PHYSICAL MATHEMATICS SEMINAR

The Neutrophil Cell Nucleus: Linking its Physical Properties to Whole Cell Deformability and Function

AMY ROWAT

Harvard University
Brigham and Women's Hospital
Harvard Medical School

ABSTRACT:

Neutrophils are the most abundant white blood cell, which are required to transit through spaces less than 1/5 of the cell's diameter; the irregular, lobulated shape of the neutrophil nucleus is thought to facilitate the transit of these cells. However, neither the physical properties of the neutrophil nucleus and nuclear envelope, which is the interface between the nucleus and the cell, are fully understood. To elucidate the effects of the nucleus on cell mechanics, as well as the mechanism underlying the transition from ovoid to lobulated nuclear shape, we use HL60 cells as a differentiable model system, and apply techniques in microfluidics, quantitative image analysis, and molecular biology. Our results show that altering levels of a particular nuclear envelope scaffold protein (Lamin A) alters whole cell deformability as well as the shape transition of the cell nucleus. Interestingly we find the nuclear envelope membrane protein (LBR) also affects nuclear shape. These findings may have possible implications for understanding the altered mechanical properties of cancer cells, as well as reduced immune function in aging, where lamin A has been reported to accumulate at the nuclear envelope.

TUESDAY, NOVEMBER 30, 2010
2:30 PM
Building 2, Room 105

Refreshments at 3:30 PM in Building 2, Room 290

Massachusetts Institute of Technology