

# Lab 6: Optical tweezers: membrane and cell

**PI:** Matt Lang

**Lab Instructor:** John Mills

## Summary

Optical tweezers that exert forces up to hundreds of picoNewtons can probe the mechanical properties of membranes and cells. Standard tweezers experiments involve optically trapping small microspheres attached to specific cell membrane locations which serve as grips to deform the cell membrane locally (tether experiments) or entire cell (cell stretch experiments). Calibration of optical trap forces on the microspheres allows quantitative measurement of static and dynamic cell mechanical properties. In this laboratory module, two experiments will be performed: membrane tether pulling of B-cells and cell stretch tests of erythrocytes.

## Recommended Reading

D. Raucher and M. P. Sheetz, "Characteristics of a Membrane Reservoir Buffering Membrane Tension," *Biophys. J.* **77**.

J. P. Mills *et al.*, "Nonlinear Elastic and Viscoelastic Deformation of the Human Red Blood Cell with Optical Tweezers," *Mol. Cell Biol.* **1**.

