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Understanding cytokinesis: lessons from fission yeast study

N. Sadananda Singh, PhD
Tamasek Lifesciences Lab, NUS
Singapore

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Abstract

Cytokinesis in many eukaryotes is facilitated by the contractile function of an actomyosin-based ring. In fission yeast, assembly, maintenance and maturity of actomyosin ring require a conserved signaling pathway termed SIN (septation initiation network). The components of SIN are orthologous to that of Hippo signaling in higher eukaryotes including human. It consists of a GTPase (Spg1p) and three protein kinases, all of which localize to the mitotic spindle pole bodies (SPBs). Two of the SIN kinases, Cdc7p and Sid1p, localize asymmetrically to the newly duplicated SPB in late anaphase. How this asymmetry is achieved is not understood, although it is known that their symmetric localization impairs cytokinesis. We have isolated a conserved protein complex named as SIN-inhibitory PP2A complex (SIP), which is crucial for the establishment of SIN asymmetry. The substrates and role of the kinases in SIN/hippo pathway are not known in detail yet. Therefore, further studies on SIN and hippo pathway at the cellular as well as system level using novel tools and technologies will help in better understanding of cytokinesis, cell proliferation and cause of certain diseases.