Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Long distance substrate deformation patterns guide collective cell migration THOMAS ANGELINI, Harvard University, EDOUARD HANNEZO, Ecole Normale Supérieure, France, XAVIER TREPAT, Universitat de Barcelona, Spain, JEFFREY FREDBERG, Harvard School of Public Health, DAVID WEITZ, Harvard University — Most eukaryotic cell types can sense and respond to the mechanical properties of their surroundings, influencing embryo development, tissue function, and wound healing. These are multi-cellular behaviors, yet most detailed knowledge of mechano-sensitivity comes from single cell studies, and very little is known about mechanical communication between cells in large multi-cellular systems. In this talk we will present studies of collective cell motion on a deformable surface, allowing us to probe substrate mediated cell-cell interactions. We show that the cell layer exerts long-distance, multi-cellular forces that generate large-scale deformation patterns in the substrate below. Surprisingly, cell groups move over the deformed surface in collective swirls, and as the substrate deformation patterns grow, so do the swirls of migrating cells. The substrate deformation patterns guide cell motion, as changes in substrate deformations precede changes in migration velocity. Thus, multi-cellular substrate deformation patterns are a type of long-distance mechanical communication between cells that controls their collective migration.

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Date submitted: 02 Dec 2009 Electronic form version 1.4