## Primary Cells for Scientific Research

# Rat Brown Adipocytes

**Cat. No. : CP-R244**

## General Information

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| **Species** | Rat/SD rats |
| **Tissue Type** | Other system |
| **Tissue** | Brown adipose tissue |
| **Cell Type** | Adipocyte |
| **Morphology** | Spindle-shaped; polygonal; round |
| **Growth Properties** | Adherent |
| **Storage Conditions** | For long-term cryopreservation, cryovials should be stored in liquid nitrogen at −150°C to −196°C. Storage at −80°C is restricted to short-term interim use only. |

## Culture Conditions and Handling

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| **Complete Medium** | Rat Brown Adipocyte Complete Medium[CM-R244] |
| **Population Doublings** | Not recommended for expansion or long-term culture |
| **Subcultivation Ratio** | Non-subculturable |
| **Dissociation Reagent** | 0.25% trypsin |
| **Coating Conditions** | PLL (0.1 mg/mL) |
| **Medium Renewal** | Every 2 to 3 days |
| **Freezing Medium** | General Freezing Medium[PB180436] |
| **Incubation Atmosphere** | Air，95%；$CO_2$，5% |
| **Temperature** | 37°C |
| **Instructions** | 1. Check all containers for leakage or breakage.<br>2. Remove the frozen cells from the dry ice packaging and immediately transfer them to liquid nitrogen (liquid or vapor phase) for long-term cryopreservation.<br>3. Rat brown adipocytes have low buoyant density, adhere poorly, and tend to float. Coating before seeding is recommended. |
| **Subculturing Procedure** | Adherent cell dissociation |

**Subculturing Procedure**

1. Aspirate the culture medium from the T25 flask and wash the cells once with phosphate-buffered saline (PBS).
2. Add 1 mL of 0.25% trypsin solution to the T25 flask. Gently swirl the flask to ensure the solution fully covers the bottom surface, then aspirate 500–700 µL of the trypsin solution. Incubate at 37°C for 1–3 min. Examine the cells under an inverted microscope. Once cells become rounded and retracted, add 5 mL of complete growth medium to neutralize the digestion.
3. Gently pipette to mix and dissociate the cells. Subculture into a new T25 flask at the recommended split ratio, and top up with fresh complete growth medium to a final volume of 5 mL. Incubate the flask in a humidified incubator at 37°C with 5% $CO_2$ .
4. Once the cells have fully adhered, assess cell viability and confluency under a microscope prior to downstream experiments. Subsequently, refresh the medium with fresh complete growth medium per the standard cell maintenance protocol.
5. Centrifugation is not recommended for these cells. If centrifugation is required, centrifuge at 1600 rpm for 5 min (speed may be increased as appropriate). Collect the cell pellet, and also collect approximately 1 mL of the top layer of the supernatant (mature adipocytes have low buoyant density and partially float on the surface). Return both fractions to the original culture flask.
6. Digestion and subculture are not recommended for these cells. These procedures may cause mature adipocytes to transdifferentiate into preadipocytes, with reduced lipid droplets. Partial recovery can be achieved by re-induction with adipogenic induction medium for 2–3 days.

## Background

Rat brown adipocytes (*Rattus norvegicus*) are isolated from brown adipose tissue. They are specialized adipocytes containing numerous small lipid droplets and abundant mitochondria in the cytoplasm, and express uncoupling protein 1. Their core functions include: generating heat through non-shivering thermogenesis to maintain body temperature; consuming excess energy to regulate energy balance; and secreting adipokines to participate in metabolic regulation. Reduced quantity or impaired function of rat brown adipocytes is closely associated with obesity, diabetes, metabolic syndrome and cardiovascular diseases. In vitro-cultured rat brown adipocytes serve as a core cell model for investigating energy metabolism and obesity therapy.

Rat brown adipocytes isolated from Procell Laboratory are prepared by combined collagenase-trypsin digestion to obtain preadipocytes, followed by induction culture in adipogenic induction medium. Each vial contains approximately $5 \times 10^5$ cells.

Rat brown adipocytes isolated from Procell Laboratory exhibit positive Oil Red O staining, with an adipogenic differentiation rate greater than 60%. In addition, the cells test negative for HIV-1, HBV, HCV, mycoplasma, bacteria, yeast and fungi.

## Handling Recommendations for Cryopreserved Cells

### Preparations Before Thawing

1. Primary cells have high nutritional demands; therefore, prepare complete culture medium in advance.
2. Preheat the complete culture medium to 37°C for 30 minutes.
3. Prepare 9 mL of complete medium within a sterile centrifuge tube to dilute the cryoprotectant present in the frozen cell suspension.

4. Use sterile gloves to protect the cryovial from contact with the water bath water, and preventing cell contamination.

### Thawing Procedure

1. Retrieve the cryovial containing frozen cells from liquid nitrogen storage. Place it in sterile gloves and immediately submerge it in a 37°C water bath.
2. Thaw the cells rapidly (<1 minute) by gently swirling the vial in the 37°C water bath until only a small ice crystal remains.
3. Transfer the vial to a laminar flow hood. Wipe the exterior of the vial with 75% ethanol before opening.
4. Transfer the thawed cells dropwise into a preheated 9 mL centrifuge tube containing complete medium.
5. Centrifuge the cell suspension at approximately 250 × g for 5 minutes. For cells characterized by low density and small volume, such as lymphocytes and suspended cells, the centrifugation speed can be appropriately increased to 400 × g for 8 minutes.
6. After centrifugation, discard the supernatant and retain the cell pellet.
7. Gently resuspend the cells in complete growth medium, then transfer them to an appropriate culture vessel and place it in the recommended culture environment.

### Notes

1. The entire recovery process should be completed as quickly as possible.
2. Select the culture vessel size based on the number of cells in the cryovial. Procell single cryovials are recommended for resuspension in 6 cm dishes or T25 flasks.
3. Minimize the time thawed cells are kept at room temperature. DMSO must be immediately diluted or removed by centrifugation.

## Precautions After Receipt of Frozen Cells

1. Upon unpacking, inspect the condition of the frozen cells and dry ice, and take photographs immediately. The following after-sales service will be provided based on these photographs, including assessment of the remaining dry ice, verification that the cryovial was fully buried in dry ice, and evaluation of whether the cells thawed and refrozen during transit.
2. Upon receipt, the cells should be transferred to liquid nitrogen immediately or directly resuscitated. If liquid nitrogen is unavailable, the cells can be temporarily stored at -80°C, however, the storage period should be limited to less than one week whenever possible. Prolonged storage at -80°C may gradually reduce post-thaw cell viability, and the extent of this viability loss is unpredictable.
3. Ensure that the operator has sufficient knowledge and experience in cell culture, and the laboratory is equipped with essential instruments, including a biosafety cabinet, $CO_2$ incubator, inverted microscope, centrifuge, water bath. Carefully review the cell instruction manual to understand key cell characteristics including growth properties (adherent or suspension), morphology, basal medium requirements, serum concentration, cytokine supplementation, subcultivation ratio, medium renewal schedule.
4. After resuscitation, observe the cells under a microscope and record the cell status by taking photographs (1-3 images each at 100× and 200× magnification for 3 consecutive days). These images will serve as supporting documentation for follow-up services. In addition, a small aliquot of cells may be used to assess cell viability by automated cell counting or trypan blue staining.

**Note:** Cells should not be observed too frequently within the first 24 hours after resuscitation, as this may affect cell growth or adherence. Observation once per day is sufficient.

5. Primary cells have a limited number of passages; it is recommended that they be used as soon as possible.