Single Cell Migration on 1D Pathways: Nuclear Contraction without 3D Constrains

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Abstract

Understanding the clues that cause cells to start migration directly impacts many areas of cell biology. Cell migration is crucial in embryo development, already at early processes. In wound healing for tissue repair. In organ development, cell migration allows life to continue under constant repair. Countless examples show the importance of cell migration in multicellular life. Among others, what makes a cell to migrate and promote cancer metastasis is of particular relevance as it results in malignant tissue spreading.

Migration studies in 3D have questioned the physiological relevance of 2D migration models for understanding migration *in vivo*. Migration studies in 3D matrices are, however, experimentally difficult. It has been shown that single cell migration in 1D confinement (i.e. 1D migratory pathways on a planar substrate) has similar characteristics to non-proteolyc single cell migration in natural fibrillar 3D environments (Doyle et al., 2009). Using our recent approach to spatiotemporal control cell migration based on a phototriggerable adhesive ligands (Salierno et al., 2013), we study single cell migration events over in-situ opened and well defined 1D paths starting from a confluent monolayer. Studies of cell motility, cytoskeletal rearrangement, focal adhesion organization, cell size and morphology and nuclear dimensions depending on line width, cell type and ligand density will be presented.