Research Tools

Controlling the Formation of Stem Cell Colonies with Tailored SAM Array

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WARF: P150062US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved method for regulating the size, shape and kinetics of cell culture aggregates using chemically defined SAM spots.

Overview

The substrate on which cells are cultured is key to successful growth and tissue generation. For example, it has been shown that attachment to a substrate by human embryonic stem cells influences whether or not they differentiate into mature, tissue-specific cell types.

Many techniques for differentiating pluripotent stem cells begin with forming ball-shaped aggregates of cells called embryoid bodies. Releasing the clumps typically requires scraping or treatment with enzymes. Cell aggregates formed in this way assume various dimensions, leading to inefficient and uncontrolled differentiation.

To improve uniformity, UW–Madison researchers developed a fresh approach using self-assembled monolayer (SAM) arrays (see WARF reference number P120127US01). SAMs are metal-coated surfaces patterned with small adherent spots for culturing and shaping cell colonies.

The Invention

Building on their previous work, the researchers have developed a new feature to make SAM arrays an even better tool to control cell aggregation. Specifically, the spots on the array consist of cellular adhesive peptides stuck to the surface by an easy-to-cleave labile bond. The peptides enable layers of cell to form and detach from the array without scraping or other external manipulation.

Any peptide capable of forming such a bond (e.g., a thioester bond) with the SAM surface could be employed.

Applications

- Controlling cell aggregation
- Platform for screening key parameters that influence cellular self-assembly, stem cell differentiation and early tissue development

Key Benefits

- Better control over size and shape of colony
- Ability to tailor cell-surface adhesion
- Less variable, more efficient cell differentiation
- Easier harvesting – no scraping or enzymes
- Compatible with a wide range of cells and peptides
- Supports enhanced throughput

Stage of Development

The researchers' SAM arrays have been used to examine the effect of peptide sequence and density on the attachment and behavior of human mesenchymal stem cells, embryonic stem cells, induced pluripotent stem cells, umbilical vein endothelial cells, dermal fibroblasts and fibrosarcoma tumor cells.

Additional Information

For More Information About the Inventors

- William Murphy

Tech Fields

- Pluripotent Stem Cells : Differentiation
- Pluripotent Stem Cells : Tools
- Research Tools : Arrays
- Research Tools : Other research tools

For current licensing status, please contact Rafael Diaz at rdiaz@warf.org or 608-960-9847