

Jeon, T.J., D. Lee, S. Merlot, N. Nguyen, G. Weeks and R.A. Firtel (2007). Rap1 controls cell adhesion and cell motility through the regulation of myosin II. *J. Cell Biol.* 176:1021-1033.

We have investigated the role of Rap1 in controlling chemotaxis and cell adhesion in *Dictyostelium discoideum*. Rap1 is activated rapidly in response to chemoattractant stimulation, and activated Rap1 is preferentially found at the leading edge of chemotaxing cells. Cells expressing constitutively active Rap1 are highly adhesive and exhibit strong chemotaxis defects, which are partially caused by an inability to spatially and temporally regulate myosin assembly and disassembly. We demonstrate that the kinase Phg2, a putative Rap1 effector, colocalizes with Rap1–guanosine triphosphate at the leading edge and is required in an in vitro assay for myosin II phosphorylation, which disassembles myosin II and facilitates filamentous actin–mediated leading edge protrusion. We suggest that Rap1/Phg2 plays a role in controlling leading edge myosin II disassembly while passively allowing myosin II assembly along the lateral sides and posterior of the cell.