Roles of protein phosphatases in cell polarity control

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Abstract

A molecular understanding of how cells define their own morphology in a spatiotemporal manner is one of the fundamental issues in biology and medical science. Rod shaped fission yeast *Schizosaccharomyces pombe* cells are highly polarised; cells grow only from cell tips with constant width. Interestingly, during G2 phase of the cell cycle, cells undergo a drastic polarity transition from monopolar to bipolar growth. This regulatory point is referred to as NETO, New-End-Take-Off.

We have identified Calcineurin (PP2B), and Casein kinase 1γ (Cki3) as critical determinants of NETO timing. Upon activation of the DNA replication checkpoint, a condition to delay NETO, *cki3*- or calcineurin mutant cells commit NETO prematurely. Intriguingly, *cki3* cells exhibit premature NETO even under unperturbed conditions. By contrast, PP1 is required for the execution of NETO. Subsequent analyses indicate that the kelch-repeat containing polarity factor Tea1 and the microtubule-associated protein Tip1 (CLIP170) are downstream factors, whose phosphorylation and dephosphorylation play a decisive role in NETO timing. In this talk, I will present our recent results in growth polarity control in fission yeast and discuss the general significance of these findings.

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Koyano T, Konishi M, Martin SG, Ohya Y, Hirata D, Toda T, Kume K (2015) Casein kinase 1γ ensures monopolar growth polarity under incomplete DNA replication downstream of Cds1 and calcineurin in fission yeast. Mol Cell Biol 35: 1533-1542.

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