



CoffeeTalk@ISOF

Guided Cell Migration – A Dynamical Systems Perspective



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The guided migration of cells is a complex dynamical process involving carefully regulated polymerization and depolymerization of the elements of the cellular scaffolding, in particular **actin**. Recent work has shown that polymerizing and depolymerizing actin can be described as an excitable system which exhibits natural waves or oscillations on scales of hundreds of nm. I will show that surface nanotopography on similar scales nucleates and guides the wave-like dynamics of actin polymerization, and that such guided actin waves control cell migration for a broad range of cell types. Furthermore controlled actin waves provide a simple framework to understand seemingly complex aspects of cell migration including zig-zag motion of cells in response to chemical guidance cues, and the ability of cells to follow each other precisely in streams. Thus the excitable systems character of the cellular scaffolding provides a simple, universal mechanism for guiding a range of migratory behaviors in many living systems

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