

The 6-site phosphorylation of Sic1 causes a switch-like G1/S transition in budding yeast cell-cycle process

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Short Abstract — Sic1 is a Clb/CDK inhibitor whose rapid degradation in the late G1 correlates well with the onset of the S phase. The minimum phosphorylation of 6 sites of Sic1 are required for its degradation. Here, we first established a mathematical model to simulate this process, including the multi-phosphorylation sites of Sic1. The results demonstrate that the multi-phosphorylation sites of Sic1 provide a switch-like activation of Clb5 to trigger the DNA replication in S phase. To investigate whether the Sic1's switch like degradation is also influenced by some other factors in vivo, we constructed an artificial SIC1 fluorescent maker, which has the same degradation kinetics with the endogenous Sic1. Then, the kinetic process of the SIC1 maker's degradation was monitored both in the wild type and some deletion backgrounds.

Keywords — cell cycle, budding yeast, mathematical model, quantitative results in single cell

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