

Accepted Manuscript

Mechanobiology of the cell–matrix interplay: Catching a glimpse of complexity via minimalistic models

Nicholas A. Kurniawan, Carlijn V.C. Bouten

PII: S2352-4316(17)30186-4
DOI: <https://doi.org/10.1016/j.eml.2018.01.004>
Reference: EML 343

To appear in: *Extreme Mechanics Letters*

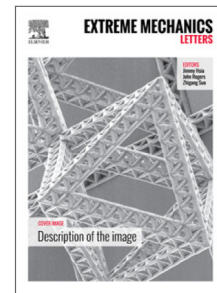
Received date: 1 November 2017

Revised date: 14 January 2018

Accepted date: 17 January 2018

Please cite this article as: N.A. Kurniawan, C.V.C. Bouten, Mechanobiology of the cell–matrix interplay: Catching a glimpse of complexity via minimalistic models, *Extreme Mechanics Letters* (2018), <https://doi.org/10.1016/j.eml.2018.01.004>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Mechanobiology of the cell–matrix interplay: catching a glimpse of complexity via minimalistic models

Nicholas A. Kurniawan* and Carlijn V.C. Bouten

Department of Biomedical Engineering & Institute for Complex Molecular Systems, Eindhoven University of Technology, Eindhoven, The Netherlands

* Corresponding author. E-mail address: kurniawan@tue.nl.

Abstract

Biological tissues present a grand challenge for mechanicians. Not only are their mechanical properties complex; they show a strong spatiotemporal heterogeneity due to ongoing and active remodeling of the living matter they are composed of: cells and extracellular matrix (ECM). The main sensors and effectors in this process are the cells, which direct tissue structure and mechanics by changing their own behavior and by producing and reorganizing the ECM. Vice versa, the ECM exhibits unique mechanical signatures associated with its fibrous polymer network that can modulate cell behavior. Grasping the full complexity of this reciprocal mechanical interaction between cells and the ECM is key for understanding physiological tissue function and maladaptation. An emerging approach is to explain the role of tissue biomechanics one component at a time and gradually (re)build tissue complexity. Here we highlight how this approach has been valuable in providing new insights in the relative and combined roles of cells and matrix, and in raising new questions into the origins of cellular and tissue responses. The answers may offer new approaches for mechanically driven tissue regeneration and biomaterial design.

Keywords:

Reconstituted ECM networks
Tissue equivalent
Remodeling
Collagen
Cell–matrix interaction
Mechanosensing

Download English Version:

<https://daneshyari.com/en/article/7170680>

Download Persian Version:

<https://daneshyari.com/article/7170680>

[Daneshyari.com](https://daneshyari.com)