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Collective Cell Migration on Deformable Substrates

ADRIAN PEGORARO, Harvard University, ALLEN EHRLICHER, Harvard, MING GUO, Harvard University, THOMAS ANGELINI, University of Florida, DAVID WEITZ, Harvard University — In many biological processes, such as wound healing, tumor migration, or embryo development, cell migration is influenced by collective dynamics and coupling between cells. While cell-cell contact is one form of mechanical coupling, long-range interactions mediated by a deformable substrate lead to both spatial and temporal correlations during cell migration that extend over many cell lengths. While it is known that interactions between nearby but not contacted single cells are modified by substrate stiffness, it is not yet clear how changes to the substrate properties affect collective cell migration. This is especially important in the understanding of cancer cell migration since the mechanical properties of these cells change during disease progression; as such we expect that the influence of the substrate to change over time. To investigate this further, we study collective cell migration on deformable substrates of different stiffness to test whether changes in short range interactions between cells are correlated with changes in collective cell migration. Furthermore, we mix cells from different cancer stages and study their migration patterns to test whether correlations exist between different cell types during migration.

Adrian Pegoraro
Harvard University

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