How Mechanical Forces Affect Bladder Cancer Progression

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The bladder is a highly variable mechanical microenvironment expanding from a few hundred to thousands of Pascals due to functional reasons. Despite that, the urothelial cancer cells become more deformable already at the early stages of cancer progression as measured by atomic force microscopy (AFM). Several structural components contribute to the mechanical properties of bladder cancer cells. Primarily, the organization of polymerized actin form (actin filaments) and the overall actin content are related to cell mechanics. By applying the brush model, the mechanical properties of the cells studied under specific cleavage conditions were correlated with the particular type of pericellular glycocalyx layer. Distinct contributions of cell structural elements to cell biomechanics form a question of the leading cause of cell alterations in mechanical properties during cancer progression. Obtained results reveal that cell morphological, mechanical, and adhesive properties are significant in bladder cancer progression. Based on the gathered data, the contribution of mechanical forces in the progression of bladder cancer will be discussed.

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