REAL-TIME CHANGES IN MECHANICAL PROPERTIES OF HUMAN ENDOTHELIAL CELLS UPON Icam-1 CROSSLINKING STUDIED BY ATOMIC FORCE MICROSCOPY

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ICAM-1 is an adhesion molecule important in the intercellular interaction between endothelial cells and neutrophils, and it mediates the stiffening response of endothelial cells upon interaction with neutrophils. The effect of crosslinking ICAM-1 on the morphological and biomechanical characteristics of human pulmonary microvascular endothelial cells was examined using atomic force microscopy (AFM) force mapping. An array of force-indentation curves was obtained and analyzed to determine elastic moduli as a function of x, y positions. ICAM-1 crosslinking induced a significant increase of 156 ± 27 % (n=4, $P<0.05$) in the elastic modulus after 20 min that was not observed in cells without crosslinking. Increases in elastic modulus were greater on filamentous structures and at intercellular junctions compared to the cytosol. AFM height images showed that the height was increased at 20 min and the space between endothelial cells widened. In conclusion, ICAM-1 crosslinking increased the elastic modulus in a nonhomogeneous manner as demonstrated by AFM force mapping.