

C2C12 Cells | 400476

General information

Description

The C2C12 cell line, an immortalized mouse myoblast cell line derived from the thigh muscle of a 2-month-old mouse of the C3H mouse strain, is extensively utilized in biomedical research for its unique cell differentiation properties. C2C12 myoblast cells proliferate rapidly and exhibit typical myoblast characteristics under high serum conditions. Upon shifting to low serum conditions or starvation, C2C12 cells initiate myogenic differentiation, transitioning into myotubes, which are precursors to contractile skeletal muscle cells.

C2C12 cells incorporate exogenous cDNA and nucleic acids through transfection easily, making them a good choice for gene expression studies and investigations into myoblasts and myotubes differentiation. The differentiation process is marked by the expression of myogenic markers such as Myf5, MyoD, Myogenin, and Mrf4, alongside muscle-specific markers like Csrp3 and Mef2a, which are essential in studying different muscle phenotypes and skeletal muscle regeneration.

The unique shape of C2C12 myoblasts and their transformation into myoblast cell rings and subsequently into mature myotubes in serum-supplemented media underscore the dynamic nature of these cells and their potential in skeletal muscle research.

Researchers use substrates like gelatin hydrogels for C2C12 cell cultures to simulate in vivo muscle conditions, enabling detailed studies of muscle cell development and extracellular matrix effects. Metabolic profiling reveals key insights into the pathways involved in muscle formation and recovery, focusing on essential proteins and calcium's role in contraction. Gene silencing techniques further illuminate the differentiation process, highlighting the significance of SMAD1 phosphorylation in muscle regeneration, crucial for understanding recovery in muscle wasting and injury.

In summary, the C2C12 cell line serves as a critical tool in the realm of biomedical research, offering a versatile platform for exploring the intricacies of muscle formation, differentiation, gene expression, and the profound impact of various factors on the skeletal muscle cell lineage, including the pivotal role of myofilaments, intermediate filament proteins, and the overall organismal context in which these cellular processes unfold.

Organism Mouse

Tissue Muscle

Applications Transfection host

Synonyms C2c12, C2-C12, C12

Characteristics

Age 2 months

Gender Female

Morphology Myoblast-like

C2C12 Cells | 400476**Cell type** Myoblast**Growth properties** Adherent**Identifiers / Biosafety / Citation****Citation** C2C12 (Cytion catalog number 400476)**Biosafety level** 1**Expression / Mutation****Handling****Culture Medium** RPMI 1640, w: 2.1 mM stable Glutamine, w: 2.0 g/L NaHCO₃ (Cytion article number 820700a)**Medium supplements** Supplement the medium with 10% FBS**Passaging solution** Accutase**Doubling time** 24 hours**Subculturing** Remove the old medium from the adherent cells and wash them with PBS that lacks calcium and magnesium. For T25 flasks, use 3-5 ml of PBS, and for T75 flasks, use 5-10 ml. Then, cover the cells completely with Accutase, using 1-2 ml for T25 flasks and 2.5 ml for T75 flasks. Let the cells incubate at room temperature for 8-10 minutes to detach them. After incubation, gently mix the cells with 10 ml of medium to resuspend them, then centrifuge at 300xg for 3 minutes. Discard the supernatant, resuspend the cells in fresh medium, and transfer them into new flasks that already contain fresh medium.**Split ratio** A split ratio of 1:3 to 1:5 is recommended**Seeding density** 1 x 10⁴ cells/cm² will yield in a confluent layer in about 4 days**Fluid renewal** Every 3 to 5 days**Freezing recovery** After thawing, plate the cells at 5 x 10⁴ cells/cm² and allow the cells to recover from the freezing process and to adhere for at least 24 hours.

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Freeze medium

CM-1 (Cytion catalog number 800100)

Handling of cryopreserved cultures

1. Confirm that the vial remains deeply frozen upon delivery, as cells are shipped on dry ice to maintain optimal temperatures during transit.
2. 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.
3. 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.
4. Perform all subsequent steps under sterile conditions in a flow hood, disinfecting the cryovial with 70% ethanol before opening.
5. 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.
6. Centrifuge the mixture at $300 \times g$ for 3 minutes to separate the cells and carefully discard the supernatant containing residual freezing medium.
7. 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.
8. Adhere to established subculture protocols for continued growth and maintenance of the cell line, ensuring reliable experimental outcomes.

Quality control / Genetic profile / HLA

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.

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STR profile

M_18-3: 16
M_4-2: 19. Mrz
M_6-7: 12
M_3-2: 14
M_19-2: 12
M_7-1: 26
M_1-1: 10
M_8-1: 17
M_2-1: 9
M_15-3: 25. Mrz
M_6-4: 18
M_11-2: 16
M_1-2: 16
M_17-2: 15
M_12-1: 16
M_5-5: 15
M_X-1: 25,26
M_13-1: 17
Human D4/D8: -