

Lee, S., F.I. Comer, A. Sasaki, I.X. McLeod, Y. Duong, K. Okamura, J.R. Yates III, C.A. Parent and R.A. Firtel (2005). TOR Complex 2 integrates cell movement during chemotaxis and signal relay in Dictyostelium. Mol. Biol. Cell, in press.

Dictyostelium cells form a multicellular organism through the aggregation of independent cells. This process requires both chemotaxis and signal relay in which the chemoattractant cAMP activates adenylyl cyclase through the G protein-coupled cAMP receptor cAR1. cAMP is produced and secreted and it activates receptors on neighboring cells, thereby relaying the chemoattractant signal to distant cells. Using coimmunoprecipitation and mass spectrometric analyses, we have identified a TOR-containing complex in Dictyostelium that is related to the TORC2 complex of *S. cerevisiae* and regulates both chemotaxis and signal relay. We demonstrate that mutations in Dictyostelium LST8, RIP3, and Pia, orthologues of the yeast TORC2 components LST8, AVO1, and AVO3, exhibit a common set of phenotypes including reduced cell polarity, chemotaxis speed and directionality, phosphorylation of Akt/PKB and the related PKBR1, and activation of adenylyl cyclase. Further, we provide evidence for a role of Ras in the regulation of TORC2. We propose that, through the regulation of chemotaxis and signal relay, TORC2 plays an essential role in controlling aggregation by coordinating the two essential arms of the developmental pathway that leads to multicellularity in Dictyostelium.