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Direct mechanical measurements of cytoskeleton-mediated intercellular fluid flow STEVEN ZEHNDER, JOLIE BREAUX, ALISON DUNN, JUAN URUEÑA, W. GREGORY SAWYER, THOMAS ANGELINI, University of Florida — Cell behavior in tissues is intimately tied to forces generated by cytoskeletal contractions. Contraction generated tensions are balanced by deformations in the cell's microenvironment, by internal cytoskeletal structures, and by the incompressible cytosolic fluid contained by the cell membrane. However, contraction generated pressures cannot be supported by the cytosol if the cell membrane is adequately permeable. Small, non-selective pores called gap junctions connect cells in a layer, allowing small molecules to pass between cells. The ability of contraction driven fluid movement to transmit forces across gap junctions and the ability of cells to respond to this movement is unexplored. To study the mechanics of intercellular fluid flow, we apply biologically relevant pressures to large regions of cells in a monolayer with a micro-indentation system. We directly measure indentation force and volume as a function of time to determine fluid flow rates and associated stresses between cells. Preliminary results will be presented.

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