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Imaging spatiotemporal redistribution of cellular traction stresses during fibroblast migration on a physiologically relevant ECM mimic ZHI PAN, YAJIE LIU, KAUSTABH GHOSH, Stony Brook University, DHRUV NANDAMUDI, Monta Vista High School, DANNY STEMP, North Shore Hebrew Academy High School, TOSHIO NAKAMURA, RICHARD CLARK, MIRIAM RAFAILOVICH, Stony Brook University — To better understand the dynamics of cell migration, we measured the spatiotemporal redistribution of cellular traction stresses during fibroblast migration at a submicron level and correlated it with nuclear translocation on a physiologically relevant ECM mimic. We found that nuclear translocation occurred in pulses whose magnitude was larger on the low ligand density surfaces (LLDS) than on the high ligand density surfaces (HLDS). Large nuclear translocations only occurred on LLDS when the rear traction forces completely relocated to a posterior nuclear location, while such relocation took much longer time on HLDS, probably due to the greater magnitude of traction forces. Our results suggest that the reinforcement of the traction forces around the nucleus is a critical step during fibroblast migration, serving as a speed regulator, which must be considered in any dynamic molecular reconstruction model of tissue cell migration. A traction gradient foreshortening model was proposed to explain how the relocation of rear traction forces leads to pulsed fibroblast migration.

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