Soft cell confiner development to decipher the impact of mechanical stimuli on cancer cells

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During tumor progression, many changes in the physical properties of the microenvironment can occur such as the apparition of compressive stresses due to proliferation burst or increase in the microenvironment stiffness. While the effect of matrix stiffness has been extensively studied in the context of tumor progression and resistance to treatment, limited studies have focused on the role of solid stresses. Indeed, the field is lacking standard in vitro test reproducing this long-term compression, without affecting cells behavior by other means.

We designed a hydrogel-based microsystem with rigidity close to physiological conditions and enabling efficient medium renewal. We challenged our so-called "Soft confiner" with different cell lines for several days (both epithelial and mesenchymal cell types, as well as non-adhesive immature hematopoietic cell lines) and found no major impact on cell proliferation. This set up is compatible with time-lapse microscopy, in-situ immunostaining, as well as classical molecular analysis (qPCR, Western Blot)

Our soft-cell confiner appears thus as a powerful tool that could be used in different biological contexts to decipher the impact of long-term mechanical stimulation on cell behavior.