



**SI-4.** Response of intracellular  $\text{Ca}^{2+}$  in MDCK cells to an acute change in flow rate from 0.3  $\mu\text{L}/\text{min}$  to 20  $\mu\text{L}/\text{min}$  (indicated by blue arrow). The responses were measured from two different regions in the same chamber, the broad region below the barrier (black) and narrow region above the barrier (red). The cells were pre-exposed to a fluid shear stress of 5.5  $\mu\text{L}/\text{min}$  for 6 hrs before the challenge. The error bars show the standard deviation of 12 individual cells.