11th Annual Sigma Xi Postdoctoral Poster Presentation
Thursday, February 19, 2004

Abstract:

Dynamical adhesion force of cells on biomaterial substrates

Y. Deng, Carl G. Simon Jr.*, P.M. McGuiggan*, S. M. Wiederhorn, B.R. Lawn
Materials Science and Engineering Lab, *Polymer Division,
National Institute of Standards and Technology
Gaithersburg, MD 20899

The adhesion of cells to synthetic biomaterial implant surfaces is an essential step for tissue growth in bone repair. Such adhesion can mandate whether the tissue will accept or reject the implanted biomaterials. In this study, the adhesion forces between live cells (MC3T3-E1) and various biomaterial surfaces have been measured using atomic force microscope (AFM) with a biochemical modified sphere tip in cell culture medium. The characteristic cell adhesion behavior to the two different biomaterials surfaces can be further differentiate at time length from 1 minute to half hour. The dynamical adhesion force is determined over the frequency range of 10^{-2} to 10^{2} Hz for the cells on bioglass and biopolymer of polystyrene substrates. Increasing tip probing frequency (or loading rate) can actually increase the average cell adhesion force. The adhesion force is also increased with the cell attachment time. However, the magnitude of increase is various for different biomaterials surfaces. Such dynamical testing protocol has a potential to be used as a new and simple methodology to evaluate a spectrum of biomaterials for biocompatibility testing. The underlying adhesion mechanisms between cells and their biomaterial surfaces will also facilitate guidance of biomaterial surface treatment engineering.

Presenting Author's information

Name: Yan Deng
Division: 850
Laboratory:MSEL
Room: A349, Bldg. 223
Mail Stop 8500
Tel: (301) 975-5774
Fax: (301) 975-5012
Email:yan.deng@nist.gov
Sigma Xi member? No

Category:
Materials and Biotechnology