

METHODS RELATED TO CELL-MICROGEL ENCAPSULATION IN INJECTABLE FORMULATIONS

Tech ID: 32816 / UC Case 2022-126-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Injectable hydrogels are attracting increasing interest for the therapeutic delivery of cells to tissue. However, these hydrogel formulations can suffer from engraftment efficiencies of less than 5% when delivered to native tissue. These poor engraftment efficiency rates are often attributed to high shear stresses during delivery and inability to provide a stable three-dimensional niche at the delivery site.

The inventors have developed a technique for encapsulating cells in the pore space between microscopic hydrogel particles by employing the yield stress fluid properties of packs of microgels. The technology protects the cells from mechanical stress during delivery and facilitates integration to the native tissue. During delivery, the packs of microgels undergo plug flow in which the pressure drop across the length of the pipe is compensated solely by frictional forces at the interface between the pipe wall and microgels. At the delivery site, the pack of microgels behave as an elastic solid across the range of physiological frequencies and provide a stable 3D culture paradigm to support engraftment.

Furthermore, the inventors address the challenges associated with cryopreserving, transporting, and delivering this injectable formulation from benchtop-to-bedside with a concept for a perfusable delivery device. The device encapsulates cells in the pore space of the microgels and confines the formulation to a fixed volume where researchers can perfuse liquid freeze/thaw or maintenance media, differentiation factors, and anti-inflammatory agents at virtually any time prior to delivery to the tissue. The porous microgel network facilitates this process and makes the formulation amenable to transport and storage which would otherwise be unattainable in hydrogel formulations.

SUGGESTED USES

Cell-based injectable therapies.

This novel microgel-based injectable system is designed to be a vehicle for neural stem cell-derived neurons for therapeutic engraftment.

The technology could in principle support any extracellular matrix and/or delivered cell.

ADVANTAGES

The advantages of this microgel-based delivery system in comparison to other cell transplantation technologies include:

- » Plug flow at high shear rate
- » Modularity
- » Perfusability

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OTHER INFORMATION

KEYWORDS

microgel, hydrogel, engraftment, neural stem cell

CATEGORIZED AS

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