Abstract Submitted
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Mechanical Coupling of Smooth Muscle Cells Using Microengineered Substrates and Local Stimulation[1] CRAIG COPELAND, DAVID HUNTER, LESLIE TUNG, The Johns Hopkins Universty, CHRISTOPHER CHEN, University of Pennsylvania, DANIEL REICH, The Johns Hopkins Universty — Mechanical stresses directly affect many cellular processes, including signal transduction, growth, differentiation, and survival. Cells can themselves generate such stresses by activating myosin to contract the actin cytoskeleton, which in turn can regulate both cell-substrate and cell-cell interactions. We are studying mechanical forces at cell-cell and cell-substrate interactions using arrays of selectively patterned flexible PDMS microposts combined with the ability to apply local chemical stimulation. Micropipette "spritzing", a laminar flow technique, uses glass micropipettes mounted on a microscope stage to deliver drugs to controlled regions within a cellular construct while cell traction forces are recorded via the micropost array. The pipettes are controlled by micromanipulators allowing for rapid and precise movement across the array and the ability to treat multiple constructs within a sample. This technique allows for observing the propagation of a chemically induced mechanical stimulus through cell-cell and cell-substrate interactions. We have used this system to administer the acto-myosin inhibitors Blebbistatin and Y-27632 to single cells and observed the subsequent decrease in cell traction forces. Experiments using trypsin-EDTA have shown this system to be capable of single cell manipulation through removal of one cell within a pair configuration while leaving the other cell unaffected.

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