Table 2. The experimental measurements of stiffness, and the center-to-center distance between vinculin cluster and 2μm bead. Regression analysis of each tensile data yields the stiffness (K) of the corresponding individual Cell. The average value and standard deviation of all obtained stiffness are 42.9pN/μm and 6.4pN/μm, respectively.

Sample Cell No.	Stiffness K [pN/μm]	Vinculin Cluster Distance [μm]	Sample Cell No.	Stiffness K [pN/μm]	Vinculin Cluster Distance [μm]
1	42.23	1.66	20	46.69	2.69
2	48.24	2.11	21	46.48	2.63
3	44.22	2.79	22	44.97	2.13
4	41.2	1.79	23	46.45	2.71
5	62.08	3.19	24	45.10	1.82
6	44.47	2.85	25	38.11	1.64
7	52.09	2.17	26	38.21	—
8	40.96	1.90	27	42.15	2.63
9	39.34	—	28	43.24	1.93
10	44.28	2.25	29	38.48	1.66
11	37.77	1.59	30	40.24	—
12	49.54	—	31	46.60	2.03
13	42.75	1.06	32	41.50	—
14	23.33	—	33	44.56	2.50
15	31.05	1.41	34	43.58	1.84
16	40.78	1.35	35	47.17	—
17	40.26	1.78	36	33.80	1.37
18	54.50	2.86	37	43.55	2.12
19	36.41	1.61	38	44.95	2.09

Movie S0: The operation of the microfluidic device is demonstrated by using 2 μm beads in both cell and bead channels. By insertion the designed amount of beads solution into inlet ports, pressure gradients can be created, for instance, in the cell channel from right to left, in the bead channel from left to right, and across interconnecting channels from up to down. The direction of the beads motion is along the pressure gradients, as seen in the movie.

Movie S1: The time-lapse movie of cell seeding in the cell channel. By insertion the cell solution into cell inlet port, pressure gradient is created and causes the flow of solution inside channels, due to gravitational driving force. In this movie, the cells are rapidly located in their wells after the insertion of the cell solution.

Movie S2: The tensile test of a single cell is demonstrated in this movie. After trapping a 2 μm bead by optical laser tweezers, the piezo-controlled stage is translated to present the bead to cell membrane in three steps. First, by displacing the stage, the trapped bead approaches the cell membrane until it deviates from the center of the trap; next, the bead is held stationary against the membrane for 5 sec to allow binding to occur between the bead and the membrane surface, arising integrin-fibronectin bindings. Finally, the stage is translated backward and as it is, the force applied to the cell membrane via the trapped bead is monitored.