Novel 3D Stem Cell Culture Systems

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Technology description

Many disorders result in tissue degeneration, including Parkinson’ s disease, heart attacks, and liver failure. One promising approach to treat these disorders is cell replacement therapy, which would implant new cells or tissues to replace those damaged by disease. Cell replacement therapy relies on stem cells, which are able to differentiate into a wide number of mature cell types. However, cell replacement therapies require large numbers of cells to clinically develop and commercialize, and the current stem cell culture methods are problematic in multiple ways, including low cell yields in 2D and poorly defined culture components. By culturing stem cells three-dimensionally, instead of two-dimensionally, far larger numbers of cells can be generated. Current three-dimensional culturing systems, however, often exert harmful shear stresses and pressures on the cells, have harsh cell recovery steps, do thus not generate large cell yields.
UC Berkeley researchers have developed new materials intended for use in fully chemically defined processes for large-scale growth and differentiation of stem cells. These materials prevent harsh cell recovery steps, and can be used in a defined, highly tunable, and three-dimensional cell culture system.

Additional Information

Publication
Developing Defined and Scalable 3D Culture Systems for Culturing Human Pluripotent Stem Cells at High Densities

Additional Technologies by these Inventors
Ultrasound Contrast Agents Based On Biological Gas Nanoparticles
Genetically Encoded Reporters for Hyperpolarized Xenon MRI
Hydrogels For Cell Derivation and Transplantation
3D System For Differentiation Of Oligodendocyte Precusors From Pluripotent Stem Cells
Self-Inactivating Targeted DNA Nucleases For Gene Therapy
Directed Evolution Of AAV Vectors That Undergo Retrograde Axonal Transport

Application area

Large scale growth of stem cells or other cell types
Chemically defined culture conditions
Stem cell differentiation
Cell therapy
Life sciences research reagent products and next-generation materials

Advantages

Compatible with tissue culture wells or stirred tank reactors
Can be made injectable and can incorporate biodegradable components
Highly tunable three-dimensional system provides to optimize stem cell growth and differentiation.

Institution

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