451a The Traction Stresses of Neutrophils during Adhesion and Chemokinesis

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When tissue damage or microbial invasion occurs, neutrophils are recruited from the blood stream to the vascular endothelium through an adhesion cascade consisting of rolling, firm adhesion, spreading, locomotion, and transmigration to the site of infection. While the neutrophils are undergoing locomotion to gap junction sites and subsequent transmigration, forces are exerted on the substrate to allow for migration. These forces were calculated and were tracked spatially and temporally as the neutrophil migrated on polyacrylamide gels with embedded fluorescent beads that were displaced upon the application of force. Measurements were taken using a gel coated with E-selectin and ICAM-1 while a physiological level of shear was imposed upon the neutrophils that were activated with fMLF. During chemokinesis, we see that the largest forces are created in the rear of the cell and the largest cell displacements occur when the forces throughout the cell align themselves to behave synergistically. As the cell turns, the forces appear to realign themselves to remain largely in the rear and to some extent in the front of the cells. This data agrees with observations that actin/myosin complexes form in the rear of the cell and are responsible for contractility.