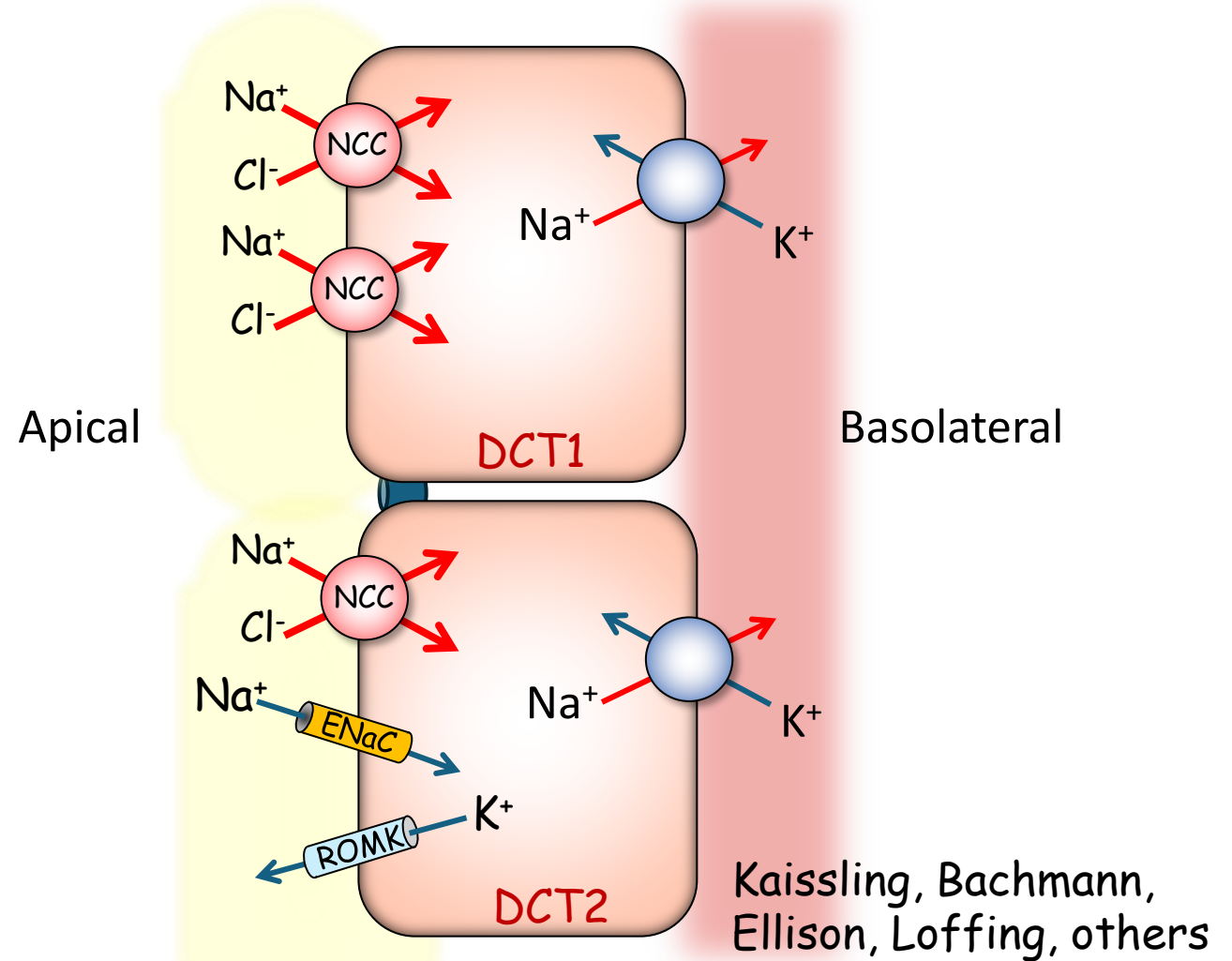
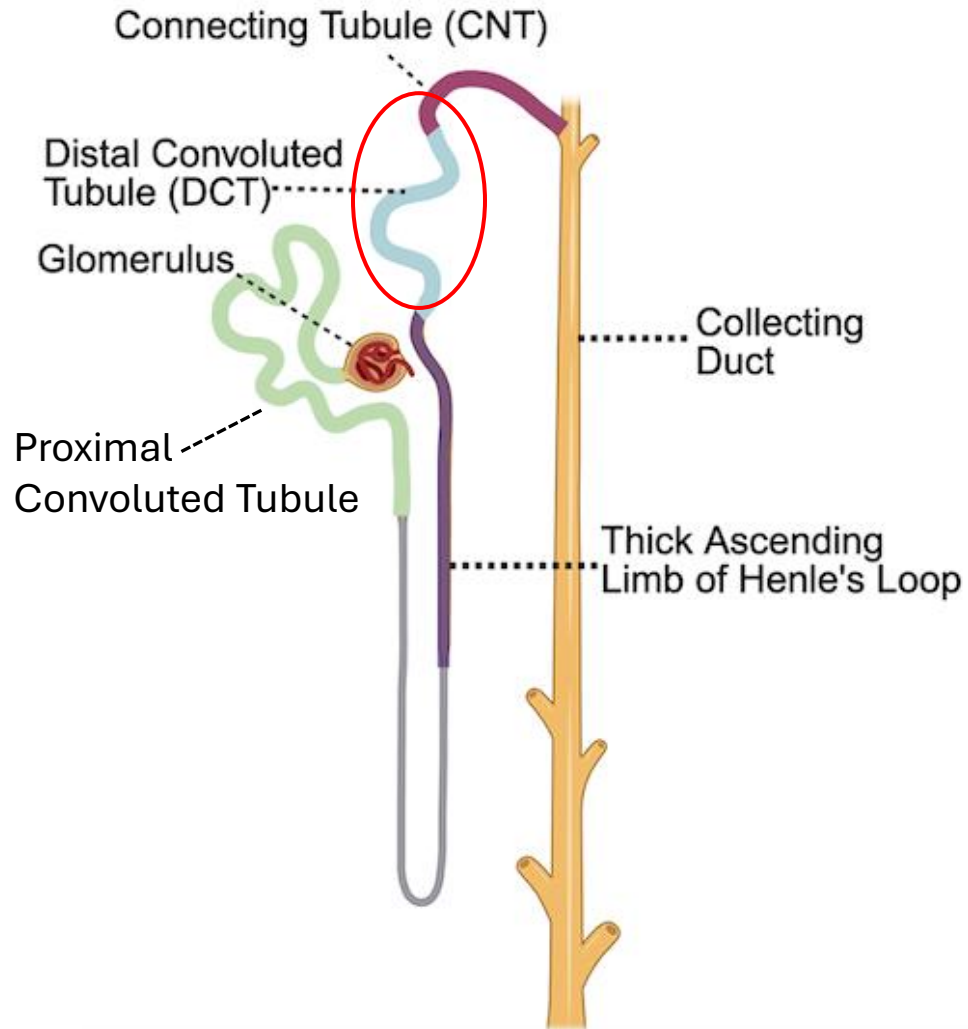


Novel Cell Types in the TAL and DCT Regulate Salt Balance

David H. Ellison, MD
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Department of Medicine
&
Chemical Physiology and Biochemistry
OHSU

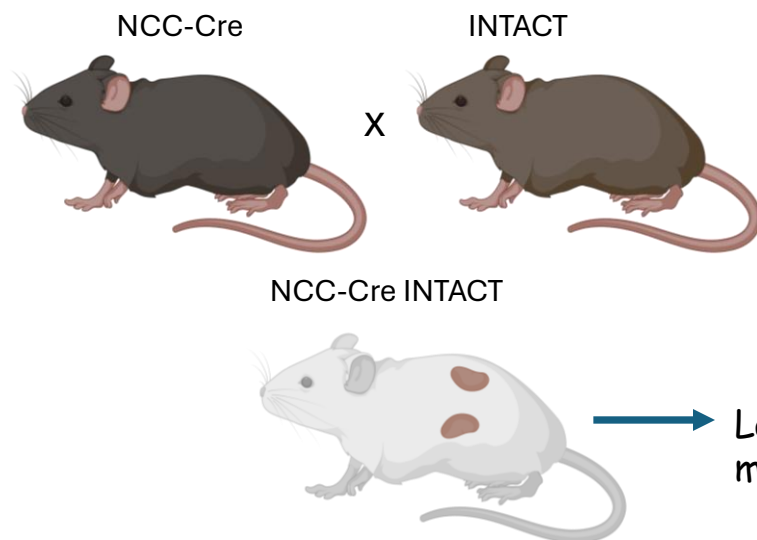
DCT Cell Types



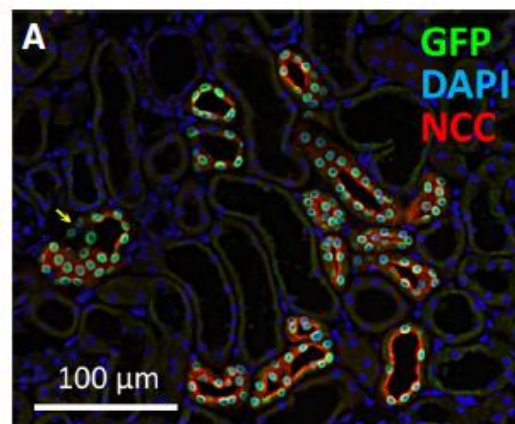
snRNA-Seq Reveals DCT cell Diversity

DCT Cells Comprise ~5% of cortical tissue

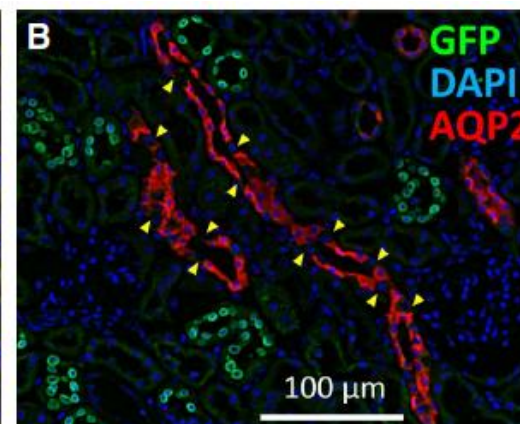
Isolation of Nuclei Tagged in specific Cell Types (INTACT)



Green nuclei in DCT

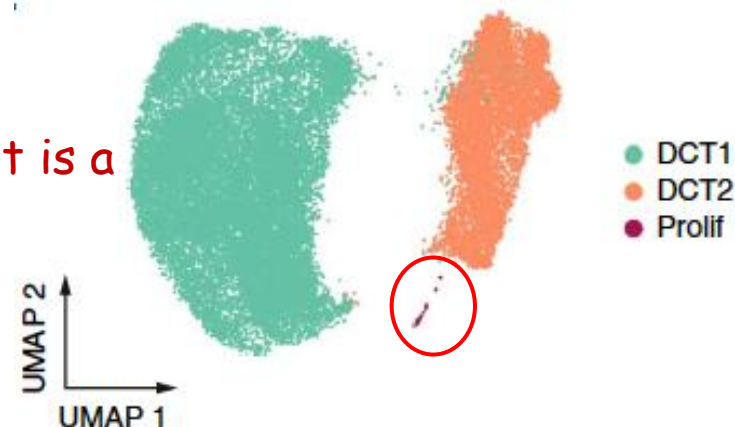


No Green nuclei in CD

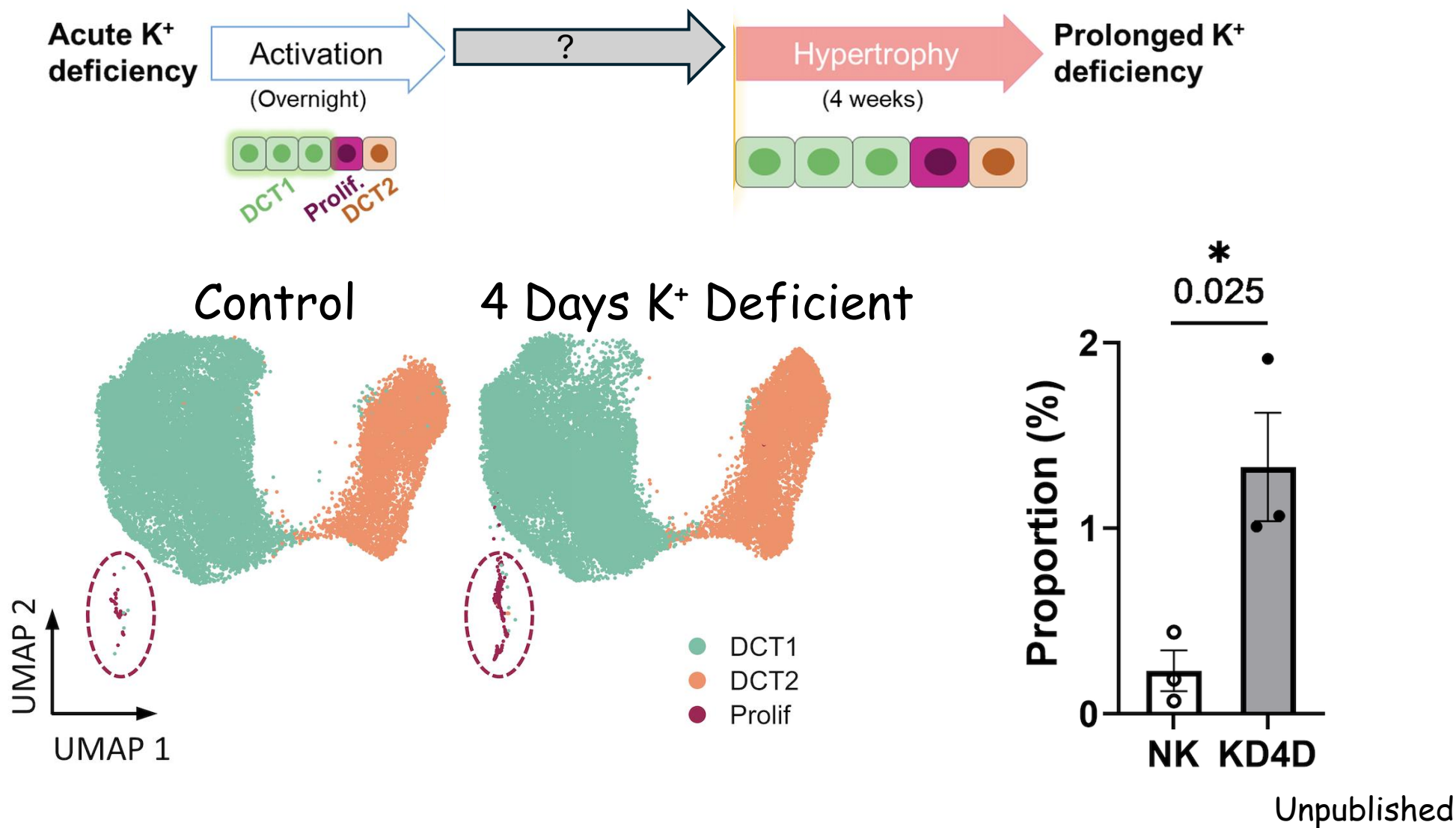


Single nucleus RNA-Seq
Two main DCT populations

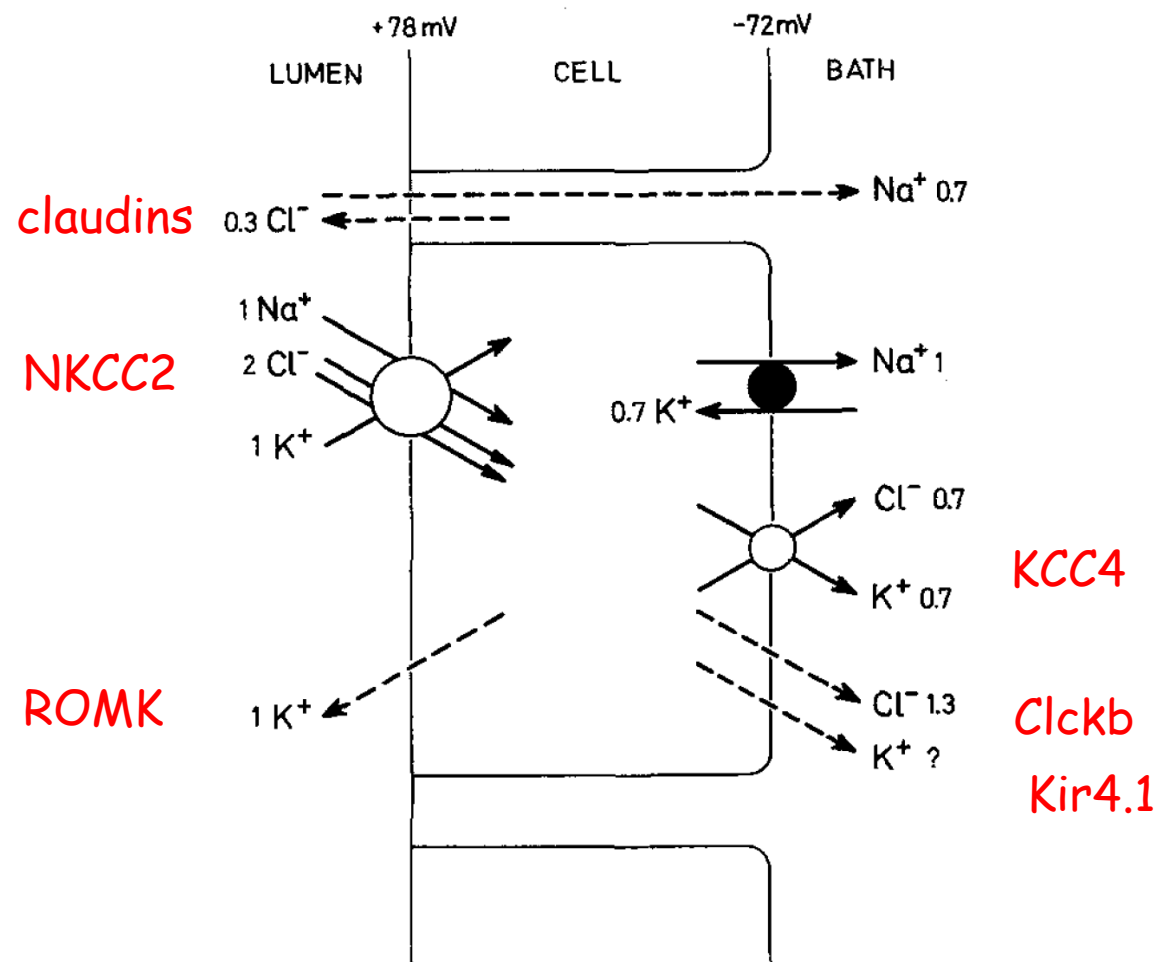
UMAP-each dot is a cell or nucleus



K⁺ Deficiency Activates Proliferative Cells

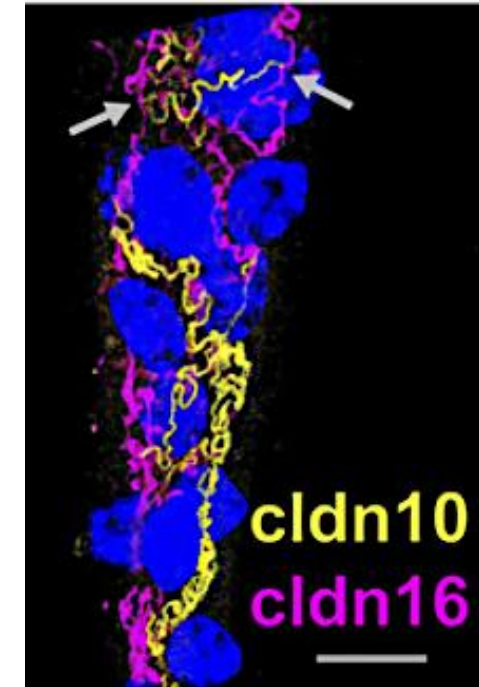


Classic TAL Model



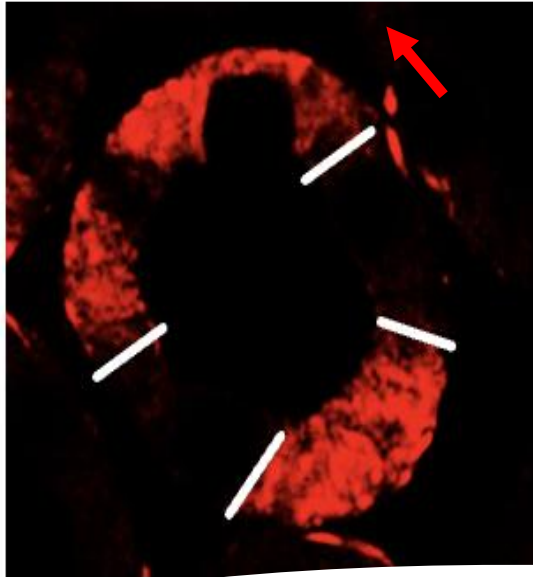
TAL Claudin Expression is Mosaic

- TAL expresses claudins in a mosaic pattern.
 - Claudin 10 is Na⁺ permeable
 - Claudin 16/19 form Ca²⁺ and Mg²⁺ permeable pathways
 - Sites are mutually exclusive

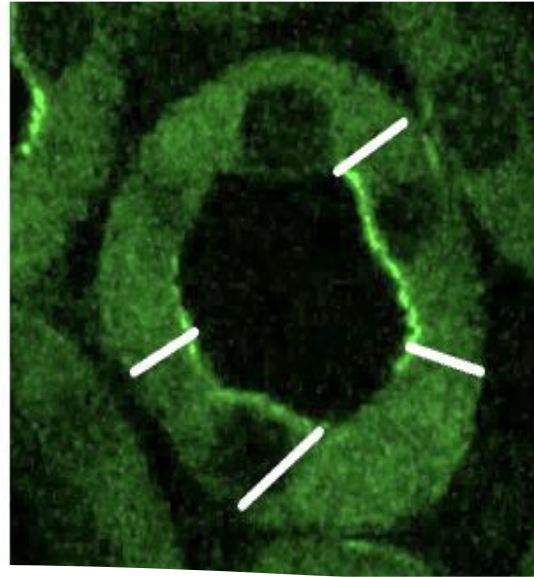


Different TAL Cell Types

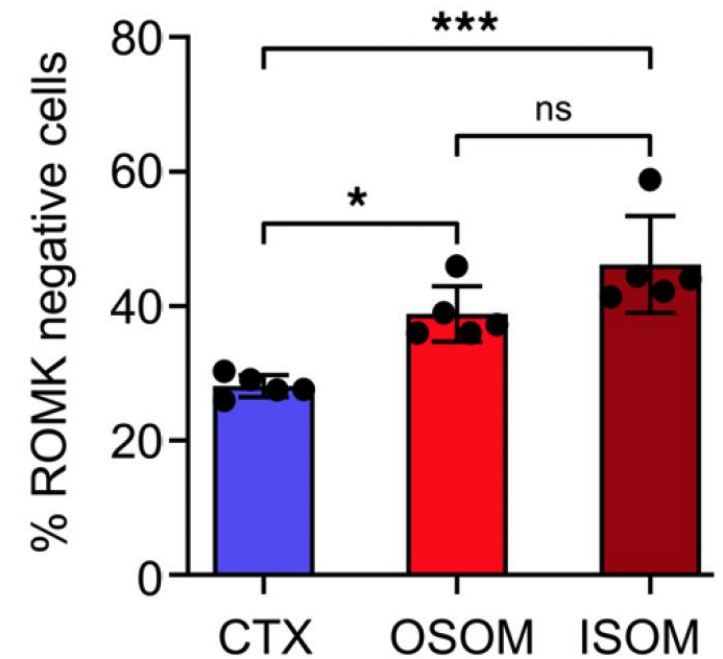
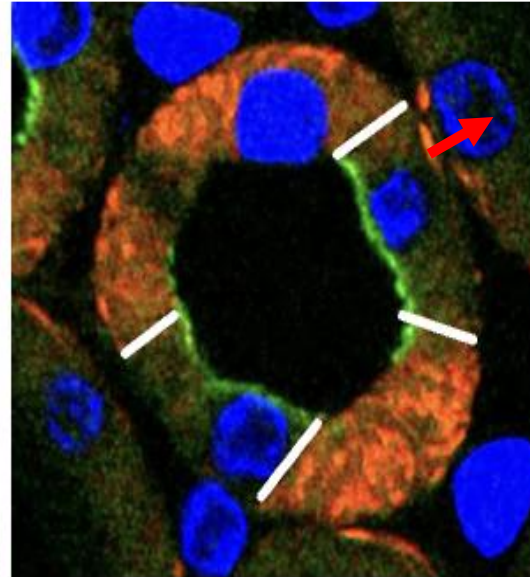
Kir4.1



ROMK

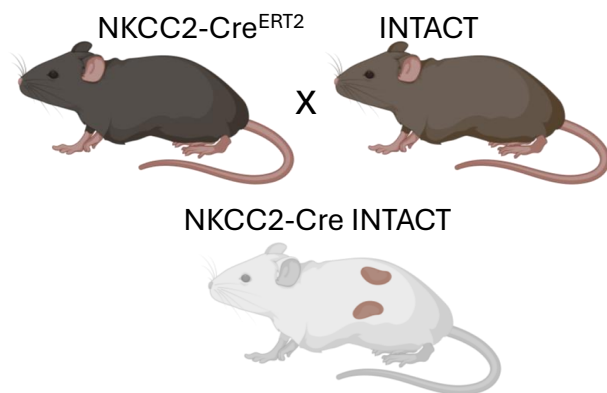


Merge

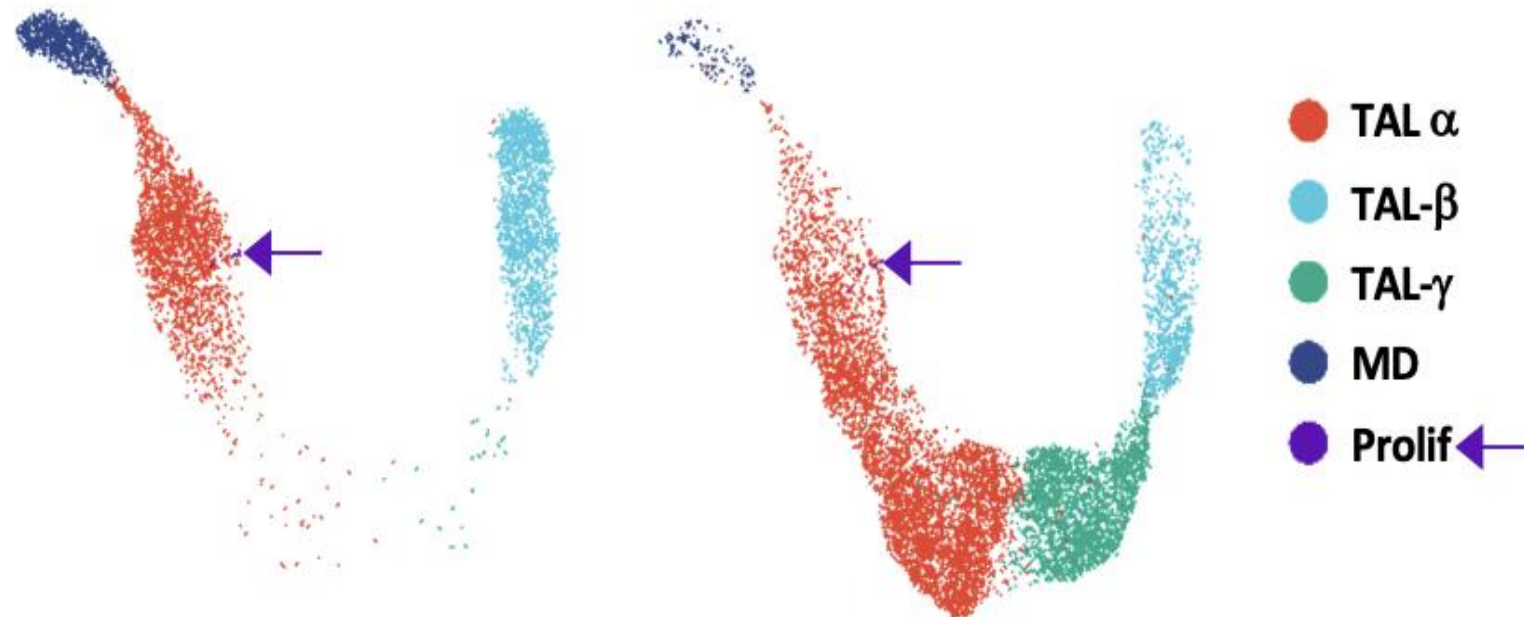


TAL Cell Types in Cortex & Medulla

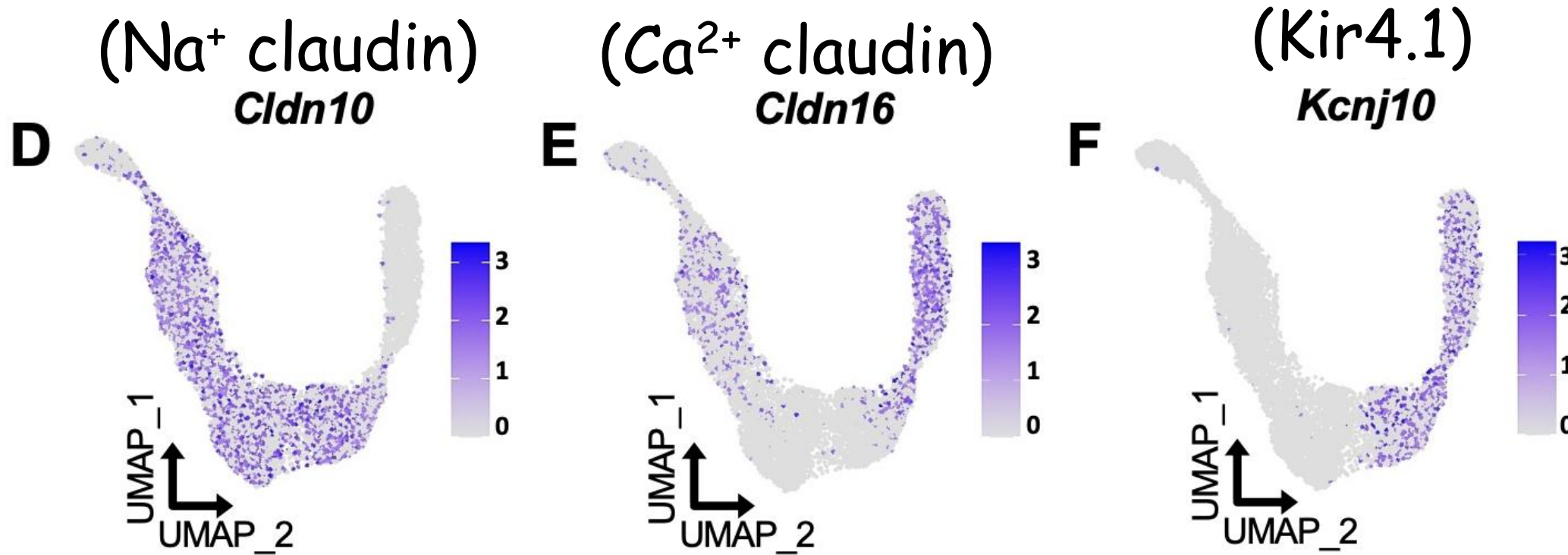
Use INTACT Approach but
with NKCC2 CRE



Dissected Cortex Dissected Medulla

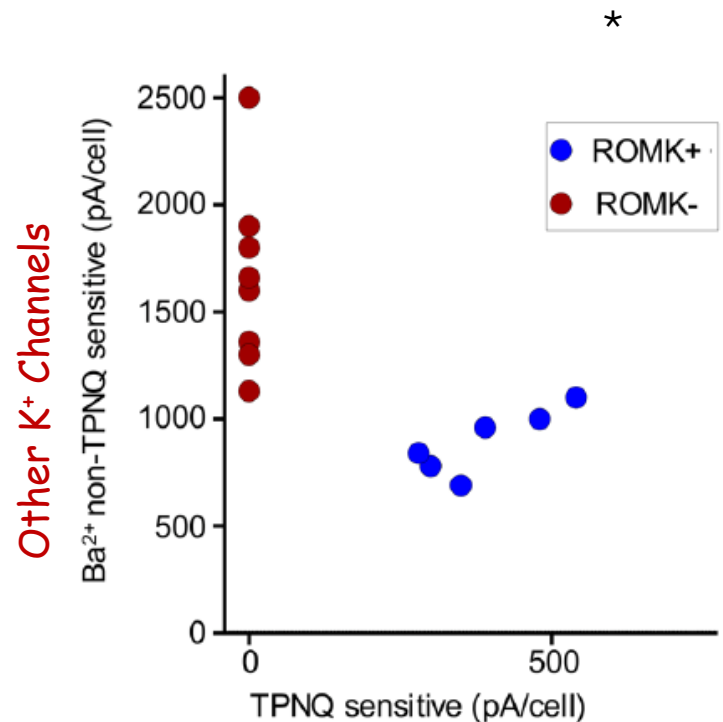


Transcriptional Heterogeneity in TAL Cells



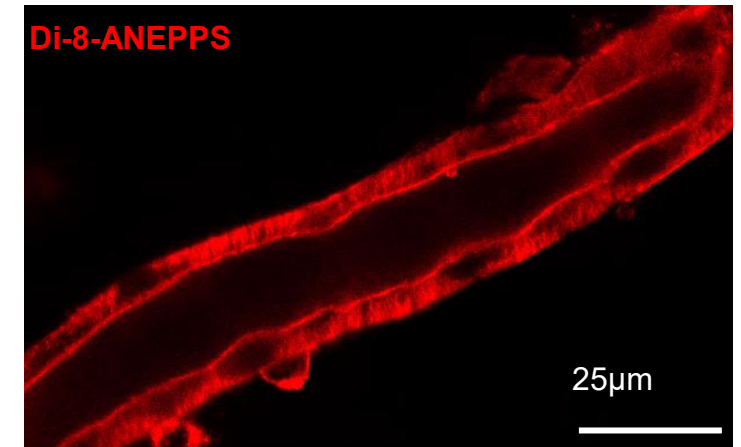
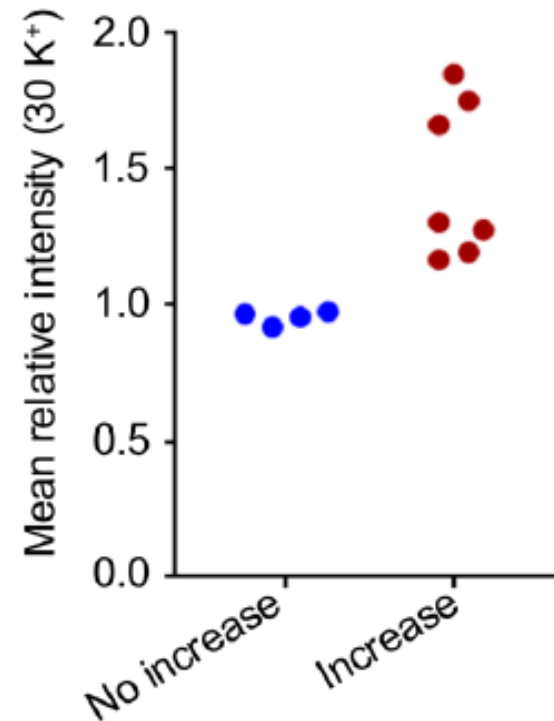
Heterogeneity of K⁺ Channel Activity

Effect of ROMK Inhibitor



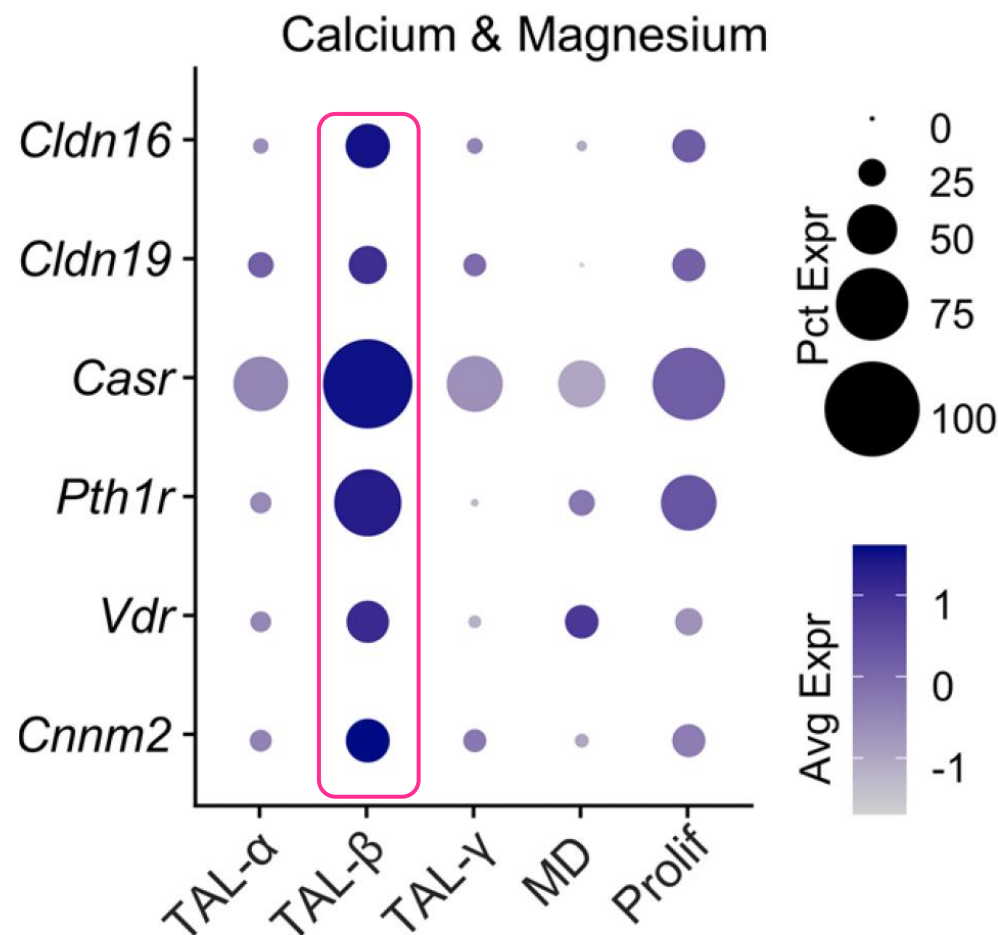
Xin-Peng Duan
Wen-Hui Wang

Effect of Basolateral Change in [K⁺]



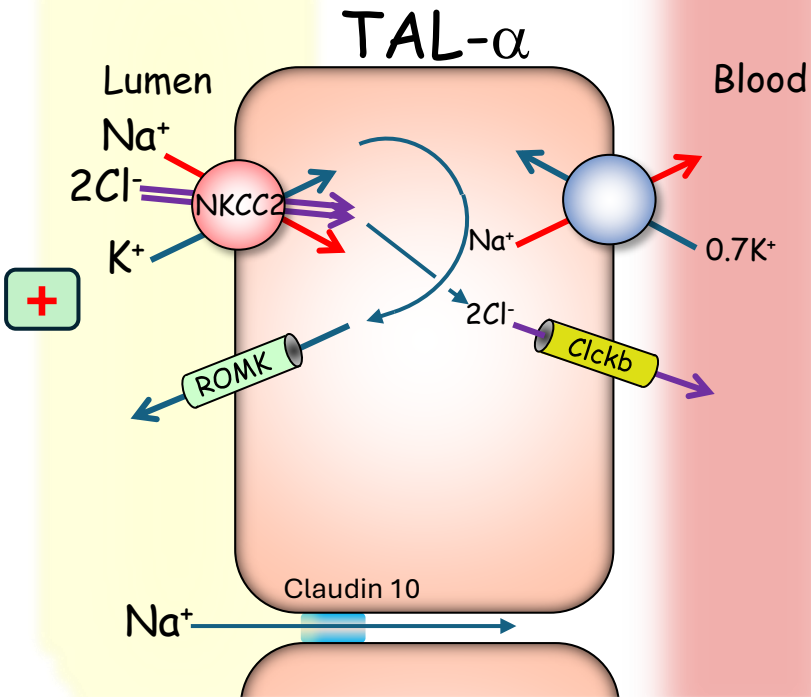
Nina Himmerkus
Markus Bleich

TAL-beta Cells are the Calcium Transporting

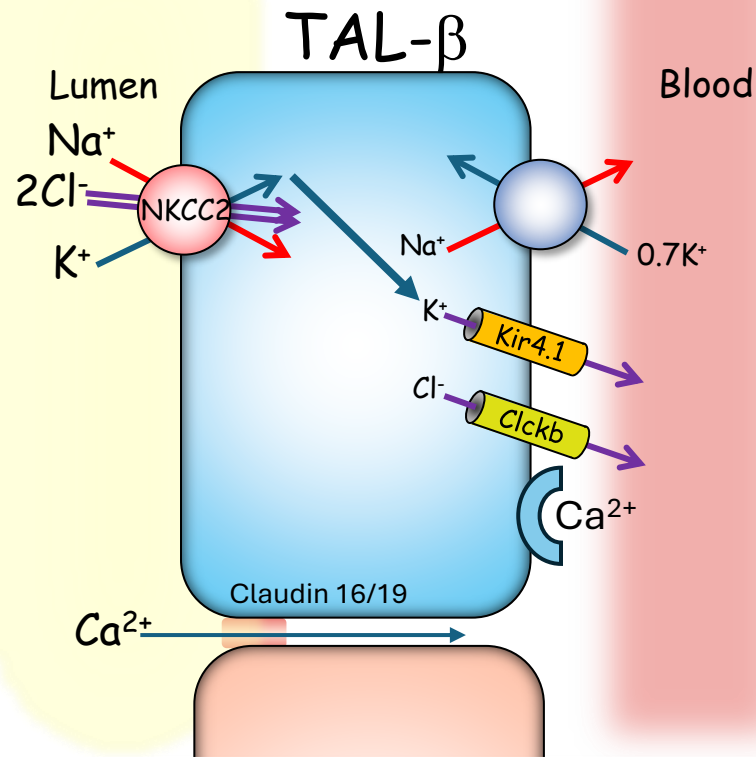


Three TAL Cell types

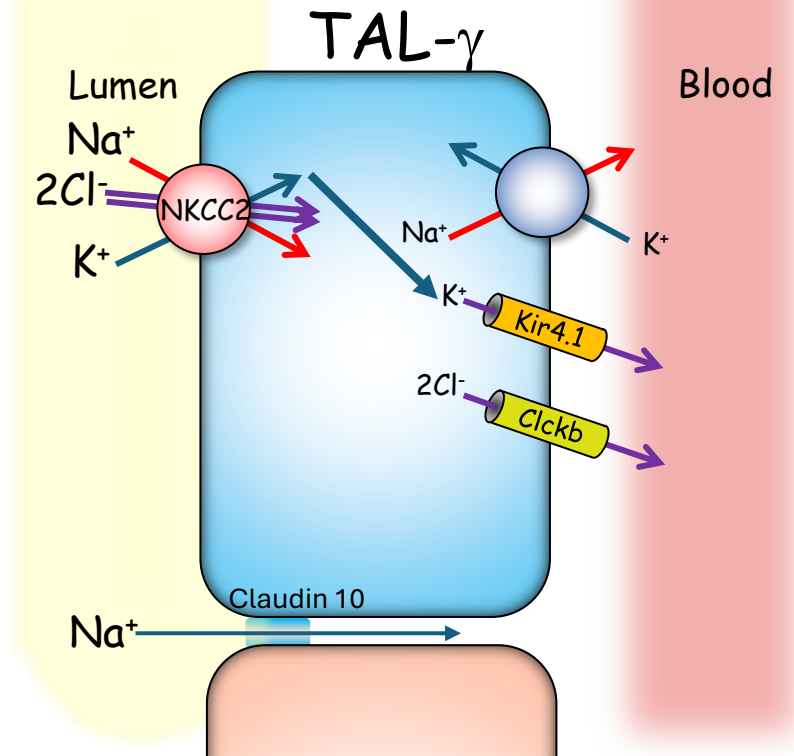
Sodium absorption
Potassium secretion
Voltage generation



Calcium absorption
Potassium absorption

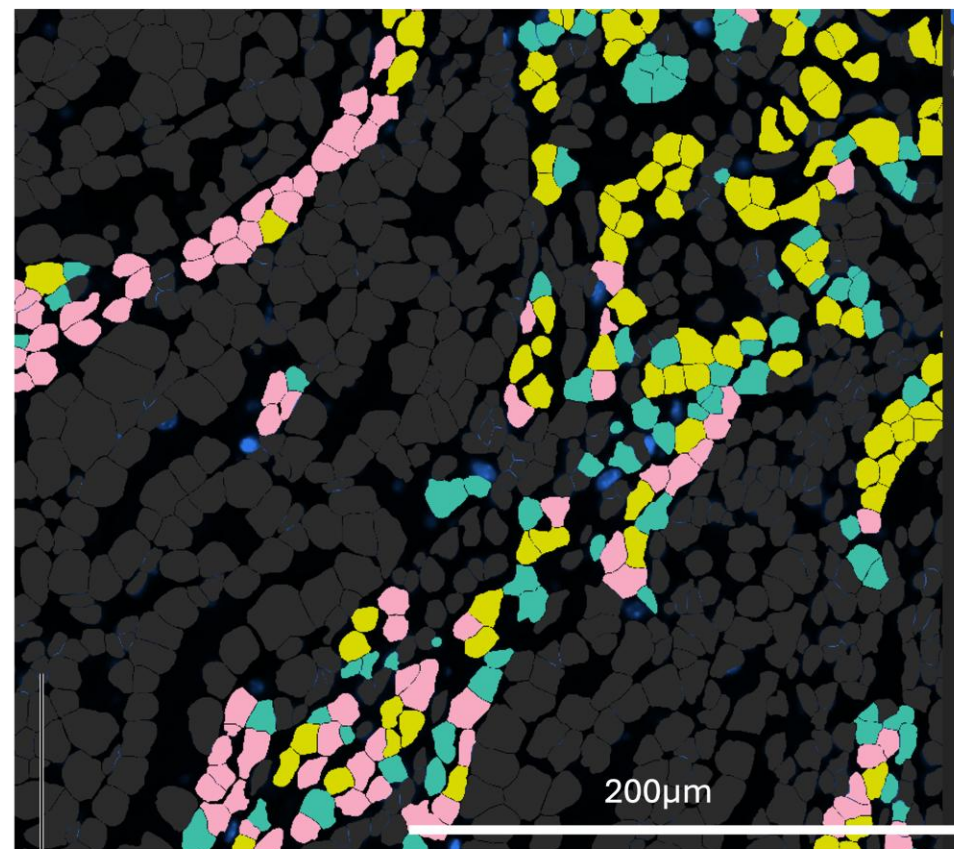
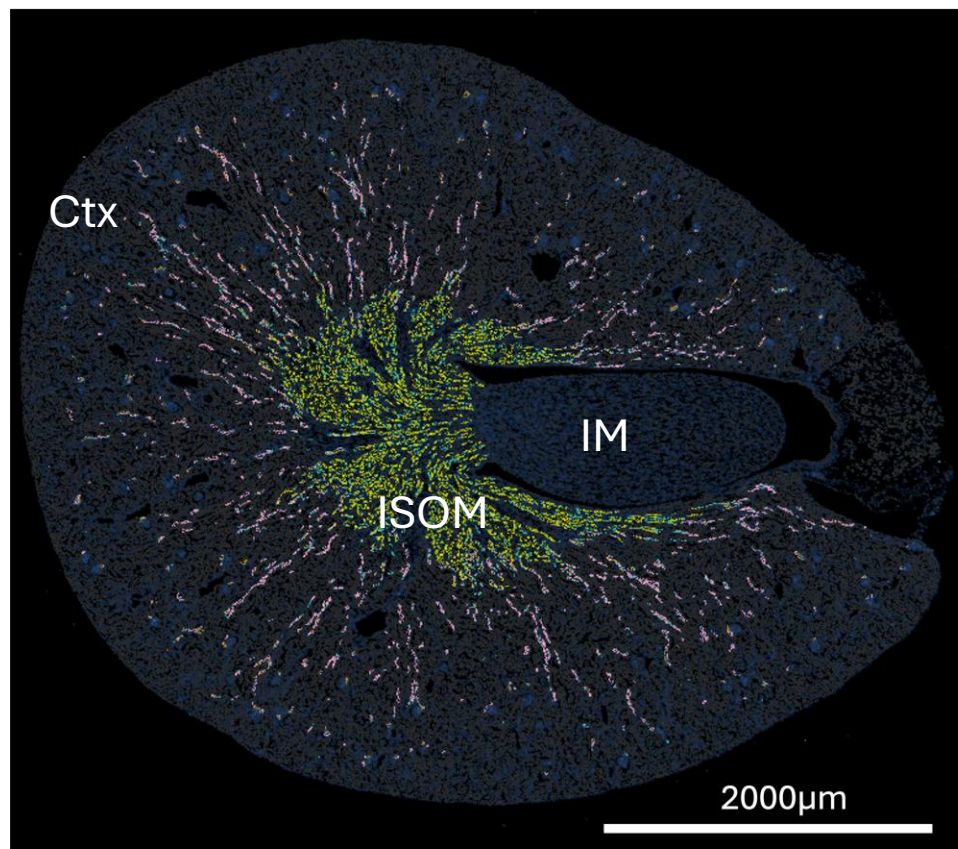


Sodium absorption
?Potassium absorption



Spatial Transcriptomics Confirms Mosaicism

Xenium HR



TAL- α

TAL- β

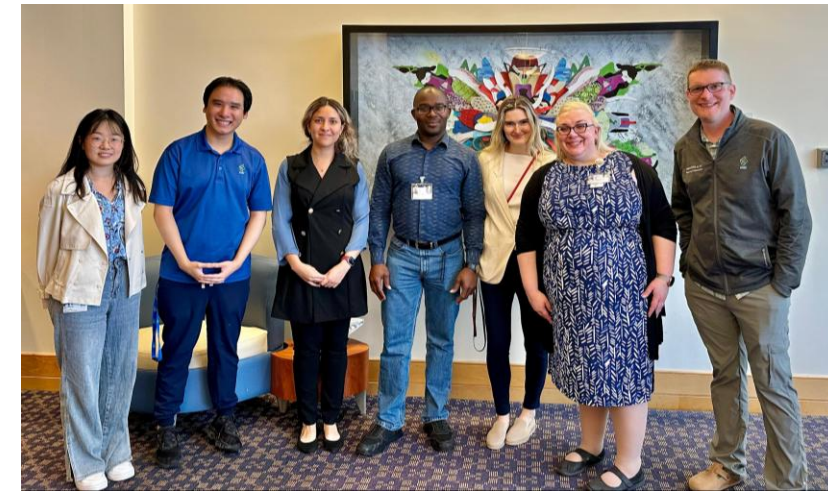
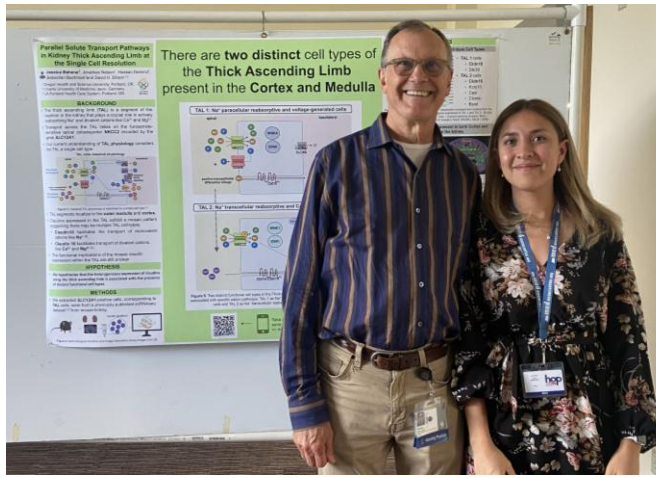
TAL- γ

Unpublished

Specialized Cell Types along the Nephron

- There are at least two populations of DCT cells with different functions
- Previously unrecognized TAL cell types only one of which corresponds to the 'classical' TAL cell model, require reanalysis of TAL function

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