

Publication

Asynchronous nuclear division cycles in multinucleated cells

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 153176

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Year 2006

Title Asynchronous nuclear division cycles in multinucleated cells

Journal The Journal of cell biology

Volume 172

Number 3

Pages / Article-Number 347-62

Keywords Active Transport; Cell Nucleus/physiology; Cell Cycle/genetics/physiology; Cell Cycle Proteins/genetics/metabolism; Cell Nucleus/*metabolism; Cell Nucleus Division/genetics/*physiology; Cyclin B/genetics/metabolism; Cyclin-Dependent Kinase Inhibitor Proteins/genetics/metabolism; Cyclins/genetics/metabolism; Cytoplasm/metabolism; Cytoskeletal Proteins/analysis; Fungal Proteins/analysis; Histones/analysis; Mitosis/genetics/physiology; Mitotic Spindle Apparatus/chemistry/physiology; Mutation/genetics; Nuclear Export Signals/genetics; Protein-Tyrosine Kinases/genetics/metabolism; Saccharomyces cerevisiae Proteins/genetics/metabolism; Saccharomycetales/cytology/genetics/*physiology; Sequence Homology; Amino Acid

Synchronous mitosis is common in multinucleated cells. We analyzed a unique asynchronous nuclear division cycle in a multinucleated filamentous fungus, *Ashbya gossypii*. Nuclear pedigree analysis and observation of GFP-labeled spindle pole bodies demonstrated that neighboring nuclei in *A. gossypii* cells are in different cell cycle stages despite close physical proximity. Neighboring nuclei did not differ significantly in their patterns of cyclin protein localization such that both G1 and mitotic cyclins were present regardless of cell cycle stage, suggesting that the complete destruction of cyclins is not occurring in this system. Indeed, the expression of mitotic cyclin lacking NH(2)-terminal destruction box sequences did not block cell cycle progression. Cells lacking AgSic1p, a predicted cyclin-dependent kinase (CDK) inhibitor, however, showed aberrant multipolar spindles and fragmented nuclei that are indicative of flawed mitoses. We hypothesize that the continuous cytoplasm in these cells promoted the evolution of a nuclear division cycle in which CDK inhibitors primarily control CDK activity rather than oscillating mitotic cyclin proteins.

Publisher Rockefeller University Press

ISSN/ISBN 0021-9525

edoc-URL <http://edoc.unibas.ch/dok/A5257591>

Full Text on edoc Available;

Digital Object Identifier DOI 10.1083/jcb.200507003

PubMed ID <http://www.ncbi.nlm.nih.gov/pubmed/16449188>

ISI-Number WOS:000235184100006

Document type (ISI) Journal Article