The Role of Nanoscale Phenomena in Regenerative Medicine

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Abstract

The emergence of nanofabrication technology has opened up new avenues for exploration, discovery, and the development of tools and devices for regenerative medicine. Many of the critical processes in cells, tissues and organs involve mechanical forces and interactions occurring at the nanoscale, and nanolithographic patterning has enabled replication of these interactions in the laboratory environment. The earliest applications of biological nanostructures in regenerative medicine will be tools to accelerate the development of safer and more efficacious pharmaceuticals. Ultimately, these capabilities will enable the formation of organ assist devices, replacement tissues and the generation of replacement organs in the laboratory for transplant medicine.

Biography

Jeffrey Borenstein is currently a Distinguished Member of the Technical Staff at the Charles Stark Draper Laboratory in Cambridge, Massachusetts. He is also Program Leader for Biomaterials and Tissue Engineering for the Center for Integration of Medicine and Innovative Technology (CIMIT). Dr. Borenstein is a Principal Investigator for several programs in tissue engineering and drug delivery with support from the NIH, NSF and other sources. Dr. Borenstein has a Ph.D. in Physics from the University at Albany and 25 years of experience in microelectronics, microfabrication technology and biomedical devices. Dr. Borenstein's research is focused on the application of microfabrication technology and microfluidics for tissue engineering, cell-based in vitro systems for discovery, and implantable drug delivery systems. He has thirteen issued patents, as well as twenty published patent applications and over eighty peer-reviewed journal articles and conference proceedings.