ABSTRACT

The microenvironment of the cell constantly changes with age and in case of certain diseases for e.g. the underlying matrix is generally stiffer in fibrotic tissue. Cells sense and respond to these changes and exert traction forces to constantly sense the environment and respond by remodeling and stress fibers formation. Cells are known to form more stress fibers on stiffer substrate and less stress fibers on softer substrates and relatively change in the traction forces. The cells sense the environment through integrins as primary molecules attaching to the ECM. On the cell side of this connection, the focal adhesion molecules like talin, vinculin and paxillin cluster to form the mature focal adhesions. These molecules transmit the mechanical cues from the ECM to actin myosin cytoskeleton which in turn causes cell contractility. Cells constantly sense the mechanical cues like shear flow and stretch as in the case of blood vessels. Through this study we have tried to understand the effect of shear stress as a mechanical cue using a custom made fluid shear device on the cell traction forces. We have completed preliminary experiments using polyacrylamide gels of 20kPa and 40kPa stiffness and showed that the traction forces exerted by the cells on stiffer gel was more. We intend to finish the study to see how these traction forces change with the additional factor of shear on the cells. This study is a part of the hypotheses that cell morphology changes with change in shear stress because of changes in cell contractility. The study will be extremely useful in mechanodiagnostic of cancer cell metastasis studies.