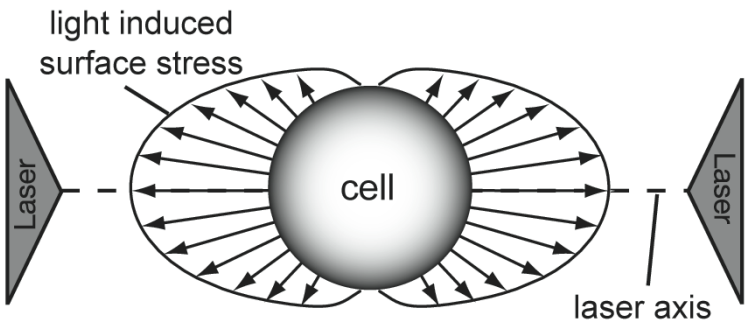
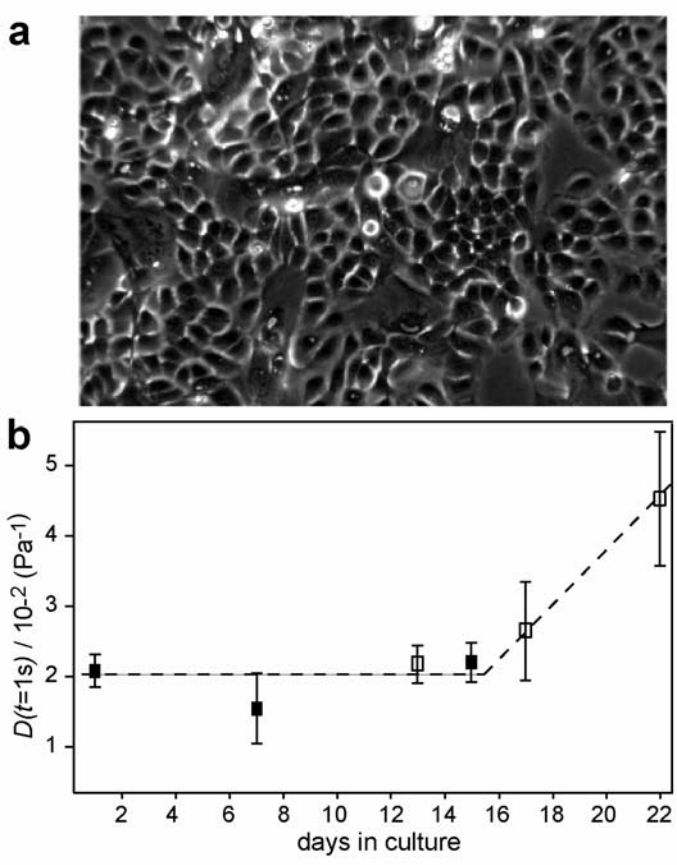


Supplementary Figure 1. Surface stress in the µOS. The distribution of surface forces, which are caused by the momentum transfer from the counter-propagating laser beams to the cell surface, is schematically indicated by the arrows. The peak stress (force per area), σ_o, occurs along the laser beam axis for each cell is calculated as described in (1) and (2) and used to normalize the strain observed to yield the compliance, $D(t) = \varepsilon(t)/\sigma_o$. The triangles indicate the propagation direction of the laser beams. The stress magnitude and distribution.

(1) Guck, J., et al. (2000). "Optical deformability of soft biological dielectrics." Phys Rev Lett **84**(23): 5451-4.

(2) Guck, J., et al. (2001). "The optical stretcher: a novel laser tool to micromanipulate cells." Biophys J **81**(2): 767-84.



Supplementary Figure 2. Change of primary oral epithelial cells in culture. (**a**) Phase contrast image of the normal epithelial cells grown in culture at about 80% confluency. (**b**) Evolution of the tensile creep compliance of cells (at 1 s of stress application) over the course of three weeks in culture. Open and filled squares are from two different donors. The error bars represent standard error of mean. Mechanical measurements were repeated over several weeks to test whether the mechanical properties of the cells in culture could be considered representative of the situation *in vivo* or whether they change due to culture. The results show that the mechanical properties of these primary cells remain constant for about 2 weeks, before they become more compliant and the variance increases. This is probably caused by de-differentiation in this non-physiological environment. Scale bar; 50 µm.