Optical tweezers and atomic force microscopy for breast cancer cells characterization

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The characterization of the mechanical properties of cancer cells is a key aspect in understanding tumour progression towards metastasis.$^1$ Elasticity is one of the most investigated mechanical property of the cell and is increasingly considered as a potential label free marker of cancer progression.$^2$ Atomic Force Microscopy (AFM) and Optical Tweezers (OT) have been used to vertically indent single cells and to measure the elastic modulus of three human breast cell lines (HBL-100, MCF-7 and MDA-MB-231) characterized by different levels of aggressiveness. For both methods we found that the highly aggressive cells, MDA-MB-231, are significantly softer than the others. The correlation between the elastic behaviour found in the cell lines studied here and their aggressiveness levels, highlights the importance of a systematic and quantitative approach to the mechanobiology of breast cancer.

Figure 1: Vertical cell indentation using AFM (a ) and OT (b)