

451b Cyclic Migratory Behavior of Neutrophils in Selectin Coated Capillary-Sized Micropipettes

Prithu Sundd, Xiaoyan Zou, Douglas J. Goetz, and David F.J. Tees

Freshly isolated human neutrophils (diameter~9 μm) were deformed into capsule shape by completely aspirating them into 4.5-7.5 μm ID micropipettes that had been pre-coated with BSA or a known concentration of endothelial cell adhesion molecule (ECAM). Following aspiration, the cells were exposed to physiologically relevant pressure differences (10-60 Pa). The cells were observed to spread on the wall of the constant ID section of ECAM/BSA coated micropipettes. They then exhibited a cyclic migratory behavior that consisted of migration out of the micropipette followed by a loss of traction and reaspiration into the micropipette. This cycle could be repeated many times. This motion was seen to be independent of the magnitude of the applied pressure difference across the cell. The fraction of cells that exhibited this behavior was higher in P-selectin-coated micropipettes than in BSA-coated micropipettes, but it was present in both. This is the first time that such behavior has been reported using an in vitro adhesion assay that replicates the biochemical and fluid mechanical environment of blood capillaries. This behavior resembles that seen in alveolar lung capillaries where the sequestered neutrophils migrate towards the junction of endothelial cells in a CD11/CD18 dependent or independent manner. This work was supported by an award from the American Heart Association (DFJT) and by the National Institutes of Health grant GM057640 (DJG).