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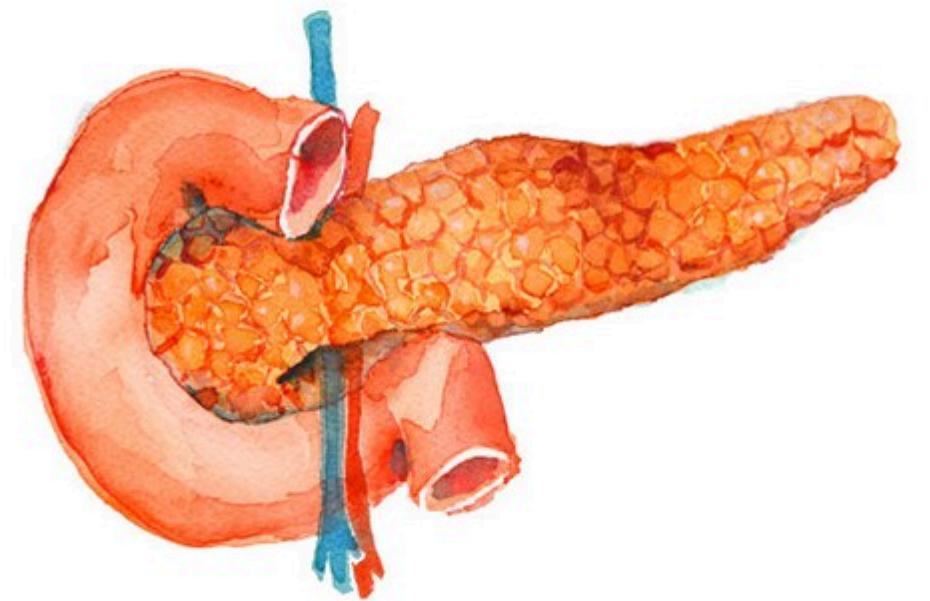
Comparative Bulk RNA Sequencing Analysis of Brain, Pancreas, and Colon Tissue Samples

Giulia Di Virgilio

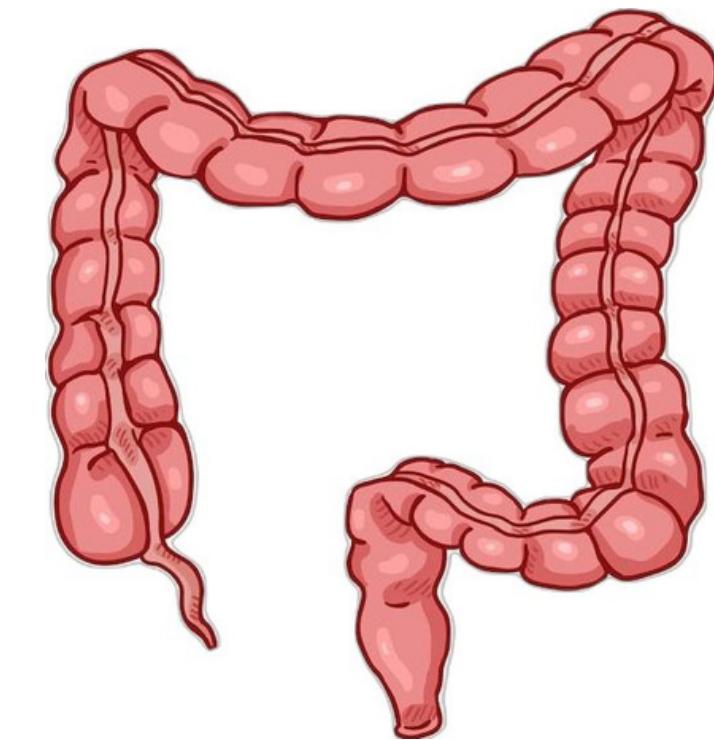
Tissues



Brain



Pancreas



Colon

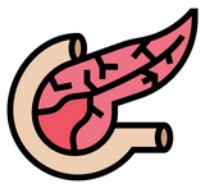
Quality control

- RIN > 6
- % of uniquely mapped reads > 80%
- % of rRNA reads < 10% (fraction < 0.1)



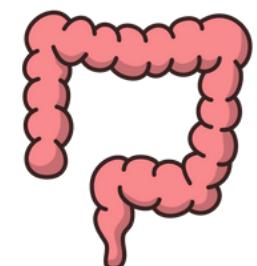
Brain

Sample	RIN	% mapped reads	% rRNA reads
Brain52	7.4	88.9	0.0345
Brain53	5.8	87	0.1113
Brain54	7.6	86.5	0.0085
Brain55	7.5	92	0.0787



Pancreas

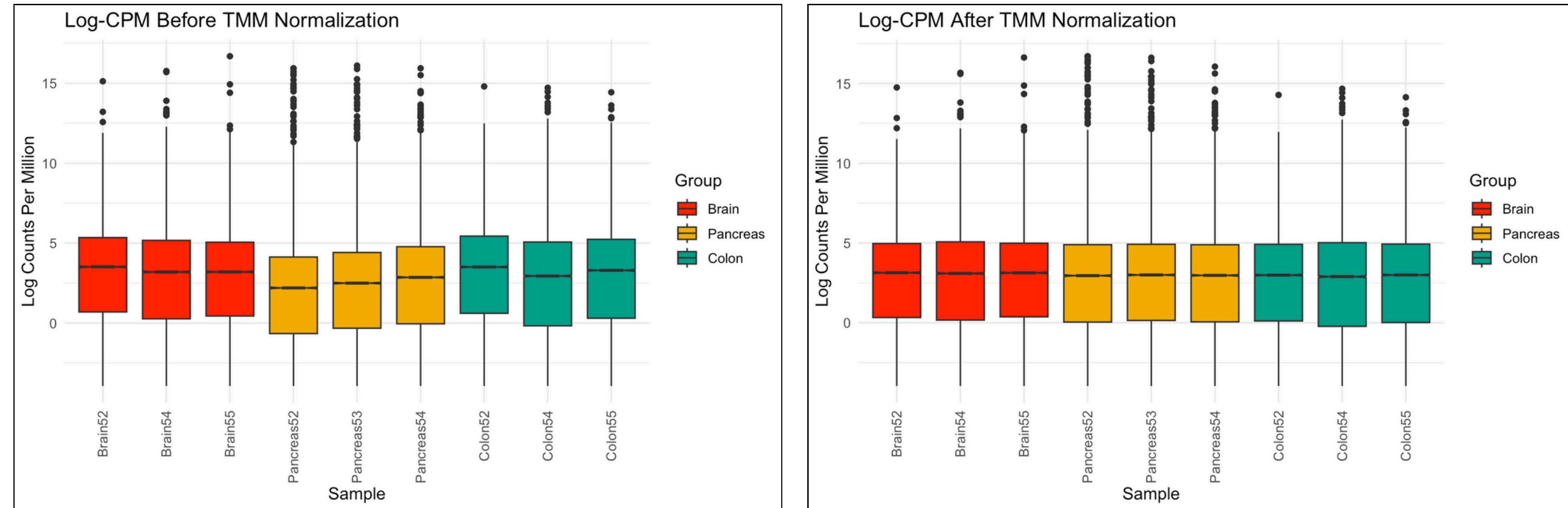
Sample	RIN	% mapped reads	% rRNA reads
Pancreas52	6.4	83.8	0.0047
Pancreas53	6.8	88.1	0.0031
Pancreas54	6.5	90.4	0.0033



Colon

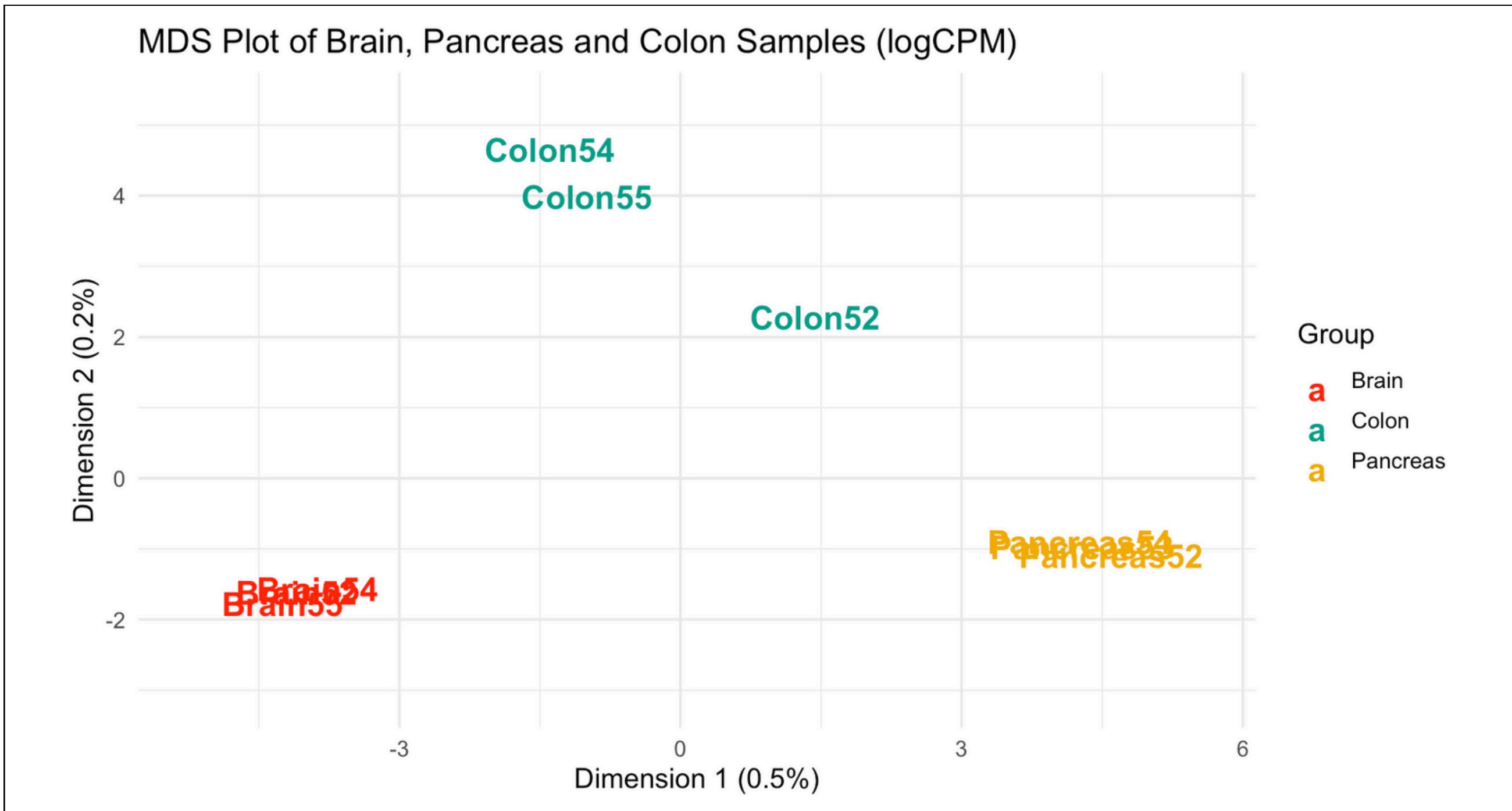
Sample	RIN	% mapped reads	% rRNA reads
Colon52	6.9	88.5	0.0191248
Colon53	5.8	89.2	0.0108241
Colon54	6.3	89.3	0.00279837
Colon55	7.4	90.5	0.006781

Normalization

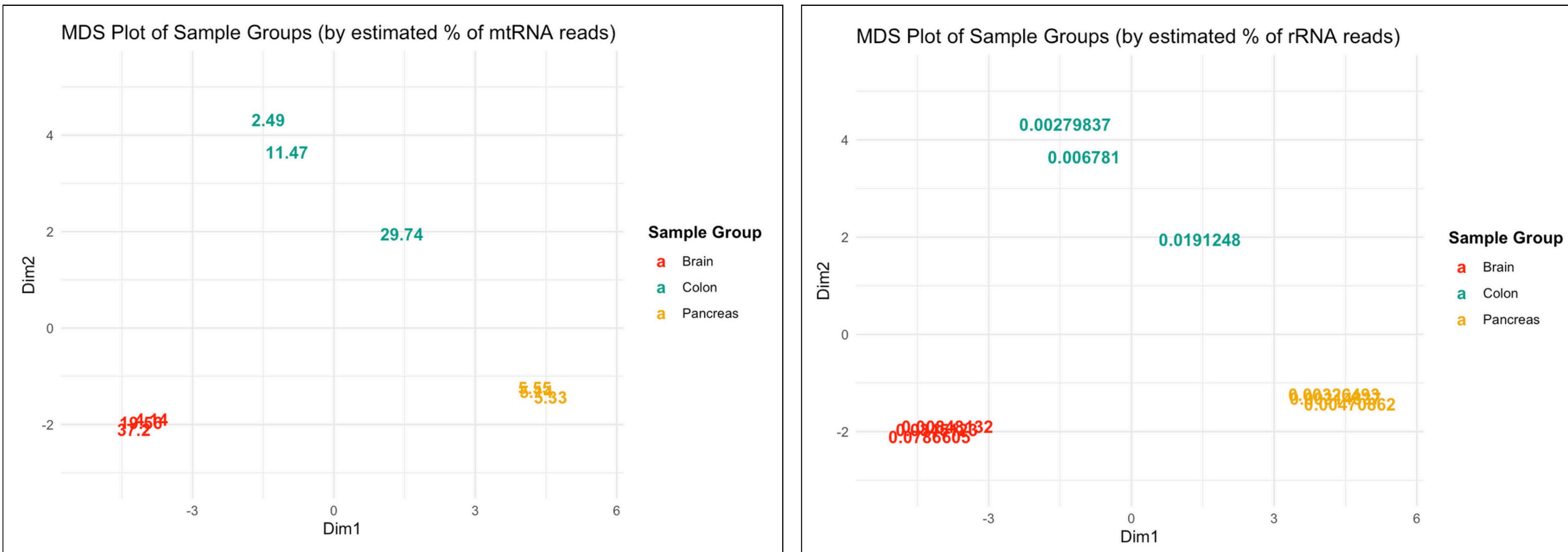


Brain52	Brain54	Brain55	Pancreas52	Pancreas53	Pancreas54	Colon52	Colon54	Colon55
1.2983352	1.0694549	1.0454667	0.5864993	0.7022214	0.9211794	1.4321745	1.0316836	1.2288879

Multidimensional Scaling



Comparing estimated % of mtRNA and rRNA reads



Differentially Expressed Genes

Selection: FDR < 0.05 and |LogFCI| > 1

Pancreas vs Brain

Up-regulated	Down-regulated
3146	4380

Colon vs Brain

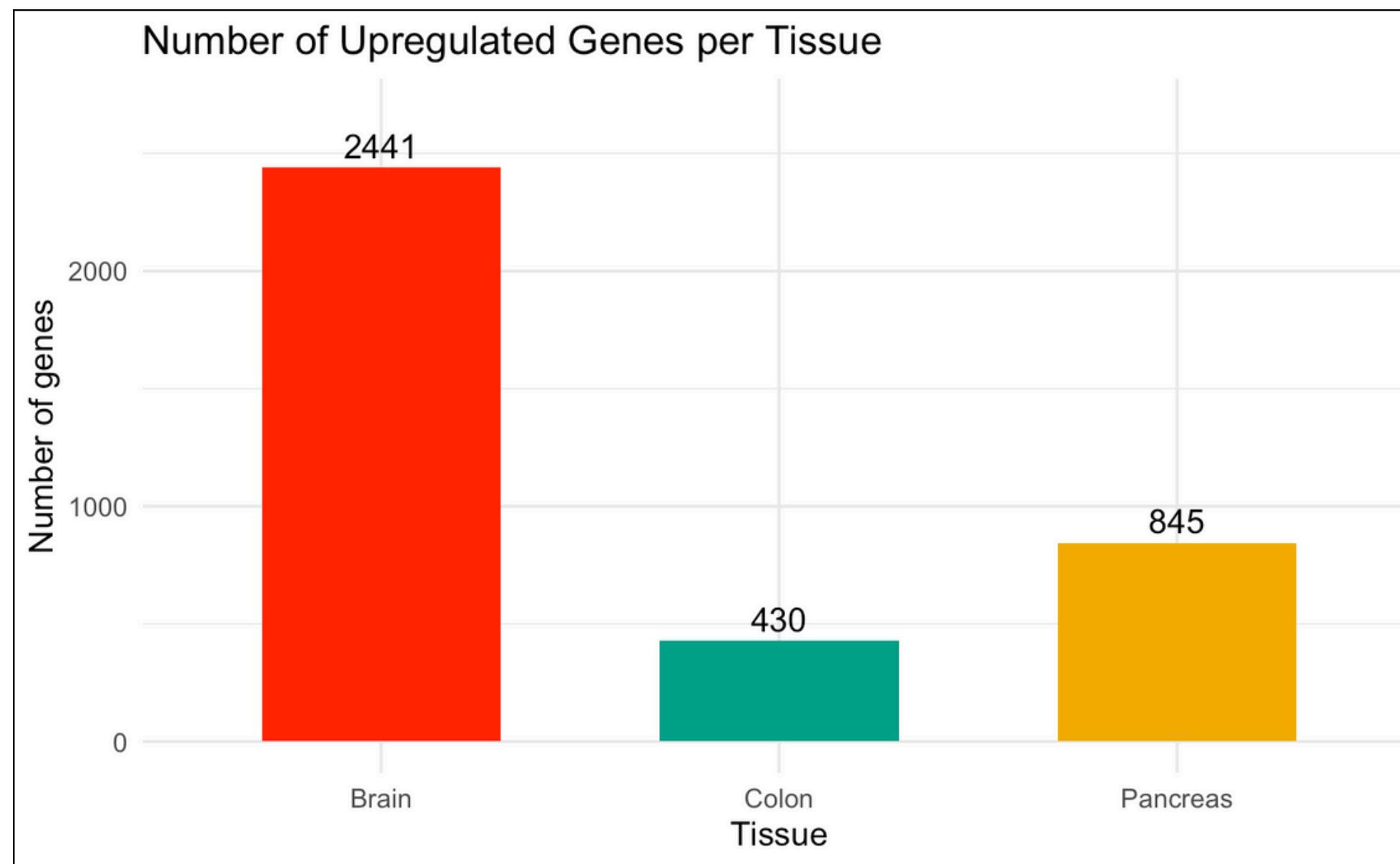
Up-regulated	Down-regulated
2287	3090

Colon vs Pancreas

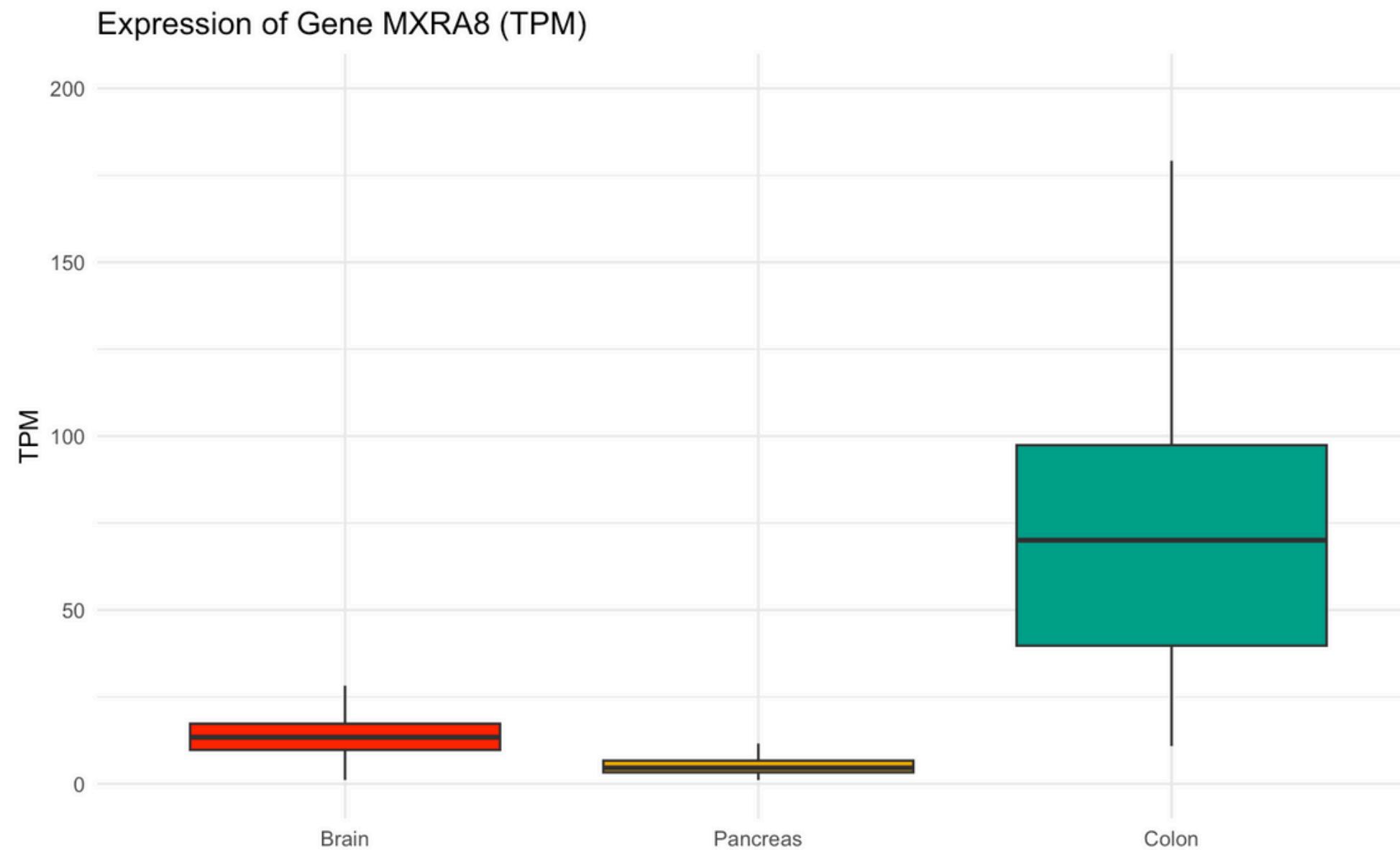
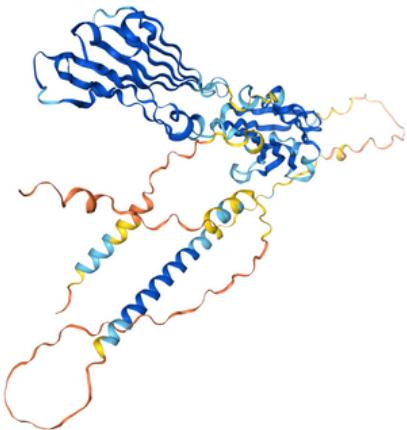
Up-regulated	Down-regulated
1111	1221

Number of up-regulated genes w.r.t. to the other tissues

Selection: FDR < 0.05 and |LogFCI| > 1



Expression of Gene MXRA8



**Wilcoxon test (pairwise) to
assess significance**

p-value < 2.2e-16

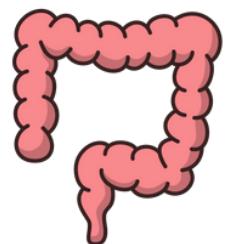
XRA8/NM_001282585.1
MXRA8/NM_032348.4
XRA8/NM_001282584.2
XRA8/NM_001282583.2
XRA8/NM_001282582.2



Functional enrichment analysis on DE genes



Brain



Colon



Pancreas

GO term	Description	Category	Adj. p-value
GO:0007268	Chemical Synaptic Transmission	Biological	0.000003288
GO:0014069	Postsynaptic Density	Cellular	0.000006245
GO:0030425	Dendrite	Cellular	0.000006245

GO term	Description	Category	Adj. p-value
GO:0030198	Extracellular Matrix Organization	Biological	6.088e-13
GO:0030199	Collagen Fibril Organization	Biological	6.589e-12
GO:0097435	Supramolecular Fiber Organization	Biological	3.587e-8

GO term	Description	Category	Adj. p-value
GO:0032543	Mitochondrial Translation	Biological	0.004943
GO:0005759	Mitochondrial Matrix	Cellular	1.453e-9
GO:0140053	Mitochondrial Gene Expression	Biological	0.04711

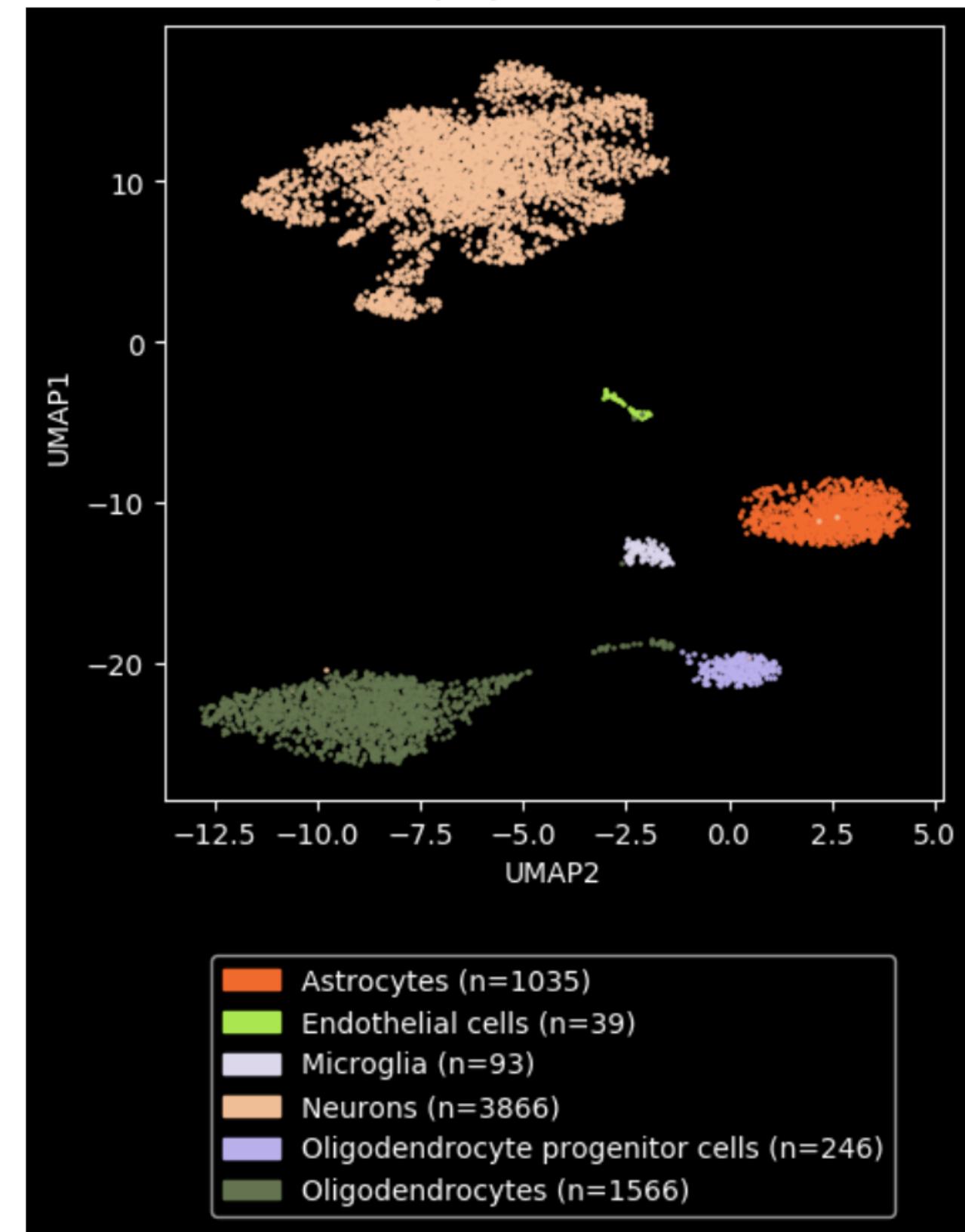
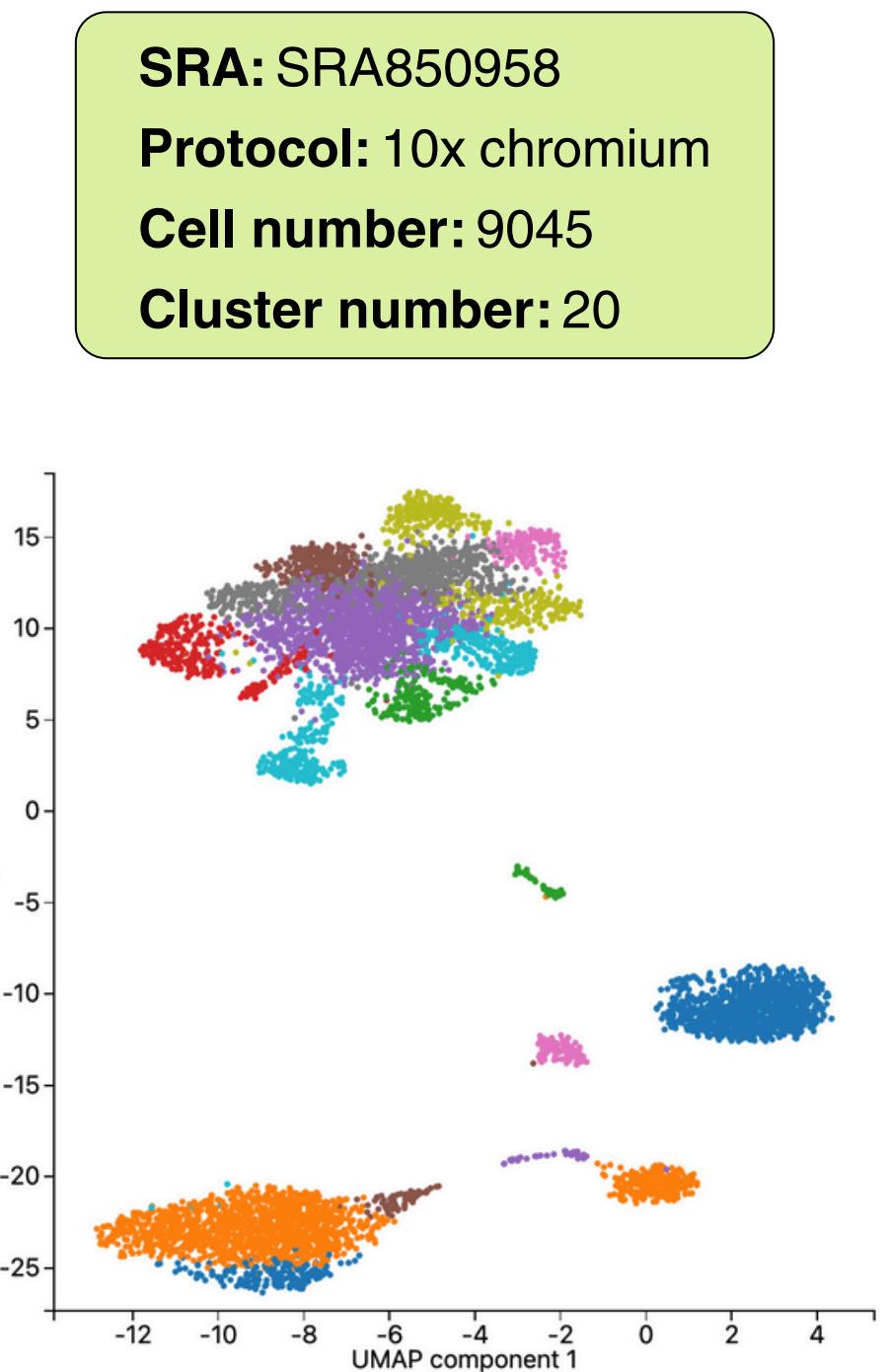


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Single-cell RNA Sequencing Analysis of Mus Musculus Bed Nucleus of the Stria Terminalis

Giulia Di Virgilio

PanglaoDB: the dataset



Publication Reference

Single-Cell Multi-omic Integration Compares and Contrasts Features of Brain Cell Identity

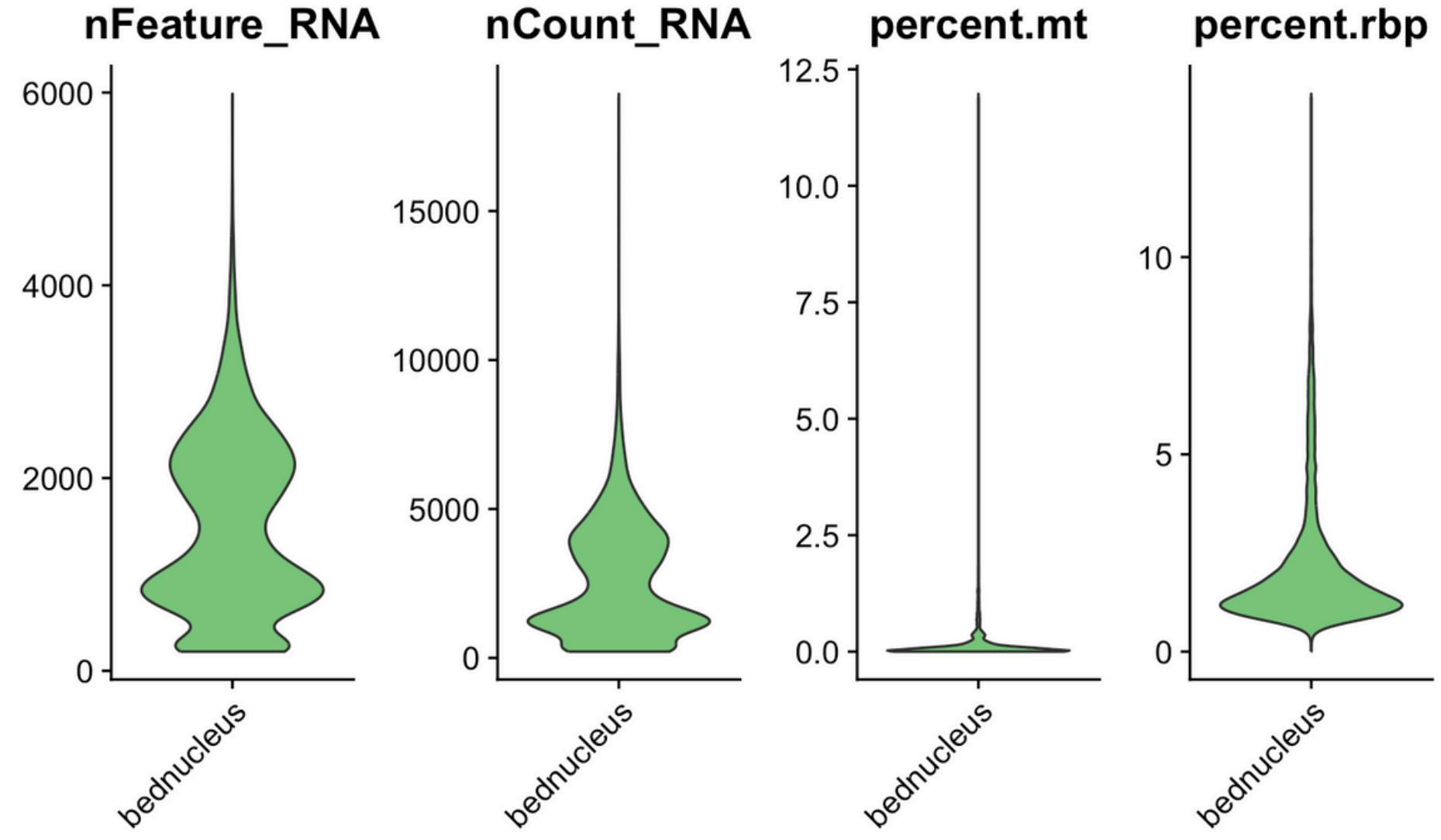
Joshua D Welch ¹, Velina Kozareva ², Ashley Ferreira ², Charles Vanderburg ², Carly Martin ², Evan Z Macosko ³

Affiliations + expand

PMID: 31178122 PMCID: [PMC6716797](#) DOI: [10.1016/j.cell.2019.05.006](https://doi.org/10.1016/j.cell.2019.05.006)

Cell types reported	Putative Marker Gene
Inhibitory neurons	Gad1, Gad2
Excitatory neurons	Slc17a6, Slc17a8
VIP+ basket cells	Vip, Htr3a
Cortical neurogliaform-like cells	Cplx3, Id2, Lamp5, Npy
Oval nucleus subpopulations	Specific markers not detailed
Striatal SPNs	Ppplrb
Rhomboid nucleus	Specific markers not detailed

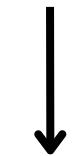
Quality control



Thresholds:

- 200 < Number of genes < 4000
- % Mitochondrial RNA < 2%

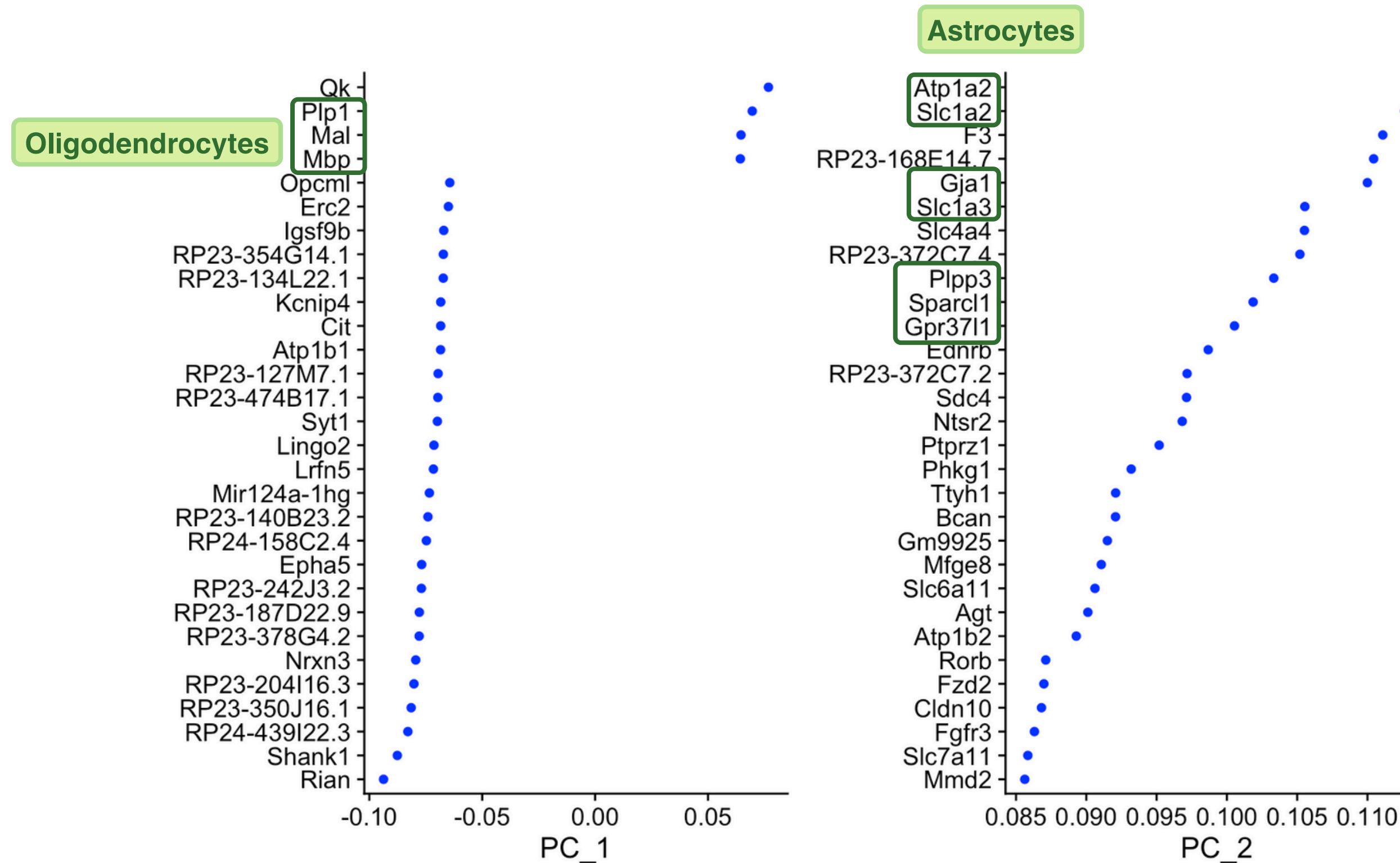
Before: 9045 cells



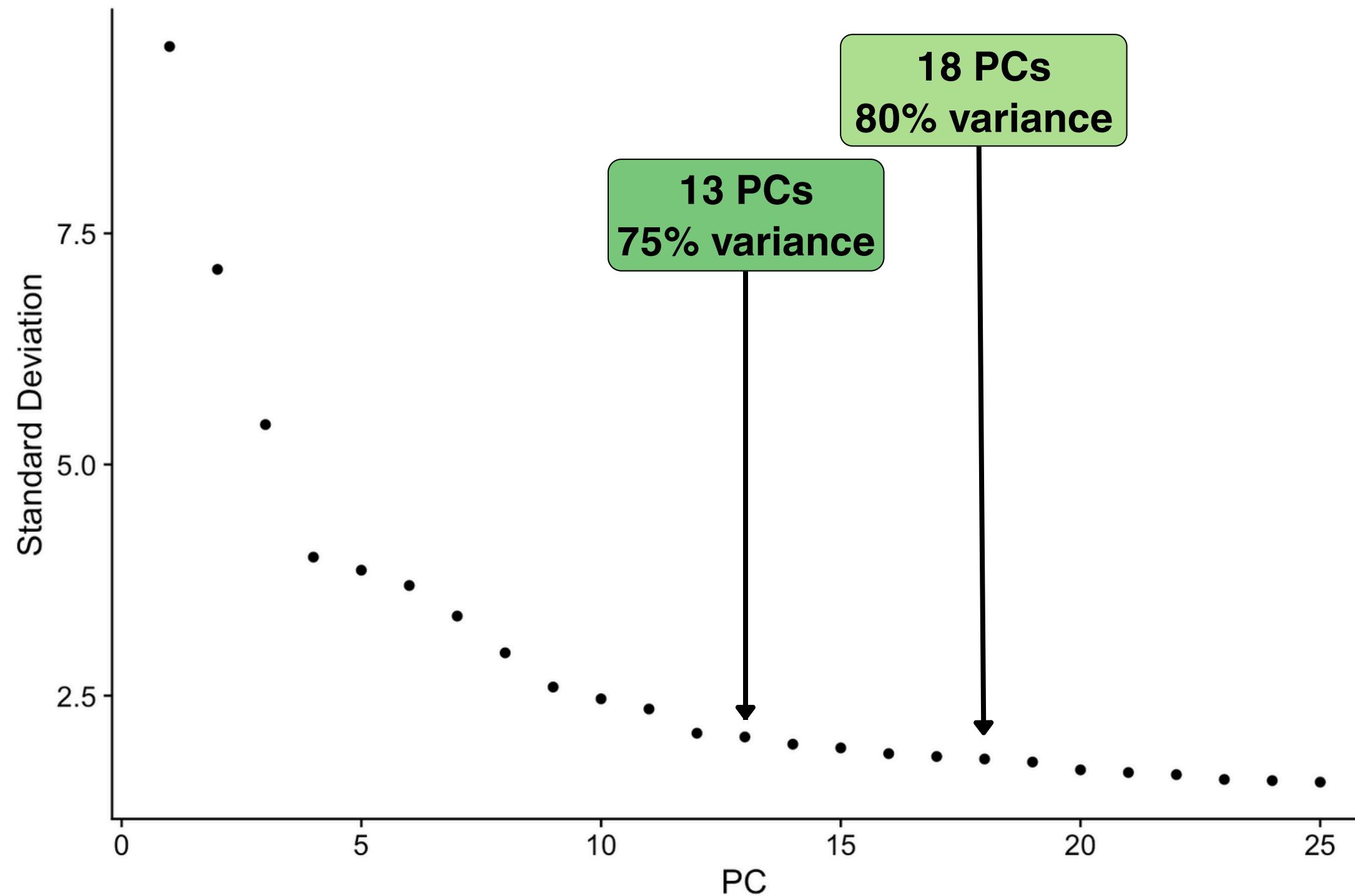
After: 8870 cells

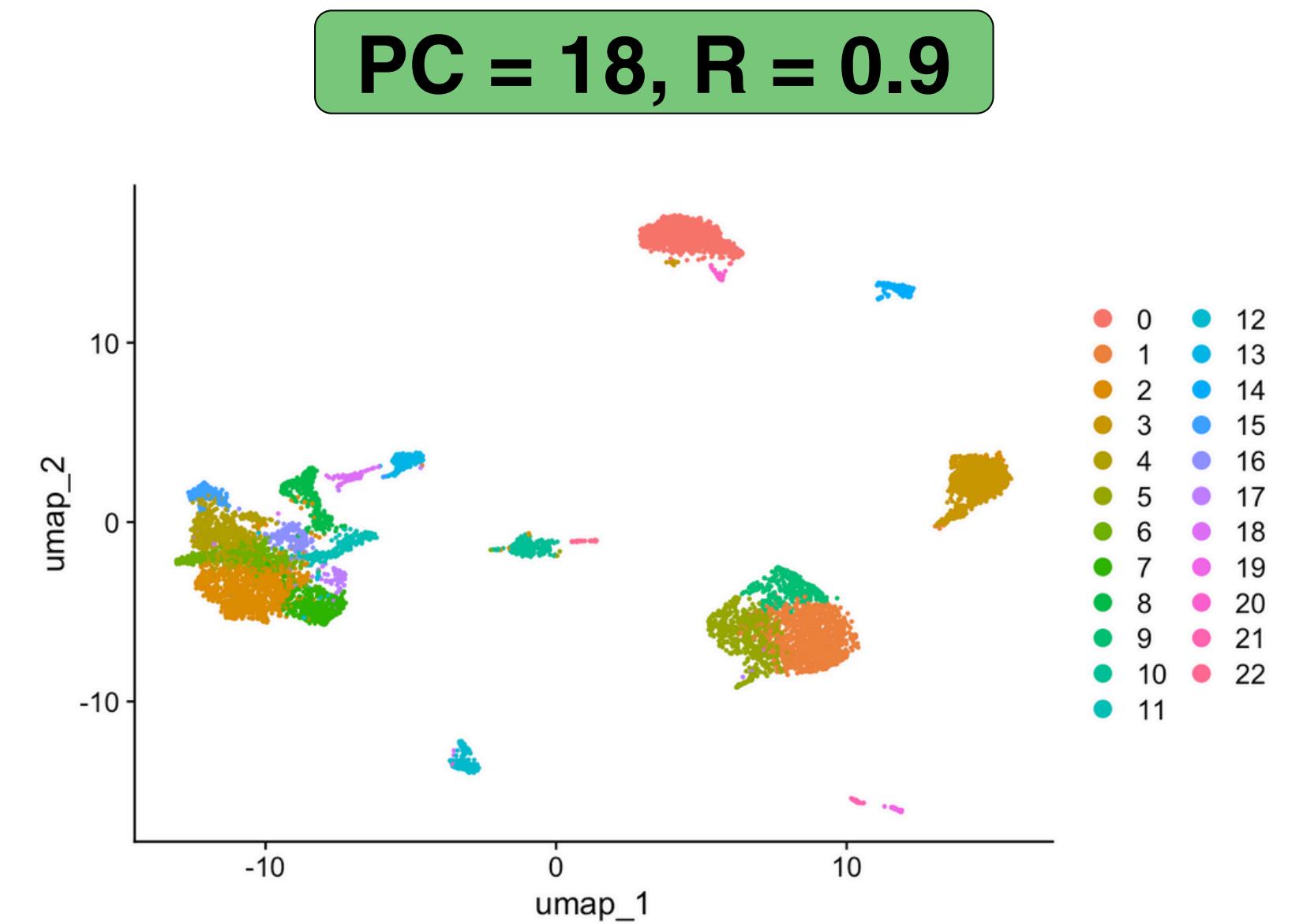
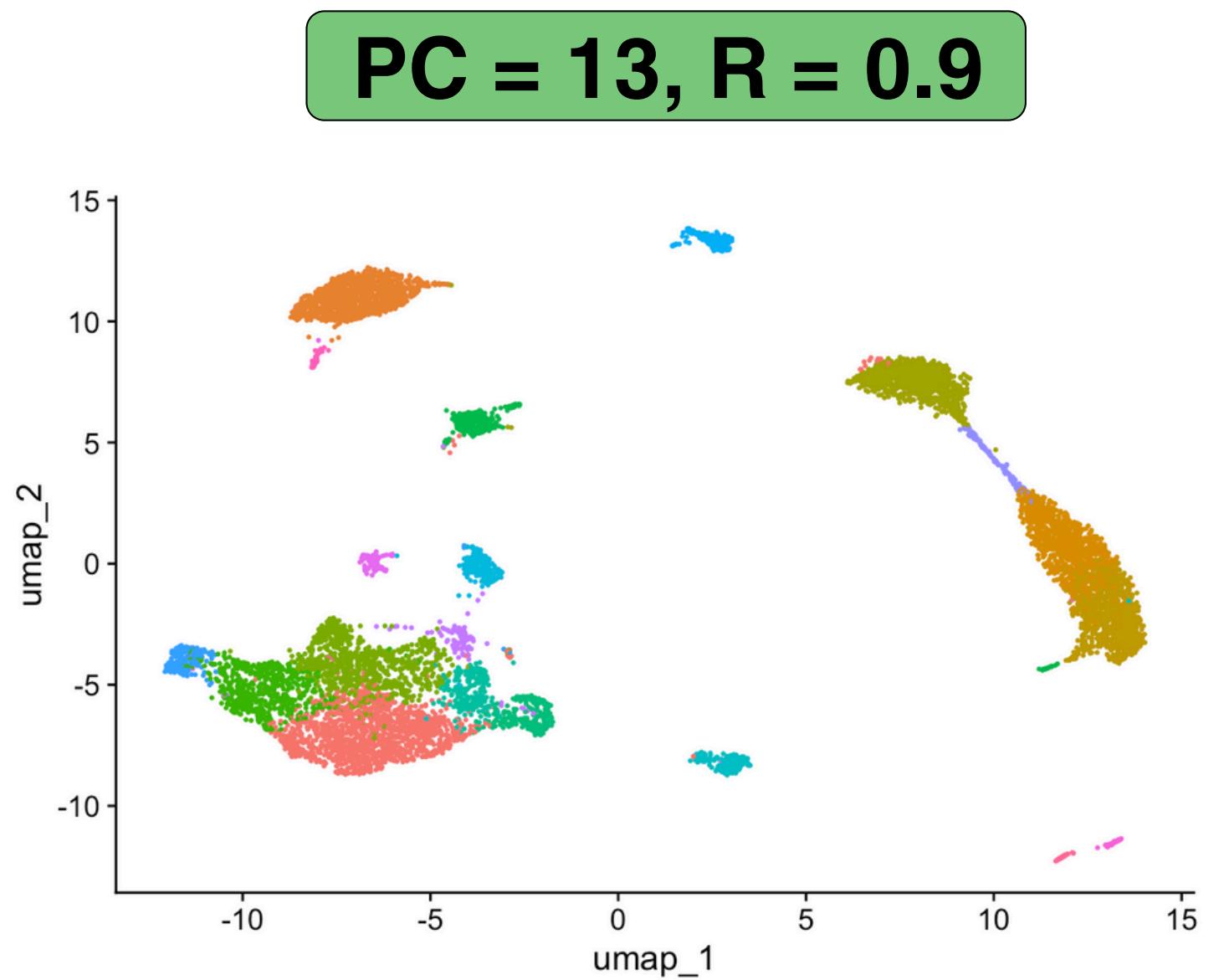
98,1% of the cells passed the quality control assessment

PCA – First Two Principal components



Elbow Plot of Principal Components

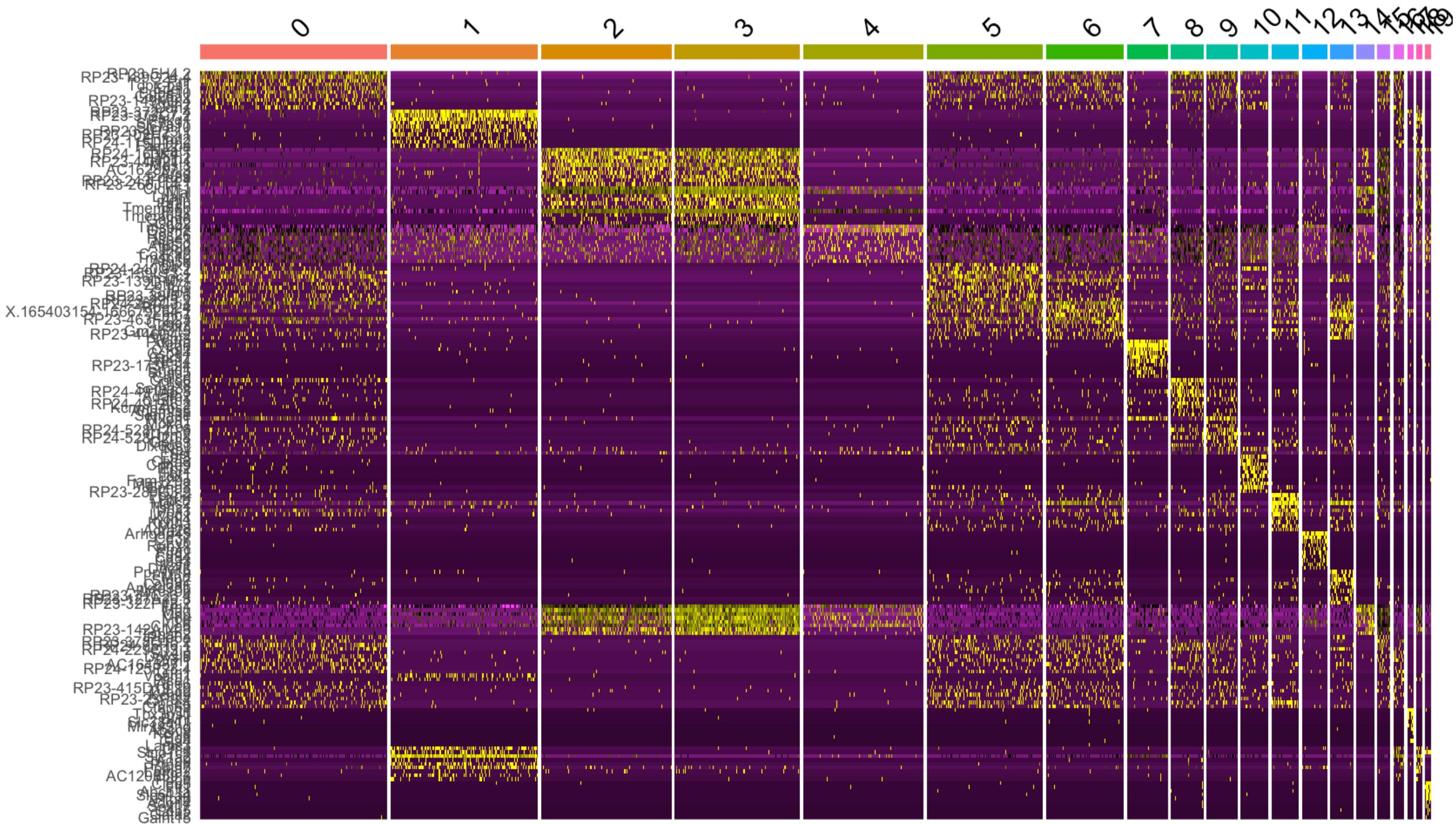




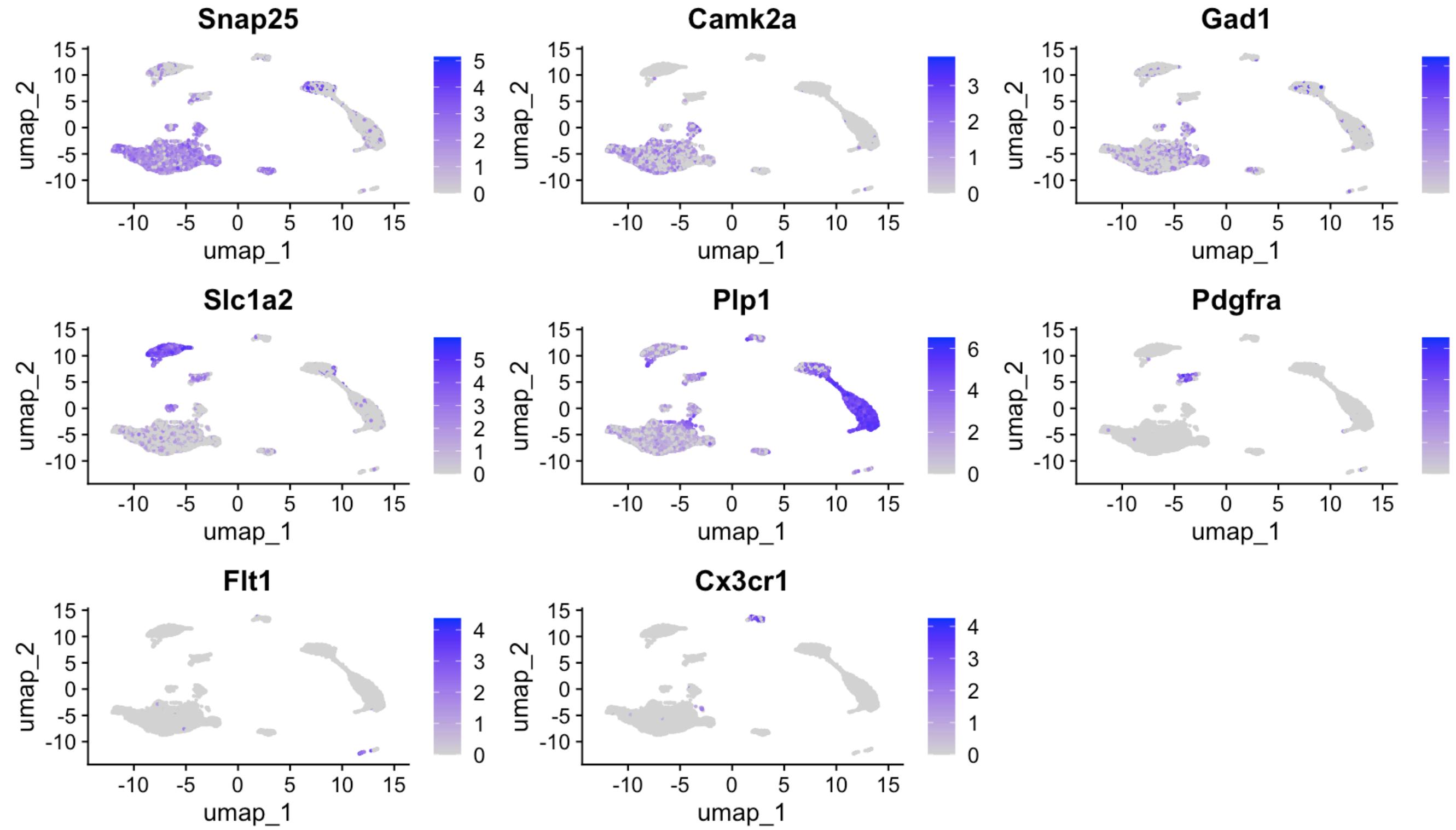
0	1	2	3	4	5	6	7	8	9
1417	1114	989	948	914	878	588	310	248	233
10	11	12	13	14	15	16	17	18	19
212	206	190	176	135	99	82	48	42	41

0	1	2	3	4	5	6	7	8	9	10
1110	1104	1095	1021	618	582	522	398	343	294	275
11	12	13	14	15	16	17	18	19	20	21
249	225	206	189	179	143	80	79	47	40	32

Heatmap

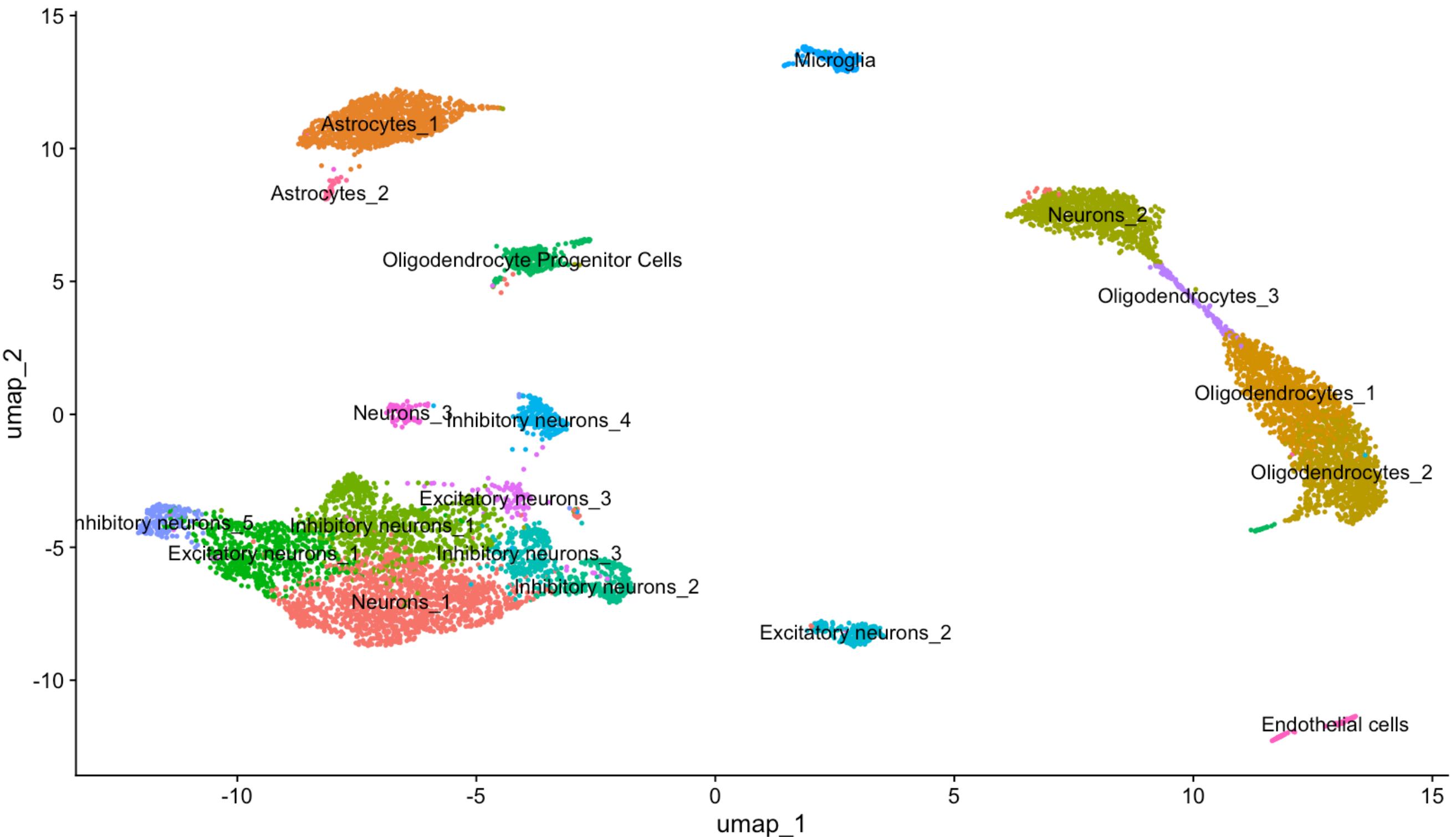
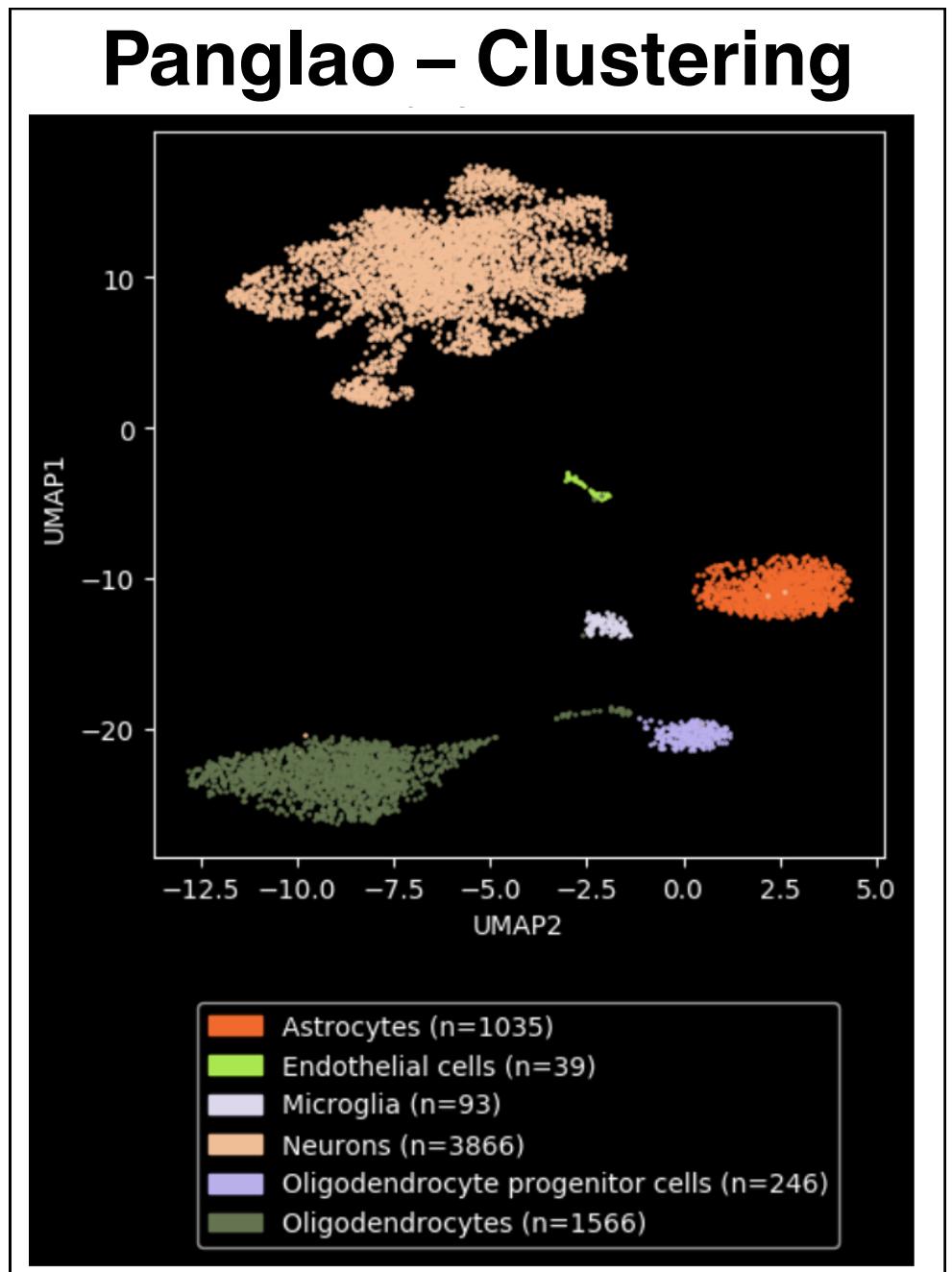


Markers Expression



Snap25	Neurons
Camk2a	Excitatory neurons
Gad1	Inhibitory neurons
Slc1a2	Astrocytes
Pip1	Oligodendrocytes
Pdgfra	Oligodendrocyte Progenitor Cells
Flt1	Endothelial cells
Cx3cr1	Microglia

Final results



Thank you for your attention!