Supporting Information (SI)

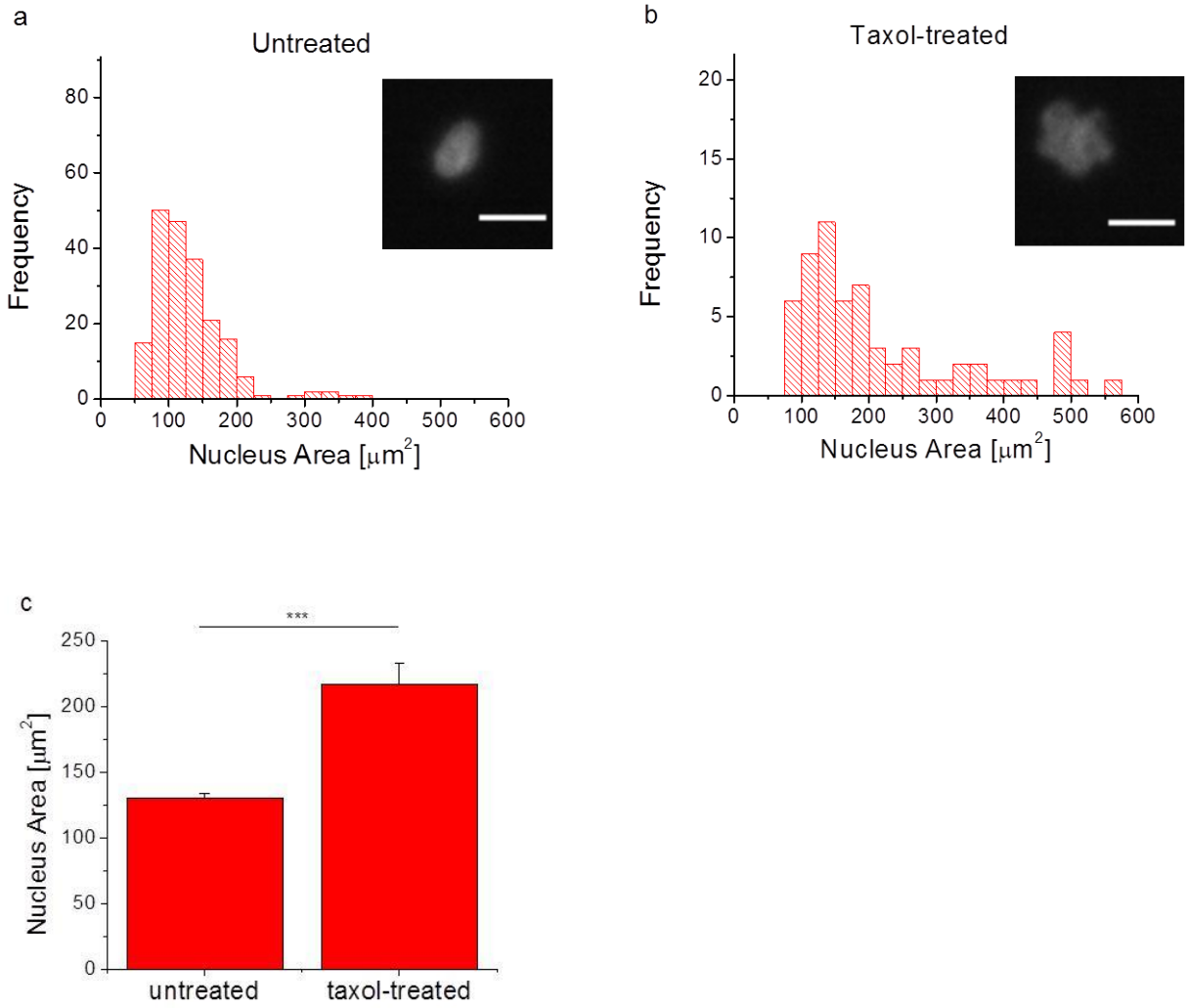
SI Video 1: A video showing the operation of the serial micropipette device. A pressure gradient is applied from left to right. Two cells in the same channel are repeatedly deformed and allowed to relax in place to enable the measurement of the coupling between deformation and relaxation dynamics. The cells are able to transit across subsequent constrictions much more quickly than the initial constriction even after substantial relaxation of their initial strains. The frame rate of the video is 100x faster than real time, and the width of the wider channel region is 15μm.

SI Video 2: A superposed phase contrast and fluorescence imaging video showing serial deformations of cells treated with a live nucleus counterstain (NucBlue/Hoechst 33342). This enables the relative contributions of the cell nucleus and the whole cell body in the cell deformation process across constrictions to be distinguished. The frame rate of the video is 100x faster than real time, and the width of the wider channel region is 15μm.

SI Figure 1: Distribution of nuclei sizes for a) untreated and b) taxol-treated (1 day) MDA-MB-231 cells with fluorescently stained representative nuclei images (insets). c) Untreated cells have an average area of 130 ± 4μm (n = 200) and taxol-treated cells have an average area of 217 ± 16μm (n = 62). Error bars are s.e.m. *** indicates $p < 0.001$. The scale bar is 20μm.

SI Figure 2: Distribution of relaxation times used in multi-cell relaxation-deformation experiments. The average relaxation time used was 3.3 minutes.

Supporting Information Figure 1



Supporting Information Figure 2