MBG FOCUS TALK

hosted by Gregers Rom Andersen, Section for Structural Biology

Wednesday 24-4 15.15-16.15

Conference room Building 3130-303

Assoc Prof Johanna Höög

Department of Chemistry and Molecular Biology, University of Gothenburg

Cryo-electron tomography of human flagella

Abstract

Most human cells have a cilium or flagellum protruding from their surface. Their malfunction causes a whole spectrum of diseases called the ciliopathies, which include infertility and reoccurring lung infections. Flagella structure and function has mostly been revealed by studying protist unicellular model organisms such as the green algea Chlamydomoas reinhardtii. However, how directly these insights can be translated into human flagella is unclear, mainly because 3D structures of human flagella were largely lacking.

We have done the first cryo-electron tomographic reconstructions of the flagella inside intact human sperm tails. This all-inclusive view of the sperm tail revealed that human spermatozoa tips are not structured like the often-used model organisms. First, we showed that the doublet microtubules can split and form two singlet microtubules at the flagellum tip. Secondly, an entirely new structure inside the flagellum tip, terminal axoneme intra-lumenal spiral (TAILS) inside the lumen of microtubules was discovered. TAILS has not been seen in other flagella, which suggests that it might be human or spermatozoa specific.

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. The discovery of this novel structure and the other differences in structure to the commonly studied model organisms of eukaryotic flagella show the need to study human flagella directly, to understand its role in human health and disease.