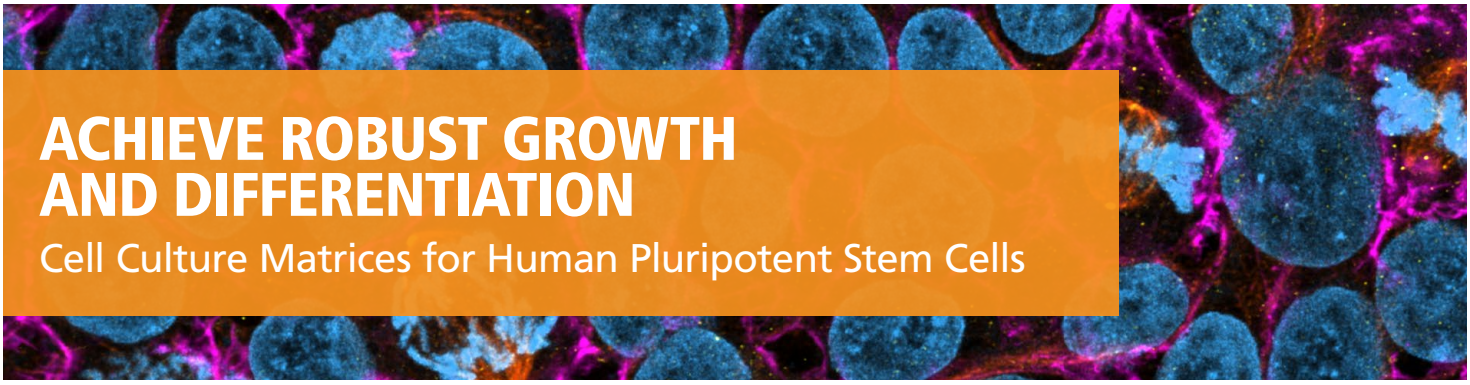

ACHIEVE ROBUST GROWTH AND DIFFERENTIATION

Cell Culture Matrices for Human Pluripotent Stem Cells

Using the right surface coating or matrix is key for achieving high-quality human pluripotent stem cell (hPSC) cultures. In the body, a complex 3D environment of supporting cells, membranes, fibrous layers, and adhesion proteins help cells to grow and thrive. While this multifaceted environment cannot be fully replicated in a plastic dish, cell culture matrices help create a more physiologically relevant setting for your hPSCs by supporting cell attachment, growth, and differentiation. When used with TeSR™ maintenance media, our matrices provide a robust culture system for hPSC maintenance under feeder-free conditions.

STEMmatrix™ BME

hPSC-Qualified Basement Membrane Matrix for Feeder-Free Expansion and Differentiation of hPSCs

STEMmatrix™ BME is a soluble, hPSC-qualified, basement membrane matrix extracted from mouse Engelbreth-Holm-Swarm (EHS) sarcoma. Rich in key extracellular matrix (ECM) proteins (e.g. collagen IV, entactin, heparan sulphate proteoglycans, laminin) and essential growth factors (e.g. EGF, bFGF, IGF-1, TGF-β, VEGF), this ECM-based hydrogel closely mimics the in vivo environment to support robust cell growth.

When used with feeder-free hPSC maintenance media, such as mTeSR™ Plus, mTeSR™1, TeSR™-E8™, or eTeSR™, STEMmatrix™ BME can be used to successfully maintain hPSC lines in the undifferentiated state. These cells retain characteristic hPSC morphology, express undifferentiated cell markers such as OCT4 and TRA-1-60, and have the capacity to differentiate into all three germ layers. For cell detachment, pair with Gentle Cell Dissociation Reagent (GCDR) or ReLeSR™ for routine passaging of hPSC aggregates, or ACCUTASE™ for single-cell passaging workflows.

Protocol

How to Coat Cultureware with STEMmatrix™ BME for hPSC Culture

www.stemcell.com/stemmatrix-bme-protocol

Learn more at www.stemcell.com/STEMmatrix-BME

Why Use STEMmatrix™ BME?

- Achieve robust cell expansion with an hPSC-qualified matrix rich in extracellular matrix proteins and essential growth factors
- Pair with any TeSR™ family medium for a feeder-free hPSC maintenance protocol
- Mimic in vivo conditions to create a physiologically relevant culture environment that supports hPSC growth and differentiation
- Promote high-quality hPSC cultures with healthy morphology and trilineage differentiation potential

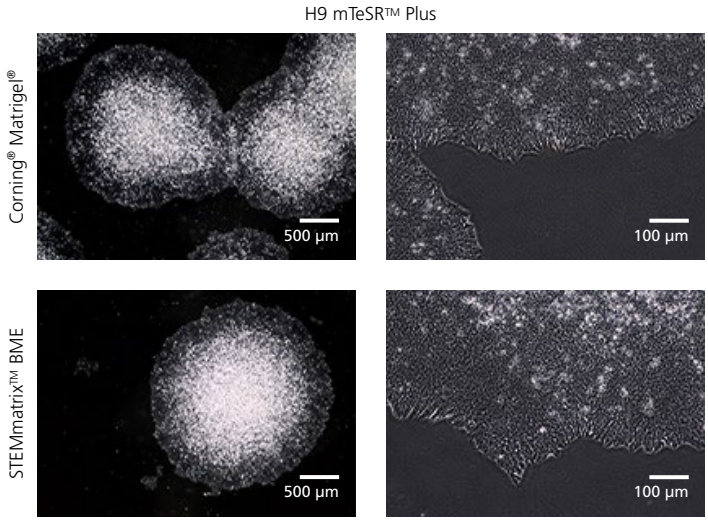

Figure 1. Normal hPSC Morphology Is Observed in Cells Cultured on STEMmatrix™ BME

Microscope images show H9 human embryonic stem cells (hESCs) that were grown on STEMmatrix™ BME or Corning® Matrigel® in mTeSR™ Plus media, both exhibiting comparable, normal morphology. Cells were imaged on the day of passage (Day 7) and display a highly multilayered and densely packed appearance.

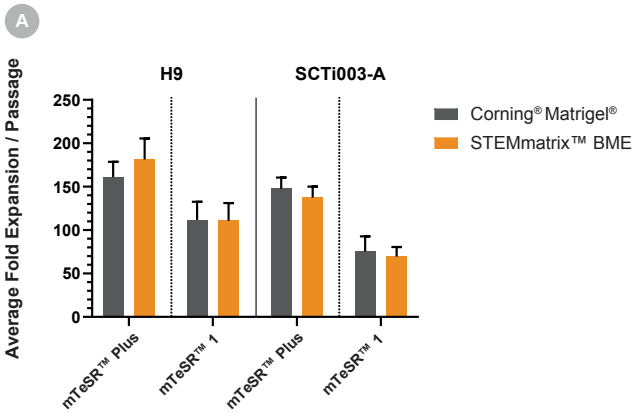

Figure 2. Robust hPSC Expansion Observed in STEMmatrix™ BME Cultures, with Comparable Performance to Corning® Matrigel®

Average fold expansion of clump-passaged hPSCs (± SEM) over 10 passages was similar between cultures grown on STEMmatrix™ BME and Corning® Matrigel®. Cultures were maintained in mTeSR™ Plus or mTeSR™1 media at 37°C and passaged every 7 days. Graph shows pooled data from H9 and SCTi003-A hPSC cultures.

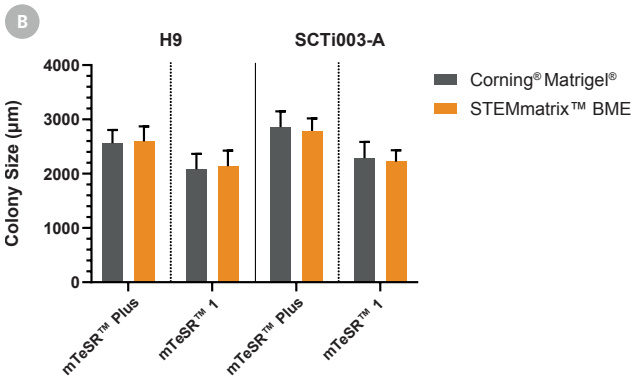

Figure 3. STEMmatrix™ BME Supports Large hPSC Colony Sizes, with Comparable Performance to Corning® Matrigel®

Colony sizes of H9 and SCTi003-A hPSCs grown on STEMmatrix™ BME in mTeSR™ Plus or mTeSR™1 media (± SD), averaged over 10 passages, were comparable to those grown on Corning® Matrigel®.

Recombinant Protein Cell Culture Matrices

Reduce Variability in hPSC Cultures with Recombinant Human Protein Matrices

Vitronectin XF™

Serum- and Feeder-Free Maintenance and Differentiation of hPSCs

Vitronectin XF™, developed and manufactured by Nucleus Biologics, is a defined, xeno-free cell culture matrix that supports the growth and differentiation of hPSCs. Use with mTeSR™ Plus, mTeSR™1, TeSR™-E8™, or TeSR™-AOF medium to provide a defined culture system for the maintenance of hPSCs and greater control over the culture environment, resulting in more consistent cell populations and reproducible results in downstream applications.

hPSCs cultured on Vitronectin XF™ retain pluripotency and normal colony morphology, without the need for an adaptation step (Figure 3). Pair with Gentle Cell Dissociation Reagent (GCDR) or ReLeSR™ when passaging to maintain high-quality cultures.

Why Use Vitronectin XF™?

- Decrease sources of variability in your experiment with a recombinant human protein matrix
- Handle at room temperature without matrix gelling
- Use with mTeSR™ Plus, mTeSR™1, TeSR™-E8™, or TeSR™-AOF to maintain hPSCs
- Create a completely xeno-free system when used with TeSR™-E8™ or TeSR™-AOF

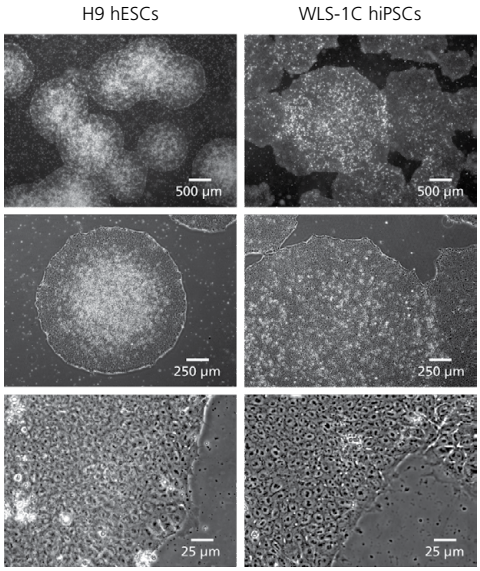

Figure 4. Morphology of hPSCs Cultured on Vitronectin XF™ Cell Culture Matrix in TeSR™-E8™

Undifferentiated human embryonic stem cell (hESC; H9) and human induced pluripotent stem cell (hiPSC; WLS-1C) cultures exhibit normal morphology when cultured on Vitronectin XF™. Colonies are round, tightly packed and multilayered, with a high nucleus-to-cytoplasm ratio. Cells were transferred directly from Matrigel® hESC-Qualified Matrix without an adaptation step.

Note: *Colonies grown in TeSR™-E8™ have a more condensed and round morphology when grown on Vitronectin XF™ matrix, compared to colonies grown on Matrigel® hESC-Qualified Matrix, which are more diffuse and irregularly shaped.*

Video

How to Coat Plates for hPSC Cultures in mTeSR Plus™ Using Vitronectin-XF

www.stemcell.com/coating-plates-for-hPSC-cultures

Learn more at www.stemcell.com/Vitronectin-XF

CellAdhere™ Laminin-521

Long-Term Feeder-Free Maintenance of hPSCs

CellAdhere™ Laminin-521 is a defined and xeno-free cell culture matrix that supports the feeder-free growth and differentiation of hPSCs. Laminin 521 is naturally expressed and secreted by hPSCs in the inner cell mass of the embryo, therefore creating a biologically relevant hPSC culture environment in vitro.

For consistent, reproducible results in downstream applications, use CellAdhere™ Laminin-521 with TeSR™ maintenance media. Compared to other matrices, CellAdhere™ Laminin-521 increases single-cell attachment and survival without requiring apoptotic inhibitors during plating. For single-cell passaging, use CellAdhere™ Laminin-521 with eTeSR™ maintenance medium. For cell detachment, pair with Gentle Cell Dissociation Reagent (GCDR) or ReLeSR™ for routine passaging of hPSC aggregates, or ACCUTASE™ for single-cell passaging workflows.

Note: *If passaging hPSCs as single cells, check the karyotype frequently for genetic aberrations.*

Why Use CellAdhere™ Laminin-521?

- Decrease sources of variability in your experiment with a recombinant human protein matrix
- Passage cells without the need for apoptotic inhibitors
- Use with any TeSR™ family medium to maintain hPSCs
- Increase cell attachment and survival when using with eTeSR™ for single-cell passaging
- Mimic the stem cell niche with this physiologically relevant matrix

Learn more at www.stemcell.com/Laminin-521

Table 1. Comparison of the Different Matrices

Features	STEMmatrix™ BME	Vitronectin-XF™	CellAdhere™ Laminin-521
Key Advantage(s)	hPSC-qualified alternative to feeders Rich in extracellular matrix proteins and growth factors, closely mimicking in vivo conditions	Defined matrix that supports the growth and differentiation of hPSCs Handle at room temperature without matrix gelling	Defined matrix providing a biologically relevant environment for hPSC culture Increases single-cell attachment and survival of hPSCs without apoptotic inhibitors
Grade	Feeder-free	Xeno-free	Xeno-free
Source	Solubilized Engelbreth-Holm-Swarm (mouse) sarcoma extract	Recombinant human protein	Recombinant human protein
Coating Temperature	2 - 8°C	15 - 25°C (room temperature)	2 - 8°C
Plasticware	Tissue culture-treated	Non-tissue culture-treated	Tissue culture-treated
Recommended Dissociation Reagents	Aggregate passaging: Gentle Cell Dissociation Reagent or ReLeSR™ Single-cell passaging: ACCUTASE™	Gentle Cell Dissociation Reagent or ReLeSR™	Aggregate passaging: Gentle Cell Dissociation Reagent or ReLeSR™ Single-cell passaging: ACCUTASE™

Cell Culture Matrices for hPSC Research

Product	Size	Catalog #
STEMmatrix™ BME	5 mL	200-0960
Vitronectin XF™	2 mL	07180
	10 x 2 mL	100-0763
CellAdhere™ Dilution Buffer **required for use with Vitronectin XF™*	100 mL	07183
CellAdhere™ Laminin-521	100 µg	77003
	500 µg	200-0117

Resource

hiPSC Solutions: Quality Research Starts with Quality Cells

www.stemcell.com/ipsc-solutions

Interactive Tool

Discover Which TeSR™ Maintenance Medium Is Right for Your hPSC Cultures

www.stemcell.com/tesr-product-finder

Complete Your hPSC Workflow with High-Quality Cells, Media, and Dissociation Reagents

Product	Size	Catalog #
Cells		
Healthy Control Human iPSC Line, Female, SCTi003-A	1 x 10^6 Cells	200-0511
Healthy Control Human iPSC Line, Male, SCTi004-A	1 x 10^6 Cells	200-0769
Healthy Control Human iPSC Line, Female, SCTi005-A	1 x 10^6 Cells	200-0944
Healthy Control Human iPSC Line, Male, SCTi006-A	1 x 10^6 Cells	200-0945
iPSCdirect™	1 unit (1 x 10^7 Cells / unit)	200-0510
	10 units (1 x 10^7 Cells / unit)	100-1028
TeSR™ Maintenance Media		
mTeSR™ Plus	500 mL	100-0276
	1L	100-1130
mTeSR™1	500 mL	85850
	1L	85857
eTeSR™	500 mL	100-1215
TeSR™-AOF	500 mL	100-0401
TeSR™-E8™	500 mL	05990
Dissociation Reagents		
Gentle Cell Dissociation Reagent	100 mL	100-0485
	500 mL	100-1077
ReLeSR™	100 mL	100-0483
	500 mL	100-0484
ACCUTASE™	100 mL	07920
	500 mL	07922

For a complete list of related products, including specialized cell culture and storage media, matrices, antibodies, cytokines, and small molecules, visit **www.stemcell.com/hPSCworkflow** or contact us at **techsupport@stemcell.com**.