see the protocol on page 7 starting at step 2.



## Troubleshooting Guide

| Observation                           | Possible causes   | Suggestions   |
|---------------------------------------|---|---|
| Preadipocytes do not differentiate    | <ol style="list-style-type: none"> <li>1. Cells have been passaged</li> <li>2. Differentiation conditions not optimal</li> <li>3. Cells were plated at a low density</li> <li>4. Cultureware used not optimal for human primary adipocytes</li> </ol> | <ol style="list-style-type: none"> <li>1. Omental cells will arrive at passage 2 or 3. We do not recommend expanding the omental cells.</li> <li>2. Use our defined Differentiation Medium (OM-DM). Make sure that wells are confluent BEFORE initiating differentiation.</li> <li>3. Use the cell density recommended in our manual</li> <li>4. Zen-Bio does not recommend the use of Falcon cultureware for all cell culture applications</li> <li>5. Verify the surface area for the cultureware brand you are using.</li> </ol> |
| Edge effects                          | <ol style="list-style-type: none"> <li>1. Medium in outside wells evaporated</li> </ol>   | <ol style="list-style-type: none"> <li>1. Ensure a saturated humidity in the incubator and feed the cells no less than every 3 days. Make sure multiple plates are stacked no more than 3 plates high.</li> </ol>   |
| Adipocytes appear uneven in each well | <ol style="list-style-type: none"> <li>1. Medium was completely removed during feeding</li> <li>2. Fresh medium was added too quickly</li> <li>3. Cells placed on uneven surface in the incubator</li> </ol>  | <ol style="list-style-type: none"> <li>1. Make sure to follow instructions listed in Table 1. Feeding Volumes</li> <li>2. Add media slowly to each well. Position the pipet tips halfway down, pressing on the side of the wells and slowly release the medium.</li> <li>3. Place cultureware are on a level surface in the incubator to ensure cells attach evenly.</li> </ol>   |

# Frequently Asked Questions

## **When do the cells differentiate?**

Oil droplets should appear within 7-8 days after differentiation is induced. They look extremely small initially. Lipid accumulation continues throughout the first two weeks. The oil droplets gradually fuse to several big locules.

## **Can I pass the cells?**

Adipocytes cannot be passed since they float after trypsinization. We do not recommend expanding the visceral preadipocytes. Cells are shipped at Passage 2, 3 or 4; please see vial or plate label to determine passage number of the lot of cells you have received. Please contact Zen-Bio for your studies in which large numbers of omental cells are required.

- **How long do the cells last?**

Adipocytes retain similar morphology and express adipocyte specific genes for at least 3-4 weeks.

[NOTE: Cultured adipocytes are usually shipped at 2 weeks old.]

## **Should antibiotics be included in the medium?**

Yes. Antibiotics and anti-fungal agents are always recommended since the cells are primary cells. All Zen-Bio media contain antibiotics and anti-fungal agents except Omental Basal Medium (OM-BM).

- **Where are the cells from?**

The preadipocytes are isolated from human omental adipose tissue.

- **How are the cells shipped?**

Cells cultured in multiple-well plates are sealed using our patented Cell Porter package method and shipped to customers via Federal Express overnight delivery.

## **How long do I have to wait before receiving the cells?**

We do not ship cells to domestic locations on Fridays. In general, preadipocytes (in culture or cryopreserved) can be shipped the second day after the purchase order is confirmed. Please inquire as to the availability of the adipocytes when ordering. All omental cultured adipocyte orders require 2 weeks to prepare.

- **Can I differentiate the cells myself?**

Yes. You can order preadipocytes and pre-made culture media for adipocyte differentiation. Simple instructions for differentiating the cells are found in this manual.

## **Do you test for pathogens? Which ones?**

Yes. Each donor is tested via PCR and found non-reactive for HIV-1, HIV-2, HTLV I, HTLV II, hepatitis B and hepatitis C. However, since we cannot test all pathogens, please treat the culture as a potentially infectious agent.

## **What donor information do I get?**

The donor's gender, age, and BMI will be provided. Additional clinical information such as fasting blood glucose or medications taken can be obtained for an additional price. Please contact Zen-Bio for more specific details.

**Are the cells from one donor?**

Yes. We can also provide lot numbers containing cells mixed from 5 to 8 donors to get average responses. Please inquire about availability of single donor and mixed donor (called a superlot) lots at time order is placed.

**What if I want to test my own compounds in differentiation?**

Please call or fax special media requests.

**What is the formulation of Zen-Bio's serum-free media?**

Zen-Bio's serum-free media are not enhanced to supplement the absence of serum. These media are available for assay procedures where cells are rested from serum. Do not differentiate preadipocytes in serum-free medium.

## Pathogen Testing

Each donor is tested via PCR and found non-reactive for HIV-1, HIV-2, HTLV I, HTLV II, hepatitis B and hepatitis C. However, no known test can offer complete assurance that the cells are pathogen free. Our products are tested and are free from mycoplasma contamination. Proper precautions and biological containment should be taken when handling cells of human origin, due to their potential biohazardous nature. All human based products should be handled at a BSL-2 (Biosafety Level 2) or higher. Always wear gloves and work behind a protective screen when handling primary human cells.

## References

Lists of articles using Zen-Bio, Inc cultured human cultured preadipocytes and adipocytes may be found at our website (<http://www.zen-bio.com>) under the COMPANY button.

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