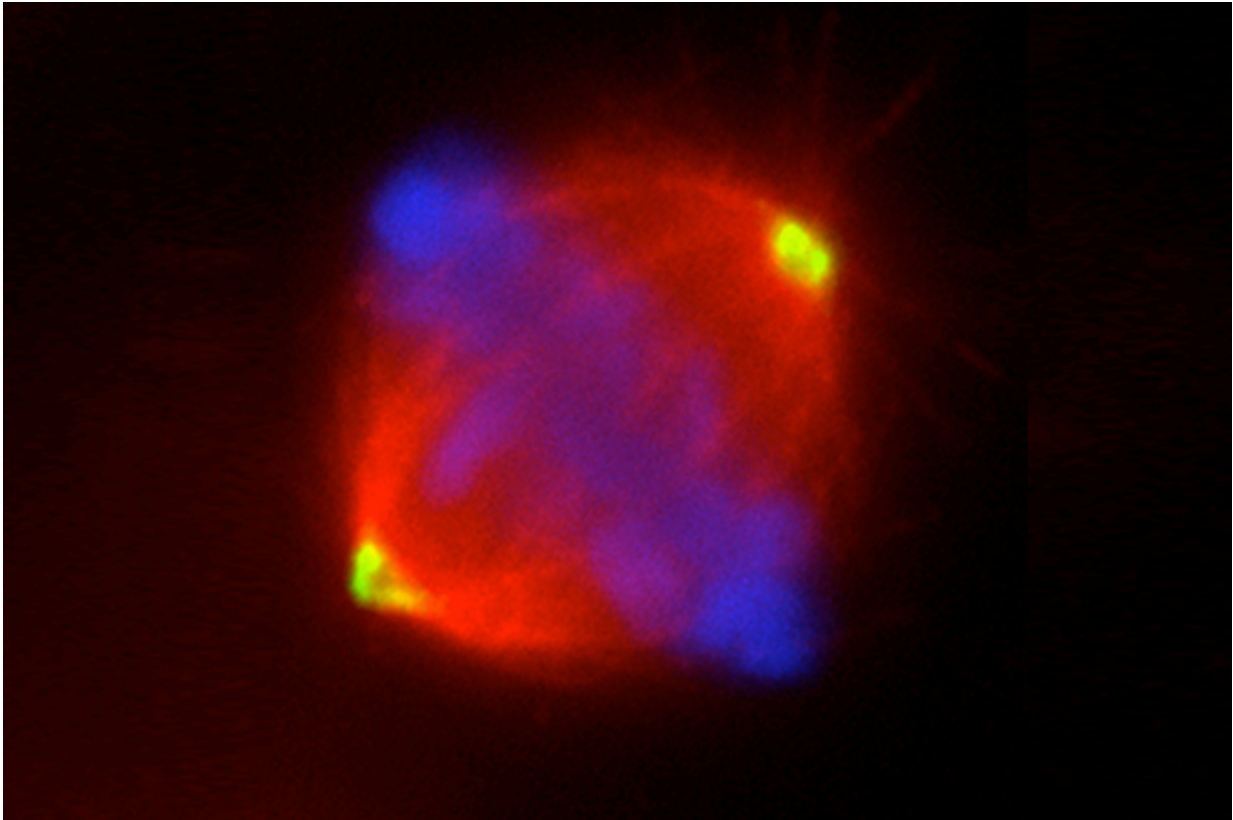


New insight into brain development disorder

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During cell division, DNA must be copied and distributed between daughter cells. A cellular structure called the mitotic spindle pulls apart the DNA-containing structures, the chromosomes. The photo shows a microscopic image of DNA (blue) in a spindle. The protein ASPM appears to play a key role in this process, as it is located at the 'poles' (yellow) in the spindle. Credit: Cell Biology Utrecht University

Two years ago, the Zika virus drew attention to microcephaly, a developmental disorder in which the brain and skull display inhibited growth. But there are other causes of microcephaly, such as congenital genetic diseases. Much is still unknown about brain development, but researchers at Utrecht University, in collaboration with their colleagues in Switzerland, have now shed light on the molecules involved. The results of their research will be published in *Nature Cell Biology*.

"Biological processes are determined by molecules in our cells. We can only understand the factors that determine health and disease and find medicines to control these factors by zooming into this molecular world", explains research leader Prof. Anna Akhmanova.

Surprising discovery

The researchers began their studies by focusing on the protein ASPM. "We knew that the genetic form of microcephaly is most often caused by defects in this protein. But a surprising discovery was that ASPM appears to work closely together with another protein, called katanin", tells Akhmanova.

Essential for healthy development

It appears that precisely this collaboration is important for [cell division](#), and therefore for the normal development of [brain cells](#). "The interaction between ASPM and katanin is required for the proper balance between cell division and their specialisation into [nerve cells](#). When the balance sways too much in one direction or the other, too few brain cells are produced", Akhmanova adds.

Crucial balance

For developing brain cells, this balance is especially crucial, because once they become nerve cells, they cannot divide. If new cells develop into nerve cells too quickly, not enough cells are formed, and the brain remains small.

Key position

During cell division, DNA must be copied and distributed between [daughter cells](#). A cellular structure called the mitotic spindle pulls apart the DNA-containing structures, the chromosomes. The photo shows a microscopic image of DNA (blue) in a spindle. The protein ASPM appears to play a key role in this process, as it is located at the 'poles' (yellow) in the spindle.

Spindle position

The study shows how ASPM does its work at the [molecular level](#), and why it is so important. In cooperation with the protein katanin, ASPM is responsible for the regulation of the organisation and positioning of the [spindle](#). "It is this positioning that helps to determine how the daughter cells develop: will they become copies of new cells, or will they develop into nerve cells", Akhmanova explains.

Much broader insight

The fact that a deviation in the protein ASPM leads to microcephaly can now be better understood at the molecular level. However, the results of this study provide a much broader insight, which may make it possible to explain or find other causes of the disorder.

Evolutionarily unique

Akhmanova's fascination for [brain development](#) is not limited to disease, however. "Even apes, our closest relatives, have much less brain capacity than we do. Our brain makes us what we are. This means the development of our brain is evolutionarily very special."

More information: Microtubule minus-end regulation at spindle poles by an ASPM–katanin complex, *Nature Cell Biology* (2017).

[nature.com/articles/doi:10.1038/ncb3511](https://www.nature.com/articles/doi:10.1038/ncb3511)

Provided by Utrecht University

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