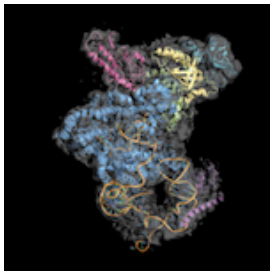

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Short Talk 5 - Human spermatozoa with a twist

Tuesday 20 November 2018 11:50 (20 minutes)

Spermatozoa swim using their long tail, which is a motile flagellum. Flagella are complex molecular machines that consists of up to 1000 different proteins, which are neatly arranged around a complex microtubule cytoskeleton consisting of nine doublet microtubules surrounding two central singlet microtubules. Movement occurs when motor molecules attached to one doublet microtubule walks on the neighboring microtubule creating a bend on the flagellum. This motion has to be strictly coordinated and regulated to create the flagellum beat, without which no natural human conception can occur.

Doing the first cryo-electron tomography study of human spermatozoa, we found that inside the lumen of microtubules a complex structure spanned over several micrometers in the spermatozoon end piece. This structure forms an interrupted helix and binds to the inside surface of the tubulin heterodimer, the protein that forms microtubules. This has not been seen in other flagella, which suggests that it might be spermatozoa specific. We named it terminal axoneme intra-lumenal spiral, or TAILS for short.

TAILS might be involved in stabilization of the microtubules which otherwise are constantly growing and shrinking, or it might make the end piece more rigid which would yield more force in the flagellar beat. This study was the first time intact human spermatozoa was visualized using cryo-electron tomography. The discovery of this novel structure shows the need to study human flagella directly, to understand the components involved in spermatozoon swimming.

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