Does estrogen receptor drug binding influence breast cancer cell viscoelasticity?

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Mechanical properties of cells have recently been linked to properties of cancerous cells and tissue, such as invasivity, tumor progression and aggression [1]. Thus studying cancer cell mechanics has gained increasing interest over the last years [2]. The majority of cases of breast cancer are estrogen receptor positive, and remodeling of estrogen receptor signaling is known to occur during tumorigenesis. This affects other signaling pathways such as the wnt/β-catenin pathway, promoting transitions associated with higher malignancy, e.g. the epithelial to mesenchymal transition (EMT) [3].

We employed Atomic Force Microscopy (AFM) to study the viscoelastic properties of MCF7 breast cancer cells at a single cell level. The influence of time exposure and concentration of 3 different drugs which interact with the estrogen receptor has been studied. We used combined stress relaxation and creep measurements to determine properties such as the relaxation times, viscosities and different elastic moduli [4]. This work deepens the understanding of changes present in cancer formation and progression.

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