Tank Treading of Optically Trapped Red Blood Cells in Shear Flow

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Supplementary Material

Figure S1 (below) depicts measured flow-velocity profiles for the 100 μm thick flow cell used in the present series of experiments. Flow velocities at different heights were determined by imaging flowing 2μm beads at different flow rates and at different heights. Each data point is an average 25 beads. Error bars show one standard deviation

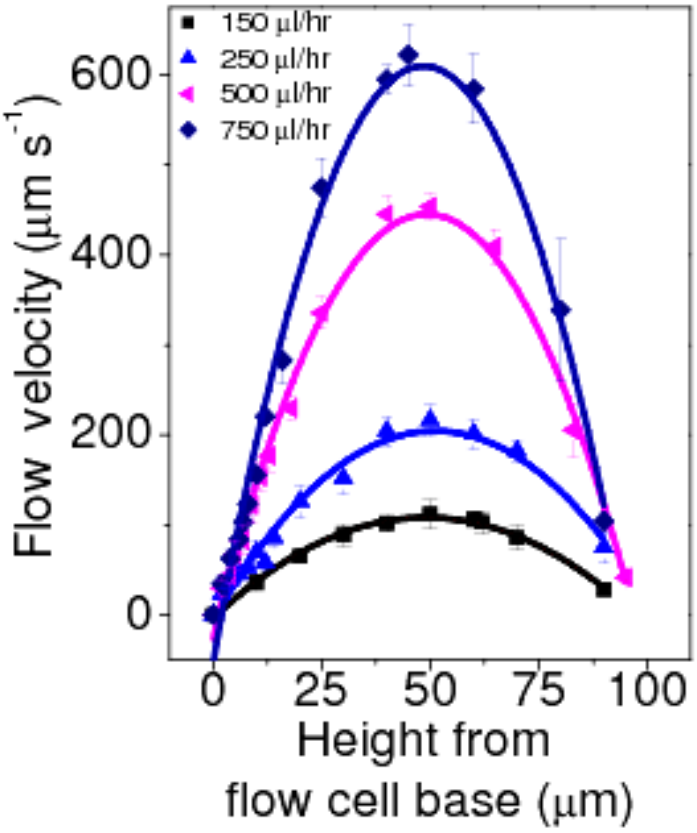
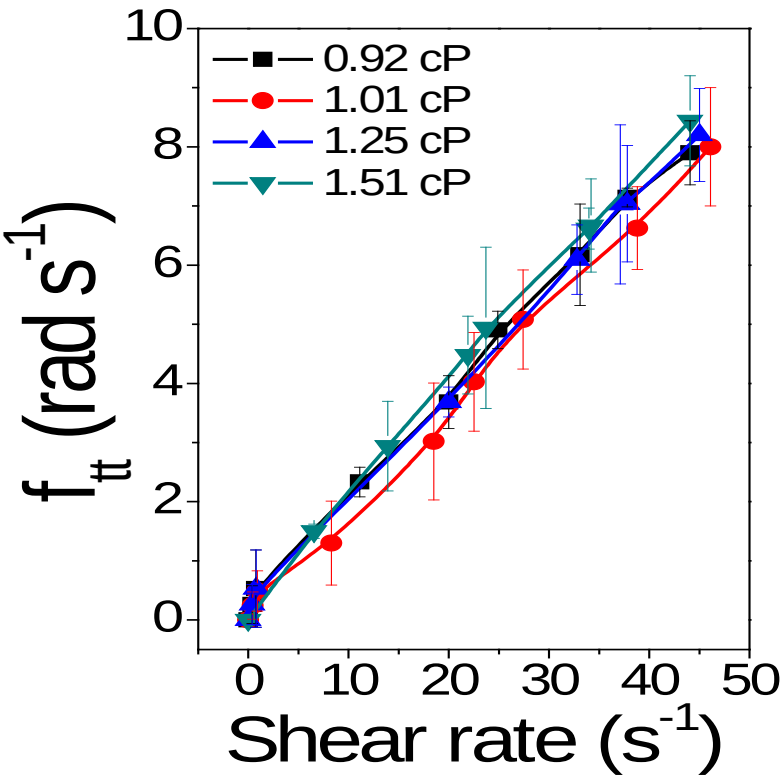


Figure S2 shows a) Dependence of tank treading frequency, f_{tt}, on shear rate at different values of viscosity of the suspendng medium. b) Variation of tank treading frequency, $f_{tt,}$ on viscosity of the suspending medium at different values of shear rate(stars indicate significant difference from immediate previous value). From both the plots it is evident that change in viscosity contributes to a negligible change in f_{tt}.

a)



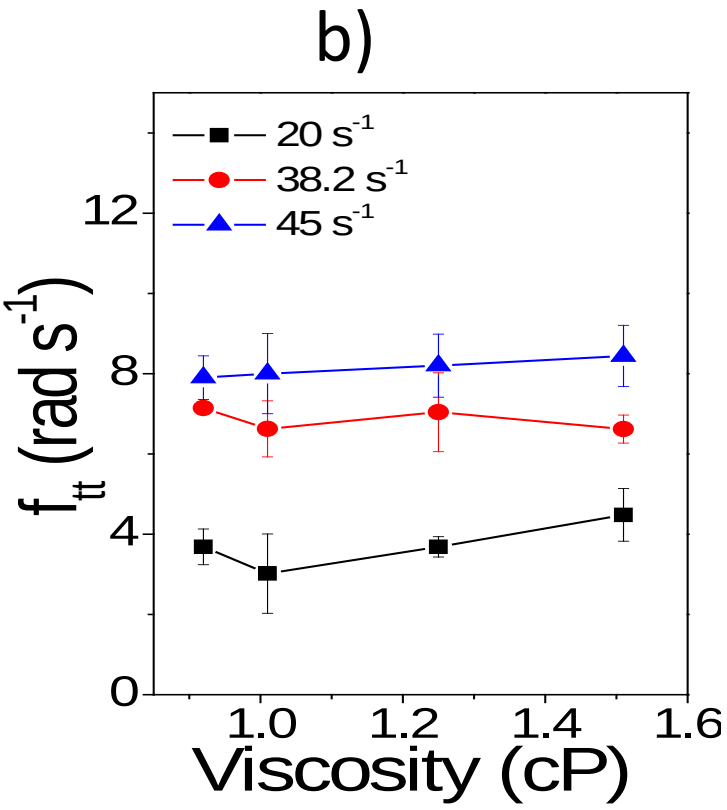
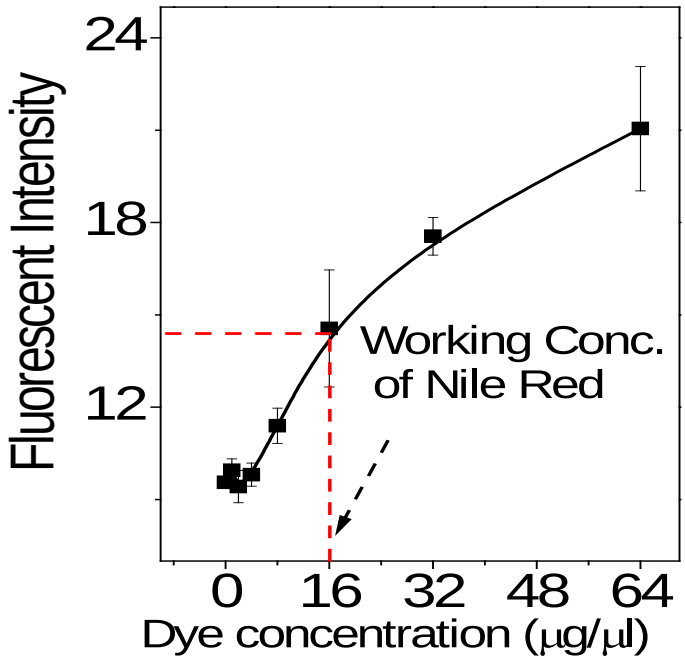


Figure S3 (below) depicts variation of RBC surface staining intensity with increasing amount of nile red concentrations. Staining intenisity is given as relative intensity to the unstained RBCs. As concentration increases, staining intensity increases. The working concentration of nile red (red dashed line) was chosen to be such that it falls in the linear region of the graph. The solid points are the measured data while the line is a guide to the eye. b) Variation of nile red staining intensity (representing amounts of neutral lipids including cholesterol esters) with increasing concentrations of MBCD. As the MBCD concentration increases, nile red intensity decreases, thereby showing decreasing amounts of neutral lipids (Stars indicate significant differences from the immediate previous value).

a)


Fluorescent Intensity
24
18
12
Working Conc.
of Nile Red
0
16
32
48
64
Dye concentration (μg/μl)

b)

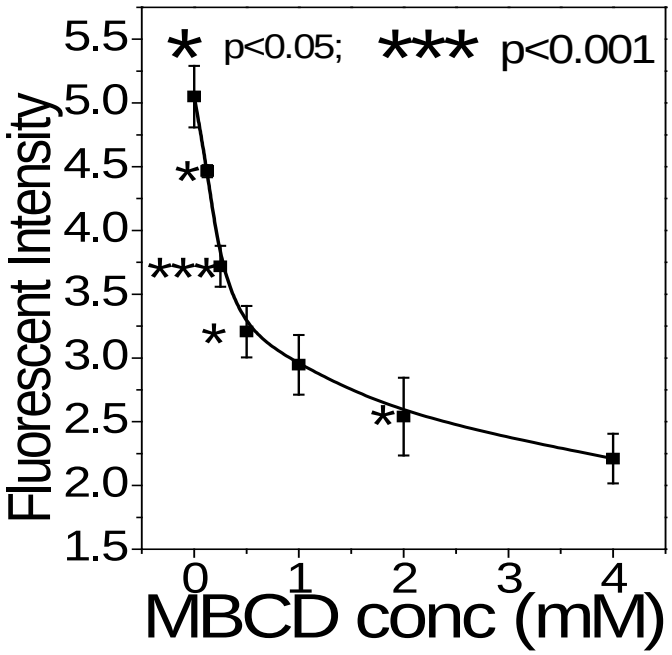
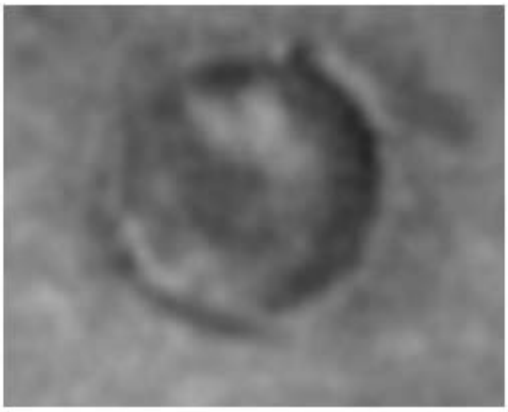

* p<0.05; *** p<0.001
Fluorescent Intensity
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
*
*
***
*
*
0
1
2
3
4
MBCD conc (mM)

Figure S4 (below) depicts RBCs in which the content of cholesterol and its esters have been depleted from the membranes. a) DIC (differential interference contrast) image showing the stomatocyticity of an RBC; b) image showing RBCs stained with nile red; only in a few cells is the circular periphery slightly perturbed.

a)



b)