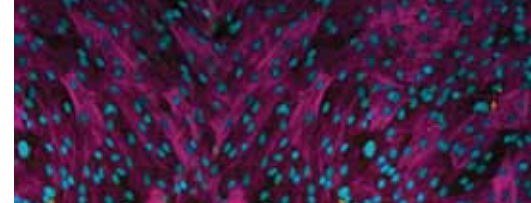
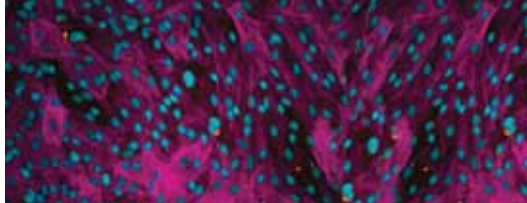


THE ESSENTIALS OF
LIFE SCIENCE RESEARCH
GLOBALLY DELIVERED™



CARDIOVASCULAR CELL SOLUTIONS

We love what we do. And now we do it even better!

As part of your portfolio for success, ATCC now provides a range of cardiovascular products designed to move your research in the right direction. At the heart of each Primary Cell Solutions™ cardiovascular system is a growing collection of human primary cells, which now include:

- Umbilical vein endothelial cells (HUVEC)
- Aortic endothelial cells (HAoEC)
- Aortic smooth muscle cells (HAoSMC)

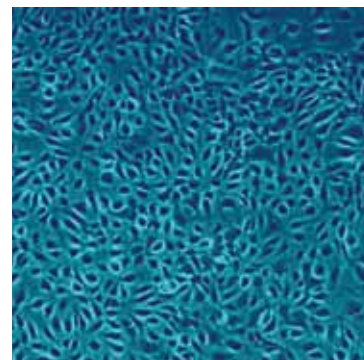
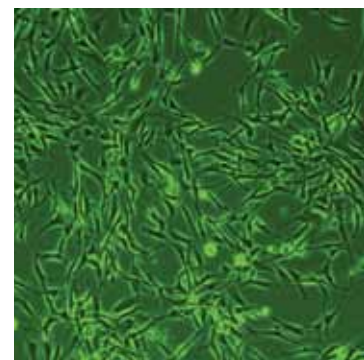
This very special group of cardiovascular cells represents some of the most widely used models for *in vitro* research related to:

- Angiogenesis and normal microvascular growth
- Wound healing, vascular differentiation and tissue remodeling
- Arteriosclerosis, hypertension and arterial disease

ATCC® Primary Cell Solutions cardiovascular cells, when grown in Vascular Cell Basal Medium supplemented with cell-specific growth kits, provide ideal cell systems for propagation in low-serum conditions (5% FBS or less).

Each lot of ATCC Normal Human Cardiovascular Primary Cells is:

- Cryopreserved in the first or second passage to ensure the highest viability and plating efficiency
- Performance tested together with ATCC Primary Cell Solutions media, kit supplements and reagents to guarantee optimum reliability
- Thoroughly tested for sample purity as part of the ATCC commitment to quality



OPTIMIZED MEDIA MAKES A DIFFERENCE

We put a lot of thought into how ATCC could improve the success of *in vitro* primary cell culture, focusing on reliability, consistency and reproducibility. The result was a full system approach, matching each cell type in the Primary Cell Solutions portfolio with:

- An optimal basal media
- Key growth factors and supplements conveniently packaged in ready-to-use kits
- Antibiotics, vessel substrates and subculture reagents

All designed to yield outstanding results and valuable data!

SUPPORTING YOUR CARDIOVASCULAR CELLS IS EASY

Vascular Cell Basal Medium is a sterile, phenol red-free, liquid tissue culture medium intended for use as one component in a complete ATCC Primary Cell Solutions system. Each complete ATCC Primary Cell Solutions vascular cell system is designed to selectively sustain the proliferation and plating efficiency of cells derived from normal human cardiovascular tissues, including smooth muscle cells, large vessel endothelial cells (e.g., umbilical vein, aorta) and microvascular endothelial cells.

Primary large vessel endothelial cells are effectively supported by the cell-specific ATCC Primary Cell Solutions system consisting of Vascular Cell Basal Medium supplemented with either one of two growth kits: Endothelial Cell Growth Kit–BBE or Endothelial Cell Growth Kit–VEGF. Experimental design dictates which Endothelial Cell Growth Kit should be used. Use of the Endothelial Cell Growth Kit–VEGF will support a faster rate of proliferation because of the presence of several purified recombinant human (rh) growth factors (rh VEGF, rh EGF, rh FGF basic and rh IGF-1) combined with heparin and hydrocortisone. Use of the Endothelial Cell Growth Kit–BBE, which contains Bovine Brain Extract (BBE), is recommended if a less defined cell culture medium is desired. The final concentration of Fetal Bovine Serum (FBS) in complete growth medium containing either one of these kits is 2%.

Primary human microvascular endothelial cells are successfully expanded in a Primary Cell Solution composed of Vascular Cell Basal Medium combined with either the Microvascular Endothelial Cell Growth Kit–BBE (mv-BBE Kit) or Microvascular Endothelial Cell Growth Kit–VEGF (mv-VEGF Kit). The rationale for using the mv-BBE Kit versus the mv-VEGF Kit is the same as for the large vessel growth kits. The final concentration of FBS using these kits is 5% in complete growth medium.



Primary aortic smooth muscle cells are best grown in the ATCC Primary Cell Solutions system comprised of Vascular Cell Basal Medium supplemented with the Vascular Smooth Muscle Cell Growth Kit.

These unique formulations are designed to produce cultures with:

- Functional expression of relevant biomarkers
- Normal morphology
- Superior growth and proliferation

Use of this complete system removes the need for additional components such as feeder layers, extracellular matrix proteins or other substrates.

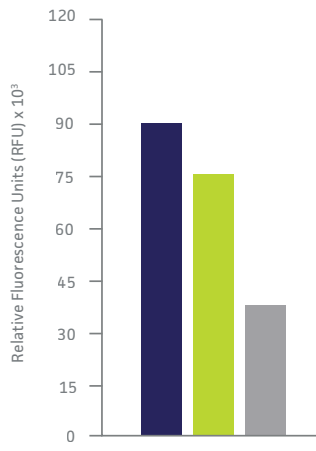
Population Doublings of Primary Cardiovascular Cells in ATCC Complete Growth Media*

Cell Type and Medium	Average Doubling Time (hrs)
Umbilical Vein Endothelial Cells (BBE Growth Kit)	25.7
Umbilical Vein Endothelial Cells (VEGF Growth Kit)	22.7
Aortic Endothelial Cells (BBE Growth Kit)	28.6
Aortic Smooth Muscle Cells (SMC Growth Kit)	28.7

* All cells achieved ≥ 15 population doublings (approximately 4 passages) under these experimental conditions.

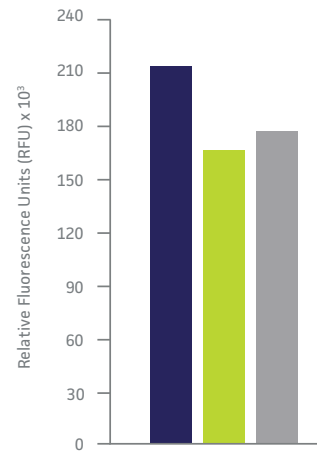
Growth of ATCC Primary Cell Solutions Cardiovascular Cells in Different Brands of Cell-Specific Low Serum or Classical Media

HUVECs & BBE Supplementation



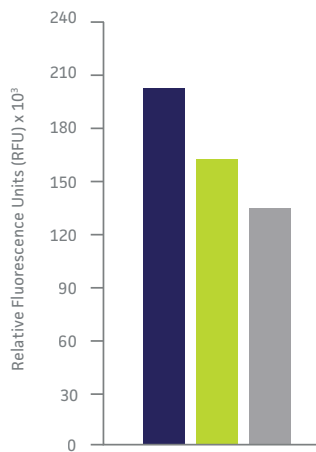
■ ATCC Complete Endothelial Growth Medium + BBE ■ Supplier 1 ■ Supplier 2

HUVECs & VEGF Supplementation



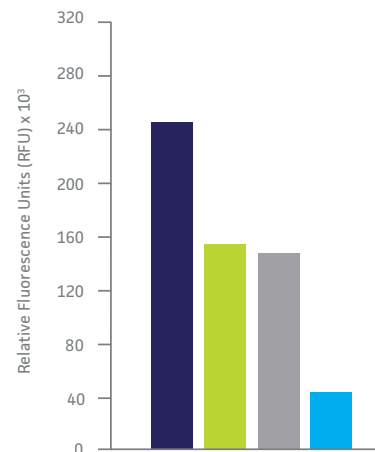
■ ATCC Complete Endothelial Growth Medium + VEGF ■ Supplier 1 ■ Supplier 2

Dermal Microvascular Endothelial Cells & VEGF



■ ATCC Complete Microvascular Endothelial Growth Medium ■ Supplier 1 ■ Supplier 2

HAoSMCs



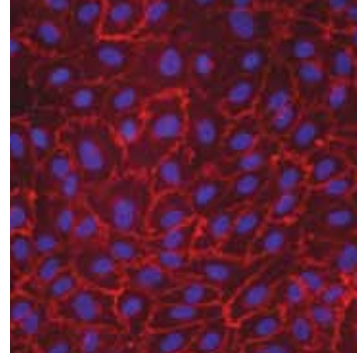
■ ATCC Complete Smooth Muscle Cell Growth Medium ■ Supplier 1 ■ Supplier 2 ■ Classic Medium (DMEM + 10% FBS)

ATCC Primary Cell Solutions primary cells were taken from liquid nitrogen and cultures initiated. The cells were cultured for 3 to 4 days. The cells were then seeded in triplicate into a 24-well plate at 2,000 cells/cm² and grown for 4 days in different brands of low serum media or classical medium. Cell proliferation was measured by adding alamarBlue® to each well, incubating for two hours, and then measuring fluorescence using a Wallac VICTOR2™ MultiLabel Counter. The medium was not changed during the incubation period; the assay is a measure of a media's capacity to support log-phase growth over time. The higher the Relative Fluorescence Unit (RFU) value, the higher the rate of cell proliferation.

Expression of Cell-Specific Markers

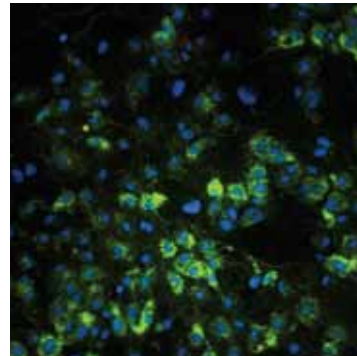
ATCC PCS-100-010

ATCC Primary Cell Solutions umbilical vein endothelial cells were stained for vascular endothelial cadherin (ve cadherin) as a marker for endothelial cells. Red fluorescence indicates the expression of ve cadherin. DAPI was used as the nuclear stain. (Image courtesy of Dr. Edward Cedrone, ATCC Cell Biology Collection Scientist.)



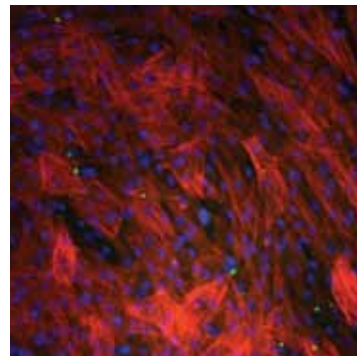
ATCC PCS-100-011

ATCC Primary Cell Solutions aortic endothelial cells were dual stained for von Willebrand factor as a marker for endothelial cells and smooth muscle α -actin. Green fluorescence indicates the expression of von Willebrand factor and red fluorescence points to the expression of α -actin. The nuclei are blue with Hoechst stain. Expression of α -actin was not detectable, demonstrating the purity of the aortic endothelial cell preparation.



ATCC PCS-100-012

ATCC Primary Cell Solutions aortic smooth muscle cells were dual stained for von Willebrand factor as a marker for endothelial cells and smooth muscle α -actin after differentiation. Red fluorescence indicates the expression of α -actin and green fluorescence points to the expression of von Willebrand factor. The nuclei are blue with Hoechst stain.



PUTTING ALL THE PIECES TOGETHER ADDS UP TO YOUR SUCCESS.



To achieve the best possible results, we suggest that you order a complete system for each cell type:

	Product Name	Components	Catalog No.
1	Primary Umbilical Vein Endothelial Cells; Normal, Human	≥ 5 x 10 ⁵ viable cells	PCS-100-010
1	Primary Aortic Endothelial Cells; Normal, Human	≥ 5 x 10 ⁵ viable cells	PCS-100-011
1	Primary Aortic Smooth Muscle Cells; Normal, Human	≥ 5 x 10 ⁵ viable cells	PCS-100-012
1	Primary Umbilical Vein Endothelial Cells; Normal, Human, Pooled	≥ 5 x 10 ⁵ viable cells	PCS-100-013
1	Primary Coronary Artery Endothelial Cells; Normal, Human	≥ 5 x 10 ⁵ viable cells	PCS-100-020
1	Primary Coronary Artery Smooth Muscle Cells; Normal, Human	≥ 5 x 10 ⁵ viable cells	PCS-100-021
1	Primary Pulmonary Artery Endothelial Cells; Normal, Human — COMING SOON	≥ 5 x 10 ⁵ viable cells	PCS-100-022
1	Primary Pulmonary Artery Smooth Muscle Cells; Normal, Human	≥ 5 x 10 ⁵ viable cells	PCS-100-023
1	Primary Dermal Microvascular Endothelial Cells; Normal, Human, Neonatal	≥ 5 x 10 ⁵ viable cells	PCS-110-010
1	Primary Cardiomyocytes; Normal, Human — COMING SOON	≥ 5 x 10 ⁵ viable cells	PCS-120-010
2	Vascular Cell Basal Medium	475 mL	PCS-100-030
3	Endothelial Cell Growth Kit-BBE	1 kit	PCS-100-040
3	Endothelial Cell Growth Kit-VEGF	1 kit	PCS-100-041
3	Vascular Smooth Muscle Cell Growth Kit	1 kit	PCS-100-042
3	Microvascular Endothelial Cell Growth Kit-BBE	1 kit	PCS-110-040
3	Microvascular Endothelial Cell Growth Kit-VEGF	1 kit	PCS-110-041
3	Cardiomyocyte Growth Kit — COMING SOON	1 kit	PCS-120-040
4	Phenol Red	1 mL	PCS-999-001
4	Penicillin-Streptomycin-Amphotericin B Solution	1 mL	PCS-999-002
4	Trypsin-EDTA for Primary Cells	100 mL	PCS-999-003
4	Trypsin Neutralizing Solution	100 mL	PCS-999-004
4	Gentamicin-Amphotericin B Solution	1 mL	PCS-999-025
4	Dulbecco's Phosphate Buffered Saline (D-PBS)	500 mL	ATCC 30-2200

Additional cells/cell types will be added in the coming months.

Visit us online at www.atcc.org/PCS to bookmark the primary cell page for easy reference.

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