Author's Accepted Manuscript

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www.elsevier.com/locate/imbbm

PII: S1751-6161(18)30329-1

DOI: https://doi.org/10.1016/j.jmbbm.2018.06.011

Reference: JMBBM2832

To appear in: Journal of the Mechanical Behavior of Biomedical Materials

Received date: 14 March 2018 Revised date: 10 May 2018 Accepted date: 5 June 2018

Cite this article as: A.R. Carotenuto, A. Cutolo, A. Petrillo, R. Fusco, C. Arra, M. Sansone, D. Larobina, L. Cardoso and M. Fraldi, Growth and *in vivo* stresses traced through tumor mechanics enriched with predator-prey cells dynamics, of the Mechanical Behavior of Biomedical Materials. Journal https://doi.org/10.1016/j.jmbbm.2018.06.011

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Growth and *in vivo* stresses traced through tumor mechanics enriched with *predator-prey* cells dynamics

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Abstract

Mechanical stress accumulating during growth in solid tumors plays a crucial role in the tumor mechanobiology. Stresses arise as a consequence of the spatially inhomogeneous tissue growth due to the different activity of healthy and cancer cells inhabiting the various districts of the tissue, an additional piling up effect, induced by stress transferring across the scales, contributing to determine the total stress occurring at the macroscopic level. The spatially inhomogeneous growth rates accompany nonuniform and time-propagating stress profiles, which constitute mechanical barriers to nutrient transport and influence the intratumoral interstitial flow, in this way deciding the starved/feeded regions, with direct aftereffects on necrosis, angiogenesis, cancer aggressiveness and overall tumor mass size. Despite their ascertained role in tumor mechanobiology, stresses cannot be directly appraised neither from overall tumor size nor through standard non-invasive measurements. To date, the sole way for qualitatively revealing their presence within solid tumors is *ex vivo*, by engraving the excised masses and then observing opening between the cut edges. Therefore, to contribute

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