PhotoHA®-LAP, Methacrylated Hyaluronic Acid Hydrogel Kit

3D CC Hydrogel

Cat. # CC327

pack size: 1 Kit

FOR RESEARCH USE ONLY.
NOT FOR USE IN DIAGNOSTIC PROCEDURES.
NOT FOR HUMAN OR ANIMAL CONSUMPTION.

Data Sheet

Background

3D cell culture, including bioprinting, allows for the creation of more physiological cell models by allowing cells to simultaneously interact with integrins on all cell surfaces, resulting in the activation of specific signaling pathways not activated in traditional 2D cell culture methods. Hydrogels are water swollen polymers that allow for the culture of cells in 3-dimensions and can have profound effects on cellular development, differentiation, migration, and function. New areas of tissue engineering such as 3D bioprinting, have utilized UV photocrosslinked methacrylated hydrogel biomaterials (PEGMA, GelMA, HAMA and ColMA etc.) to encapsulate cells to make printable bioinks.

Hyaluronic acid is the most abundant glycosaminoglycan in the body being an important component of several tissues throughout the body. While it is abundant in extracellular matrices, hyaluronan also contributes to tissue hydrodynamics, movement and proliferation of cells, and participates in a number of cell surface receptor interactions. Hyaluronic acid is a polymer of disaccharides, themselves composed of D-glucuronic acid and Nacetyl- D-glucosamine, linked via alternating β-(1→4) and β-(1→3) glycosidic bonds.

The PhotoHA®-LAP, Methacrylated Hyaluronic Acid Hydrogel Kit is based upon purified hyaluronic acid methacrylate (HAMA), which when photocrosslinked provides a native-like 3D environment for cells. In addition to hyaluronic acid methacrylate, the kit includes the photoinitiator lithium phenyl-2,4,6-trimethylbenzoylphosphinate (LAP) for users to easily fine tune their photocrosslinking experiments (i.e. altering hydrogel stiffness or gelling speeds).

Kit Components

The PhotoHA®-LAP, Methacrylated Hyaluronic Acid Hydrogel Kit (CC327) contains:

1) CC327-1 (Store at 2-8°C): LAP Photoinitiator, 1 X 100 mg (CS226445).

2) CC327-2 (Store at -20°C): Methacrylated Hyaluronic Acid, 1 X 100 mg (CS226446).

Quality Control

Appearance: Lyophilized Powder
Sterility (USP modified): No Growth
Grafting Efficiency: 50-70%
pH: 6.0-8.0
Osmolality: 200-400 mOsmo H20/kg in 1X PBS
Molecular Weight: 100 – 150 kDa
NMR: Characteristic
Cell Compatibility: Characteristic

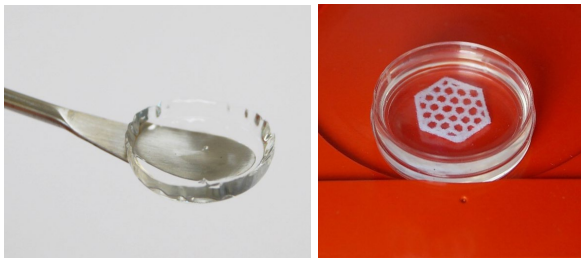

Figure 1. 3D printing of PhotoHA® Methacrylated Hyaluronic Acid Hydrogels can be used as native bioinks for tissue engineering bioprinting applications.

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Instructions for Use

Note: Employ aseptic practices to maintain the sterility of the product throughout the preparation and handling of the collagen and other solutions. It is recommended that the collagen and other working solutions be chilled and kept on ice during the preparation of the collagen. Vortexing is not recommended at any step.

1. Add 10 ml of 1X phosphate buffer saline (PBS), water or cell culture media to the 100 mg of lyophilized methacrylated HA powder.
2. Mix on a shaker table or rotator plate until fully solubilized (~30 to 60 minutes) at 2-10°C. *Note: Solubilization times may vary depending on the desired concentration and volume of PBS, water or medium added.*
3. Calculate the volume of photoinitiator to add by multiplying the volume of solubilized hyaluronic acid by 0.02. If the resulting number is 200 ul, for example, you will add 200 ul of LAP.
4. Solubilize the required amount of LAP (per step 3) at a concentration of 17 mg/ml in 1X PBS or cell culture media.
5. Add the calculated volume of photoinitiator to the required volume of HA methacrylate solution and mix thoroughly.
6. Add your cells to the HA methacrylate/photoinitiator solution.
7. Dispense your HA methacrylate /photoinitiator/cell solution into the desired cultureware (i.e. 6-well plate, 48-well plate).
8. For photocrosslinking, place the hydrogel solution directly under a 405 nm light crosslinking source.

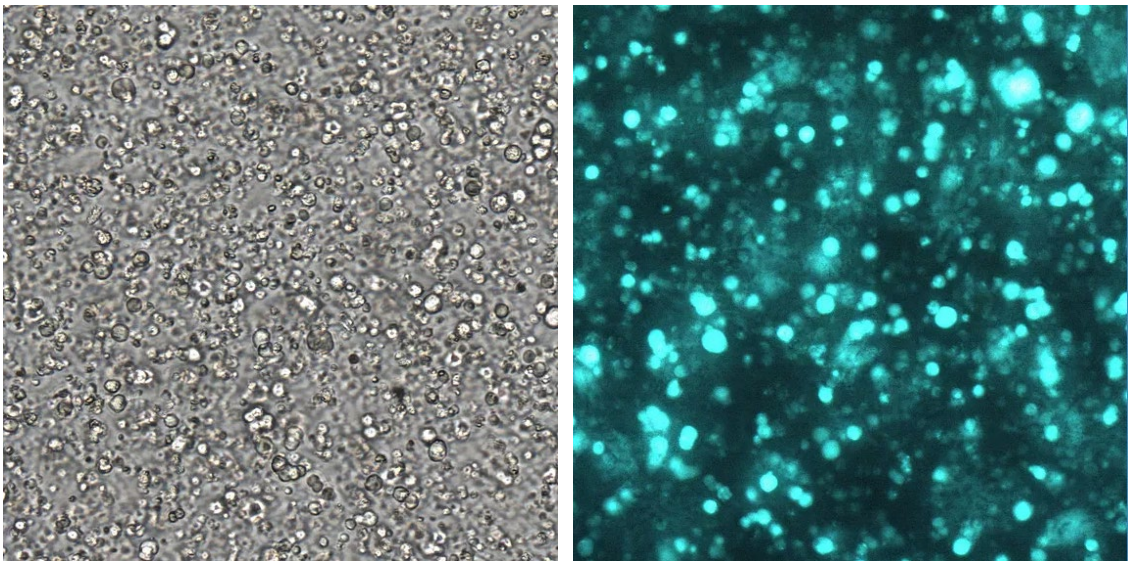

Figure 2. 3D culture of human neural stem cells using PhotoHA®. Encapsulated GFP labeled neural stem cells in 1% PhotoHA® hydrogels after 7 days in culture. 0.25% LAP was used as the photoinitiator and then the HA was polymerized by exposure to 365nm light for 1 minute, forming hydrogels ~100-200µm thick. Images taken after day 7 at 10X magnification. Stem cell images courtesy of Jonathan Ramirez from Dr. Deepak Lambda's Lab at Buck Institute.