

Accepted Manuscript

Title: The Role of the Microenvironment in the Biophysics of Cancer

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PII: S1084-9521(17)30383-X
DOI: <http://dx.doi.org/doi:10.1016/j.semcdb.2017.07.022>
Reference: YSCDB 2285

To appear in: *Seminars in Cell & Developmental Biology*

Received date: 30-6-2017
Revised date: 14-7-2017
Accepted date: 18-7-2017

Please cite this article as: Rianna Carmela, Kumar Prem, Radmacher Manfred. The Role of the Microenvironment in the Biophysics of Cancer. *Seminars in Cell and Developmental Biology* <http://dx.doi.org/10.1016/j.semcdb.2017.07.022>

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The Role of the Microenvironment in the Biophysics of Cancer

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Abstract

During the last decades, cell mechanics has been recognized as a quantitative measure to discriminate between many physiological and pathological states of single cells. In the field of biophysics of cancer, a large body of research has been focused on the comparison between normal and cancer mechanics and slowly the hypothesis that cancer cells are softer than their normal counterparts has been accepted, even though in situ tumor tissue is usually stiffer than the surrounding normal tissue. This corroborates the idea that the extra cellular matrix (ECM) has a critical role in regulating tumor cell properties and behavior. Rearrangements in ECM can lead to changes in cancer cell mechanics and in specific conditions the general assumption about cancer cell softening could be confuted. Here, we highlight the contribution of ECM in cancer cell mechanics and argue that the statement that *cancer cells are softer than normal cells* should be firmly related to the properties of cell environment and the specific stage of cancer cell progression. In particular, we will discuss that when employing cell mechanics in cancer diagnosis and discrimination, the chemical, the topographical and - last but not least - the mechanical properties of the microenvironment are very important.

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