

Fatty Connective Tissue Interaction changes Cancer Cell Mechanics

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The tumor micro-environment plays an important role in tumorigenesis and during tumor progression. While already significant findings on the influence of the ECM on cell mechanics [1] and the role of fatty connective tissue in tumor invasion [2] were made, the impact of fatty connective tissue onto the biomechanics of cancer cells remains elusive even though tumors often grow in the direct vicinity.

Here we show that adipocytes of fatty tissues and cancer cells significantly interact with each other. As a result the cancerous cells drastically change their phenotypical and biomechanical properties. We quantified these viscoelastic changes with the optical stretcher. Further we show that the observed viscoelastic changes are time-dependent and reversible. The cancer cells regain their initial mechanical state when the coculturing and the crosstalk are stopped. Our coculture experiments show that cells adapt their mechanical properties not only depending on the ECM and its stiffness but are also influenced by the interaction with adipocytes of the fatty connective tissue.

From a biophysical perspective, our results indicate an essential impact of adipocytes and fatty connective tissue on cancer, potentially affecting cell motility and possibly inducing an unjamming transition.

[1] Northcott et al, *Frontiers in Cell and Developmental Biology* **6** (2018).

[2] Kubitschke et al., *Scientific Reports* **9** (2019).