



**Fig. S1: Estimate of Contact Area.** In the AFM, the contact area can be estimated from  $c^2 = (R+h)^2 - (R-z)^2$ , where  $R$  is the radius of the cell ( $R \sim 5 \mu\text{m}$ ),  $h$  the length of a microvillus ( $h \sim 0.3 \mu\text{m}$  (J. Y. Shao, H. P. Ting-Beall and R. M. Hochmuth, *Proc. Natl. Acad. Sci. U. S. A.*, 1998, **95**, 6797-6802)) and  $z$  the indentation. The indentation can be calculated

according to  $z = \sqrt[3]{\frac{9F^2(1-\theta^2)^2}{16E^2R}}$  (X. Zhang, E. P. Wojcikiewicz, V. T. Moy, *Exp Biol. Med.*,

2006, **231**, 1306-1312). With a median Young modulus of  $E = 20 \text{ Pa}$ ,  $\theta = 0.5$  and at contact force of  $75 \pm 25 \text{ pN}$ , we determined a contact area of  $\sim 37 \pm 5 \mu\text{m}^2$ . The contact area in the flow chamber can be estimated from  $c^2 = (R+h)^2 - R^2$ , which yields a contact area of  $\sim 10 \mu\text{m}^2$  at typical values for cell diameter and microvillus length neglecting flattening.