

# SCALE UP

## With 3D TeSR™ Media and the PBS-MINI Bioreactor

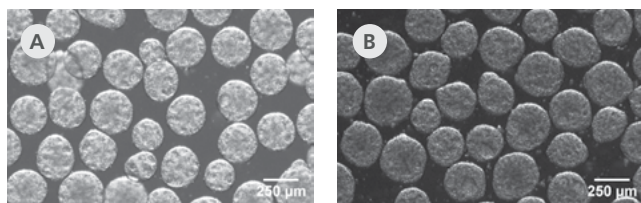
### Expand Large Numbers of hPSCs in 3D

Suspension culture of hPSCs as 3D aggregates provides a convenient method to produce large numbers of high-quality, undifferentiated hPSCs with reduced labor and costs.

hPSCs expanded in the TeSR™ family suspension culture systems have robust growth, maintain high expression of pluripotent stem cell markers, and retain trilineage differentiation ability.

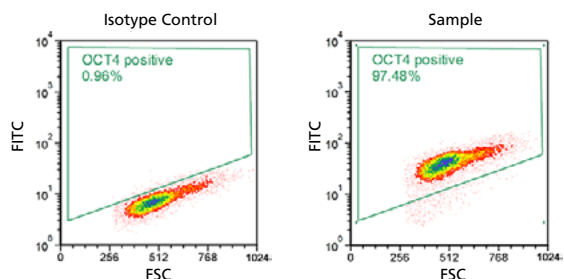
### mTeSR™3D

Based on mTeSR™1, mTeSR™3D is optimized for the expansion and scale-up of hPSCs. It is optimized as a fed-batch culture system, in which required nutrients are added daily, eliminating the need for daily medium exchanges.



**Figure 1.** Morphology of hPSC Aggregates Cultured in mTeSR™3D

Characteristic morphology of suspension-cultured hPSC aggregates includes: approximately spherical shape, edges that are clear but not perfectly smooth, and a mottled or pock-marked appearance. Aggregates should be approximately 350 - 400 μm by the end of the passage. Shown are (A) human ES cell line H7 and (B) human iPSC cell line STiPS-F016.



**Figure 2.** OCT4 Expression of hPSCs Cultured in mTeSR™3D

hPSCs expanded in mTeSR™3D maintain expression of pluripotent stem cell markers. Shown are representative plots of OCT4 expression after 7 passages in mTeSR™3D.

Learn more at [www.stemcell.com/mTeSR3D](http://www.stemcell.com/mTeSR3D)

### Why Use Suspension Culture?

**OPTIMIZED.** Part of the TeSR™ family, mTeSR™3D, and TeSR™-E8™3D are optimized for hPSC suspension culture.

**STREAMLINED WORKFLOW.** Fed-batch strategy provides a simplified culture system.

**SIMPLIFIED CULTURE SYSTEM.** Serum-free culture system with no microcarriers or external matrix required.

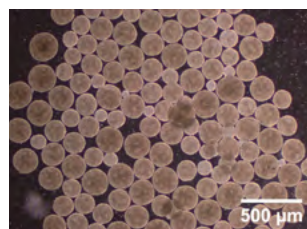
**SCALE-UP.** Easily produce up to  $1 \times 10^9$  hPSCs in as few as 2 - 3 weeks.

**VERSATILE.** Compatible with a variety of suspension culture vessels.

**COST-EFFECTIVE.** Significant cost savings in both media and labor.

### TeSR™-E8™3D

TeSR™-E8™3D is a low protein, animal component-free medium based on TeSR™-E8™. The system contains only the most critical components for hPSCs, providing a simpler culture medium for robust, large-scale hPSC expansion. It uses a fed-batch feeding strategy that replenishes nutrients daily while reducing labor and costs.



**Figure 3.** Morphology of hPSC Aggregates Cultured in TeSR™-E8™3D

Characteristic morphology of suspension-cultured hPSC aggregates includes: approximately spherical shape, edges that are clear but not perfectly smooth, and a mottled or pock-marked appearance. Aggregates should be approximately 350 - 400 μm by the end of the passage. Shown are human ES cell line H1 cultured in TeSR™-E8™3D.

## Coming Soon: TeSR™-AOF 3D

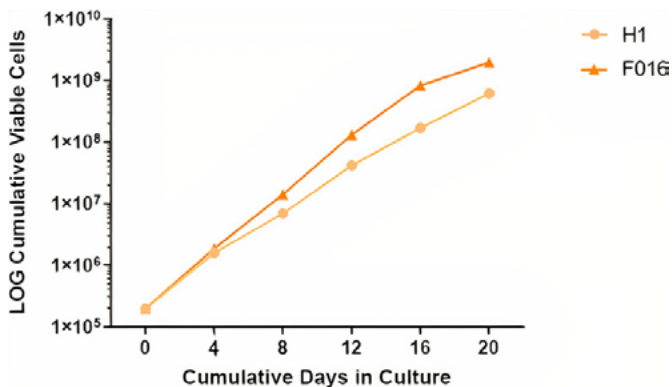
Expand and scale up your hPSCs in an animal origin-free 3D suspension medium that reduces risk while enhancing cell quality attributes. Ease your path to the clinic with straightforward traceability and built-in viral safety: no materials of animal or human origin are used in the manufacture of this medium or its components, to at least the secondary level of manufacturing. TeSR™-AOF 3D is compatible with the PBS-MINI Bioreactor.

Register your interest at [www.stemcell.com/upcomingproducts](http://www.stemcell.com/upcomingproducts)

## PBS-MINI Bioreactor

### Rapidly Scale Up Your 3D hPSC Culture

Reliably and rapidly scale up your 3D cell cultures and suspensions with the PBS-MINI Bioreactor. The gentle yet efficient mixing provided by the Vertical-Wheel™ impeller enables the expansion of shear-sensitive cells without anti-foaming agents or shear protectants. Ideal for hPSCs, and recommended for use with the TeSR™ 3D family of media, the compact, sealed Base Unit and the 0.1 and 0.5 MAG Single-Use Vessels can be used inside incubators. Conveniently control your culture system with a speed dial and digital display, and visualize cells in low-light conditions using built-in LED lights.



**Figure 4.** Culturing hPSCs in PBS-MINI 0.1 and 0.5 MAG Single-Use Vessels Achieves Rapid Scale-Up of Viable Cells

H1 and F016 cell lines were seeded in TeSR™-AOF 3D (Coming Soon) at a density of  $1 \times 10^5$  viable cells/mL in 2 mL in 6-well plates. Cell cultures were passaged every 4 days and the cumulative number of viable cells was calculated at each timepoint. On Day 4 and 8, the cultures were passaged and seeded at a density of  $1 \times 10^5$  viable cells/mL in 11 mL and 35 mL, respectively, in Nalgene™ filter bottles. On Day 12 and 16, the cultures were passaged and seeded at a density of  $5 \times 10^4$  viable cells/mL in 100 mL (in PBS-MINI 0.1 MAG) and 500 mL (in PBS-MINI 0.5 MAG), respectively. After transferring cells to PBS-MINI MAG 0.1 and 0.5 Vessels, cells continued to expand rapidly.

Learn more at [www.stemcell.com/PBS-MINI](http://www.stemcell.com/PBS-MINI)

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### Why Use the PBS-MINI Bioreactor?

**COMPACT.** The compact, stainless steel Base Unit fits where you need it, even allowing operation inside incubators.

**SAFE & EFFICIENT EXPANSION.** The Vertical-Wheel™ impeller and U-shaped base create a low-shear mixing environment that is optimal for culturing hPSC aggregates of uniform size.

**EASY AGGREGATE RECOVERY.** The U-shaped base collects aggregates and the wide diameter cap provides easy access for aggregate recovery.

**A PERFECT PAIR.** The Base Unit is designed to be used with the 0.1 L and 0.5 L PBS-MINI MAG Single-Use Vessels, magnetically driving the vessels via MagDrive technology.



**Figure 5.** PBS-MINI Bioreactor

Compact bioreactor with single-use vessels for high-throughput, 3D suspension culture of hPSCs and other cell types