Establishing the single-cell molecular architecture of the neurohypophysis to study the development and function of pituicyte

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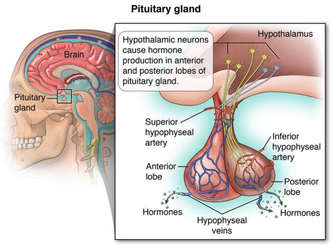
Introduction

The neurohypophysis (NH), located at the base of the hypothalamus, is a major neuroendocrine interface that serves as a communication point between the brain and peripheral organs.

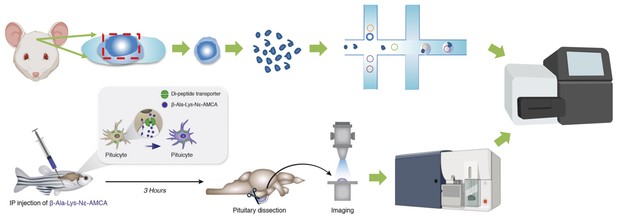


Pituicytes, the resident astroglia are the main component of the NH. They derives signals instructing the permeable fate of the NH endothelia cells (Anbalagan et al., Dev Cell. 2018).

Only a handful markers are available for pituicytes and show promiscuous staining profiles. *Single-cell level transcriptomics for the NH cells are needed.*

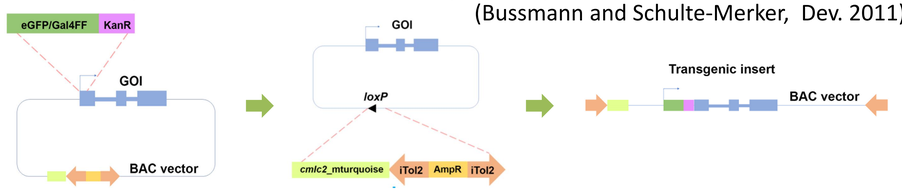
Experimental Design

Step1. Single-cell RNA-Seq of mouse and zebrafish NH



Step2. mRNA fluorescent in situ hybridization validations

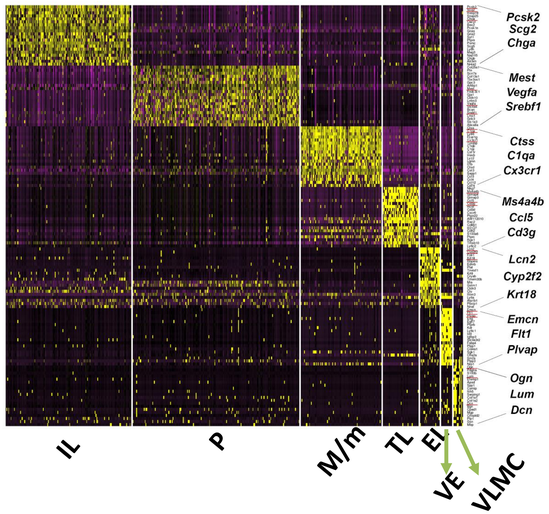
Step3. Generating tol2-mediated BAC constructs for pituicyte reporter and driver transgenes (Bussmann and Schulte-Merker, Dev. 2011)



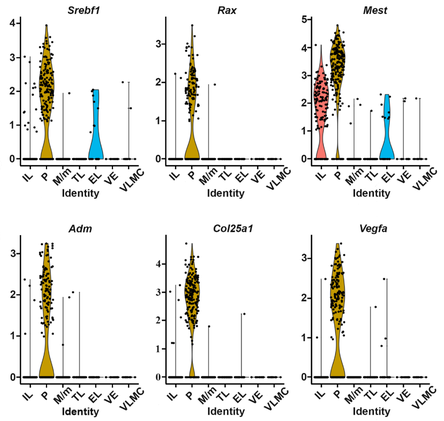
Step4. Creating stable pituicyte reporter and driver transgenes

Results

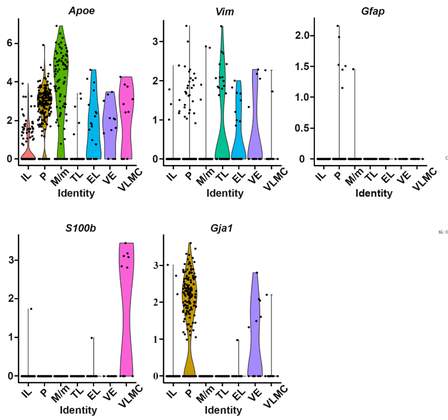
7 cell types in the dissected mouse NH



Novel pituicyte markers



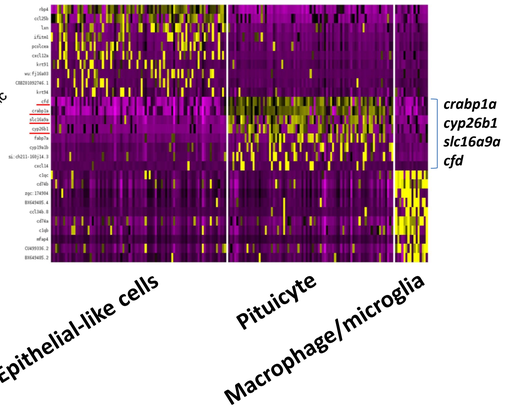
Old pituicyte markers



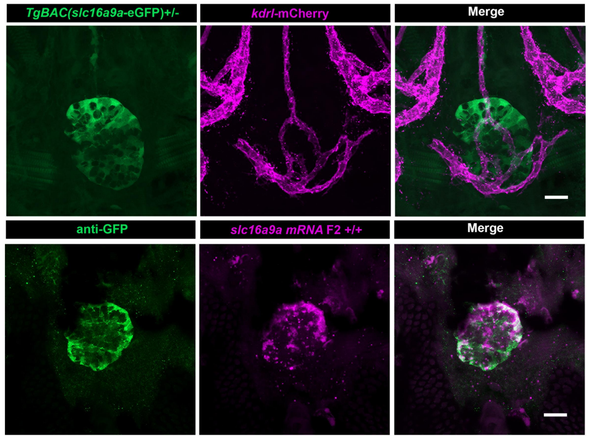
(Chen et al. eNeuro. 2020)

3 cell types in AMCA+ population of the zebrafish NH

(validated pituicyte markers by the side)



Zebrafish BAC pituicyte eGFP reporter overlap with endogenous mRNA signal



Future work

- To establish pituicyte specific BAC Gal4 driver transgene.
- To explore the underlying mechanisms of pituicyte's role in regulating the NH vasculature permeability by pharmacological and/or genetic perturbations, followed transcriptomic profiling.

Acknowledgements

Thanks to Dr. Yael Kupermen to help dissecting the mouse NH, Amanda Lydia Farack to provide the smFISH probes, Dr. hanjie Li and Dr. Shuangying Wang, Prof. Ido Amit for collaboration in the zebrafish neurohypophyseal scRNA-Seq project.