

Cancer Science 2020: Chk1 is required for optimal spindle formation, Greece

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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

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