

Abstract Submitted
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M & M's: Mechanosensitivity and Mechanotransduction in Myoblasts¹ ZEINAB AL-REKABI, ANDREW PELLING, University of Ottawa — The effect of external mechanical stimulation of muscle precursor cells (myoblasts) during exercise is a crucial step in myogenesis. This effect takes place many hours later while muscles are in a resting state; however it remains unclear to what extent the role of force application has on the promotion of myogenesis. Here, we combine Traction Force Microscopy (TFM) and Atomic Force Microscopy (AFM) to directly measure the magnitude of generated cellular traction forces (CTFs) in myoblasts, as a result of controlled mechanical loading. Precise nanonewton forces (1 & 10 nN) were applied to live cells with the AFM tip while simultaneous TFM measurements were performed. The experiment was performed on substrates ranging in elastic moduli (E), (16-89 kPa) mimicking resting and active muscle tissue, respectively. The results of this analysis demonstrated that the magnitude of CTFs was dependent on substrate E , as expected. However, CTFs only increased in response to applied force (compared to controls) on substrates with E greater than 62 kPa. Our results suggest that muscle precursor cells are most sensitive to mechanical force when the surrounding muscle tissue is stiff and contracted, whereas myogenesis itself proceeds optimally on softer, resting tissue.

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