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Mechanical coupling of smooth muscle cells using local and global stimulations[1] CRAIG COPELAND, Johns Hopkins University, CHRISTOPHER CHEN, University of Pennsylvania, DANIEL REICH, Johns Hopkins University — Mechanical stresses can directly alter many cellular processes, including signal transduction, growth, differentiation, and survival. These stresses, generated primarily by myosin activity within the cytoskeleton, regulate both cell-substrate and cell-cell interactions. We report studies of mechanical cell-cell and cell-substrate interactions using patterned arrays of flexible poly(dimethylsiloxane) (PDMS) microposts combined with application of global stretch or local chemical stimulation. Bovine pulmonary artery smooth muscle cells are patterned onto micropost arrays to create multicellular structures to probe intercellular coupling. Global stimulation is applied by building the micropost arrays on a flexible membrane that can be stretched while allowing simultaneous observation of cell traction forces. Results for triangle wave stretches of single cells show increasing traction forces with increasing strain, and immediate weakening of traction forces as strain is decreased. "Spritzing," a laminar flow technique, is used to expose a single cell within a construct to a drug treatment while cell traction forces are recorded via the microposts. Results will be described showing the response of cells to external stimulation both directly and through intercellular coupling.

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