



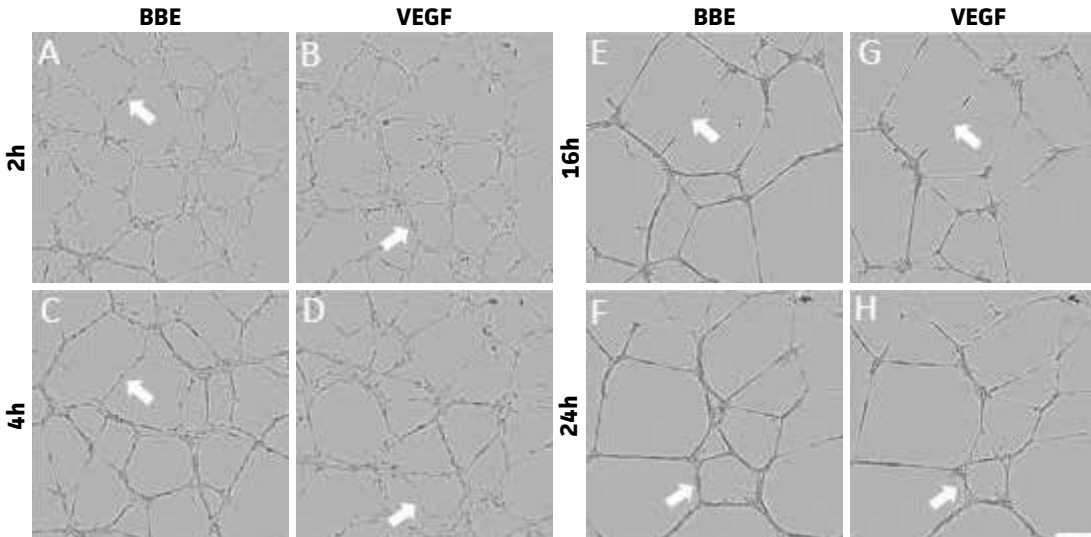
# PRIMARY CARDIOVASCULAR CELLS

## PHYSIOLOGICALLY RELEVANT MODELS OF THE CARDIOVASCULAR SYSTEM

ATCC® offers cardiovascular endothelial and smooth muscle cells as well as growth media and supplements for *in vitro* studies related to:

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

Primary cardiovascular cells display many of the physiological characteristics of their parental cells, making them ideal cell culture models for any of the above applications. For example, primary endothelial cells (HUVECs) have the ability to undergo vascular tubule formation *in vitro* and thus are useful for measuring angiogenesis (Figure 1).

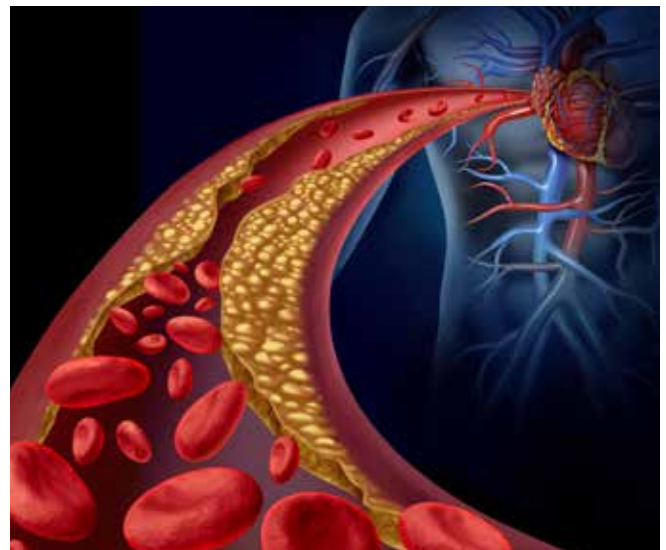


**Figure 1. Microvasculature formation.** Primary normal HUVECs develop angiogenic tubules (white arrows) when cultured on CellMatrix™ gel with ATCC media and either bovine brain extract (BBE) or vascular endothelial growth factor (VEGF). Scale bar = 200  $\mu$ m.

## WELL CHARACTERIZED, HIGH PERFORMANCE PRIMARY CELLS

ATCC primary cardiovascular cells are consistently isolated and processed, minimizing the variation between individual vials as well as production lots. Specification and characterization for each lot of cardiovascular cells includes:

- Provided at passage 2
- At least  $5 \times 10^5$  viable cells per vial
- Capable of greater than 15 population doublings
- Tested for appropriate endothelial and smooth muscle cell-specific markers:
  - Von Willebrand factor
  - VE-cadherin
  - Smooth muscle alpha actin
- Greater than 70% post-thaw viability
- Normal cell morphology
- Gender, age, ethnicity, and cause of death information available
- Negative for bacteria, yeast, fungi, viruses, and mycoplasma



## HIGH VIABILITY HOSTS FOR TRANSFECTION

In search of primary cardiovascular cells that are amenable to nucleic acid transfer for your genetic manipulation experiments? ATCC primary dermal microvascular cardiovascular endothelial cells (DMVEC; ATCC® PCS-110-010™) and primary umbilical vein endothelial cells (HUVEC; ATCC® PCS-100-010™) exhibit high viability and transfection efficiency when transfected with GeneXPlus and TransfeX™ Transfection Reagents (ATCC® ACS-4004™ and ACS-4005™).

To get started with your gene transfer experiments, explore ATCC transfection reagents and primary cell-specific transfection protocols at [www.atcc.org/transfections](http://www.atcc.org/transfections)

ATCC® No.	Name	Transfection reagent	Transfection efficiency
PCS-100-010™	Umbilical Vein Endothelial Cells	GeneXPlus (ATCC® ACS-4004™)	70
PCS-110-010™	Dermal Microvascular Endothelial Cells; Neonatal	GeneXPlus (ATCC® ACS-4004™)	53
PCS-100-010™	Umbilical Vein Endothelial Cells	TransfeX™ (ATCC® ACS-4005™)	71
PCS-110-010™	Dermal Microvascular Endothelial Cells; Neonatal	TransfeX™ (ATCC® ACS-4005™)	75

**Table 1.** Transfection efficiencies for primary cardiovascular cells

Cell Type	Product Name	ATCC® No.	Number of Cells/vial	Growth Kit	Basal Media
Endothelial Cells	Aortic Endothelial Cells	PCS-100-011™	500,000	Endothelial Cell Growth Kit-BBE (ATCC® No. PCS-100-040™) or Endothelial Cell Growth Kit-VEGF (ATCC® No. PCS-100-041™)	Vascular Cell Basal Medium (ATCC® No. PCS-100-030™)
	Coronary Artery Endothelial Cells	PCS-100-020™	500,000		
	Umbilical Vein Endothelial Cells	PCS-100-010™	500,000		
	Umbilical Vein Endothelial Cells; Pooled	PCS-100-013™	500,000		
	Dermal Microvascular Endothelial Cells; Neonatal	PCS-110-010™	500,000		
	Pulmonary Artery Endothelial Cells	PCS-100-022™	500,000		
Smooth Muscle Cells	Aortic Smooth Muscle Cells	PCS-100-012™	500,000	Vascular Smooth Muscle Cell Growth Kit (ATCC® PCS-100-042™)	Vascular Cell Basal Medium (ATCC® No. PCS-100-030™)
	Coronary Artery Smooth Muscle Cells	PCS-100-021™	500,000		
	Pulmonary Artery Smooth Muscle Cells	PCS-100-023™	500,000		

**Table 2.** Primary cells, supporting media, and growth kits

## REFERENCES

1. Arnaoutova I, *et al.* The endothelial cell tube formation assay on basement membrane turns 20: state of the science and the art. *Angiogenesis* 12(3):267-74, 2009.
2. CellMatrix Basement Membrane Gel supports *in vitro* angiogenesis assays. Application Note Number 4, 2013.

**For ATCC Primary Human Cardiovascular Cells, as well as other cardiovascular research resources, explore [www.atcc.org/angio](http://www.atcc.org/angio)**

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PC-0616-01

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