Connective Tissue and Cancer Cross-Talk: Treatment Implications and Biomechanical Signature?

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The most crucial step in cancer progression, often deciding about treatment options, life and death of patients, is the formation of metastases. Unfortunately, in the last decades, progress was slim to treat metastases better. Currently, the best survival strategy is to prevent metastases by detecting the primary tumor as early as possible and to surgical resect it as well as possible.
One step towards a better survival rate is to identify tissues at risk. The second step is elucidating the interaction of tumors and their microenvironment, which often is fatty connective tissue. Here we show that cervical cancers spread from the tissue of origin to tissues of ontogenetic proximity in reverse order of embryogenic development [1]. This “inverse morphogenesis” provides a unique roadmap for tissues at risk of cancer infiltration.
Further, the cross-talk between cancer cells and fatty connective tissue is essential for the mechanical phenotype of cancer cells. We show that stiffness changes of cancer cells are drastic when growing them in proximity to fatty tissue and are one of the largest recorded in optical stretcher measurements. Here, we present the framework for elucidating this emerging field of mechanical phenotyping under tissue cross-talk.

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