MUSCLE CELL RESEARCH

Derive, Expand, and Differentiate Human Skeletal Muscle Progenitor Cells

MyoCult™: A Complete Workflow

Skeletal muscle progenitor cells (also known as satellite cells) are studied to gain insight into muscle biology and are used for preclinical investigations into muscle-related diseases and drug discovery. The MyoCult™ Workflow supports your muscle research from start to finish, allowing you to derive, expand, and differentiate human skeletal muscle progenitors. A schematic presentation of the workflow is illustrated in Figure 1.

MyoCult™-SF Expansion Supplement Kit (Human)

The serum-free MyoCult™-SF Expansion Supplement Kit (Human; Catalog #05980) is optimized to derive and expand PAX7$^+$ human skeletal muscle progenitors following tissue isolation (Figure 2). Complete MyoCult™-SF Expansion Medium is prepared by combining the expansion supplement with the basal DMEM medium (Catalog #36253). MyoCult™-expanded myoblasts generate a greater number of cells per passage compared to serum-containing media (Figure 3). Cryopreserved and human pluripotent stem cell (hPSC)-derived myoblasts can also be expanded using this kit (Figure 4).

Why Use the MyoCult™-SF Expansion Supplement Kit (Human)?

CONSISTENT. Serum-free formulation improves experimental reproducibility.

HIGH PERFORMANCE. Superior cell expansion when compared to serum-containing media.

FUNCTIONAL. Cultured myoblasts retain robust expansion and differentiation capacities.

OPTIMIZED. Supports myoblast derivation and expansion directly from primary human skeletal muscle progenitors and cryopreserved or hPSC-derived myoblasts.

Primary skeletal muscle progenitors can be derived using MyoCult™-SF Expansion Medium and enriched further by the EasySep™ Human CD56 Positive Selection Kit II (Catalog #17855). The resulting cells, known as myoblasts, retain a robust differentiation capacity (Figures 4,5) and can be used for a wide range of downstream applications.

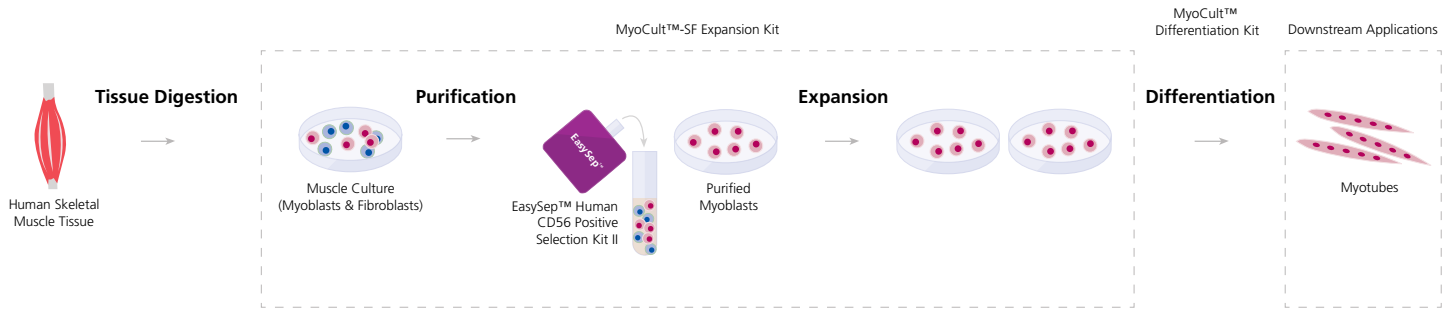

Figure 1. The MyoCult™ Workflow for Derivation, Expansion, and Differentiation of Human Skeletal Muscle Progenitor Cells

Human skeletal muscle tissue is digested into a single-cell suspension and plated into MyoCult™-SF Expansion Medium. Myoblasts are then enriched by cell sorting or using a selection kit such as the EasySep™ Human CD56 Positive Selection Kit II. Purified myoblasts can be expanded for downstream applications or differentiated into myotubes using the MyoCult™ Differentiation Kit (Human; Catalog #05965).

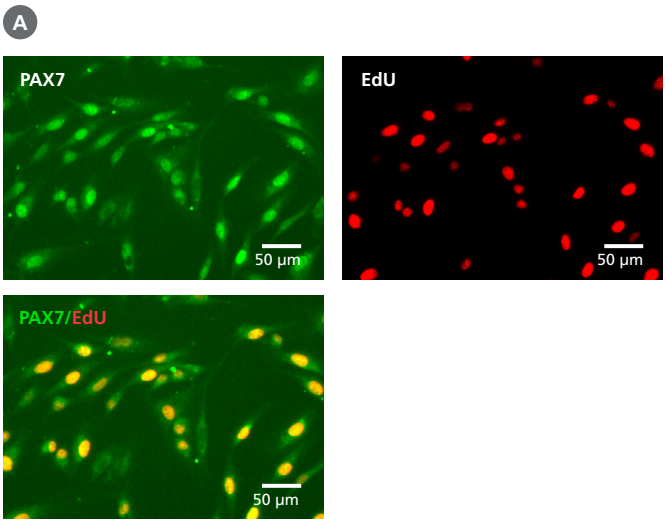

Figure 2. MyoCult™-SF Expansion Medium Derives PAX7⁺ Skeletal Muscle Progenitor Cells From Human Muscle

Skeletal muscle progenitor cells were derived from human skeletal muscle tissue and expanded using the MyoCult™-SF Expansion Kit or a serum-containing medium. (A) Following 6 days of expansion, myoblasts were fixed and immunostained for PAX7 (green) and a thymine analogue (EdU; red) to identify proliferating myogenic progenitors. (B) Total percentage of cells expressing PAX7, or PAX7 and EdU were quantified (n = 4). Data were generated and used with permission by Dr. Penney M. Gilbert's Lab, Department of Biochemistry, University of Toronto. Error bars represent standard error of mean (SEM).

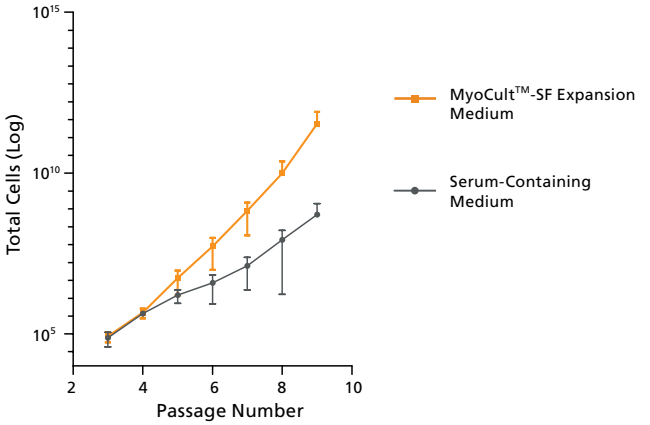

Figure 3. MyoCult™-SF Expansion Medium Enables Long-Term Expansion of Primary Human Myoblasts

Expansion of myoblasts in MyoCult™-SF Expansion Medium generated a greater yield of CD56⁺ cells after 9 passages compared to myoblasts cultured in serum-containing medium (P9; n = 2). Data were generated and used with permission by Dr. Penney M. Gilbert's Lab, Department of Biochemistry, University of Toronto. Error bars represent SEM.

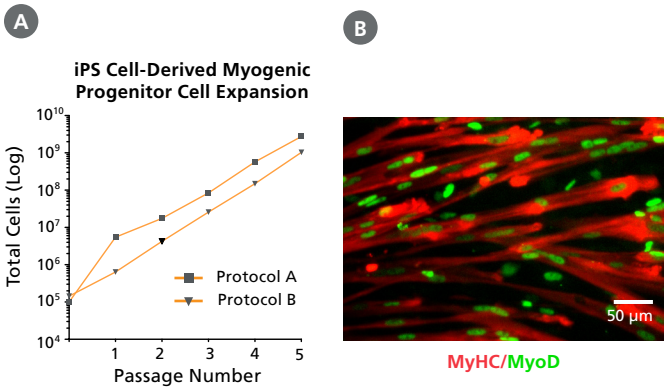

Figure 4. MyoCult™-SF Expansion Medium Supports Expansion of Human iPS Cell-Derived Skeletal Muscle Progenitor Cells

(A) Induced pluripotent stem (iPS) cell-derived skeletal progenitor cells displayed long-term expansion when using the MyoCult™-SF Expansion Supplement Kit (Human). iPS cell-derived skeletal progenitor cells were generated using the Chal et al. (Protocol A) and Xi et al. (Protocol B) methods.[1-2] (B) Culture-expanded iPS cell-derived skeletal progenitor cells were differentiated using the MyoCult™ Differentiation Kit (Human) and expressed MyHC (red) and MyoD (green). Similar results were observed for embryonic stem (ES) cell-derived muscle progenitors.

MyoCult™ Differentiation Kit (Human)

The MyoCult™ Differentiation Kit (Human; Catalog #05965) is optimized for the in vitro differentiation of human myoblasts into multinucleated myotubes. The Animal Component-Free (ACF) Attachment Substrate included in this kit enhances differentiation and supports myotube attachment to cultureware. Myoblasts treated with the MyoCult™ Differentiation Kit (Human) can differentiate into fully matured myotubes with a high fusion index in as little as five days (Figure 5).

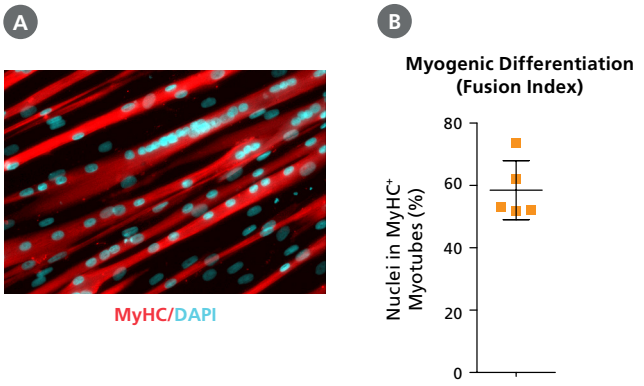

Figure 5. Primary Human Myoblasts Expanded in MyoCult™-SF Expansion Medium Maintain Differentiation Capacity

Myoblasts derived and expanded in MyoCult™-SF Expansion Medium were further differentiated into myotubes using the MyoCult™ Differentiation Kit (Human) at passage 5. (A) Myotubes differentiated from myoblasts were immunostained for myosin heavy chain (MyHC; red) and nuclei (DAPI; blue). (B) Approximately 60% of total nuclei were associated with MyHC-expressing myotubes, indicative of high fusion indices of MyoCult™-expanded myoblasts. Each donor is indicated by an orange square. Data are from 5 independent donors. Error bar represents SEM.

Why Use the MyoCult™ Differentiation Kit (Human)?

RELIABLE. Rigorous raw material screening and quality control minimize experimental variability and increase reproducibility.

EFFICIENT. Fast and robust differentiation of human myoblasts into fully mature myotubes.

OPTIMIZED. Attachment substrate supports cell adherence to cultureware and enhances myotube morphology.

Product Information

PRODUCT	SIZE	CATALOG #	COMPONENT
MyoCult™-SF Expansion Supplement Kit (Human)	1 Kit	05980	• MyoCult™-SF Expansion 10X Supplement (Human) (2 x 10 mL) • MyoCult™-SF Attachment Substrate (100 µg)
MyoCult™ Differentiation Kit (Human)	200 mL	05965	• MyoCult™ Differentiation Basal Medium (Human) (190 mL) • MyoCult™ Differentiation 20X Supplement (Human) (10 mL) • Animal Component-Free (ACF) Cell Attachment Substrate (1 mL)

Supporting Products for Human Skeletal Muscle Research

PRODUCT	CATALOG #	APPLICATION
DMEM with 1000 mg/L D-Glucose	36253	General cell culture
EasySep™ Human CD56 Positive Selection Kit II	17855	Purification of CD56+ myoblasts from bulk human skeletal muscle cell culture
Anti-Human CD56 (NCAM) Antibody, Clone HCD56	60021	Characterization and isolation of myoblasts
Anti-Human CD45 Antibody, Clone HI30	60018	
Anti-Human CD45 Antibody, Clone 2D1	60123	

References

1. Chal J. et al. (2016) Generation of human muscle fibers and satellite-like cells from human pluripotent stem cells in vitro. Nat Protoc 11(10): 1833–1859.
2. Xi H. et al (2017) In vivo human somitogenesis guides somite development from hPSCs. Cell Rep (18)6: 1573–1585.