

## Journal club



## A CENTRIOLAR LIFELINE

The centrosome is the main microtubule-organizing centre in animal cells. Centrosomes are composed of two centrioles, which are microtubule-based structures, surrounded by pericentriolar material. Centrioles duplicate once every cell cycle. Electron microscopy studies performed by Robbins *et al.* over 40 years ago first described centriole duplication at the ultrastructural level in HeLa cells. A remarkable conserved feature reported at that time was that the newly formed procentriole is at a right angle to the mother centriole.

Although centriole assembly can occur via a 'de novo' pathway that does not require the presence of a mother centriole, the orthogonal position of the procentriole seems to

“raises the intriguing possibility that the connective stalk sets the geometry of procentriole assembly”

be the rule in the canonical pathway. What determines the orthogonal position of the nascent procentriole is still unclear; however, Guichard *et al.* recently used cryo-electron tomography (cryo-ET) to characterize human centriole duplication, and they provided encouraging insights.

Cryo-ET offers the advantage of imaging specimens in their native status without the need for fixation procedures that can create artefacts. Unexpectedly, Guichard *et al.* observed a previously uncharacterized structure of 110 nm that connects the mother centriole to the nascent procentriole, just like an umbilical cord connecting mother and baby throughout embryonic development. This structure was named 'connecting stalk' and seems to be present in a transient way. It was only seen in six out of the 21 tomograms analysed, and it was no longer detected as cells entered mitosis.

The work by Guichard *et al.* raises the intriguing possibility that the connective stalk sets the geometry of procentriole assembly and thus determines the position of the procentriole in relation to its mother. Whether this structure is present in all duplicating centrioles and whether its formation depends on the activity of known centriole duplication factors remain open questions, which will hopefully be answered soon.

Renata Basto  
UMR144, Centre national de la recherche  
scientifique (CNRS), Institut Curie,  
12 rue Lhomond,  
75005 Paris, France.  
e-mail: renata.basto@curie.fr

The author declares no competing financial interests.

**ORIGINAL RESEARCH PAPERS** Robbins, E., Jentsch, G. & Micali, A. The centriole cycle in synchronized HeLa cells. *J. Cell Biol.* **36**, 329–339 (1968) | Guichard, P., Chrétien, D., Marco, S. & Tassin, A. M. Procentriole assembly revealed by cryo-electron tomography. *EMBO J.* **29**, 1565–1572 (2010)