

P016 The CellHesion - quantifying adhesion forces between single cells

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The CellHesion Development Kit has been designed to allow reproducible and quantitative analysis of cell-cell and cell-substrate binding forces. Using a combination of light microscopy and force spectroscopy, single cells can be selected, attached to a flexible cantilever and subsequently allowed to adhere to a second, specific cell or region of substrate. The instrument allows precise control of the force the cells are subjected to during a user-defined binding period under temperature control. The bound cells can then be separated at a specific speed, to a distance of up to 100 μm . By monitoring the bending of the sensor during the retraction process a force-distance curve can be plotted. From this force-distance curve it is possible to calculate the amount of work and maximal force required to separate the two cells. Additionally, analysis of sub-features of the force-distance retraction curve allows the determination of the force required for the unbinding of single protein-protein interactions at the cell surface. The design of the CellHesion allows a combination of this AFM force spectroscopy with phase contrast, DIC and epifluorescent microscopy or confocal imaging. Such capabilities not only enable the selection of specific cells within a culture for binding measurements, but also the monitoring of multiple additional cellular processes that may occur on binding, such as changes to actin structure, calcium flushes, distribution of labelled proteins, or morphological changes.