

BioHackathon 2025

Challenge Track 1

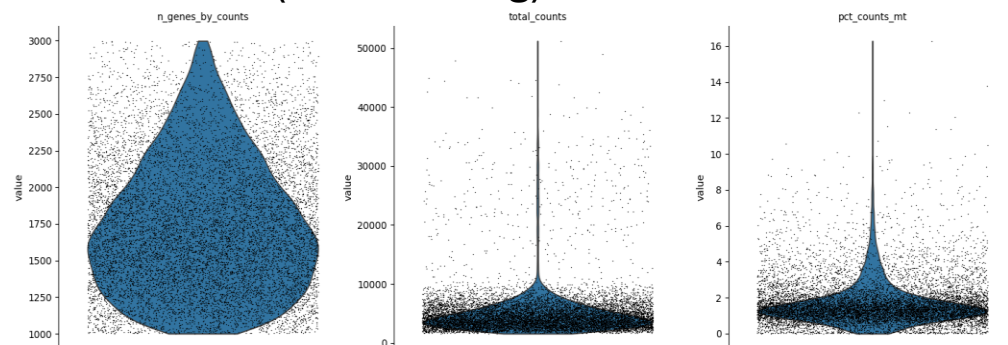
Team 7

Source Data

Epithelial Dataset:

8 cell types

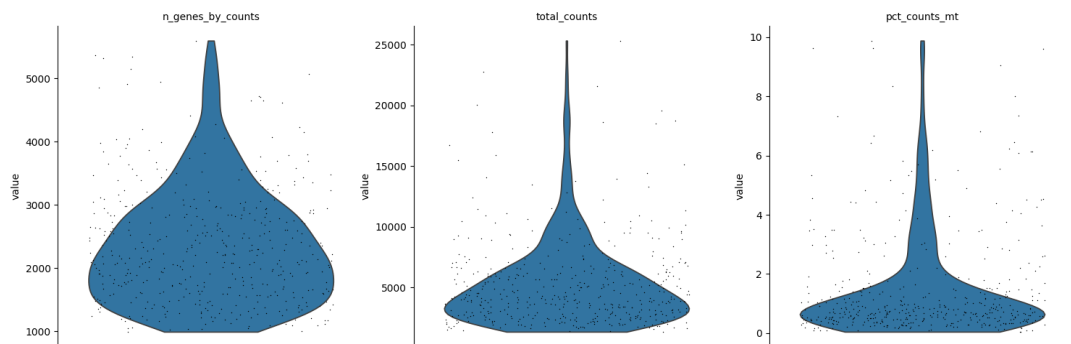
11 652 cells (after filtering)



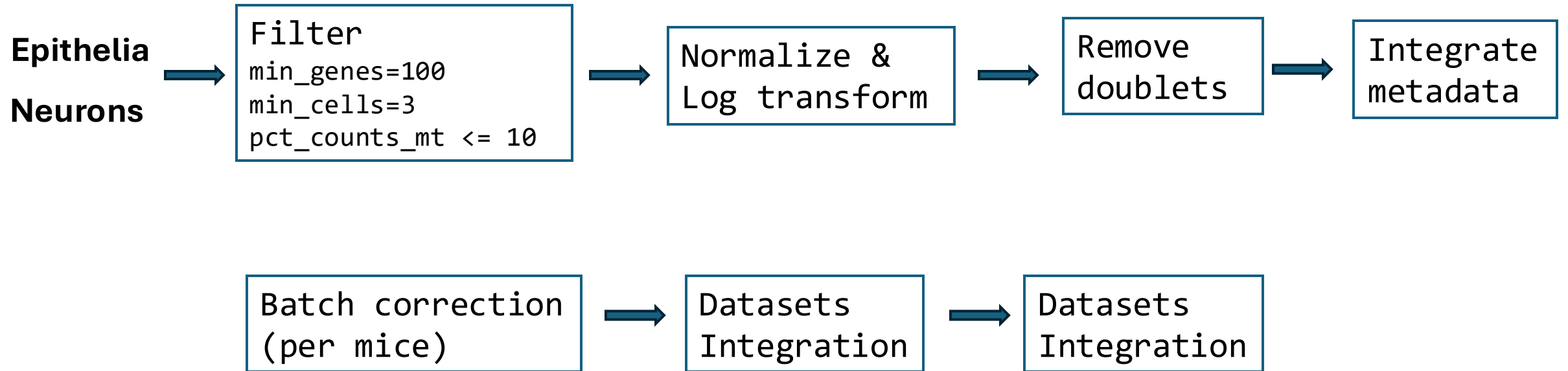
Neurons Dataset:

2 cell types

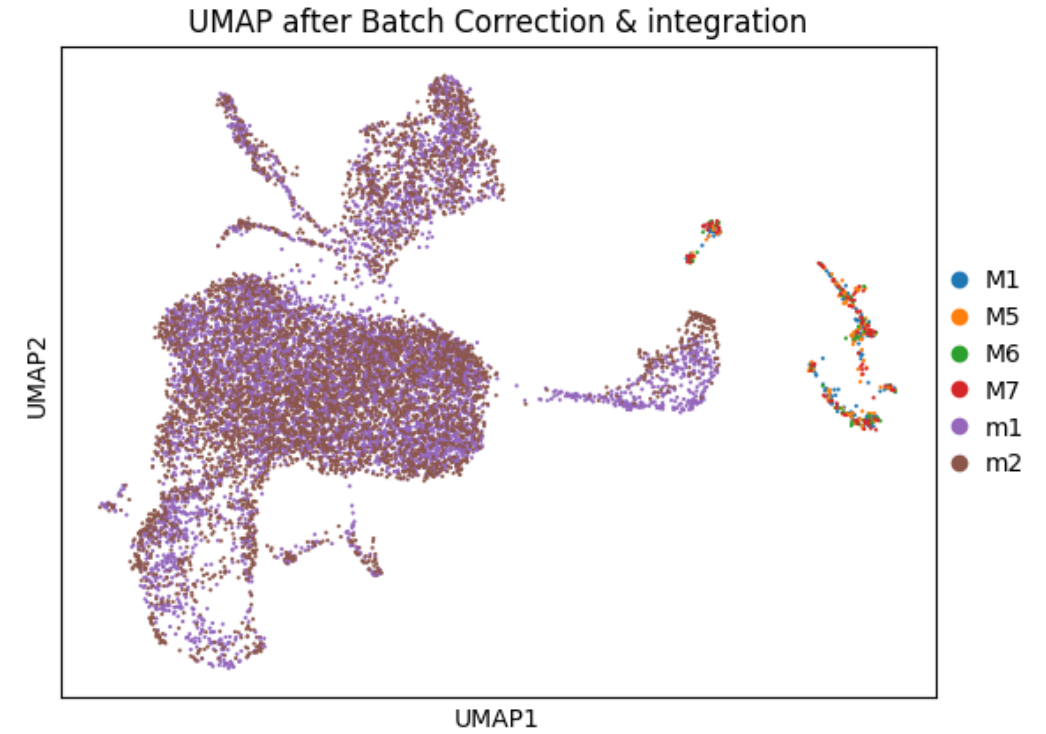
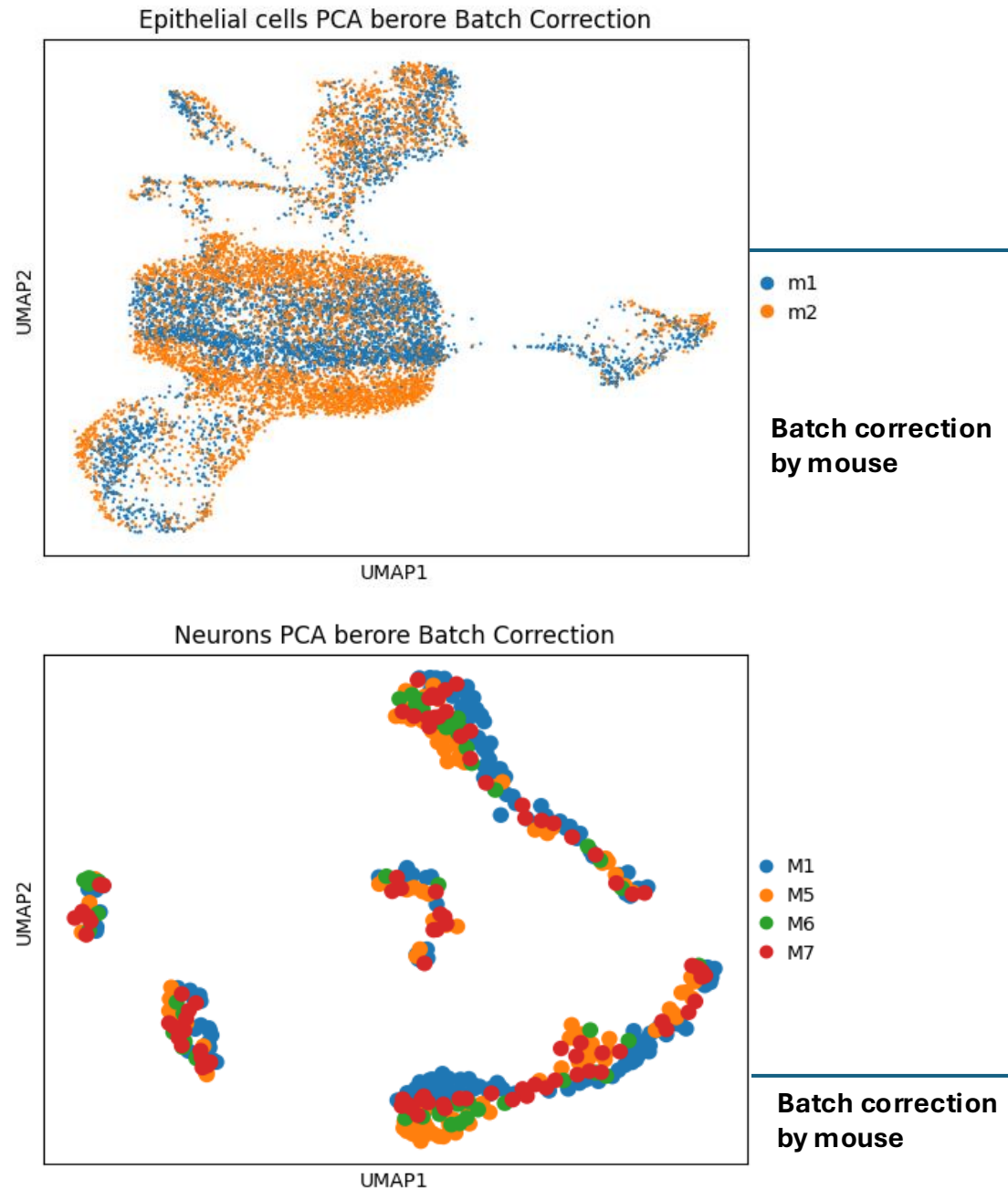
473 cells



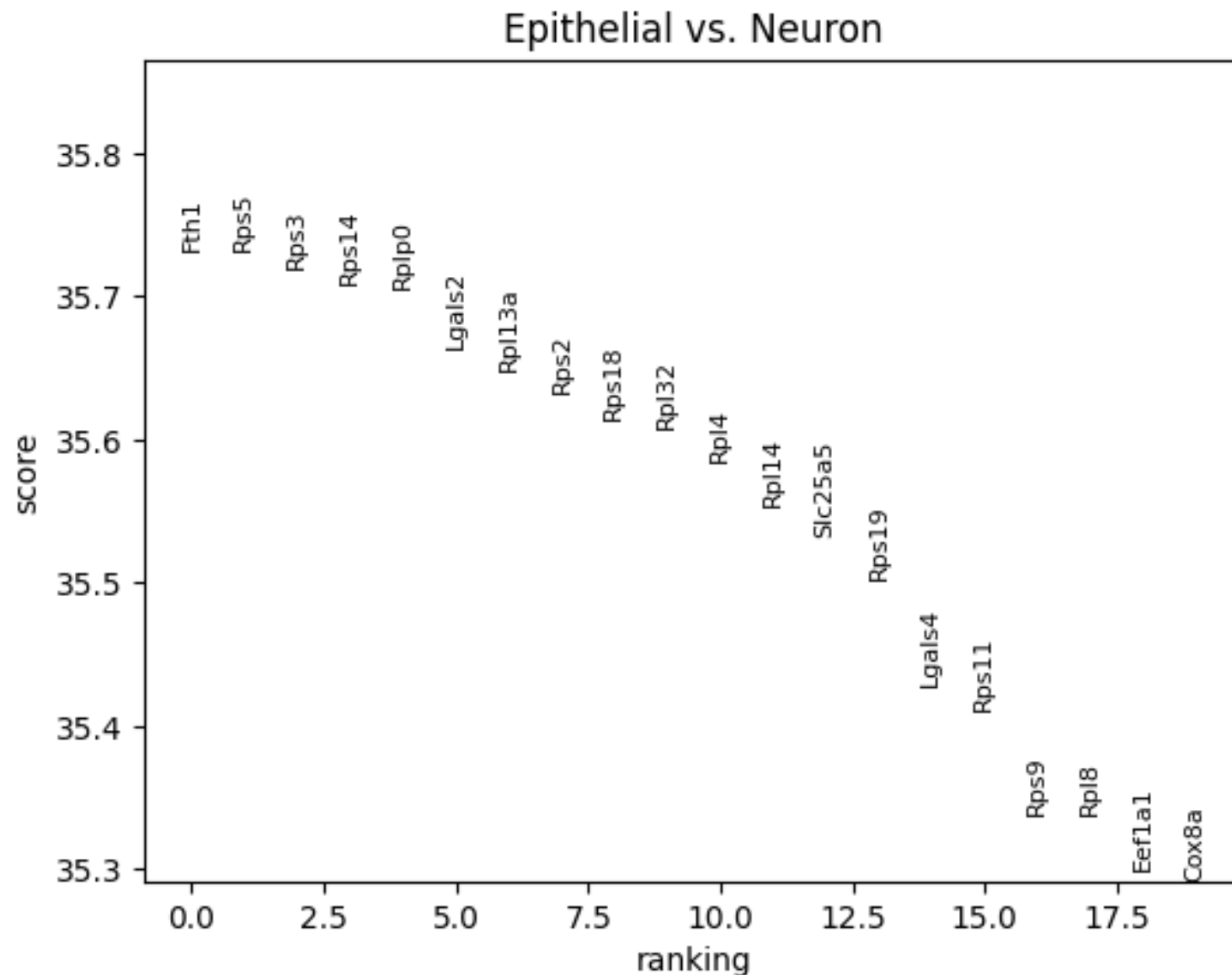
Data Analysis Pipeline



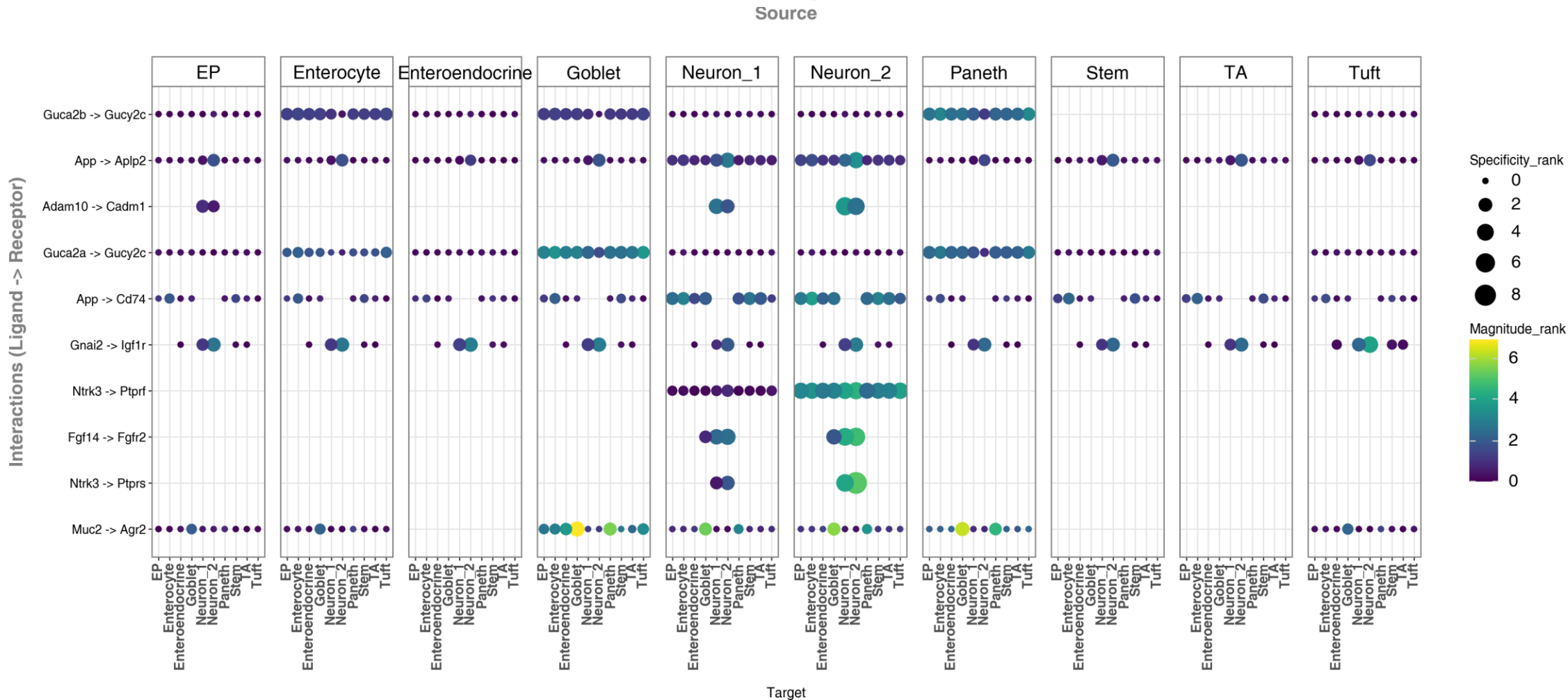
Data integration



Differential Expression between 2 Cell Populations



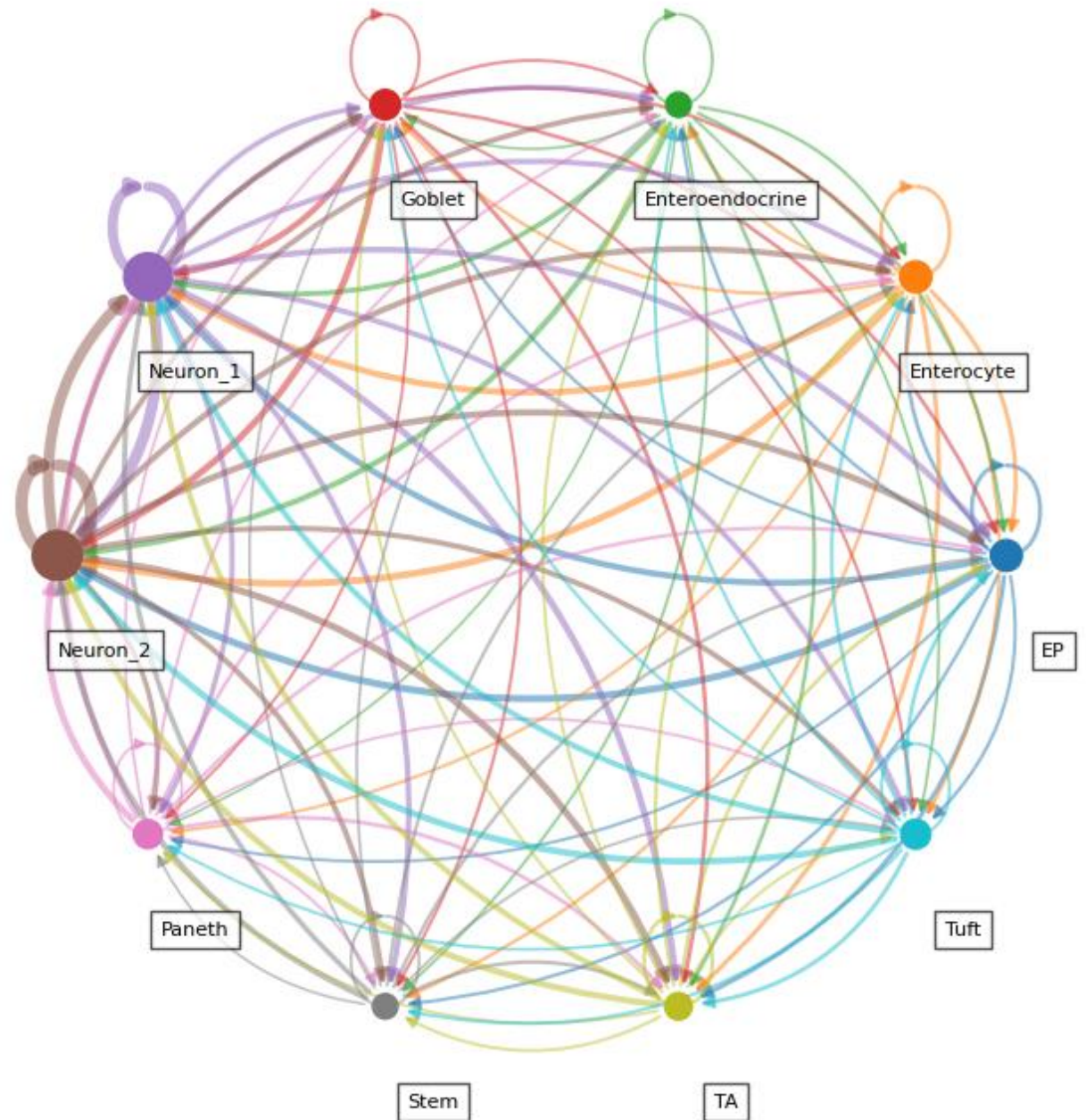
LR pairs across cell types



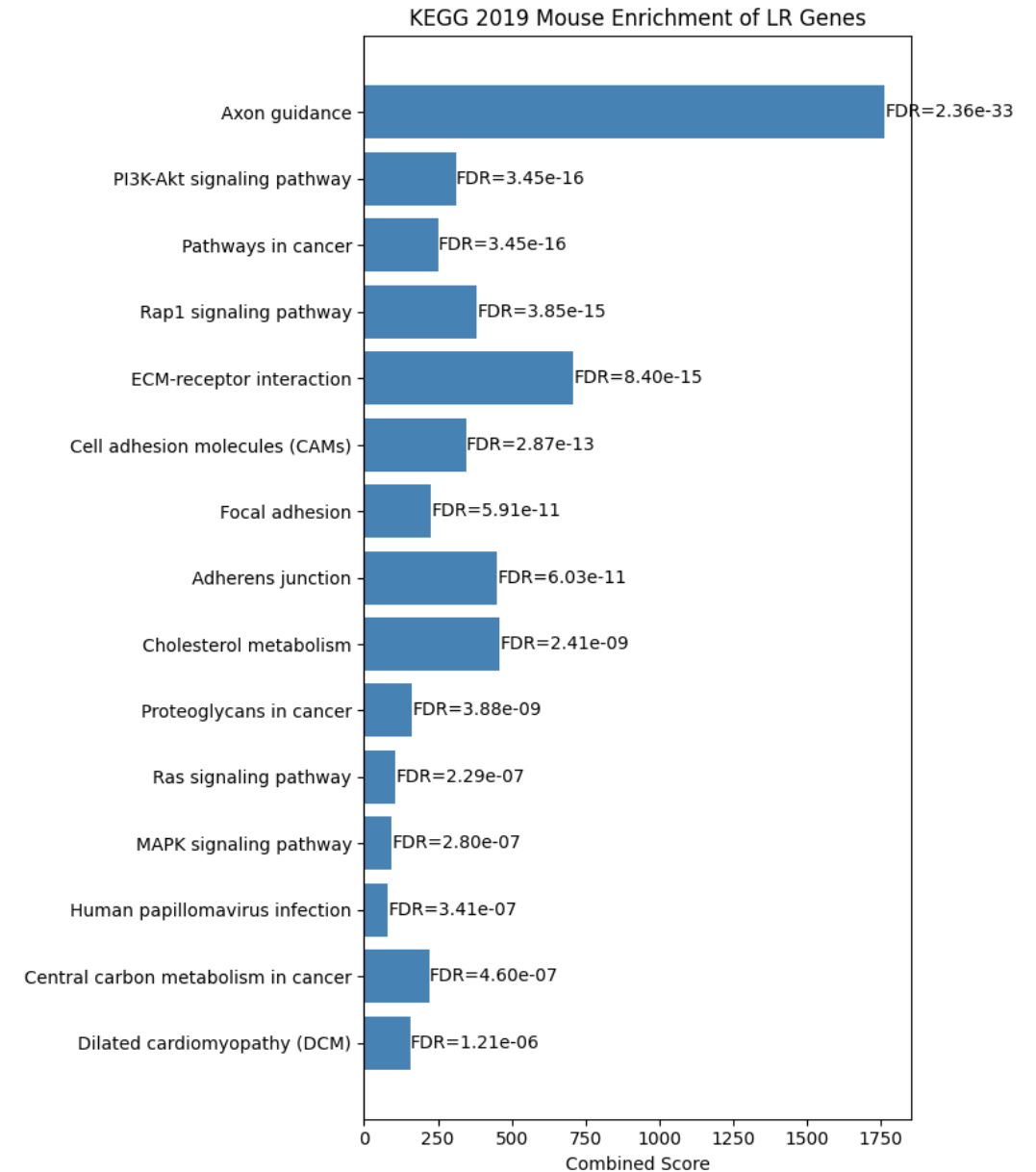
"AGR2 does not bind MUC2"

Feng Zhang, Mengxian Chen, Xiaodan Liu, Xu Ji, Shenghe Li, Erhui Jin, New insights into the unfolded protein response (UPR)-anterior gradient 2 (AGR2) pathway in the regulation of intestinal barrier function in weaned piglets, *Animal Nutrition*, <https://doi.org/10.1016/j.aninu.2023.08.007>.

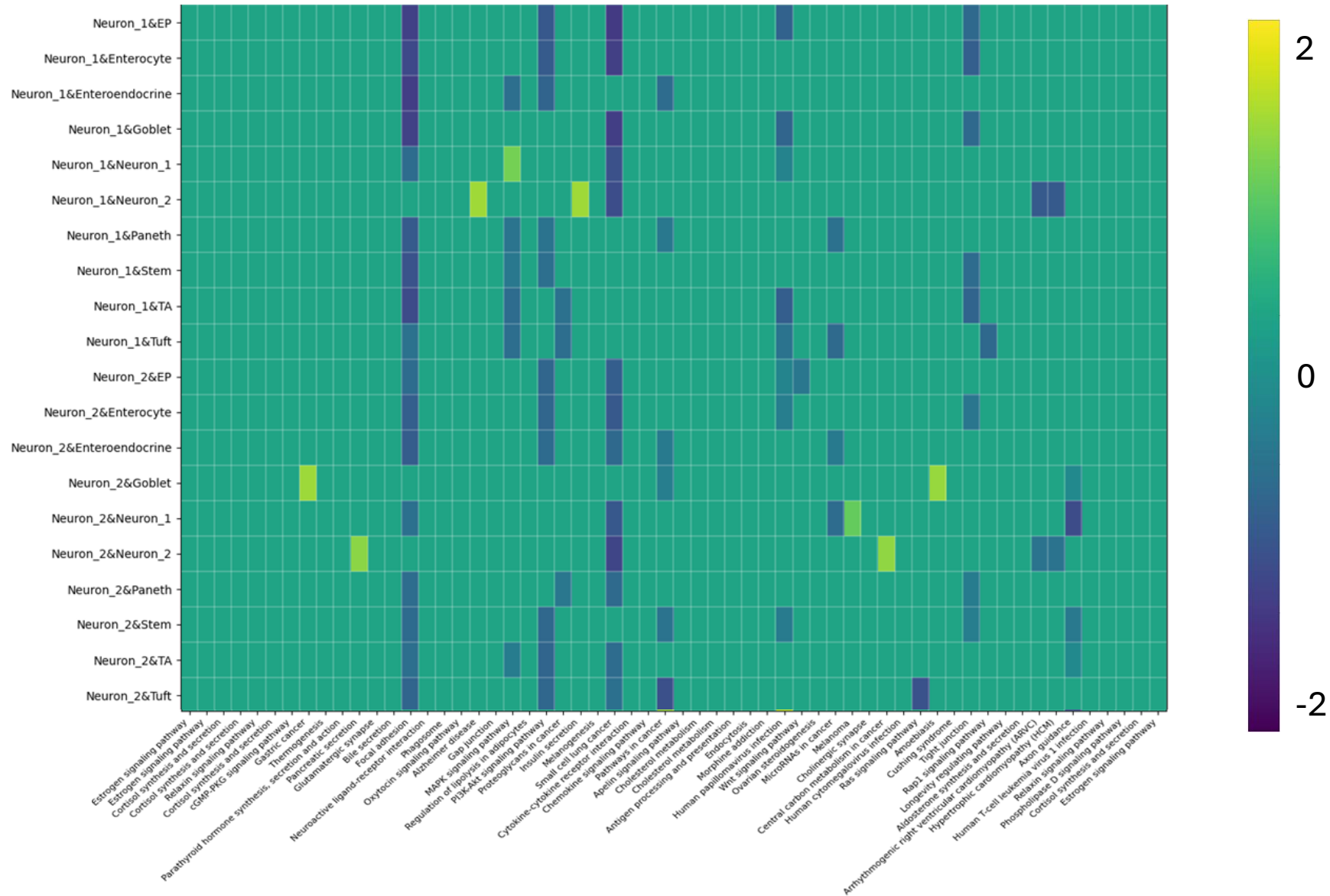
Circle Plot of Interactions



Global enrichment of Ligand-receptor interactions

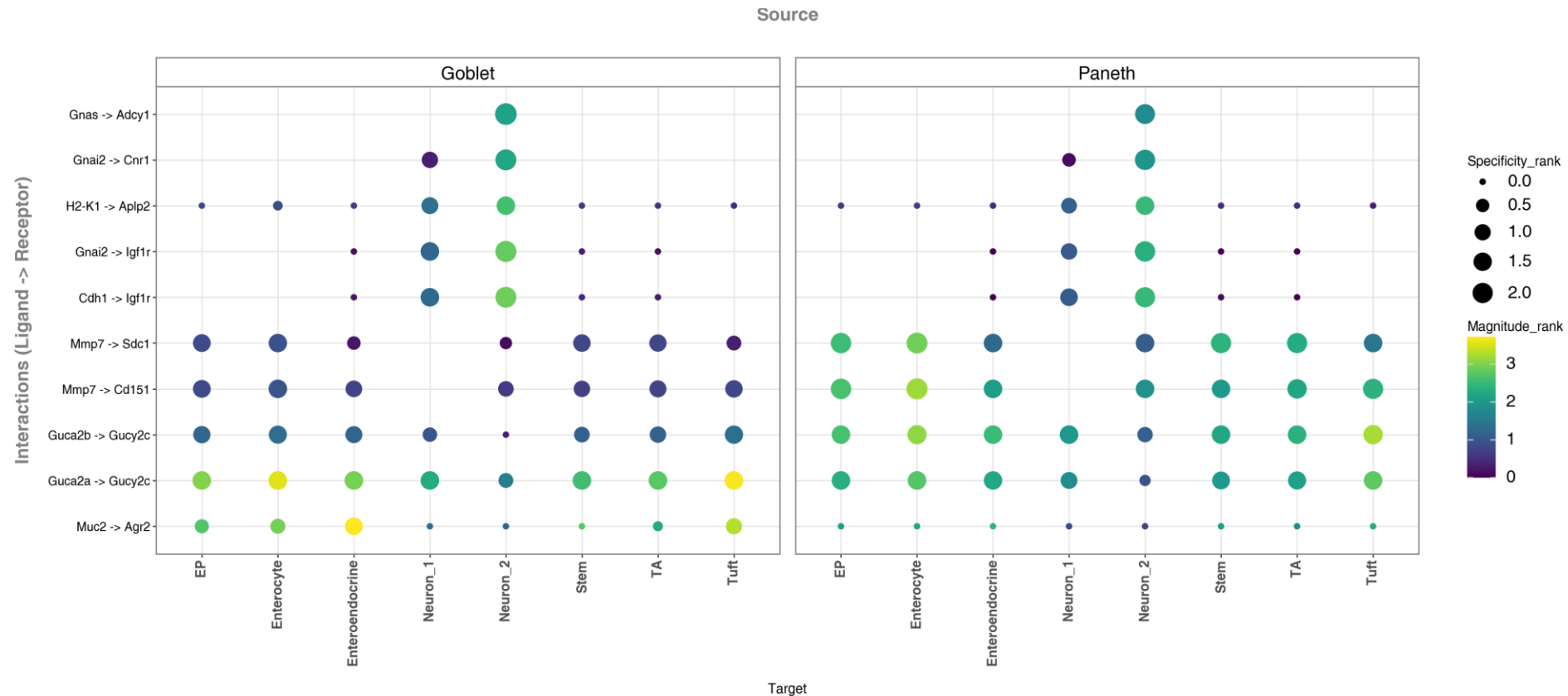


Top enriched pathways per source→target



Conclusions: Zoom-in

- Neuron-specific CDH1-IFGR1 interaction
 - May block cellular growth

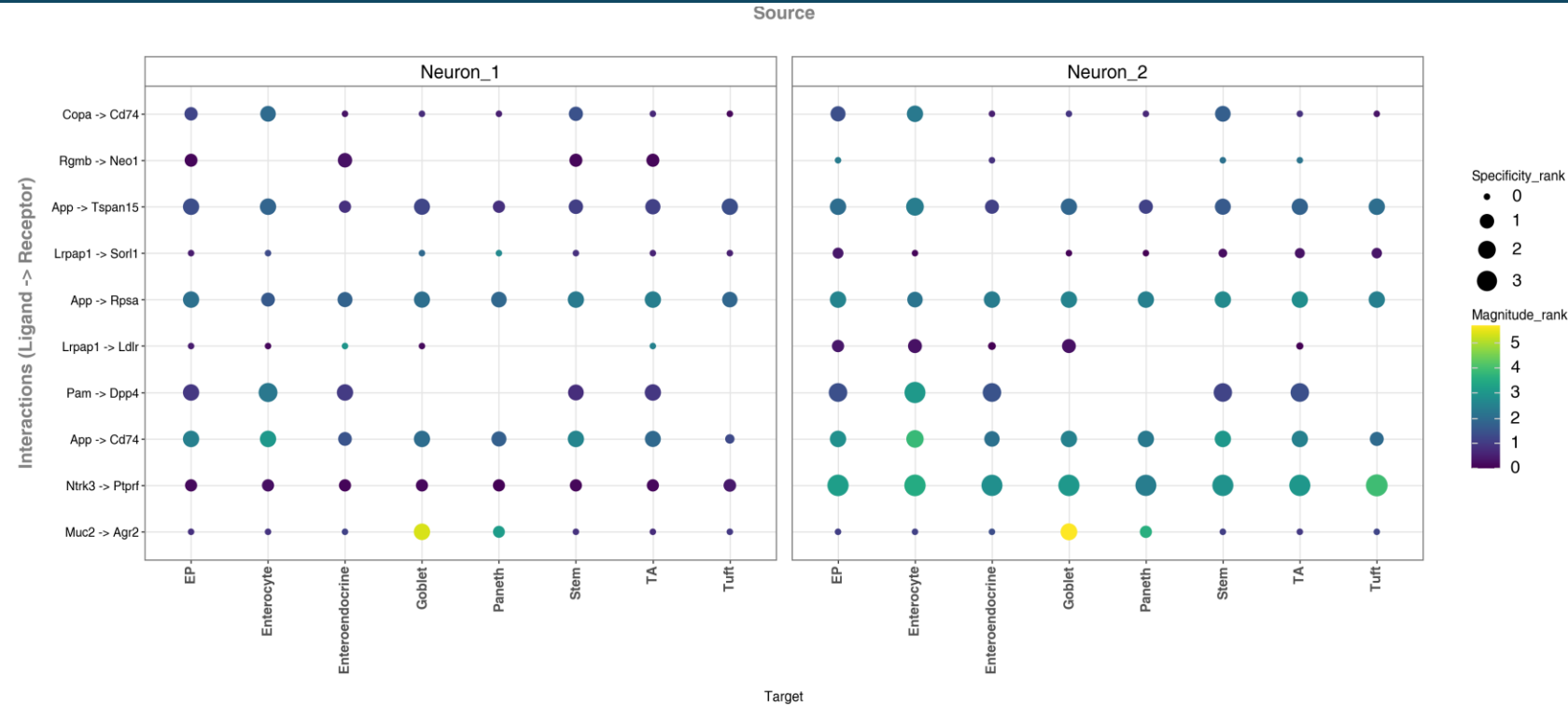


E-cadherin functions as a negative regulator of the IGF1R

Elangovan A, Hooda J, Savariau L, Puthanmadhomnarayanan S, Yates ME, Chen J, Brown DD, McAuliffe PF, Oesterreich S, Atkinson JM, Lee AV. Loss of E-cadherin Induces IGF1R Activation and Reveals a Targetable Pathway in Invasive Lobular Breast Carcinoma. Mol Cancer Res. 2022 Sep 2;20(9):1405-1419. doi: 10.1158/1541-7786.MCR-22-0090. PMID: 35665642; PMCID: PMC9444924.

Conclusions: Zoom-in

- Neuron2 sends signals;
- Goblet and Paneth receive;
- Atypical interaction of Muc2 → Agr2:
 - Arg2 is
 - in neurone-Goblet & neurone-Paneth (co-expression or new interactions?)



"AGR2 does not bind MUC2"

Feng Zhang, Mengxian Chen, Xiaodan Liu, Xu Ji, Shenghe Li, Erhui Jin, New insights into the unfolded protein response (UPR)-anterior gradient 2 (AGR2) pathway in the regulation of intestinal barrier function in weaned piglets, *Animal Nutrition*, <https://doi.org/10.1016/j.aninu.2023.08.007>.