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Investigation of autonomous cell dynamics using holographic laser microsurgery AROSHAN JAYASINGHE, M. SHANE HUTSON, Dept. of Physics & Astronomy, Vanderbilt University, Nashville, TN — Laser-microsurgery has emerged as a powerful technique for evaluating *in vivo* tissue mechanics. We extend this technique by using a spatial light modulator (SLM) to diffract a single UV laser pulse to simultaneously ablate multiple points in living tissue. Using this method, we can quickly and cleanly isolate a single cell by destroying all its nearest neighbors. The post-ablation dynamics of such an isolated cell are then largely dependent on autonomous intracellular forces. Here, we use this technique to investigate cell shape pulsations in amnioserosa cells in *Drosophila* embryos during dorsal closure – specifically to address the degree to which these pulsations are cell autonomous or driven by the contractions of neighboring cells. When cells are isolated at different points in the pulsation cycle, we find that the post-isolation dynamics are strongly dependent on the pre-isolation pulsation phase: cells in a contractile phase collapse immediately, but cells in an expansionary phase continue to expand – at least for 20-60 s before collapsing. These results are in conflict with previous pulsation models that place expanding cells under large extensional strain, and instead suggest that even the expansion phase has a significant cell autonomous component.

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