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**Patterned Cell Alignment in Response to Macroscale Curvature** NATHAN BADE, RANDALL KAMIEN, RICHARD ASSOIAN, KATHLEEN STEBE, Univ of Pennsylvania — The formation of spatial behavior patterns in tissues is a long-standing problem in biology. Decades of research have focused on understanding how biochemical signaling and morphogen gradients establish cell patterns during development and tissue morphogenesis. Here, we show that geometry and physical cues can drive organization and pattern formation. We find that mouse embryonic fibroblasts and human vascular smooth muscle cells sense curvature differently when in monolayers than when isolated on surfaces with various amounts of Gaussian curvature. While the long, apical stress fibers within these cells align in the direction of minimum curvature on cylindrical substrates, a subpopulation of stress fibers beneath the nucleus aligns in the circumferential direction and is bent maximally. We find dramatic reorganization of the actin cytoskeleton upon activation of RhoA, which is associated with increased contractility of the fibers. Thus, stress fiber alignment is likely a result of a complex balance between energy penalties associated with stress fiber bending, contractility, and the dynamics of F-actin assembly.

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