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Two-state micropattern: dynamic adhesion assay at the single cell level

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Microstructured surfaces offer powerful platforms to investigate single cell adhesion, migration and contractility. Micropattern lattices have been successfully used to control the cell contractile apparatus [1], the cell motion [2,3], and also to study the regulation between integrins and Rho-family GTPases (or Src-familiy kinases) adhesion signaling pathways [4,5]. Two-state micropattern, composed of two connected patterns, was recently employed to study occupancy probability according to the shape, the size and the orientation of each patterns [6]. By this way, we propose to use two asymmetric motifs, displaying a non-uniform fibronectin concentration, and on which cells exhibit a different adhesion strength and contractility (one motif is pro-adhesive and pro-contractile). These patterns were obtained with the *Alvéole* system, which allows to control the concentration of fibronectin on glass substrate. Cell motion between the two motifs was observed during 48h with epi-fluorescence and phase contrast imaging. Single cell tracking analysis provides probability of occupancy, transit rates and dwell times between motifs. In order to highlight the fingerprints of RPE1 cells on such two-state pattern, all these readouts parameters have been examined with a dedicated deep learning approach.

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