

Lab 11: Microfluidics

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Summary

This laboratory will demonstrate the use of microfabricated structures to investigate the mechanical response of cells as they are deformed through narrow microfluidic channels. Specifically, the biorheological behavior of red blood cells at different stages of malaria infection will be studied. Under a known constant pressure differential, it can be seen that the entrance time and velocity through narrow channels (varying from 2 - 8 microns square cross-section) differ between the early and late stage infected and much stiffer red blood cells. It can also be shown that the sufficiently stiff cells cannot pass through the narrowest channels. Analogies can be made between this behavior and that experienced in the body as the cell passes through capillaries of comparable size.

Recommended Reading

J. P. Shelby *et al.*, "A microfluidic model for single-cell capillary obstruction by Plasmodium falciparum infected erythrocytes," *PNAS*, **100**.

B. Yap and R. D. Kamm, "Mechanical deformation of neutrophils into narrow channels induces pseudopod projection and changes in biomechanical properties," *J. Appl. Physiology*, **98**.

