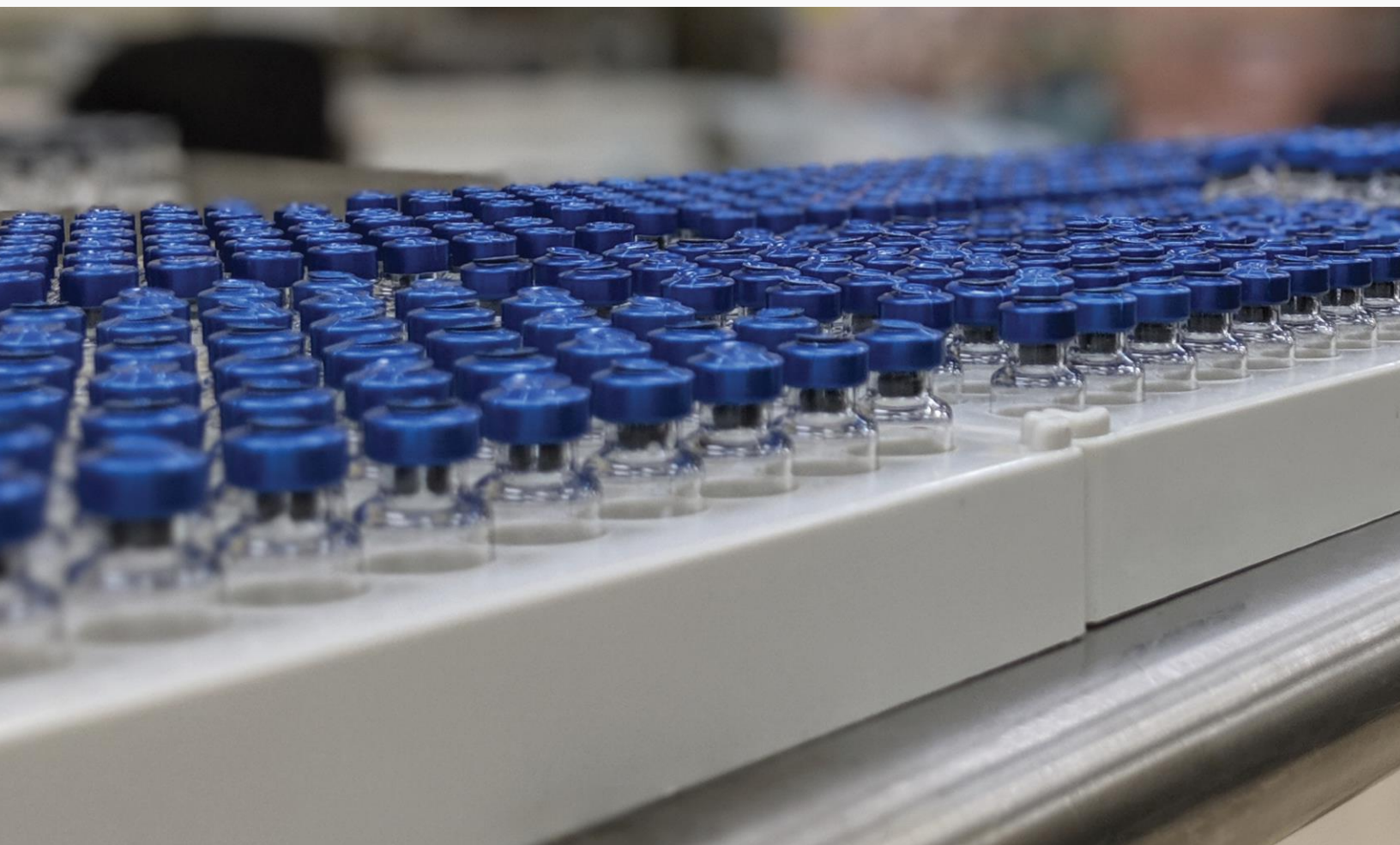


ADVANCED BIOMATRIX

A BICO COMPANY

HyStem[®] 3D Hydrogels

3D Matrices for Physiologically Relevant Research



The Technology

The HyStem® technology is based on the reaction between thiol-modified hyaluronic acid and a thiol-reactive crosslinker to produce a hydrogel that gels in situ and can be used as a cell culture scaffold and cell or drug delivery vehicle.

The main component of HyStem® is one of the major constituents of the extracellular matrix (ECM) - [Hyaluronic Acid \(HA\)](#). HA is the simplest glycosaminoglycan (a negatively charged, linear, non-sulfated polysaccharide) that provides compression strength, lubrication and hydration within the ECM. It also regulates cell adhesion and motility and mediates cell proliferation and differentiation, making it not only a structural component of tissues but also an active signaling molecule.



Easy-to-Use

Add Water.
Add Cells.
Done.



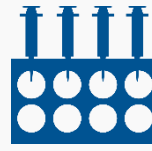
Transparent

Transparent 3D hydrogel compatible across various imaging systems



Tunable Hydrogel

Adjust hydrogel gelation kinetics and stiffness



Reproducible

Improved manufacturing controls and quality assurance for reproducible results



Clinical Pathway

GMP HyStem® is available for clinical applications*



Biocompatible

Works with broad range of cell types



Injectable

Microcarrier for cell or drug delivery applications



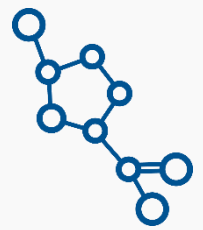
Room Temperature Gelation

No ice or incubation required for proper gelation



Xeno-Free

HyStem® kit is a widely used xeno-free hydrogel**



Chemically Defined

No secret additives or unknown compounds (ie. the opposite of Matrigel)

*GMP HyStem® is supplied by a third party contract manufacturer

** HyStem® kit is Xeno-Free, but HyStem*-C and HyStem*-HP contain bovine gelatin

HyStem[®] Hydrogel Kit

The Blank Slate Matrix



HyStem[®] is a chemically-defined, animal-free, synthetic matrix.

HyStem[®] allows complete control over the design of matrix characteristics and consists only of synthetic thiol-modified hyaluronan (Glycosil[®]) and synthetic PEGDA crosslinker.

ECM proteins or attachment peptides can be added to HyStem[®] prior to crosslinking.

HyStem[®]-C Hydrogel Kit

The Starter Matrix



HyStem[®]-C provides an excellent native hydrogel for 3D cell culture.

HyStem[®]-C is based on three biocompatible components: thiol-modified hyaluronan (Glycosil[®]), thiol-reactive crosslinker PEGDA (Extralink[®]), and thiol-modified gelatin (Gelin-S[®]).

Gelin-S provides basic cell-attachment sites for a wide variety of primary cells and cell lines and is therefore recommended as an ideal substrate for adherent cell types and cell culture optimization.

HyStem®-HP Hydrogel Kit

The Growth Factor Delivery Matrix



HyStem®-HP is ideal for cell applications where the slow, continuous release of growth factors is crucial to re-creating a desired microenvironment.

The HyStem®-HP hydrogel kit contains a combination of thiol-modified hyaluronan and a thiol-modified heparin (Heprasil®), thiol-modified gelatin (Gelin-S®), and thiol-reactive crosslinker, PEGDA (Extralink®).

The immobilized heparin in the HyStem®-HP hydrogel mimics the heparin sulfate proteoglycans normally present in the extracellular matrix. Heparin forms an ionic bond with proteins which protects them from proteolysis and facilitates their slow release into the cell culture medium.



HyStem hydrogels provide a flexible format for translational research. They can be used to culture cells in a 2D environment on cell culture plates, to encapsulate cells in a 3D ECM in vitro or to inject cells in vivo.

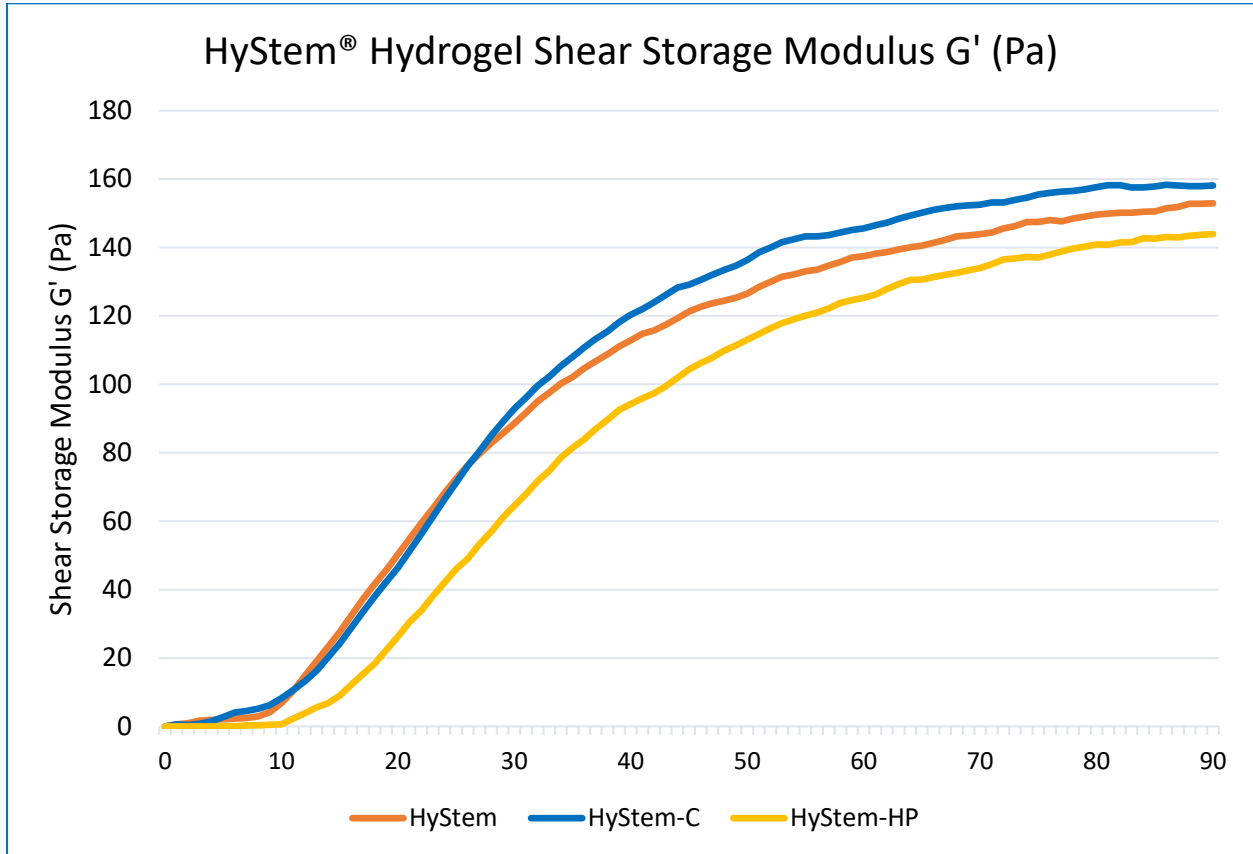
HyStem[®] Guide

	HyStem	HyStem-C	HyStem-HP
Highlights	<ul style="list-style-type: none"> • Blank-slate substrate • completely customizable 	<p>Good starter kit with incorporated cell binding sites</p>	<ul style="list-style-type: none"> • Allows simultaneous growth factor, drug, and cell delivery in vivo. • Less growth factor required
<ul style="list-style-type: none"> • Fast (30 min), Easy-to-use, Safe (no by-products) • Substrate mimics native tissue • 3D use in vitro and injectable for in vivo applications • Components are translatable for clinical use 			
Features	<p>Xeno-free</p>	<p>Gelatin provides general attachment protein for wide range of cells</p>	<p>Growth factors added to gel mixture ionically bind with heparin for a slow, more controllable release</p>
<ul style="list-style-type: none"> • Formulation and rigidity can be customized to vary stiffness, component concentration, and gelation time • ECM proteins can be introduced covalently through thiol bonds • Chemically-defined 			
Components	<ul style="list-style-type: none"> • Thiol-modified hyaluronan (Glycosil[®]) • Thiol-reactive PEGDA crosslinker (Extralink[®]) • Degassed, deionized water 	<ul style="list-style-type: none"> • Thiol-modified hyaluronan (Glycosil[®]) • Thiol-reactive PEGDA crosslinker (Extralink[®]) • Thiol-modified gelatin (Gelin-S[®]) • Degassed, deionized water 	<ul style="list-style-type: none"> • Thiol-modified hyaluronan and heparin (Heprasil[®]) • Thiol-reactive PEGDA crosslinker (Extralink[®]) • Thiol-modified gelatin (Gelin-S[®]) • Degassed, deionized water

The following cells have been cultured using HyStem[®]:

- Human embryonic stem cells (H9s)
- Umbilical cord blood CD34+ stem cells
- Hepatic stem cells
- Hepatic progenitor cells
- Adipose-derived stem cells
- Cardiomyocytes
- Mesenchymal stem cells
- Bone marrow derived mesenchymal stem cells
- Neural progenitors
- Pancreatic islet cells
- A549 lung cancer cells
- HUES-7 hESCs
- Fibroblasts

HyStem[®] Rheological Properties



The above gelation data (G' Shear Storage Modulus) was collected using the ElastoSens Bio2 contactless rheometer. Samples were prepared according to the directions for use. The samples were gelled within the ElastoSens unit at room temperature for 90 minutes. The gelation curves indicate consistent mechanical properties across the various HyStem[®] products. The stiffness can be tuned by altering Hyaluronic Acid or Crosslinker (Extralink[®]) concentrations.

Ordering Information

Description	Size	Catalog Number
HyStem® Hydrogel Kit	2.5 mL	GS310F
	7.5 mL	GS311F
	12.5 mL	GS1004F
HyStem®-C Hydrogel Kit	2.5 mL	GS312F
	7.5 mL	GS313F
	12.5 mL	GS1005F
HyStem®-HP Hydrogel Kit	2.5 mL	GS314F
	7.5 mL	GS315F
	12.5 mL	GS1006F

To order product or learn more,
visit our website at
www.AdvancedBioMatrix.com