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Editorial Open Access

Molecular Mechanisms Underlying Chemotaxis in the Model System *Dictyostelium discoideum* and Mammalian Neutrophils and Breast Cancer Cells

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Editorial

Chemotaxis is defined as directional cell migration guided by chemo attractant gradients and plays an important role in a number of biological processes, including recruitment of neutrophils to sites of inflammation, neuron patterning, metastasis of cancer cells, and development of the model organism *Dictyostelium discoideum*. All eukaryotic cells detect chemo attractants by G protein-coupled receptors (GPCRs) and share remarkable similarities in the signaling pathways which control chemotaxis. Chemotaxing cells display a polarized morphology: a leading front and a trailing edge of the cells. Over the last decade, multiple GPCR-mediated signaling pathways have been revealed to control cytoskeletal dynamics in directional cell migration. At the leading edge, signaling pathways control the activity of Arp2/3 complexes that initiate the formation of new branches of actin filaments. At the trailing edge, actin also collaborates with myosin to retract the rear of migrating cells and to prevent errant pseudopod extension. How the signaling pathways are spatiotemporally coordinated to precisely regulate directed cell migration still largely remains elusive. More importantly, many other components and signaling pathways essential for chemotaxis still remain to be identified.