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Supplemental Information

Pericellular Brush and Mechanics of Guinea Pig Fibroblast Cells Studied with AFM

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Supporting Materials

for

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Measurement of the cell radius using the AFM data

The radius of the cell R_{cell} used in this work has been measured from the AFM topographical image of the cell obtained in the force-volume mode, and corrected by the cell deformation *i* (the latter was calculated using eq. (1) of the main text). The below is an example describing how to extract this from the force volume data collected with AFM.

Figure S1a shows a representative height image collected in the force volume mode. Because we don't want to disturb cells for excessively long time, only 16 x 16 pixels maps are collected. However, as one can see, it is quite enough to obtain the cell radius. It is worth noting that the same information has to be used to identify the force curves which will be processed for the data analysis. It should be noted that because we use the Hertz model, we can only use the pixels around the top (see the main text for more details).

To calculate the radius of the cell, we have to correct the height data for their deformation. This is important because the cell is soft and deformation can be substantial. This can easily be done by increasing the height at each pixel by the amount of deformation calculated with the help of equation 1 of the main text. The result of such correction is shown in figure S1b. Figure S1c shows the horizontal cross-section of the reconstructed (undeformed) cell surface of figure S1b. Horizontal and vertical radiuses of the cell were calculated by parabolic fitting (done with the help of SPIP software by Image Metrology Inc.). The final radius was derived as a geometrical average

from radiuses taken from vertical and horizontal cross-sections. It is 11 µm in this specific example.

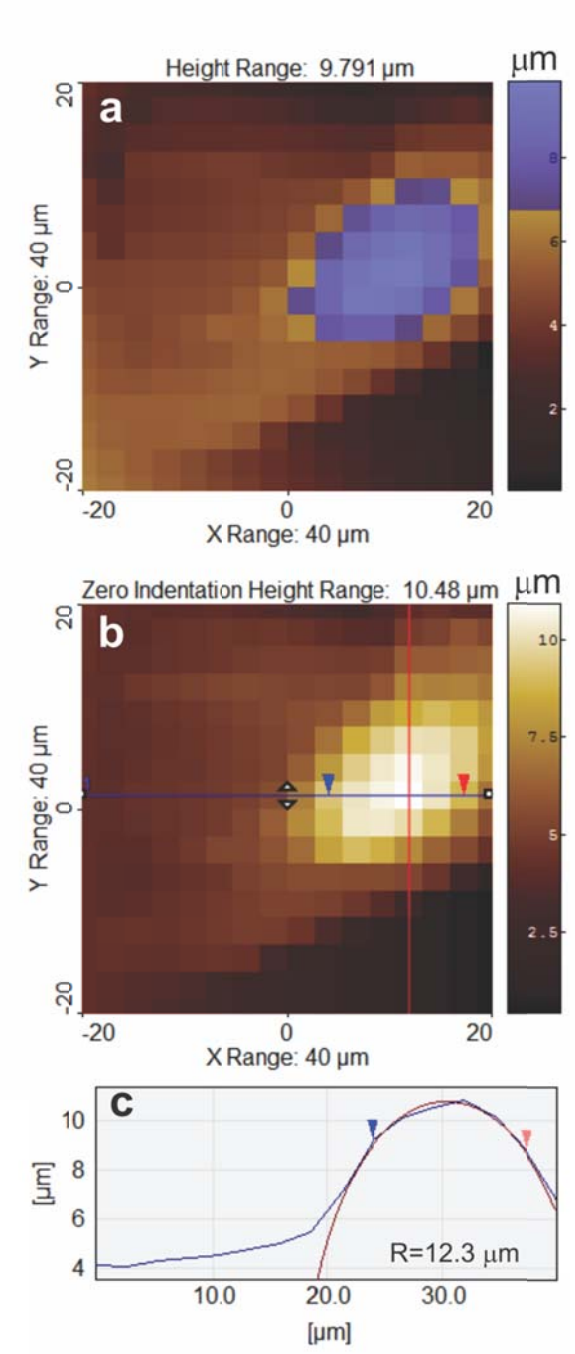
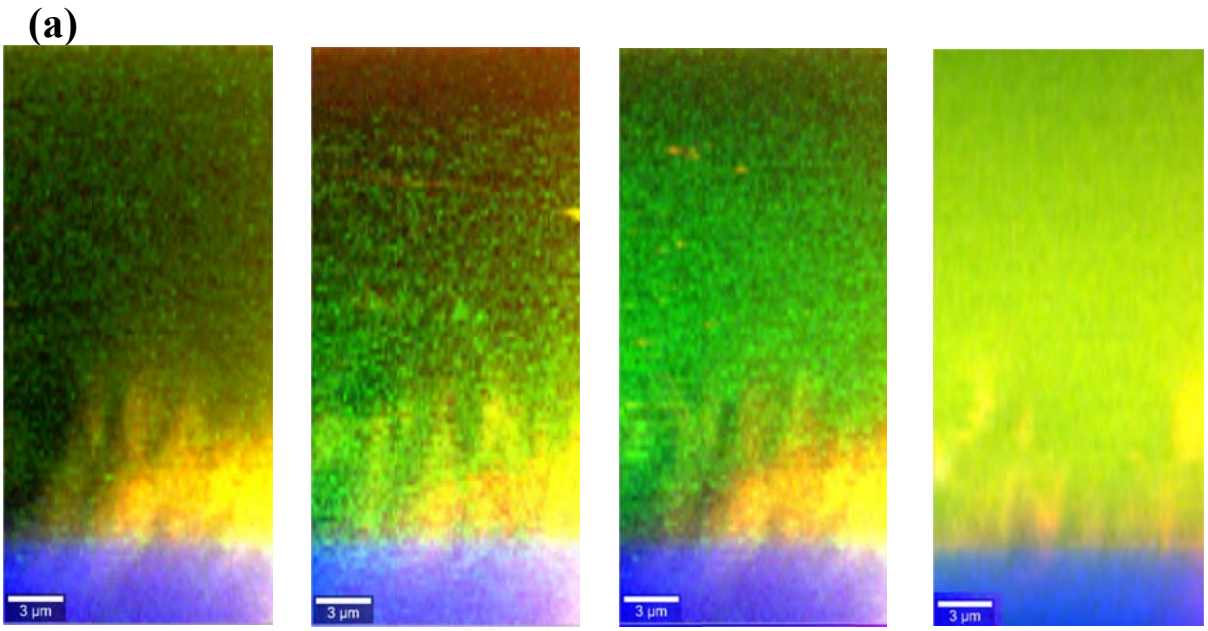


FIGURE S1. A representative (a) height image of a deformed skin fibroblast cell. Area in the center (on top) of the cell where force curves were extracted is highlighted by blue color. (b) Restored undeformed cell topography. (c) Radius of an undeformed cell calculated from the horizontal cross-section. The radius used for the final calculation was derived as a geometrical average from radiuses taken from vertical and horizontal cross-sections.

Detection of the pericellular coat with fluorescent silica particles

The results of imaging of pericellular coat with the help of ultrabright fluorescent particles is shown in figure S2(a). The description of the imaging is given in the main text around figure 7.



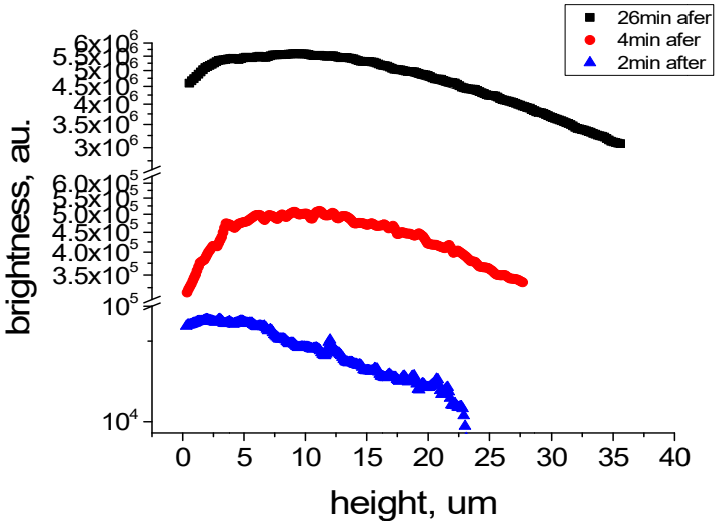


FIGURE S2. (a) Vertical distribution of positively charged fluorescent silica nanoparticles (seen through green fluorescence) which are diffusing/attaching to polysaccharides of the pericellular brush layer. Blue color indicates polystyrene of the culture dish. Yellow orange color highlights lipids of the cellular membranes. (b) The decrease of the average brightness of the fluorescent silica nanoparticles at the function of height above the cell shown for three different times after adding the solution of nanoparticles (2, 4 and 26 minutes).