

Effects of Stiffness on Endothelial Cells Behavior

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Abstract : Endothelium proliferation is an important process in cardiovascular homeostasis and can be regulated by extracellular environment, as cells can actively sense mechanical environment. In this study, we evaluated endothelial cell proliferation on PDMS/alumina (Al₂O₃) composites and pure PDMS. The substrates were prepared from pure PDMS and its composites with 5% and 10% Al₂O₃ at curing temperature 50°C for 4 h and then characterized by mechanical, structural and morphological analyses. Higher stiffness was found in the composites compared to the pure PDMS substrate. Cell proliferation of the cultured bovine aortic endothelial cells on substrate materials were evaluated via Resazurin assay and 1, 1'-Dioctadecyl-1, 3, 3, 3', 3'-Tetramethylindocarbocyanine Perchlorate-Acetylated LDL (DiI-Ac-LDL) cell staining, respectively. The results revealed that stiffer substrates promote more endothelial cells proliferation to the less stiff substrates. Therefore, this study firmly hypothesizes that the stiffness elevates endothelial cells proliferation.

Keywords : stiffness, proliferation, bovine aortic endothelial cells, extra cellular matrix, vascular

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