Exploring the molecular mechanism of mitotic progression and control: The spindle microtubule as a key player

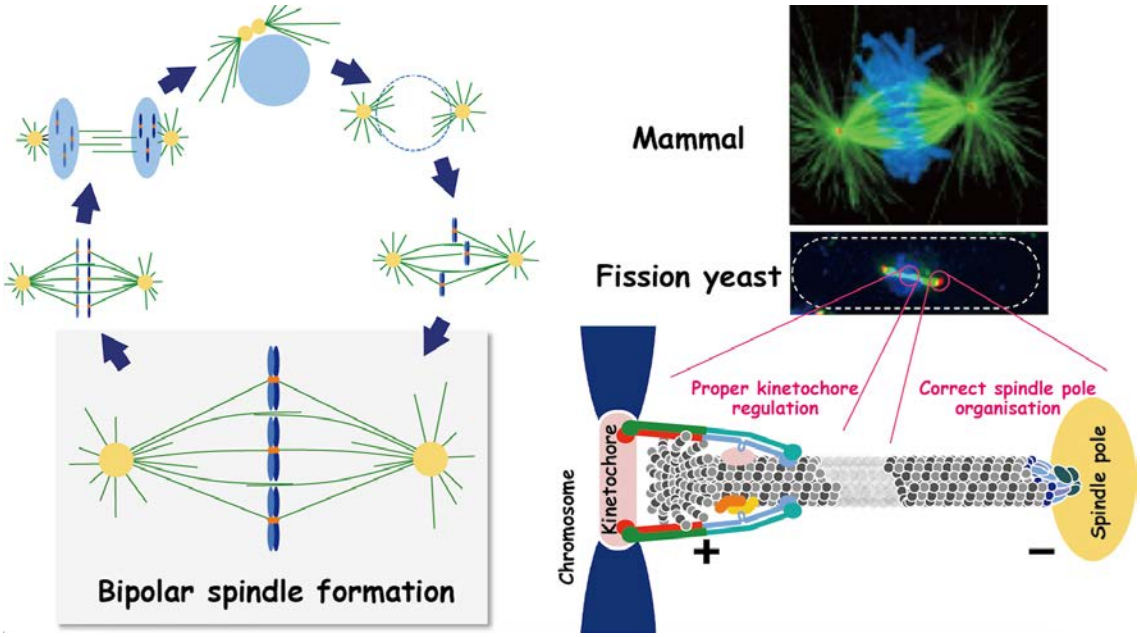
Takashi Toda (登田　隆)

Hiroshima Research Center for Healthy Aging (HiHA), Department of Molecular Biotechnology, Graduate School of Advanced Sciences of Matter, Hiroshima University
(先端物質科学研究科，分子生命機能科学専攻，広島健康長寿研究拠点 HiHA)
e-mail: takashi-toda@hiroshima-u.ac.jp

Abstract:
Impeccable chromosome segregation during mitosis underlies genome stability and integrity. Any errors in this process would result in miscarriage, birth defects and/or aneuploidy, the hallmark of human cancers. Segregating each sister chromatid towards the opposite poles is driven by the mitotic spindle, a dynamic ensemble of microtubules, microtubule-associated proteins (MAPs) and motor proteins. Nucleation of microtubules in vivo does not occur spontaneously; instead specialised structures called microtubule organising centres (MTOCs) are required. In animal cells, the centrosome comprises a major MTOC, whilst in fungi the spindle pole body (SPB) plays an analogous role. Our laboratory has been uncovering the principles of microtubule structure, function and regulation using the genetically amenable model system, the fission yeast *Schizosaccharomyces pombe*, and more recently we have been using zebrafish and human culture cells to scrutinise the evolutionary conservation of our findings obtained from work in fission yeast. The long-term goal of our laboratory is simple; to understand the molecular mechanisms of how the mitotic spindle ensures faithful chromosome segregation. In this presentation, I would like to introduce the outline of our research including the most recent advances on spindle microtubules and chromosome segregation.

Note:
Over the last 20 years, I had conducted research in the Francis Crick Institute (formerly Cancer Research UK, London Research Institute). After I moved to Hiroshima University last October, I set up a new group within Department of Molecular Biotechnology, Graduate School of Advanced Sciences of Matter.

Figure: Overview of our research interest


Bipolar spindle formation
Mammal
Fission yeast
Proper kinetochore regulation
Correct spindle pole organisation
Kinetochore
Chromosome
Spindle pole
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