

Abstract Submitted
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Microfluidic Manipulation of Suspended Single Cells: Cell Deformation and Mechanical Stress Analysis NATHALIE NEVE, SEAN KOHLES, DEREK TRETHERWAY, Portland State University — Bone and cartilage cells experience multiple stresses in vivo. The optimum mechanical conditions for cell health are not fully understood. With the recent development of an integrated optical tweezer with micron resolution particle image velocimetry, the opportunity to apply and measure controlled multiaxial stresses to suspended single cells is possible. In this work, we examine optically suspended cells in uniform and extensional flow fields. The cellular deformation and applied fluid induced stresses are determined. Maximum applied stresses for uniform flows are substantially smaller than typical fluid stresses in cell monolayer studies. Extensional flows enable potentially higher applied stresses. For extensional flows, bone cells show no deformation for shear stresses up to 250 mPa, while significant deformation of muscle cells is observed.

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