

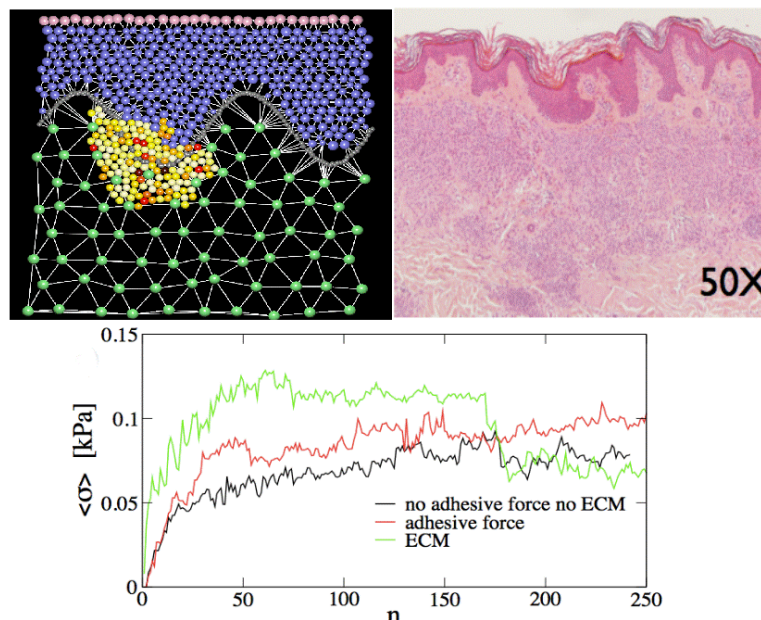


Mechanical properties of growing melanocytic nevi and the progression to melanoma

Melanocytic nevi are benign proliferations that sometimes turn into malignant melanoma in a way that is still unclear from the biochemical and genetic point of view. Diagnostic and prognostic tools are then mostly based on dermoscopic examination and morphological analysis of histological tissues.

To investigate the role of mechanics and geometry in the morphological dynamics of melanocytic nevi, CNR equipe at IENI Institute of Milan, in collaboration with two groups one at Milan University "La Statale" and Cornell University, have devised a computation model for cell proliferation in a layered non-linear elastic tissue. Numerical simulations suggest that the morphology of the nevus is correlated to the initial location of the proliferating cell starting the growth process and to the mechanical properties of the tissue.

Results also support that melanocytes are subject to compressive stresses that fluctuate widely in the nevus and depend on the growth stage. Numerical simulations of cells in the epidermis releasing matrix metalloproteinases display an accelerated invasion of the dermis by destroying the basal membrane. Moreover, CNR study suggests experimentally that osmotic stress and collagen inhibit growth in primary melanoma cells while the effect is much weaker in metastatic cells. Knowing that morphological features of nevi might also reflect geometry and mechanics rather than malignancy could be relevant for diagnostic purposes.



Reference: A. Taloni, A. Alemi, E. Ciusani, J. Sethna, S. Zapperi, C. La Porta
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