

Fig. 1 Control *S. pombe* cells

Mitotic checkpoints in the nuclear division of *Schizosaccharomyces pombe*

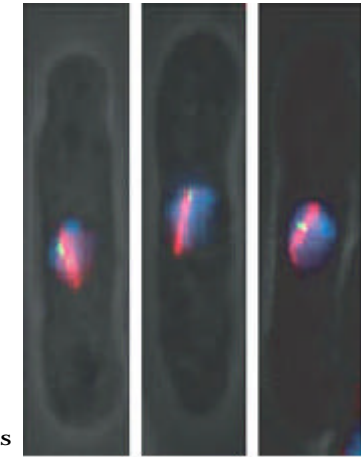


Fig. 2 Lat B treated *S. pombe* cells

Professor Jeremy Hyams and his group belong to the Department of Biology at University College London. The group is interested in the role of the cytoskeleton in growth and cytokinesis in the fission yeast, *Schizosaccharomyces pombe*, and the cross-talk between the cytoskeleton and the molecules that drive and regulate the cell division cycle. Studying the control of cell division in yeast provides important insights into their mechanisms in humans and is thus very relevant to human health and understanding many clinical disorders.

The accurate segregation of chromosomes at mitosis depends on a correctly assembled bipolar spindle that exerts balanced forces on each sister chromatid. The integrity of mitotic chromosome segregation is ensured by the spindle assembly checkpoint (SAC) that delays mitosis in response to defective spindle organisation or failure of chromosome attachment. Dr Yannick Gachet of Professor Hyam's research group has discovered a distinct mitotic checkpoint in *S. pombe*, that monitors the integrity of the actin cytoskeleton and delays sister chromatid separation, spindle elongation and cytokinesis until the spindle poles have been properly oriented. This mitotic delay is imposed by a stress-activated mitogen-activated protein (MAP) kinase pathway but is independent of the anaphase-promoting complex (APC).

The images shown here were acquired using the Openlab cell imaging system. In Fig. 2, the normal nuclear division process has been disrupted by re-inoculating the yeast cells into a fresh medium containing latrunculin B (Lat B), an inhibitor of actin polymerisation. These cells exhibit short mitotic spindles which were frequently misorientated, with either missing or unbalanced astral microtubules. The new mitotic checkpoint described by Dr Gachet may function to maintain metaphase arrest until orientation has been established. This work predicts that the bypass of this checkpoint would contribute to the uncontrolled proliferation and genome instability of human tumour cells.

Figs 1 & 2 show *S. pombe* cells expressing a GFP tag at the centromere. Tubulin is labelled red and the DNA is labeled with DAPI (blue). In the presence of Lat B a single fluorescent dot (yellow) represent unseparated centromeres.



Module configuration

Module Families

Camera

Snapper Video

Hardware

Filters & Shutters

File Filter

Quick Time File Filter

TIFF file filter

PICT file filter

Application

Registration

Automation

Automator

Critical Points

- High resolution, high dynamic range chilled camera (ORCA) used to acquire high quality images
- ORCA has enhanced sensitivity in the blue-green region of the spectral response curve allowing minimal exposure when using GFP and derivatives
- High quality excitation filters used with a double band pass emission filter
- User defined color LUT for optimum visual effect
- Mis-alignment of images due to any achromatic aberrations can be corrected using the Registration Module
- Images merged to show spatial arrangement
- Images can be annotated for publication
- Image sequences can be saved in other formats, individual PICTS or TIFFS or QuickTime movies