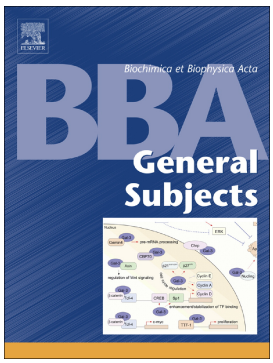

Multi-scale mechanical characterization of prostate cancer cell lines: Relevant biological markers to evaluate the cell metastatic potential

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Multi-scale mechanical characterization of prostate cancer cell lines:

Relevant biological markers to evaluate the cell metastatic potential

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Abstract:

Background: Considering the importance of cellular mechanics in the birth and evolution of cancer towards increasingly aggressive stages, we compared nano-mechanical properties of non-tumoral (WPMY-1) and highly aggressive metastatic (PC-3) prostate cell lines both on cell aggregates, single cells, and membrane lipids.

Methods: Cell aggregate rheological properties were analyzed during dynamic compression stress performed on a homemade rheometer. Single cell visco-elasticity measurements were performed by Atomic Force Microscopy using a cantilever with round tip on surface-attached cells. At a molecular level, the lateral diffusion coefficient of total extracted lipids deposited as a Langmuir monolayer on an air-water interface was measured by the FRAP technique.

***Results*:** At cellular pellet scale, and at single cell scale, PC-3 cells were less stiff, less viscous, and thus more prone to deformation than the WPMY-1 control. Interestingly, stress-relaxation curves indicated a two-step response, which we attributed to a differential response coming from two cell elements, successively stressed. Both responses are faster for PC-3 cells. At a molecular scale, the dynamics of the PC-3 lipid extracts are also faster than that of WPMY-1 lipid extracts.

Conclusions: As the evolution of cancer towards increasingly aggressive stages is accompanied by alterations both in membrane composition and in cytoskeleton dynamical