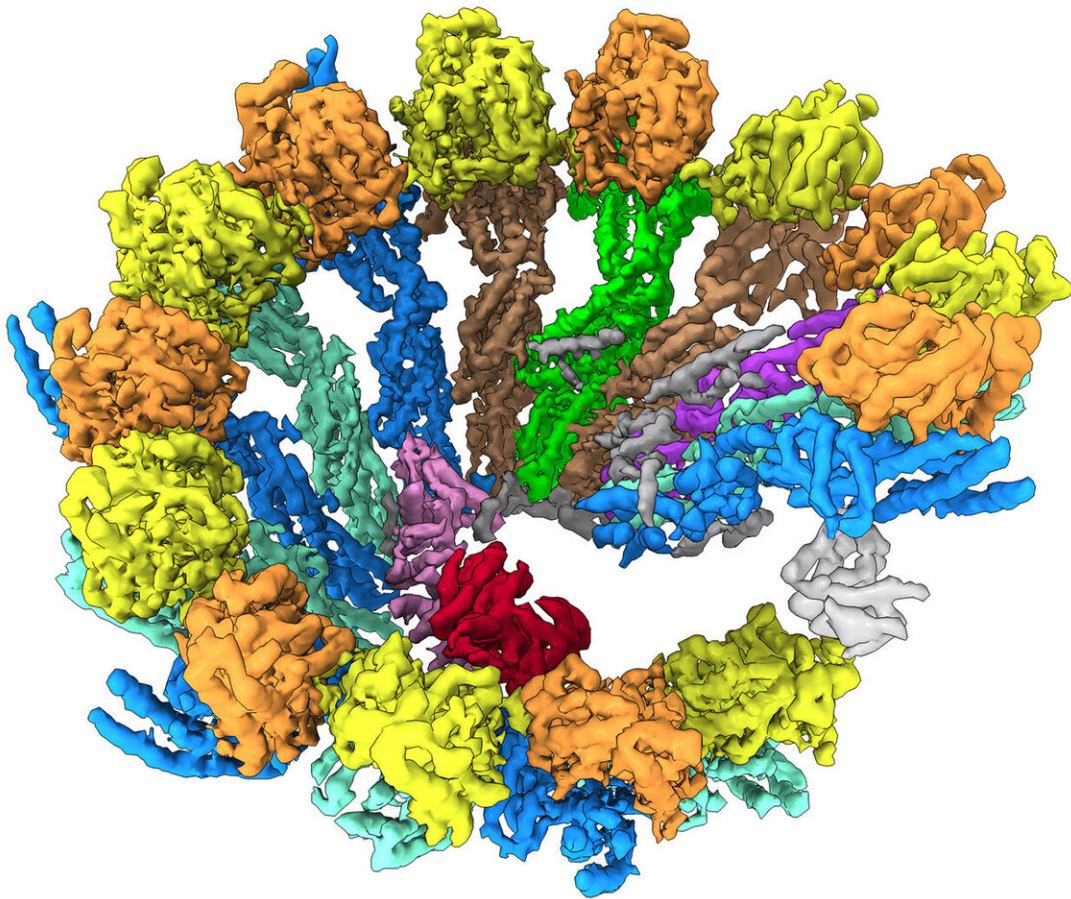


How cells assemble their microtubule skeleton

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Cryo-EM structure of the γ -TuRC spiral. The components of the complex were coloured differently. Credit: Pfeffer & Schiebel, ZMBH

Microtubules, filamentous structures within the cell, are required for many important processes, including cell division and intracellular transport. A research team led by scientists from Heidelberg University recently discovered how the spiral-shaped, modular microtubules are formed and how their formation is controlled. These processes were visualized using state-of-the-art cryo-electron microscopy (cryo-EM).

"To assemble microtubules from their individual components, the [cells](#) use structural templates that mimic one layer of the [microtubule](#) helix and can serve as a starting point for the newly forming microtubules," explains Dr. Stefan Pfeffer, junior research group leader at the Center for Molecular Biology of Heidelberg University (ZMBH). In [human cells](#), the gamma-tubulin ring complex (γ -TuRC) serves as such a structural template. To more accurately understand how it influences the formation of microtubules, the scientists used cryo-EM for determining the structure of the γ -TuRC at molecular resolution. The study elucidates in detail how the γ -TuRC is structurally organized and how its approximately 30 different subunits are assembled. It also clarifies how the formation of microtubules on γ -TuRC can be quickly regulated by a simple change in the ring diameter.

"The activation of γ -TuRC in particular is essential for efficient and reliable division of the genetic material during [cell division](#). Because the number of microtubules in [cancer cells](#) is changed, contributing to the aggressiveness of tumors, these findings are also significant for [cancer research](#)," adds Prof. Dr. Elmar Schiebel, ZMBH research group leader who, together with Dr. Pfeffer, is a corresponding author of the study. As a next step, the scientists plan on finding drugs that can be used to block the microtubule nucleating activity of γ -TuRC. The goal would be to establish a new mode of action for inhibiting cell division, which the scientists believe could be used in tumor therapy.

Scientists from the universities in Bochum and Bonn as well as Charité -

University Medicine Berlin also participated in the study. The results of this study were published in the journal *Nature*.

More information: Peng Liu et al, Insights into the assembly and activation of the microtubule nucleator γ -TuRC, *Nature* (2019). [DOI: 10.1038/s41586-019-1896-6](https://doi.org/10.1038/s41586-019-1896-6)

Provided by Heidelberg University

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