**3D CelluSponge**

**NOVEL IN VITRO PLATFORM TECHNOLOGY**

*3D CelluSponge* is a range of innovative *in vitro* platforms for 3D cell culture. It is fabricated from inert hydroxypropyl cellulose (HPC), has a uniform macroporosity of 80 - 150 μm and each disk is 1 mm thick. The controlled macroporosity allows the formation of uniformly sized spheroids thereby preventing necrosis in the spheroid core via access to nutrients without mass transfer limitations. The constrained spheroids have shown excellent maintenance of 3D cell morphology, viability, cell-cell interaction, cell polarity, synthetic and metabolic functions. The 3D CelluSponge exhibits minimal drug absorption and offers new possibilities for *in vitro* drug safety testing.

This innovative technology has been developed by Professor Hanry Yu in the Laboratory of Cellular and Tissue Engineering of the National University of Singapore and validated through collaboration with leading pharmaceutical companies.

**Benefits**
- Simulates complex cell microenvironment *in vitro*
- Promotes enhanced cell-cell contact
- Long term maintenance of differentiated hepatocellular function
- Supports HCV entry and replication
- Supports accelerated differentiation of HepaRG progenitor cells with higher yield of mature HepaRG™ cells
- Easy to use

**Features**
- Macroporous
- Homogenous distribution of spheroids in pores
- Controlled and well-defined spheroid size thus preventing necrosis of the spheroid core
- Similar mechanical properties as the *in vivo* liver
- Works with primary rat, human and monkey hepatocytes as well as HepG2 and HepaRG™ cells
- Compatible with multi-well plates
- Suitable with routine downstream analytical techniques
- Easily scalable

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SEM images of 3D CelluSponge:  
A) cross-sectional view (scale bar 100 μm),  
B) top view (scale bar 100 μm),  
C) surface nano-roughness (scale bar 1 μm).
Applications

- 3D cell culture
- *In vitro* drug metabolism and pharmacokinetics (DMPK) assays
- *In vitro* toxicology
- Stem-cell differentiation and maturation
- Pathogen infection and hit identification
- Regenerative medicine

Technical Specifications

- Fabricated from hydroxypropyl cellulose (HPC), an FDA approved biocompatible material
- Diameter of 3D CelluSponge: 9 mm (24-well plate), 6 mm (48-well plate and 96-well plate)
- Thickness of 3D CelluSponge: 1 mm
- Pore size: 80 – 150 μm

Patents

- U.S. patent 8283028 B2
- U.S. patent application 20140080214 A1

Publications

1. Z. Yue et al. 2010. Preparation of three-dimensional interconnected macroporous cellulosic hydrogels for soft tissue engineering. Biomaterials 31(32), 8141-8152
2. H. Gu et al. 2010. Control of *in vitro* neural differentiation of mesenchymal stem cells in 3D macroporous, cellulosic hydrogels. Regenerative Medicine 5(2), 245-253