Electronic Supplementary Material (ESI) for RSC Advances.

Biocompatibility assay of cellular behavior inside leaf-inspired biomimetic microdevice at single cell level

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Supplementary material (ESI 1)

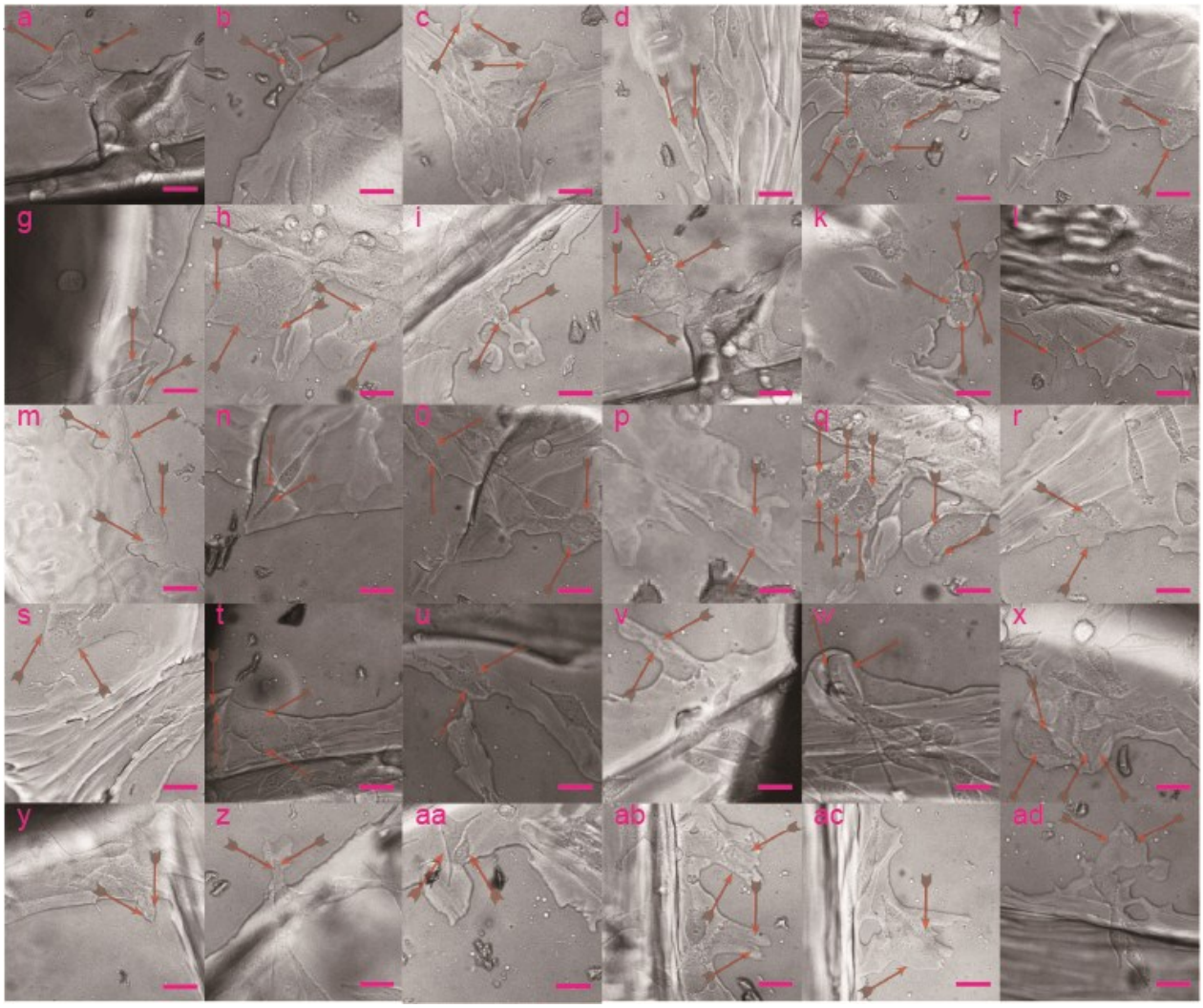

Fig. S1 Cell deformation inside leaves inspired biomimetic microvascular networks. Red arrows indicate cell location. Scale bars, 50 μm.

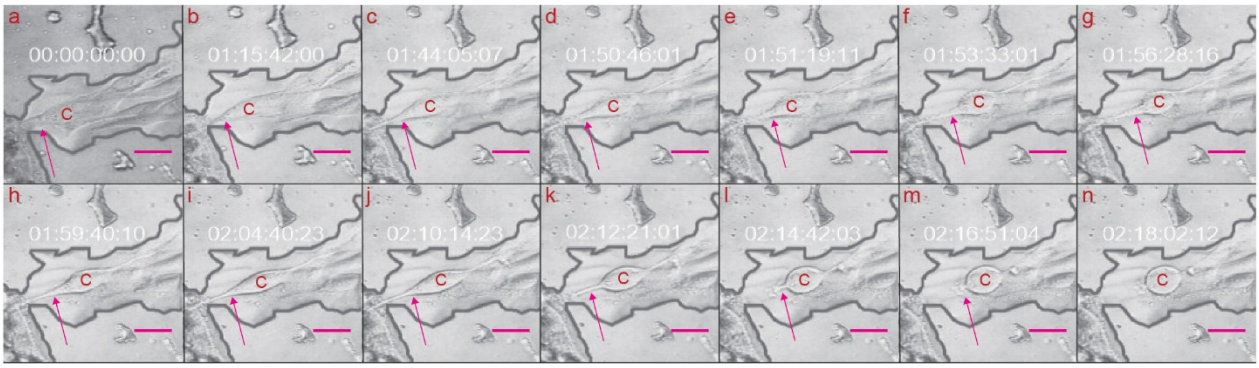

Fig. S2 Dynamic tension analysis between cytomembrane and microchannel neck. Scale bars, 50 μm.

Fig. S2 shows the dynamic tension between cytomembrane and microchannel neck. Easily seen, the concerned cell fail to escape from the tiny channel during the first contractive motion, and thus the cytomemebrane begins to extend. Afterwards, the cytomembrane contracts again, and finally this cell escapes from the tiny channel with the prolonged cell tether braking with the channel neck, lasting for about one hour. The intracellular pressure (ΔP) of human melanoma lines M2 are measured to be $20.7 \pm 5.9 N/m^2 (STD)$ as reported previously.[54] Because the relationship between membrane tether force (F_b) and intracellular pressure (ΔP) an be represented by the following equation:[54~55]

$$\Delta P = F_b^2 / 4\pi^2 B R_b$$

wherein, B is the bending stiffness with a constant value assumed to be $2.7 \times 10^{-19} N \cdot m$ (for lipid bilayer, red cell, and neutrophil membranes), R_b is the bled radius and measured to be 5.72 μm by the video processing model here (Fig. S2k). As a result, herein membrane tether force (F_b) is calculated to be 35.5×10^{-12} N.

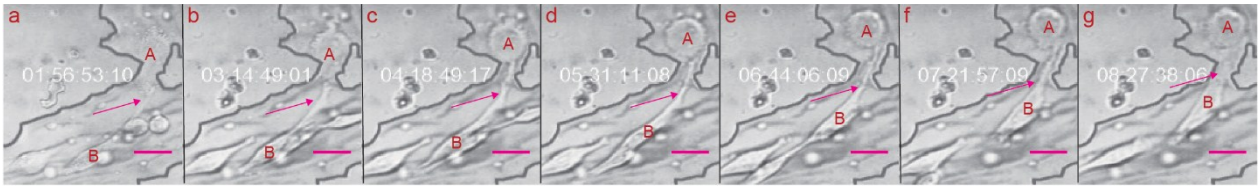

Fig. S3 Dynamic extracellular communication analysis of two cells: cell A and cell B in the frames. Scale bars, 50 μm.

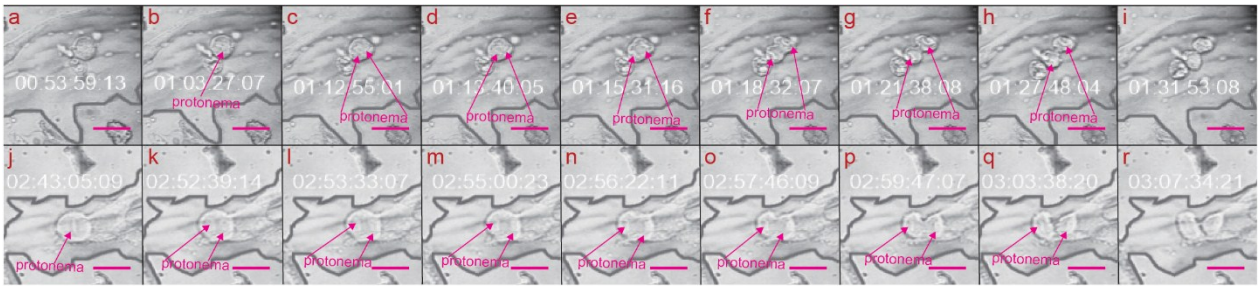

Fig. S4 Dynamic analysis for cell division of two independent cells. Scale bars, 50 μm.