

Research Theme: Cell Biology
Research Project Title: Functional characterization of the Crumbs polarity complex during lumenogenesis in 3D epithelial cell cultures and during zebrafish kidney development
Principal Investigator/Supervisor: Alexander Ludwig
Co-supervisor/ Collaborator(s) (if any): Tom Carney (LKC Medicine)
Project Description
<p>a) Background: The Crumbs complex is an important regulator of epithelial tissue morphogenesis and acts as a tumor suppressor. One of the key hallmarks of epithelial tissue is their capability to form hollow tubes, which make up most internal organs such as the kidney, the gut, and the liver. In vitro work has demonstrated that in the absence of a functional Crumbs complex lumen biogenesis is impaired. In addition, loss of the Crumbs complex in mice or the zebrafish leads to cystic kidneys and severe defects in tissue architecture in other organs. This suggests an important role for the Crumbs complex in kidney development, function and disease. However, to date we know very little about how kidney lumens are formed in vivo, and about when and how the Crumbs complex functions during this process.</p> <p>b) Proposed work: The goal of this PhD project is to characterize the spatio-temporal regulation and functions of the Crumbs complex during lumenogenesis in 3D renal epithelial cell cultures and during the development of the zebrafish pronephric kidney. The PhD candidate will generate knockout and transgenic zebrafish lines as well as genetically engineered renal cell lines using state-of-the-art genome editing tools (e.g. CRISPR/Cas9 and transposase technology). Lumen formation will be studied in live fish larvae and in 3D epithelial cell cultures using various fluorescence microscopy approaches (confocal and spinning disk microscopy, light sheet microscopy). In addition, electron microscopy and 3D tomography will be used to obtain higher resolution information on the lumen forming process, both in cultured cells and in the zebrafish. The goal is to understand the architectural principles of how lumens are formed and to decipher the spatio-temporal functions of the Crumbs complex during lumenogenesis in kidney epithelia.</p> <p>c) Preferred skills: The PhD candidate should have a degree in biology, biochemistry, or a related subject, and should have sufficient background in cell biology, imaging, biochemistry, and/or genetics.</p>
Supervisor contact:

If you have questions regarding this project, please email the Principal Investigator:

aludwig@ntu.edu.sg

Please also visit our lab homepage for more information:

<https://blogs.ntu.edu.sg/alabntusg/>

SBS contact and how to apply:

Associate Chair-Biological Sciences (Graduate Studies) : **AC-SBS-GS@ntu.edu.sg**

Please apply at the following:

Application portal:

<https://venus.wis.ntu.edu.sg/GOAL/OnlineApplicationModule/frnOnlineApplication.ASPX>