Protein CENP-E plays important role during cell division

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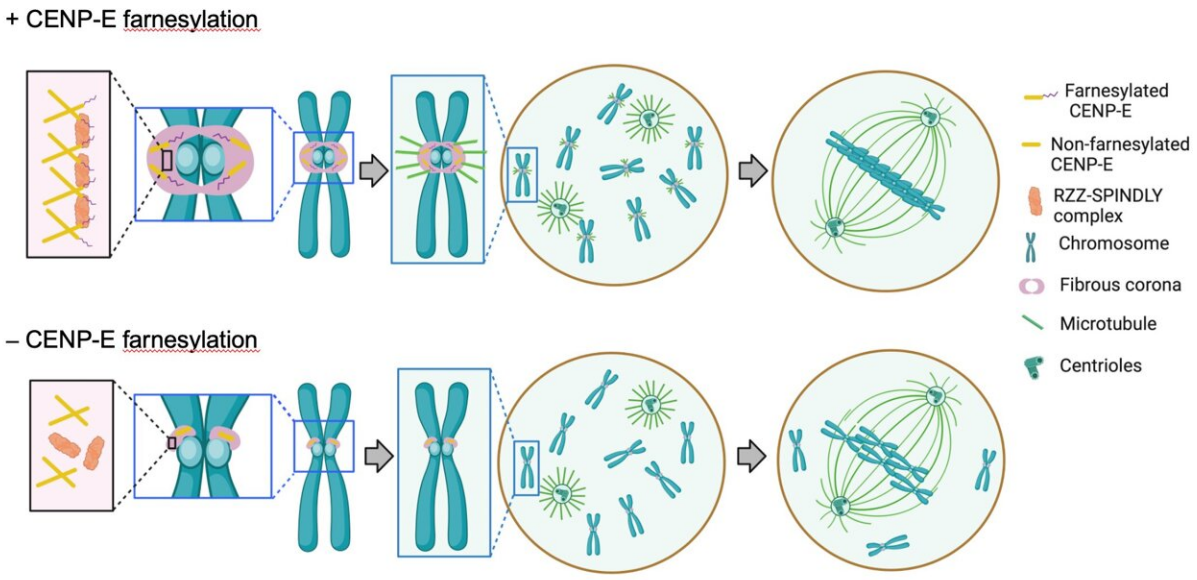

Effects of CENP-E functioning on fibrous corona. Top: functionally normal CENP-E (farnesylated) promotes the formation of the fibrous corona and facilitates chromosome alignment. Bottom: functionally abnormal CENP-E (non-farnesylated) fails to fulfill these tasks. Credit: Credit: Jingchao Wu, Hubrecht Institute.

Cells divide to produce new cells. A protein meshwork called the fibrous corona plays an important role during this process, as it ensures that DNA is evenly distributed over the new daughter cells. In collaboration with the UMC Utrecht, researchers from the group of Geert Kops now

offer new insight into the components that are involved in the formation of the fibrous corona and found a key role for the protein CENP-E. They published their results in the *Journal of Cell Biology* on November 7th.

The bodies of humans, animals and other types of organisms consist of trillions of cells. These cells have a limited life span, so it is important that the body constantly creates new cells to replace the old ones. New cells are created through the process of cell division, also called mitosis.

First, cells duplicate all their DNA, which they carry in the form of chromosomes. After duplication, a cell has two pairs of each chromosome. One pair of chromosomes is called a chromatid. Second, the chromosomes are evenly distributed over two new daughter cells.

If errors occur during this phase, daughter cells can end up with too few or too many chromosomes, which can cause cell death or the development of tumors. Division of the chromatids over the daughter cells is therefore one of the most critical events of cell division.

Dividing cells use a special tool called the spindle apparatus to drag and separate the chromatids into the two daughter cells. The chromatids make it easier for the spindle apparatus to grab them by developing a belt-like structure. This structure is called the fibrous corona and consists of dozens of proteins.

The fibrous corona has been shown to have multiple important functions to ensure normal cell division. However, the exact components required to build this structure and the ways in which these components work together were unknown.

In their new paper, published in the *Journal of Cell Biology*, researchers from the group of Geert Kops provide new insights into the development

of the fibrous corona. They found a component called CENP-E to be essential for the formation of the fibrous corona. CENP-E binds to protein complexes, which are known to serve as scaffolding components for the building process.

"When we disable CENP-E, we see that the fibrous corona is poorly built and functionally compromised," says Jingchao Wu, first author on the paper. "And a poorly functioning fibrous corona makes it more difficult for the spindle apparatus to evenly distribute the chromatids over the daughter cells."

The results were quite surprising for Wu and his colleagues. "Since the discovery of CENP-E, it has been known as an essential motor protein in mitosis. But we now found a new role for it, which is independent of its motor function." In other words, CENP-E plays more than one important role in the process of cell division.

The study provides new insight in the process of cell division and the ways in which errors can occur. Ultimately, these findings could shed light on the way certain types of cancers are caused and contribute to the development of therapeutic strategies. "To achieve this, we need to further study the components involved in the formation of the fibrous corona in diverse types of cancer cells," Wu concludes.

More information: Jingchao Wu et al, A farnesyl-dependent structural role for CENP-E in expansion of the fibrous corona, *Journal of Cell Biology* (2023). DOI: 10.1083/jcb.202303007

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