NANYANG TECHNOLOGICAL UNIVERSITY

School of Biological Sciences

Reg. No. 200604393R

Research Theme: Cell Biology

Research Project Title: How proteins are targeted to cilia

Principal Investigator/Supervisor: Asst. Prof. Lei Lu

Co-supervisor/ Collaborator(s) (if any):

Project Description

a) Background:

Cilia are cell surface membrane protrusions with bundled microtubules underneath. They are cellular antennas that sense environmental cues and initiate intracellular signaling pathways. Defects in structures and functions of cilia are known to cause diverse human diseases, collectively called ciliopathies, such as kidney or liver cyst and retinal degeneration, etc. As a unique organelle, cilia have a distinct protein and lipid composition from the plasma membrane, though both share the same membrane sheet. It is still unclear how a ciliary protein resides at cilia instead of the plasma membrane or other membrane-bound organelles. Such specific localization of ciliary proteins is vital for proper ciliary functions, and incorrect localization has been found to cause human diseases. Our lab has discovered transportin1 and Rab8 as the common machinery for the ciliary targeting, and they can engage motifs of a few ciliary membrane proteins to assemble a ternary complex (Madugula et al., 2016). We proposed the transportin-Rab8 model, which can satisfactorily explain most findings in the literature (Lu and Madugula, 2017). However, the model is still in its infancy, and the detailed molecular and cellular mechanism is still lacking.

b) Proposed work:

There are two aims for this project.

1) We will search more ciliary proteins targeted by transportin1 and Rab8 and compare their ciliary targeting or transporin1-Rab8-binding motifs.
2) We will test if other transportin and Rab family members can similarly assemble alternative ternary complex for the ciliary targeting of proteins.

Supervisor contact:

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