

Abstract Submitted
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Substrate Curvature Regulates Cell Migration -A Computational Study¹ XIUXIU HE, YI JIANG, Georgia State Univ — Cell migration in host microenvironment is essential to cancer etiology, progression and metastasis. Cellular processes of adhesion, cytoskeletal polymerization, contraction, and matrix remodeling act in concert to regulate cell migration, while local extracellular matrix architecture modulate these processes. In this work we study how stromal microenvironment with native and cell-derived curvature at micron-meter scale regulate cell motility pattern. We developed a 3D model of single cell migration on a curved substrate. Mathematical analysis of cell morphological adaption to the cell-substrate interface shows that cell migration on convex surfaces deforms more than on concave surfaces. Both analytical and simulation results show that curved surfaces regulate the cell motile force for cell's protruding front through force balance with focal adhesion and cell contraction. We also found that cell migration on concave substrates is more persistent. These results offer a novel biomechanical explanation to substrate curvature regulation of cell migration.

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