528a Leukocyte Firm Adhesion in Capillary-Sized, Selectin Coated Micropipettes

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Leukocyte retention in lung alveolar capillaries is a necessary part of the response to infection in the lung. It has been hypothesized that cells either become mechanically trapped or adhere to capillary endothelial cells via endothelial cell adhesion molecules (ECAMs). We propose that retention involves both mechanical and adhesive forces and that the biochemical adhesive force is modulated by mechanical forces that alter the contact area between leukocyte and endothelium. To probe this hypothesis, an adhesion assay has been developed (Micropipette Cell Adhesion Assay) in which individual leukocytes were aspirated into micropipettes (tip ID = 5.5-8.5 μm) pre-coated with ECAMs. Following aspiration, cells were exposed to physiologically relevant pressure differences (10-60 Pa) and cell motion and arrest were tracked during video microscopy. Significantly more adhesion was seen in micropipettes coated with ECAMs than in micropipettes coated with BSA. Leukocytes arrest firmly in the micropipette on concentrations of ECAMs that lead to rolling or no adhesion in a parallel plate flow chamber assay. The results suggest that the large contact area imposed on the aspirated cell by the capillary geometry leads to a more durable adhesion under higher disrupting forces than that seen for cells in venules. This also implies that lower density of ECAMs can mediate arrest in capillaries than would be necessary for adhesion in venules. This work was supported by an award from the American Heart Association (DFJT) and by the National Institutes of Health grant GM057640 (DJG).