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Chk1 is required for optimal spindle formation

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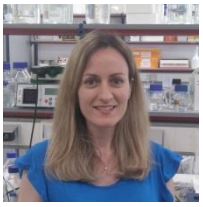
Abstract

The mitotic spindle consists mainly of microtubules (MTs) and is essential for accurate distribution of chromosomes in the two daughter cells during cell division. Errors in spindle formation can lead to incorrect separation of chromosomes or unequal size of daughter cells, which are associated with carcinogenesis or developmental disorders. However, the molecular mechanisms of spindle formation are not fully understood. In the present study, we show for the first time that Chk1, a kinase involved in the cellular response to DNA damage, is essential for optimal density and effective polymerisation of the spindle MTs in human cells. Chk1 localises to the centrosomes (the main centers of MTs organization) in mitosis and phosphorylates β-tubulin in newly identified sites in vitro. Also, reduced microtubule density in cells without functional Chk1 is associated with formation of disorganized spindles. We suggest that Chk1 phosphorylates β-tubulin to promote optimal spindle MT polymerisation. These findings describe novel mechanisms that could protect against carcinogenesis and developmental disorders, through regulating formation of the mitotic spindle

Biography:

Eleni Petsalaki has completed her PhD at the age of 28 years at the University of Crete. She is currently a post doctoral research scientist in Dr George Zachos' Cell Cycle and Division Lab at the University of Crete where she is investigating mechanisms of mitotic cell division in human cells. She has published 8 papers in peer reviewed journals including Nature Communications, Journal of Cell Biology, Journal of Cell Science and others, 2 review articles and 2 commentaries.



Speaker Publications:

1. "Building bridges between chromosomes: novel insights into the abscission checkpoint", July 2019Cellular and Molecular Life Sciences, CMLS 76(21), DOI: 10.1007/s00018-019-03224-z
2. "Chmp4c is required for stable kinetochore-microtubule attachments", Chromosoma 127(4), DOI: 10.1007/s00412-018-0675-8
3. "Src activation by Chk1 promotes actin patch formation and prevents chromatin bridge breakage in cytokinesis", The Journal of Cell Biology 217(9):jcb.201802102, DOI: 10.1083/jcb.201802102
4. "Novel ESCRT functions at kinetochores", Aging 10(3), DOI: 10.18632/aging.101399

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