Chemical Engineering

Seminar

Cellular Response to Nanotopography

April 20, 2012 at 1:15pm in SCOB 228

Abstract

Topography of extracellular microenvironment can influence cellular responses from attachment and migration to differentiation and production of new tissue. Cells in their natural environment interact with extracellular matrix that contains structures in the nanometer scale. Nanoscaled topography of synthetic materials, through its resemblance to *in vivo* surroundings, may provide potent cues to influence the behavior of the seeded cells in regenerative medicine applications. It may also influence the implant-tissue interface reaction.

This presentation will highlight our recent work on gaining mechanistic insights of cell-nanotopography interactions. The presentation will also explore the potential of applying topography to enhance nonviral transfection. Optimization of nonviral gene delivery typically focuses on the design of particulate carriers that are endowed with desirable membrane targeting, internalization, and endosomal escape properties. Topographical control of cell transfectability, however, remains a largely unexplored parameter. Using high-throughput screening of primary human dermal fibroblasts cultured on a combinatorial library of microscale topographies, we have demonstrated an improvement in nonviral transfection efficiency for cells cultured on dense micropit patterns compared to smooth substrates

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Biosketch

Professor Leong is the James B. Duke Professor in the Department of Biomedical Engineering, Pratt School of Engineering at Duke University. He received his PhD from the University of Pennsylvania in 1987 and was a Research Associate at Massachusetts Institute of Technology from 1983 to 1986. A major focus of his lab is to understand and exploit the interaction of stem cells with their microenvironment for tissue engineering applications. Cells in their natural environment interact with extracellular matrix that contains structures in the nanometer scale. Nanotopography of synthetic materials, through its resemblance to *in vivo* surroundings, may provide potent cues to influence the behavior of the seeded cells, particular stem cells, in regenerative medicine applications. It may also influence the implant-tissue interface reaction. We have fabricated polymeric continuous nanostructures by either electrospinning or nanoimprinting for studies of cell-substrate and cell-topography interactions.