Single-Cell Probe Force studies to identify Sox2 overexpression-promoted Cell adhesion variations in MCF7 Breast Cancer Cells

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Replacement of the tip by a living cell as probing element in Atomic Force Microscopy (AFM) experiments permits direct quantification of cell-substrate and cell-cell adhesion forces. This is called Single-Cell Probe Force measurement technique [1]. When complemented with the use of optical/fluorescence microscopies it allows a controlled manipulation of the cell, and a well-defined location on the area of interest. In this work, a setup based on two glass-half-slides -a non-fouling one with bacterial S-layer protein SbpA from L. sphaericus CCM 2177, and a second half-slide with a fibronectin layer- has been employed to measure adhesion of MCF7 breast cancers, in two different states, towards fibronectin films (and SbpA as control) and cells (symmetric vs asymmetric systems). Measurements aimed at characterizing the adhesion behavior of Sox2 factor-overexpressing MCF7 cells, which are more invasive and of higher aggressiveness than control cells [2]. Together with the use of fluorescence techniques (epifluorescence, TIRF) the visualization of Vinculin and Actin distribution in both control MCF7 and Sox2-overexpressing cells in contact with fibronectin surfaces is enabled. Hence, the respective formation of adhesion complexes (i.e. focal adhesions) could be monitored and quantified. Results show the validity of this combined approach for the comparison between cell lines.

References

[1] A. Moreno-Cencerrado et al. *Microsc. Res. Techniq.*, 80 (2017) 124-130.
[2] M. Piva et al. EMBO Mol. Med., 6 (2014) 66-79

Figures

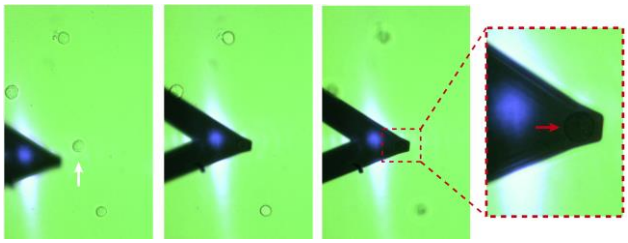

Figure 1: (left to right) Cell capture process sequence. The pre-modified tipless cantilever approaches the target cell (on a SbpA coating) until soft contact is achieved. Retraction after few minutes allows cell capture (see magnification).

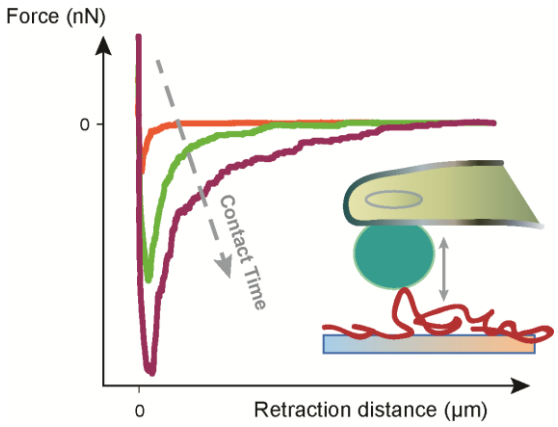

Figure 2: Schematic view of a cell-substrate interaction measurement, showing the corresponding contact time-dependent force vs distance plots at the retraction segment.