


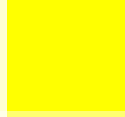





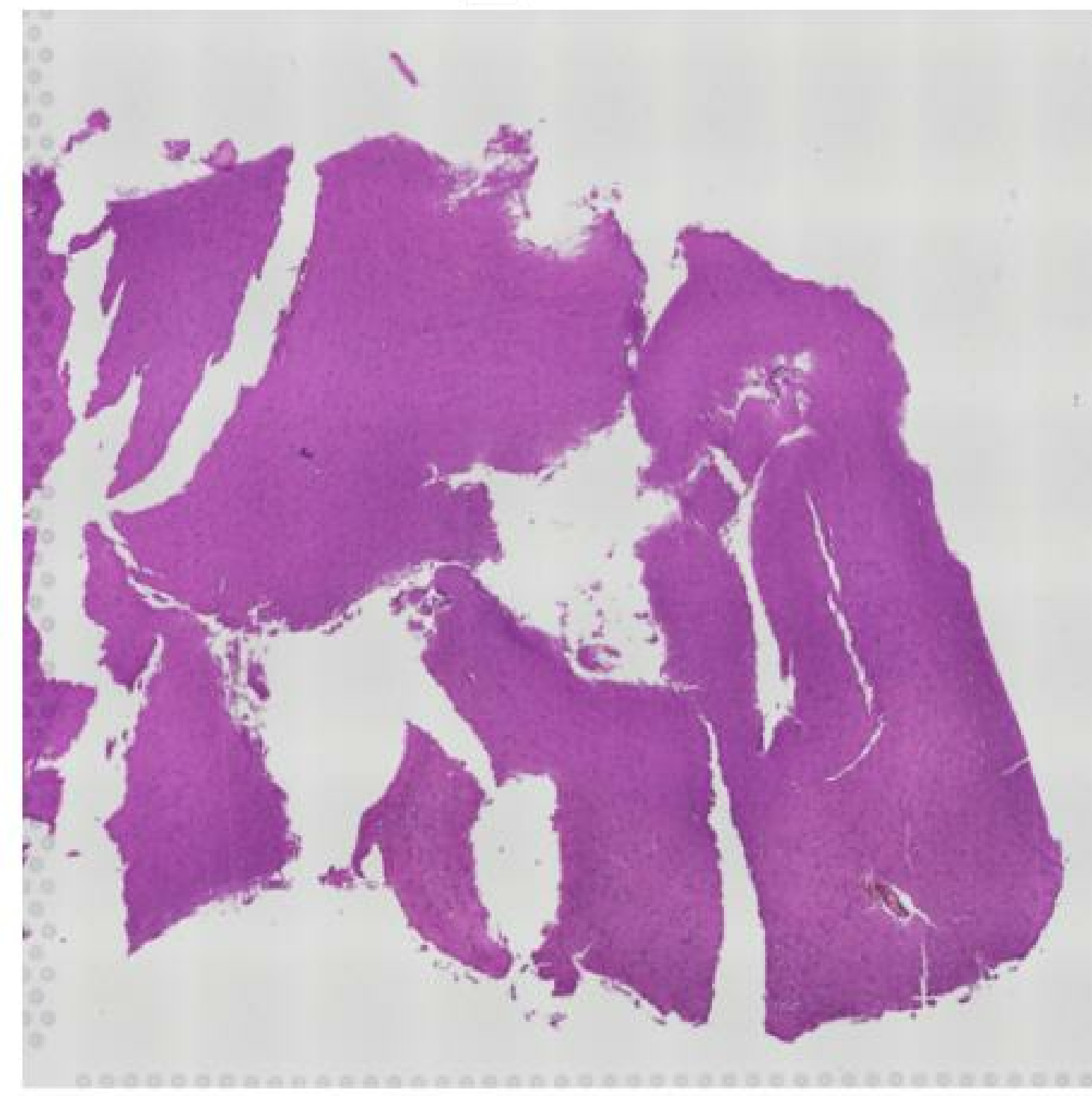


- A. Spatial images with anatomical features annotation. The barplot shows the distribution of cell types across all the anatomical features.
- B. Single-cell UMAP colored by cell type and split by tissue. The barplot shows the distribution of cell types across the tissue types in the sample.
- C. CNV analysis using bulk RNA_seq analysis.
- D. Mutational profile of the patient.
- E. CNV analysis using spatial data across anatomical features.
- F. CNV analysis using single-cell RNA-Seq data across major cell types

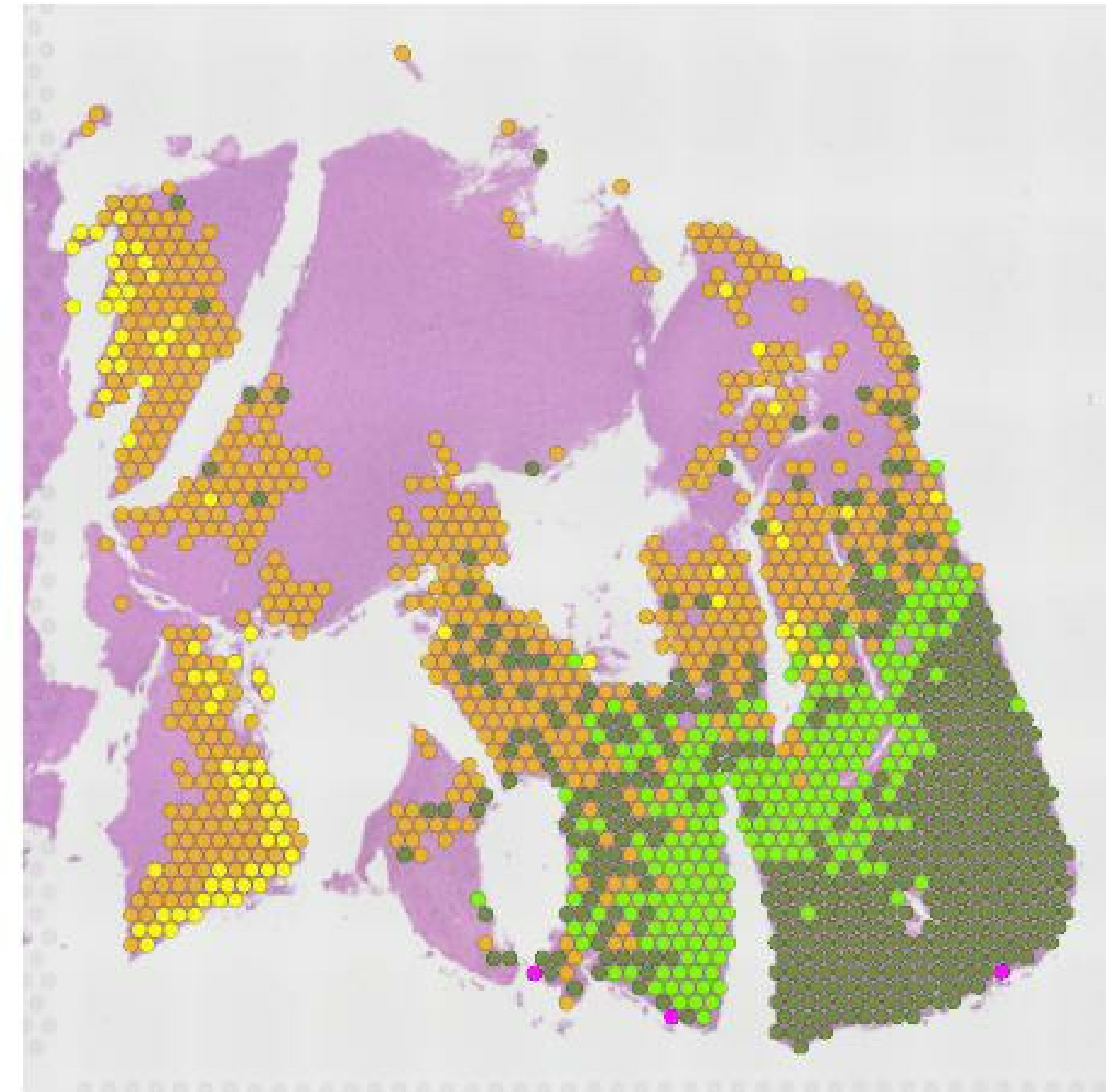
AF - Anatomic Features

	LE_GM	Leading Edge Gray Matter
	LE_WGM	Leading Edge White/Gray Matter
	LE_WM	Leading Edge White Matter
	CT_control	Cellular Tumor not expressing community-curated GBM stem cells associated genes
	CT	Cellular Tumor
	PNZ_ccGSC	PeriNecrotic Zone expressing community-curated GBM stem cells associated genes
	PAN	Pseudopalisading cells Around Necrosis
	HBV_ccGSC	Hyperplastic Blood Vessels expressing community-curated GBM stem cells associated genes
	MVP	MicroVascular Proliferation

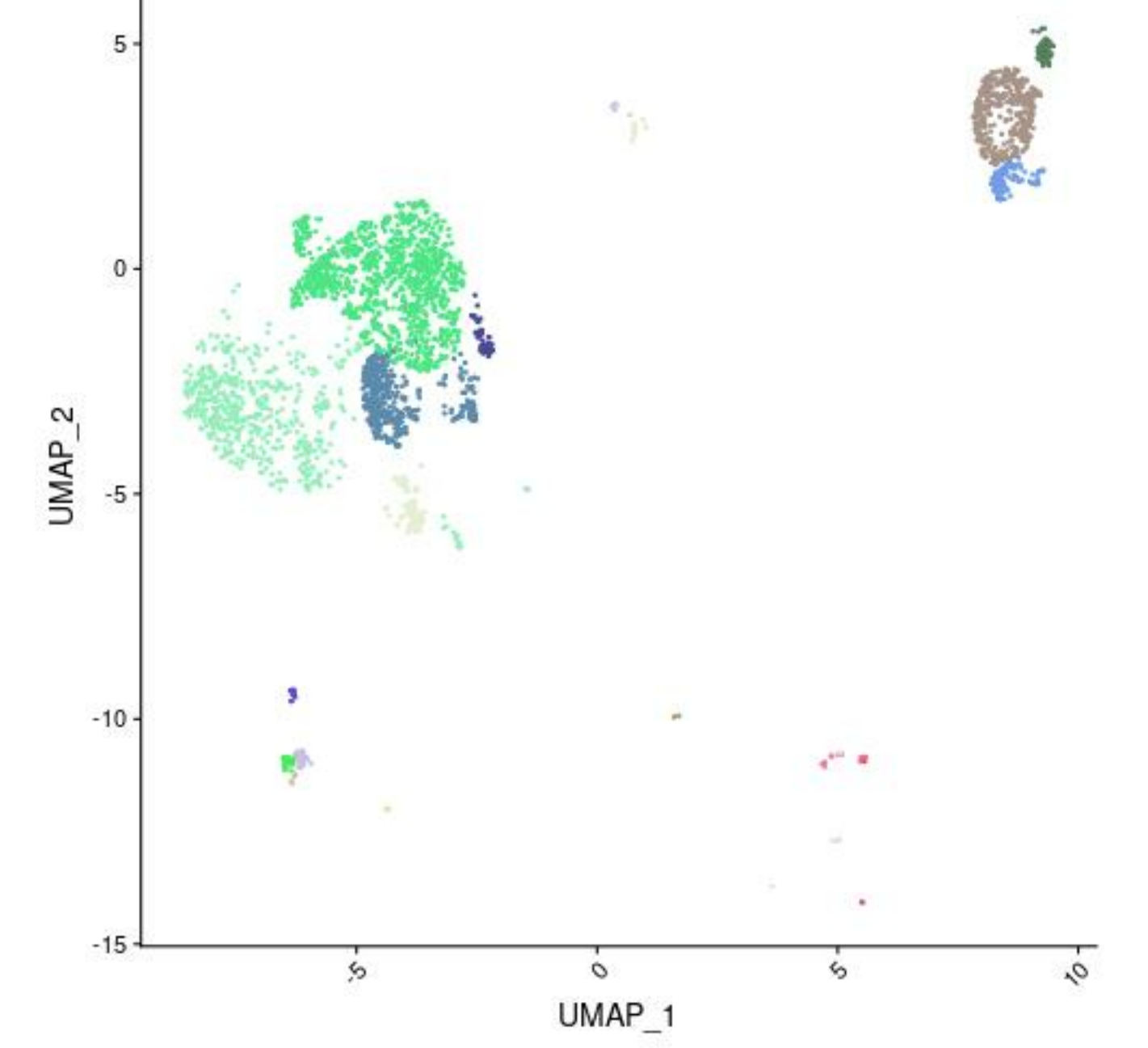
A SNU38A_NormalBrain



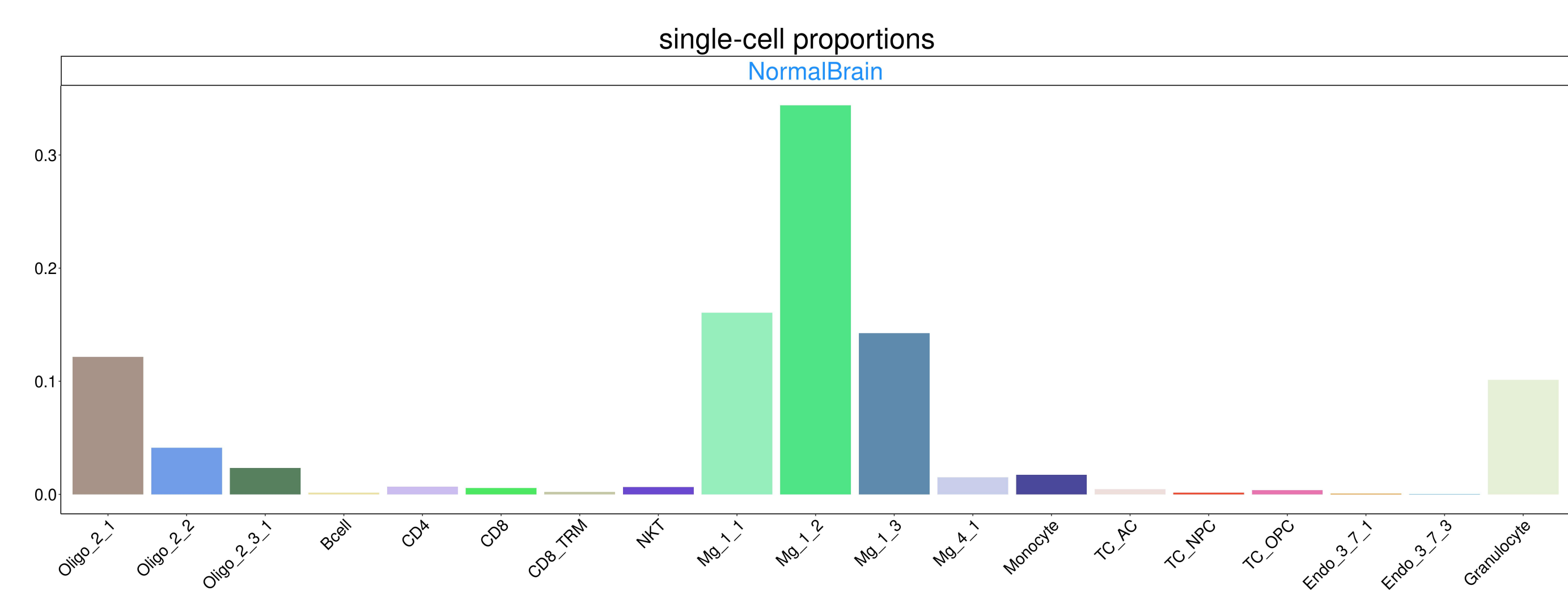
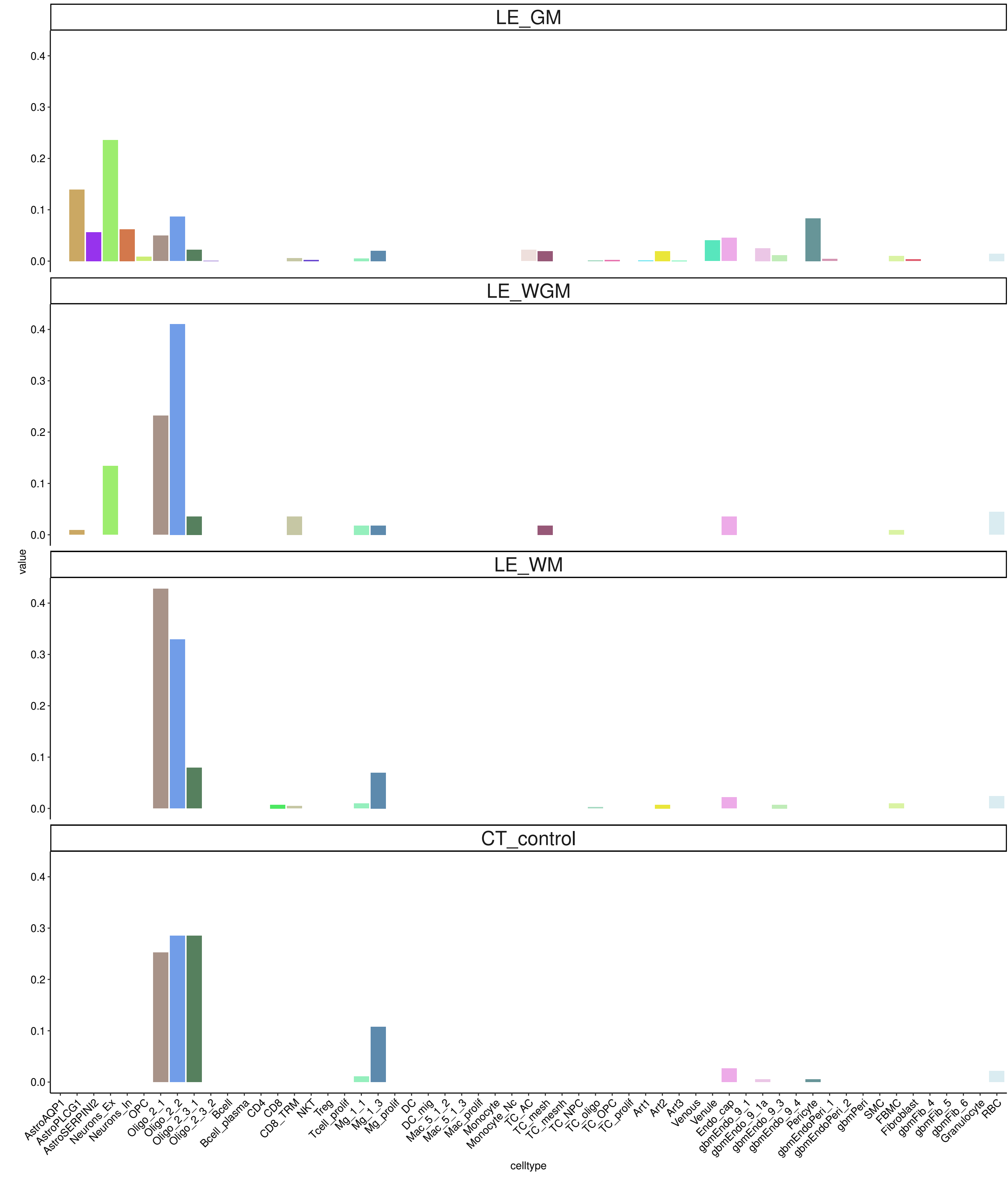
slide 1 of 1



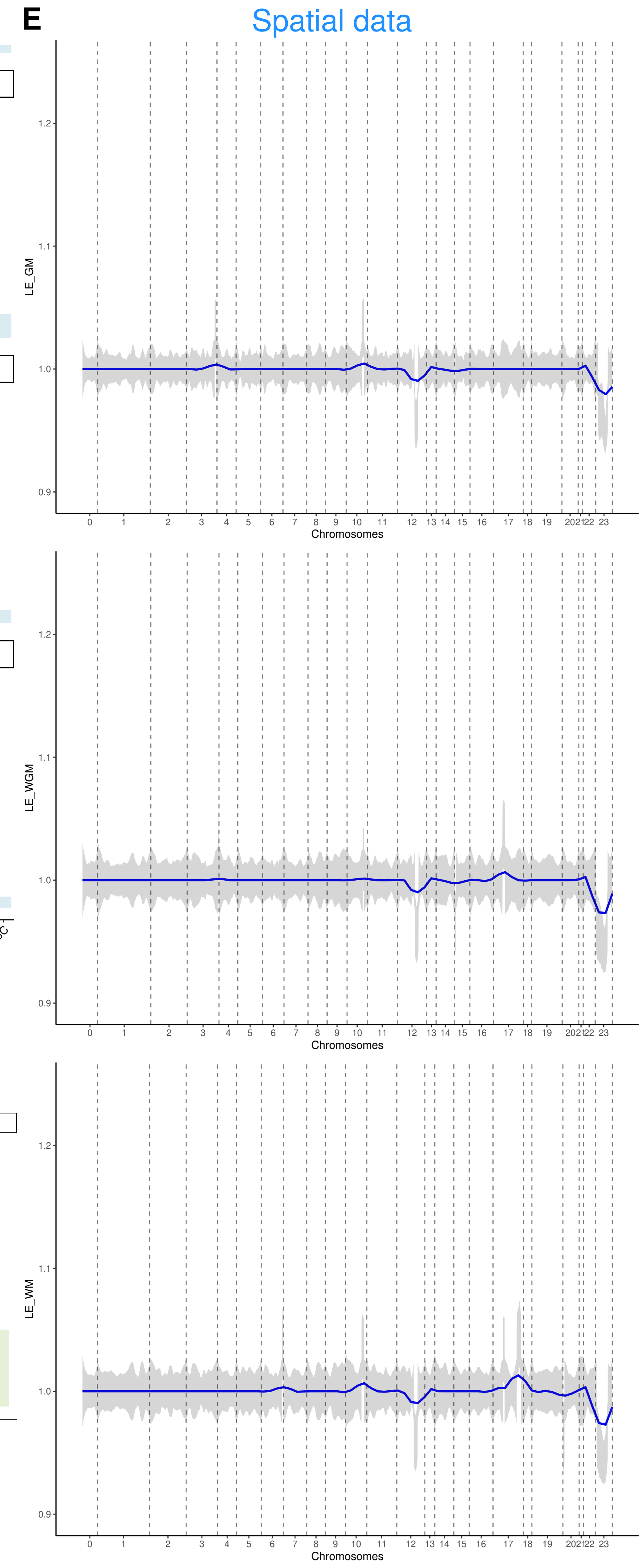
B #cells 3250 single-cell cite-seq
SNU38
NormalBrain



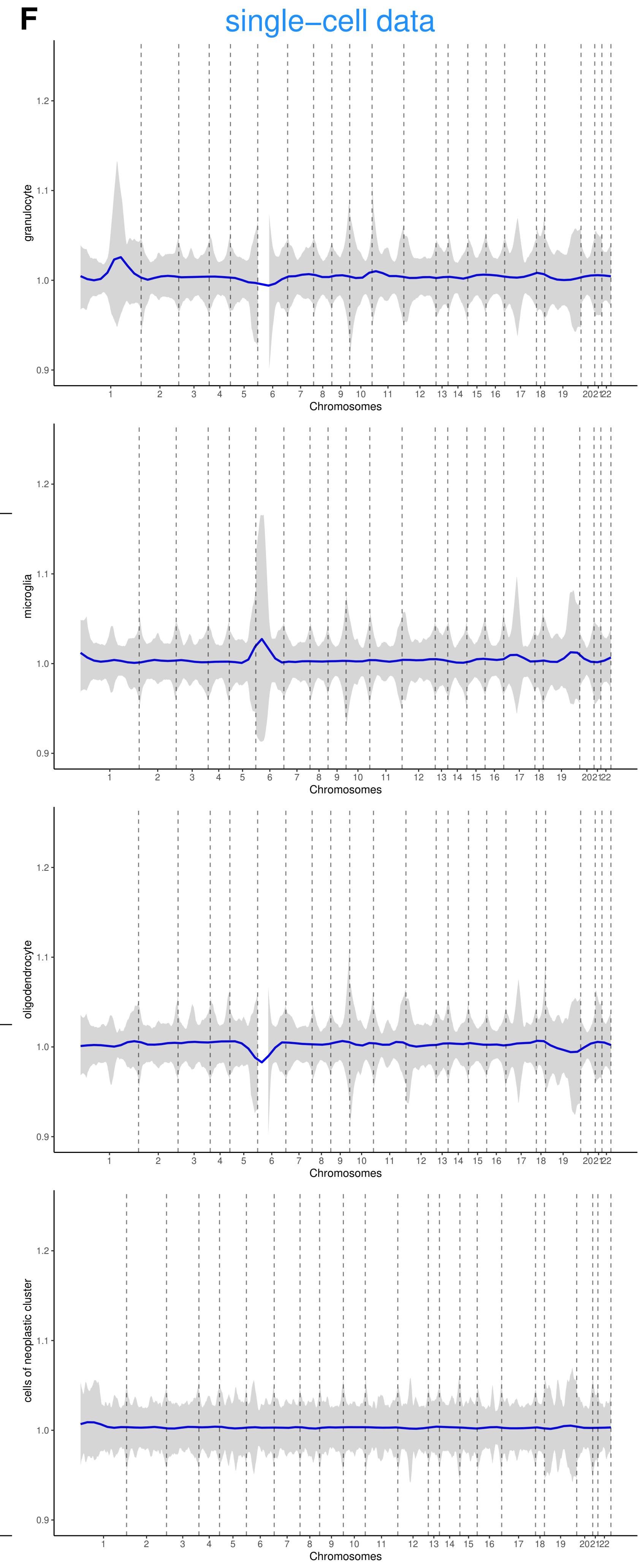
#spots 1402



E



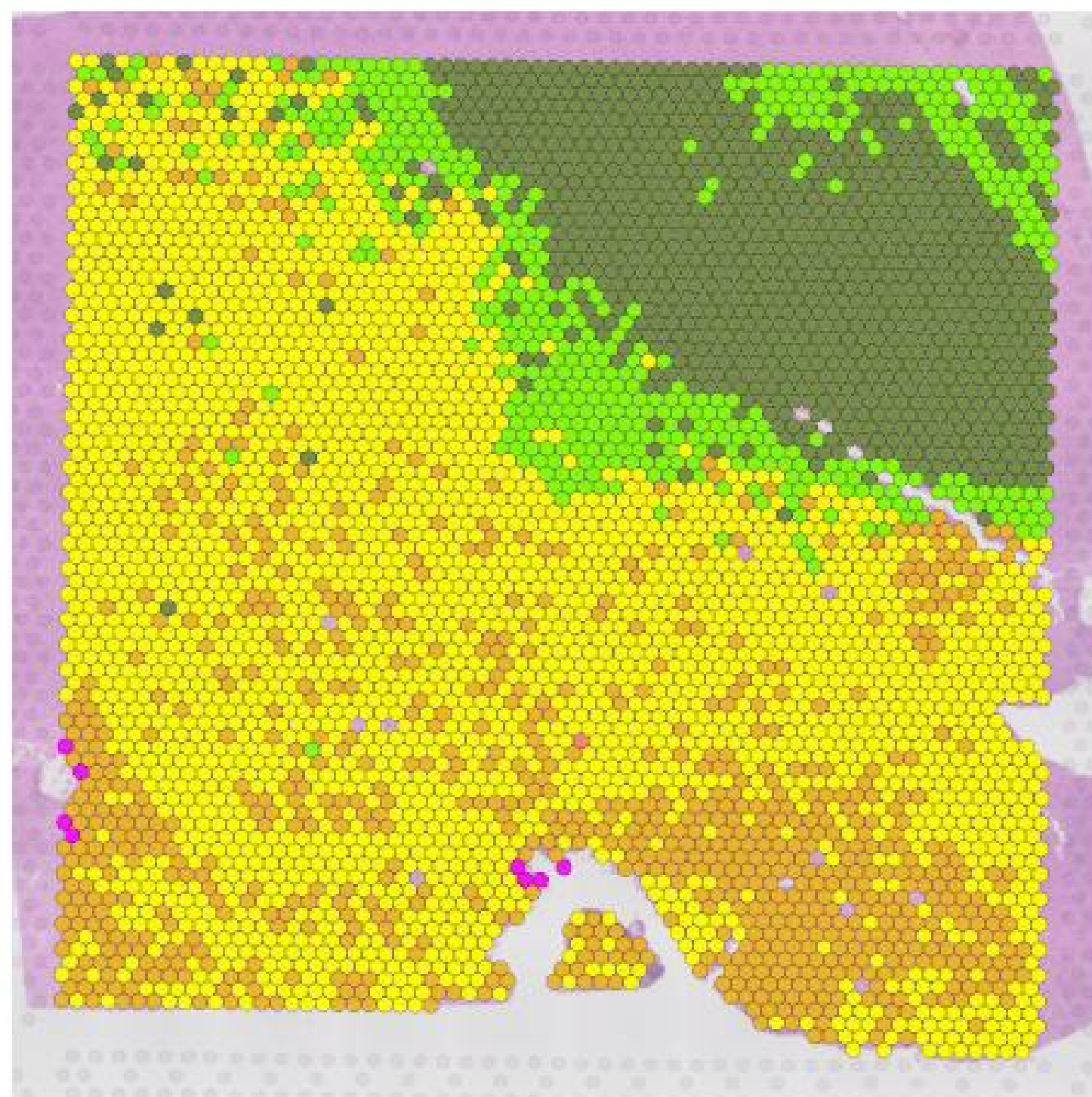
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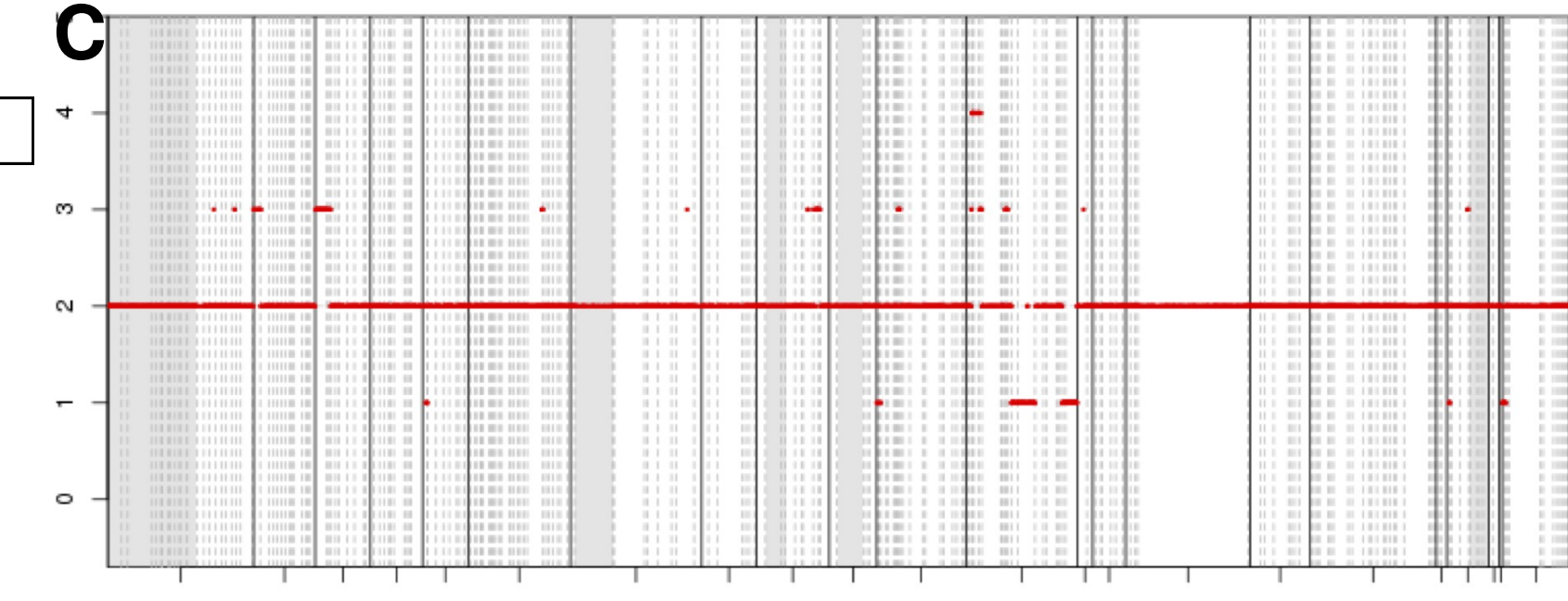
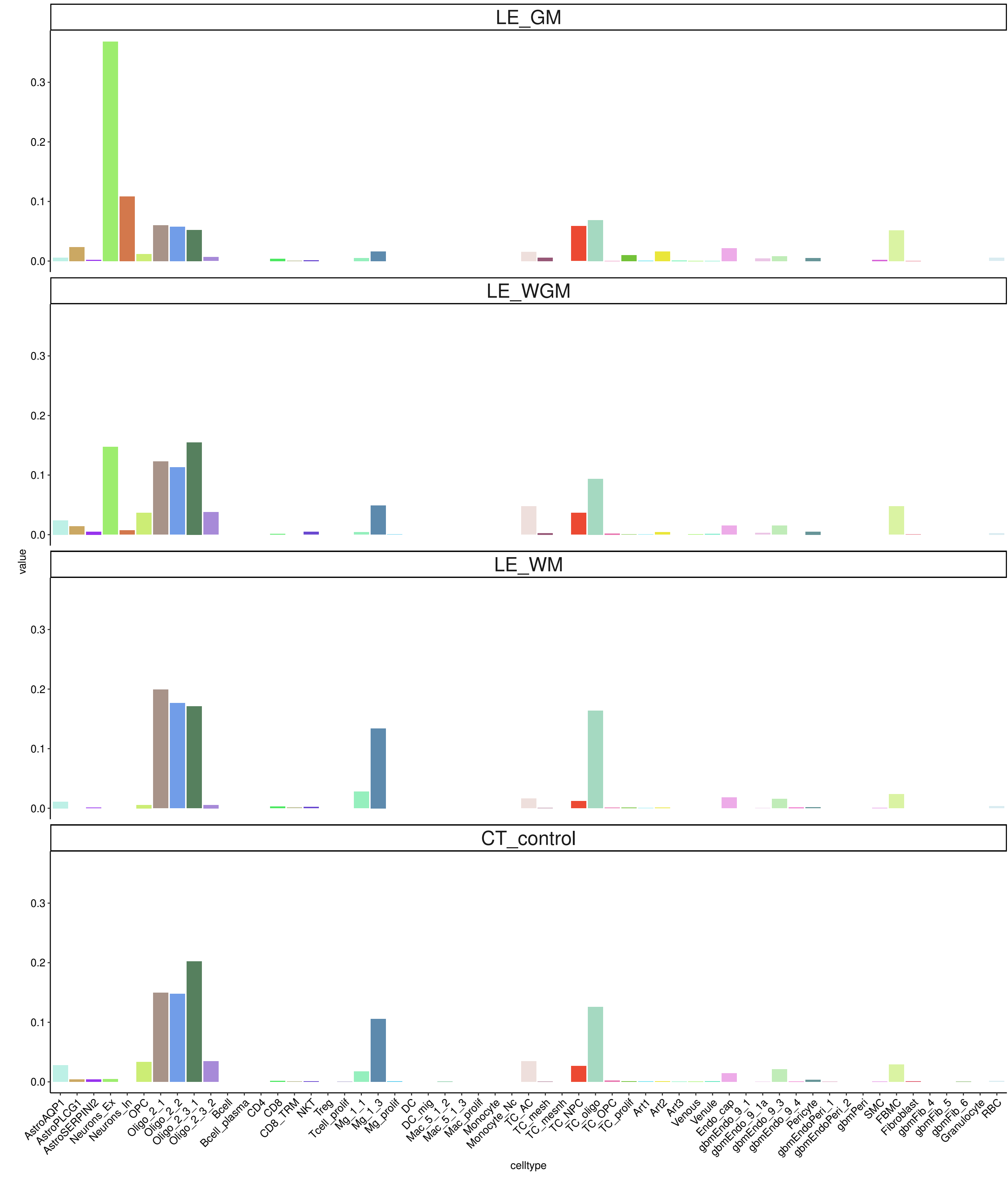
A SNU19A_A3_mutIDH



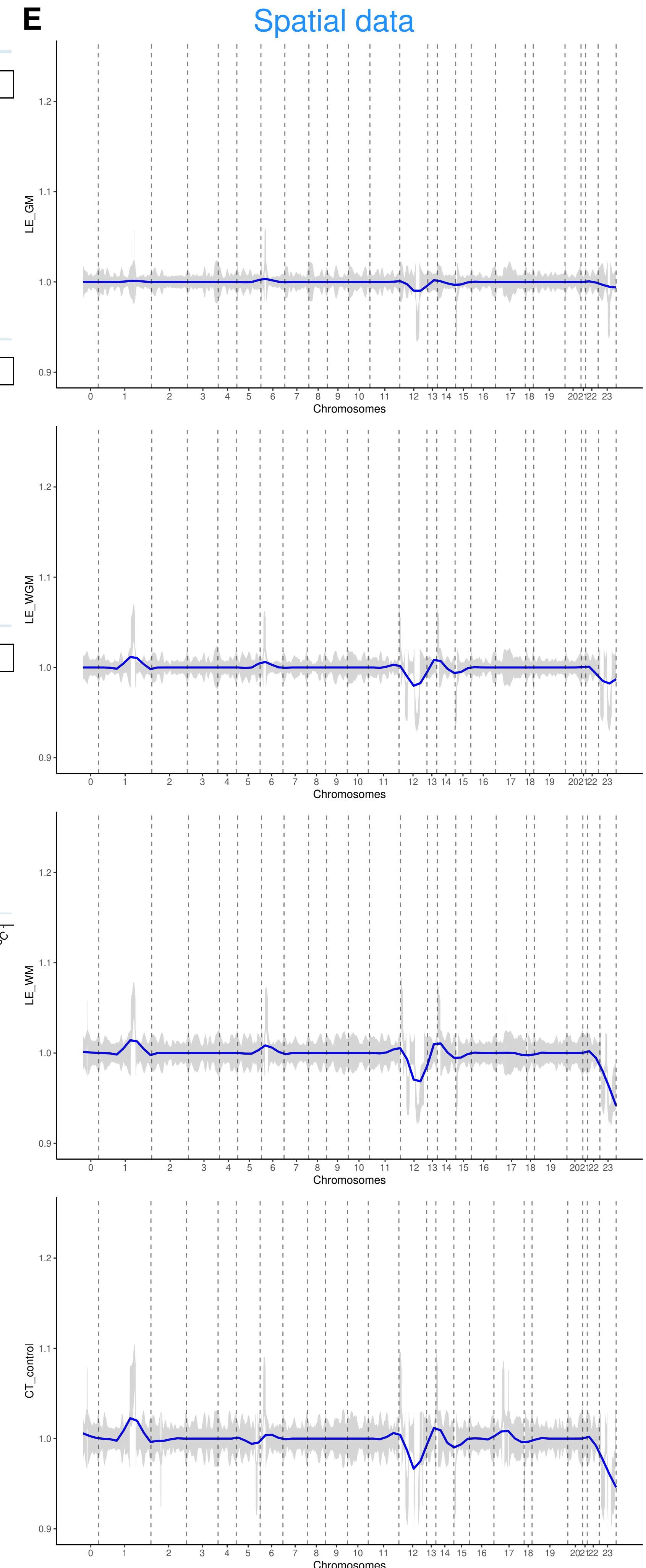
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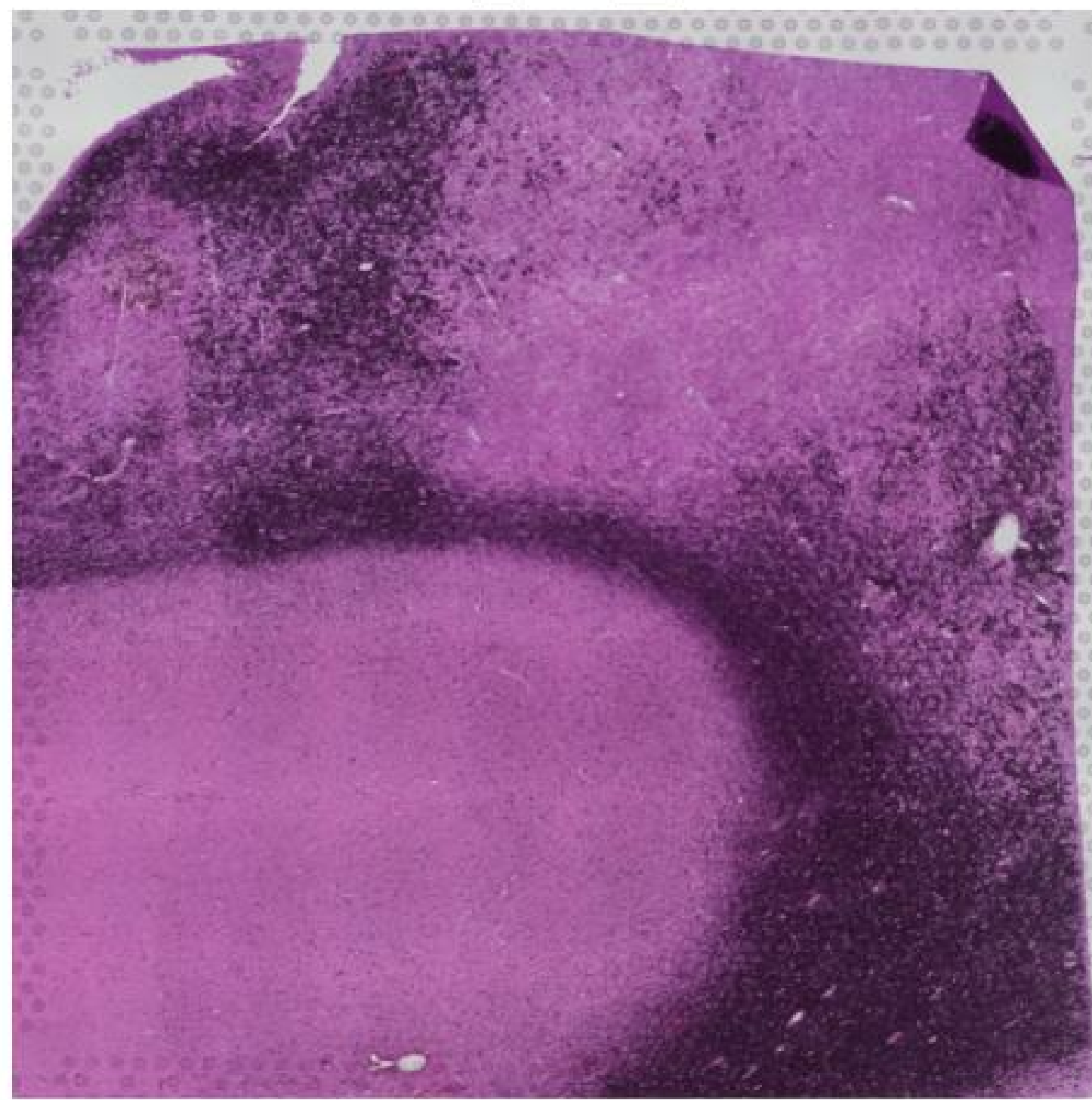


Marker	Alteration	Marker	Alteration
IDH1 mutation	mutant (p.Arg132His, c.395G>A)	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	wildtype	NF1 deletion	absent
TP53 mutation	mutant (p.Arg273Cys, c.817C>T)	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

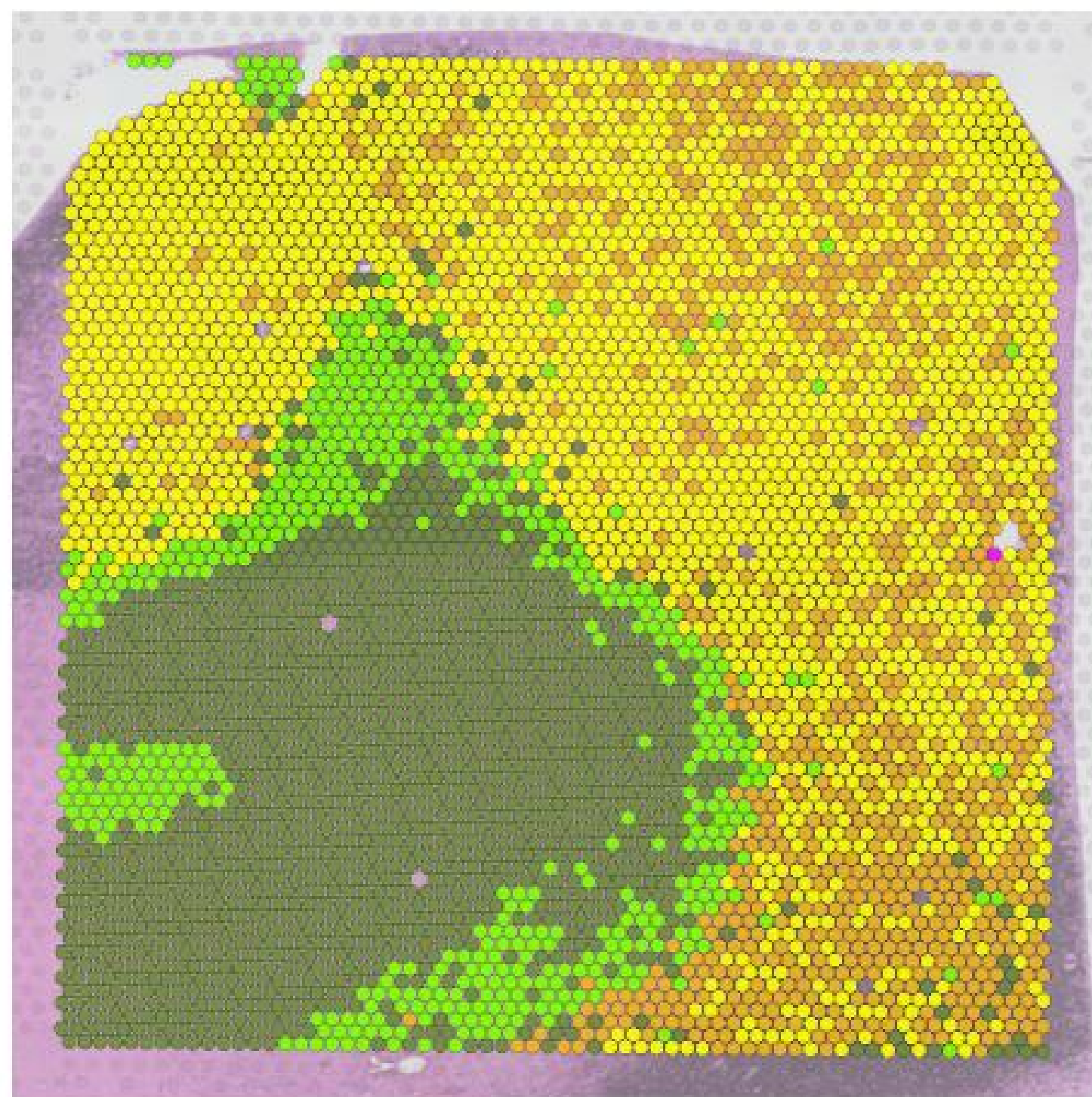


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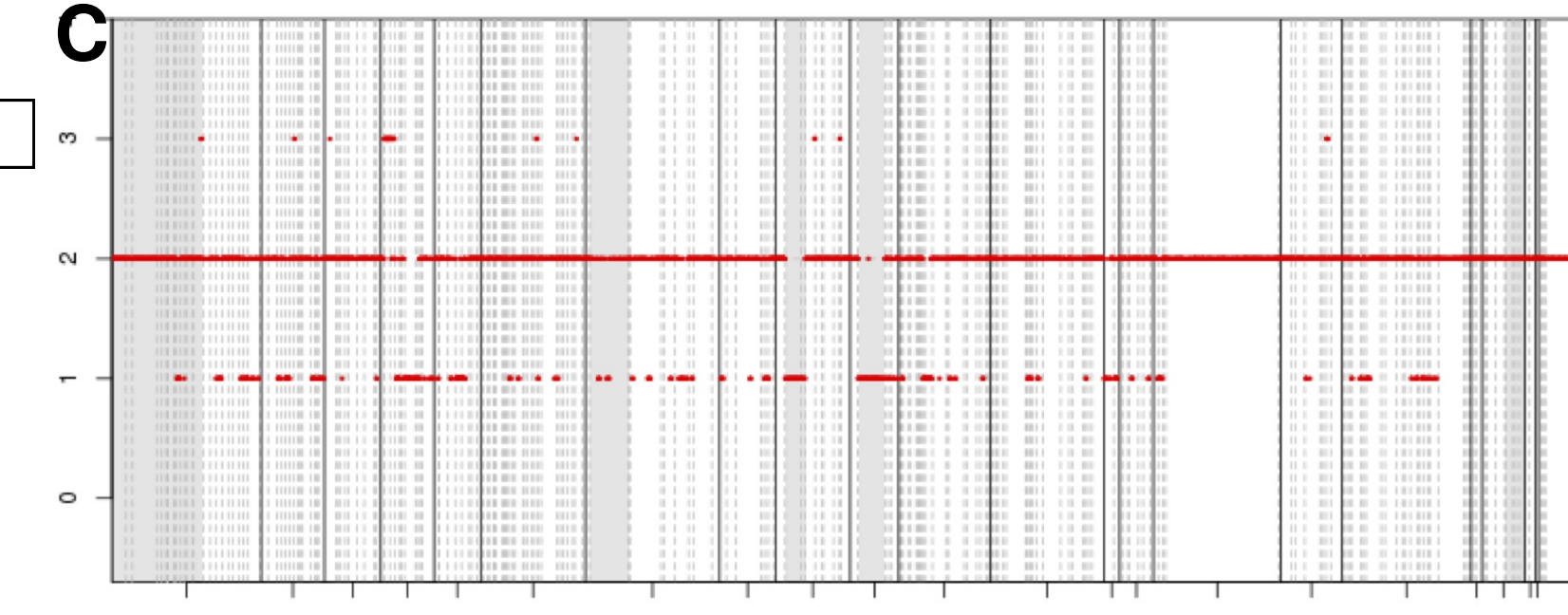
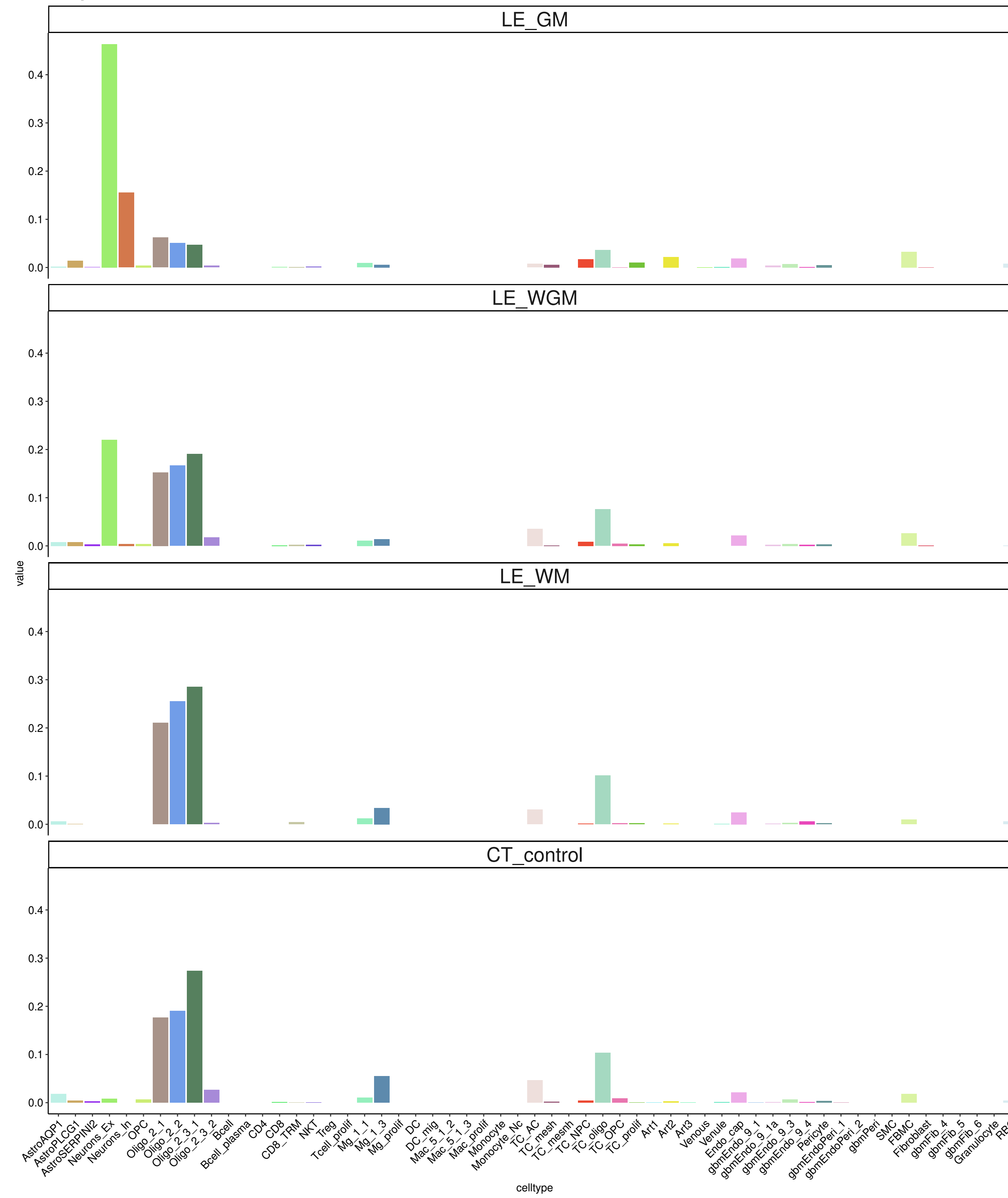
A SNU22A_A3_mutIDH



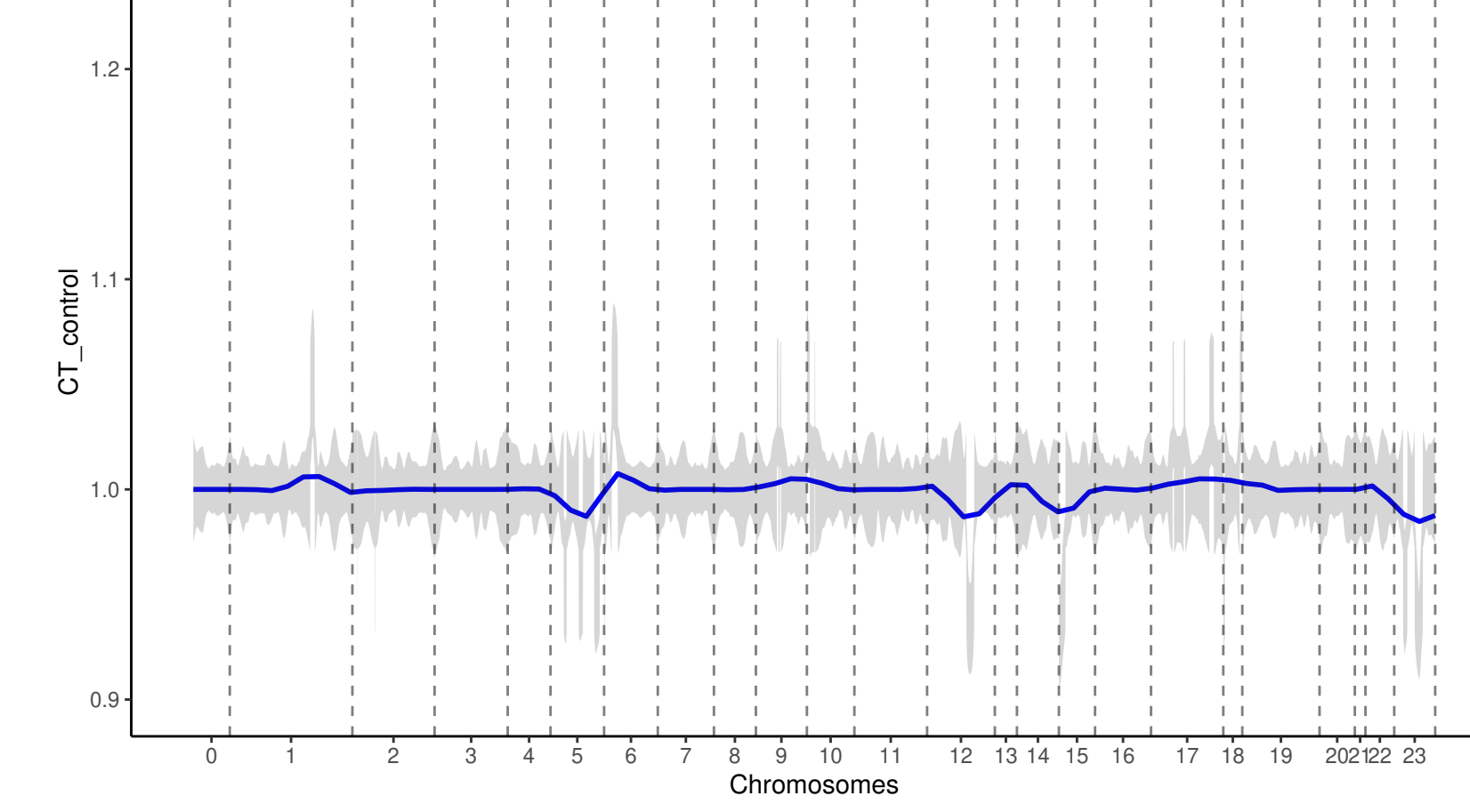
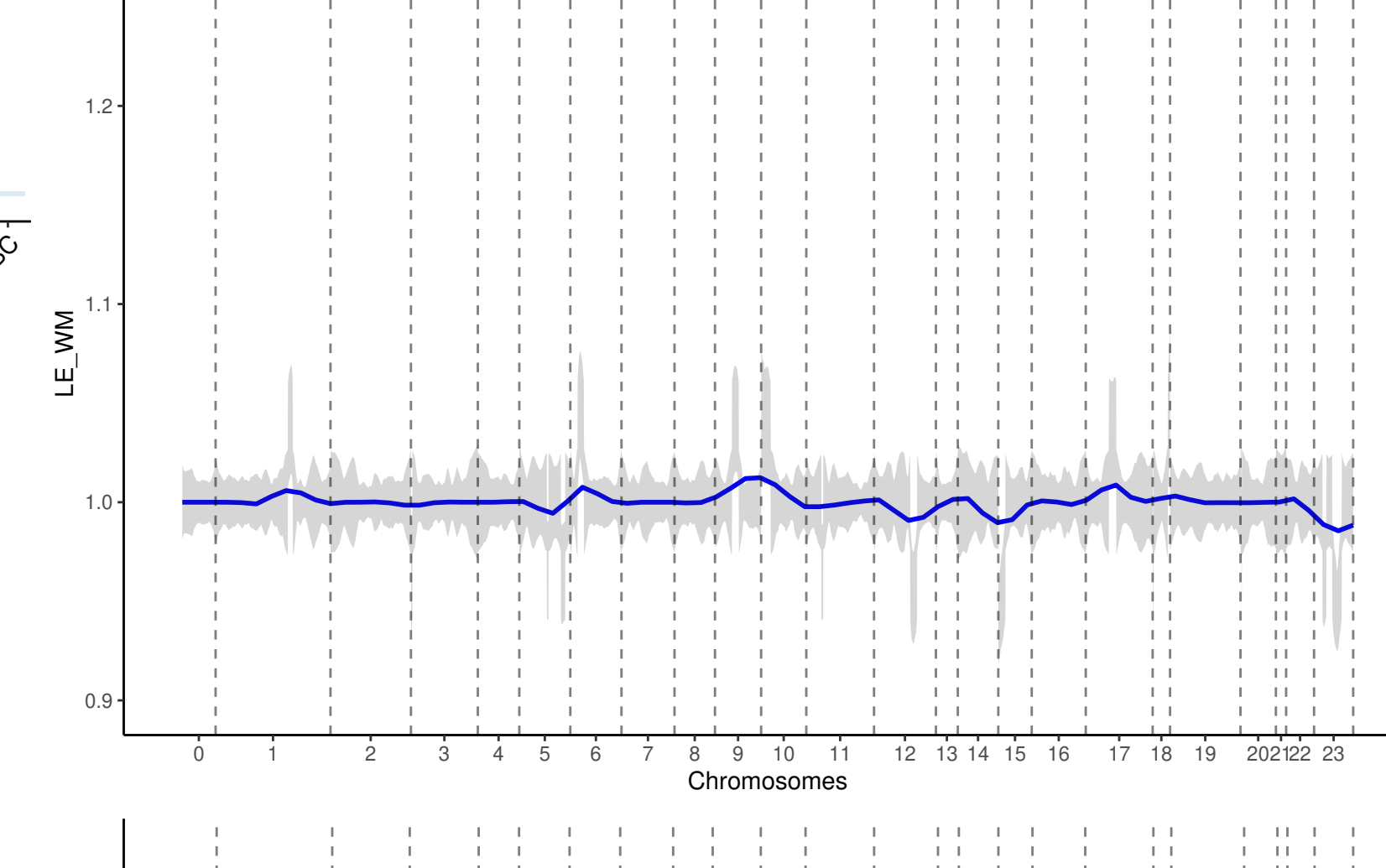
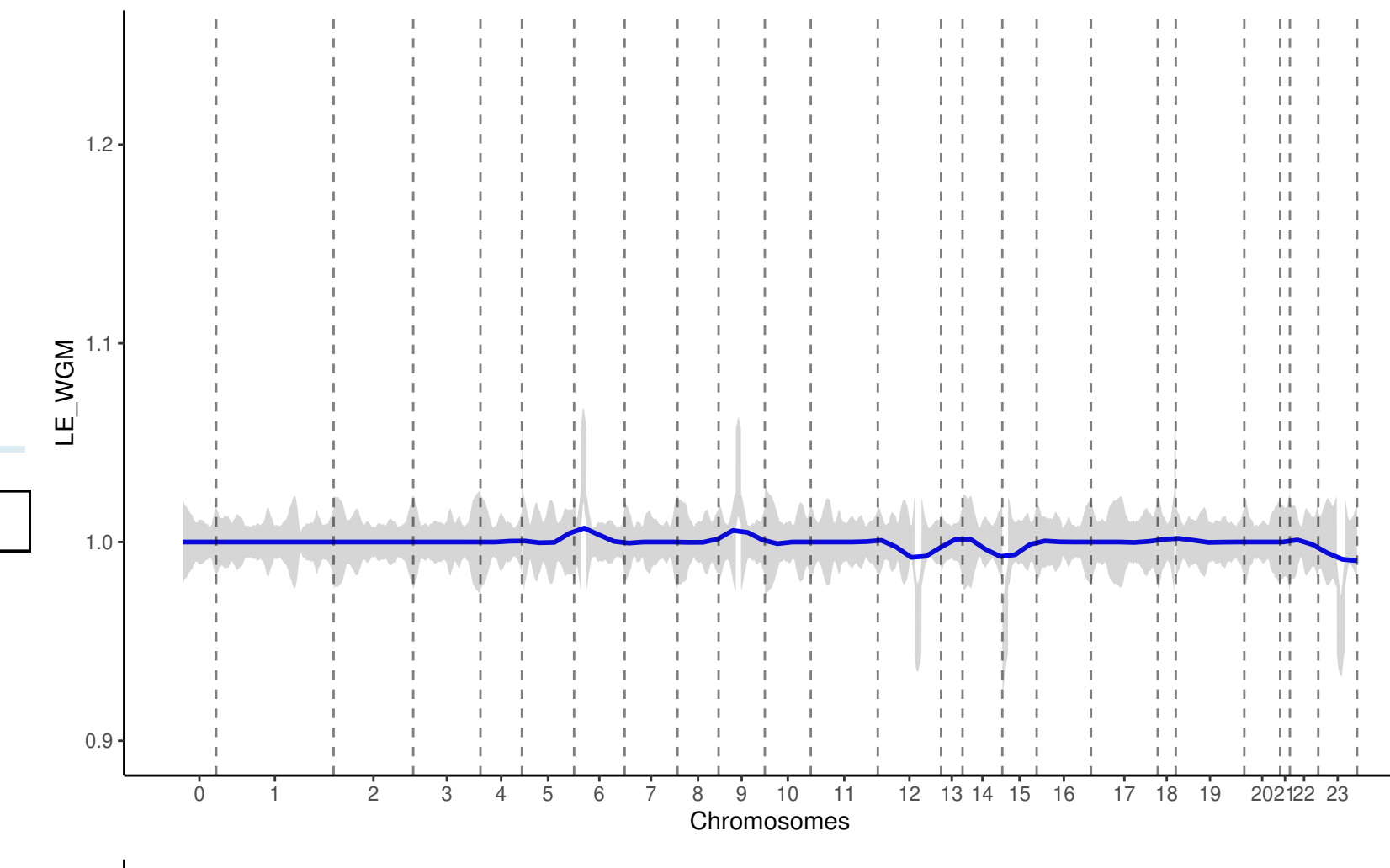
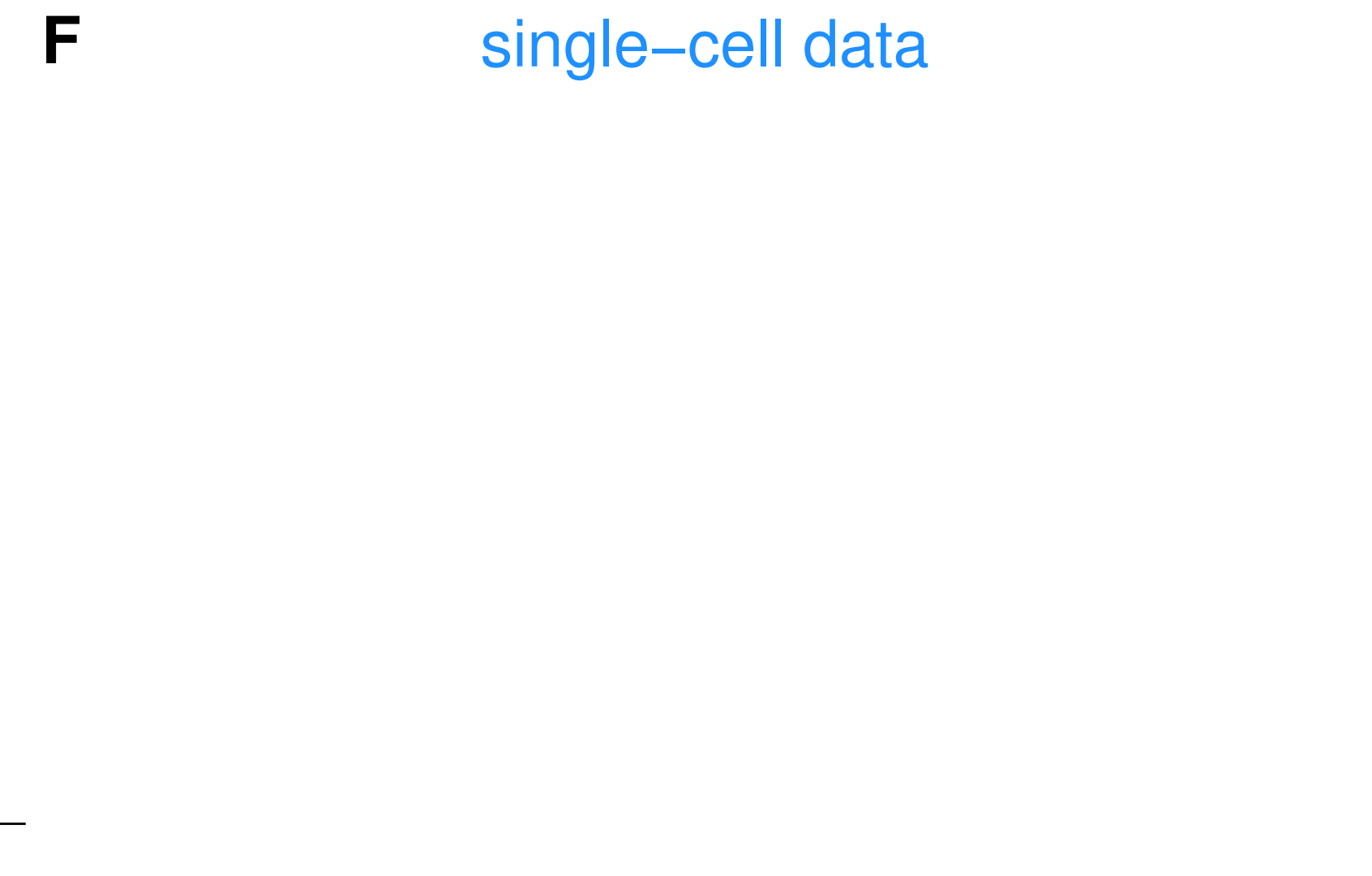
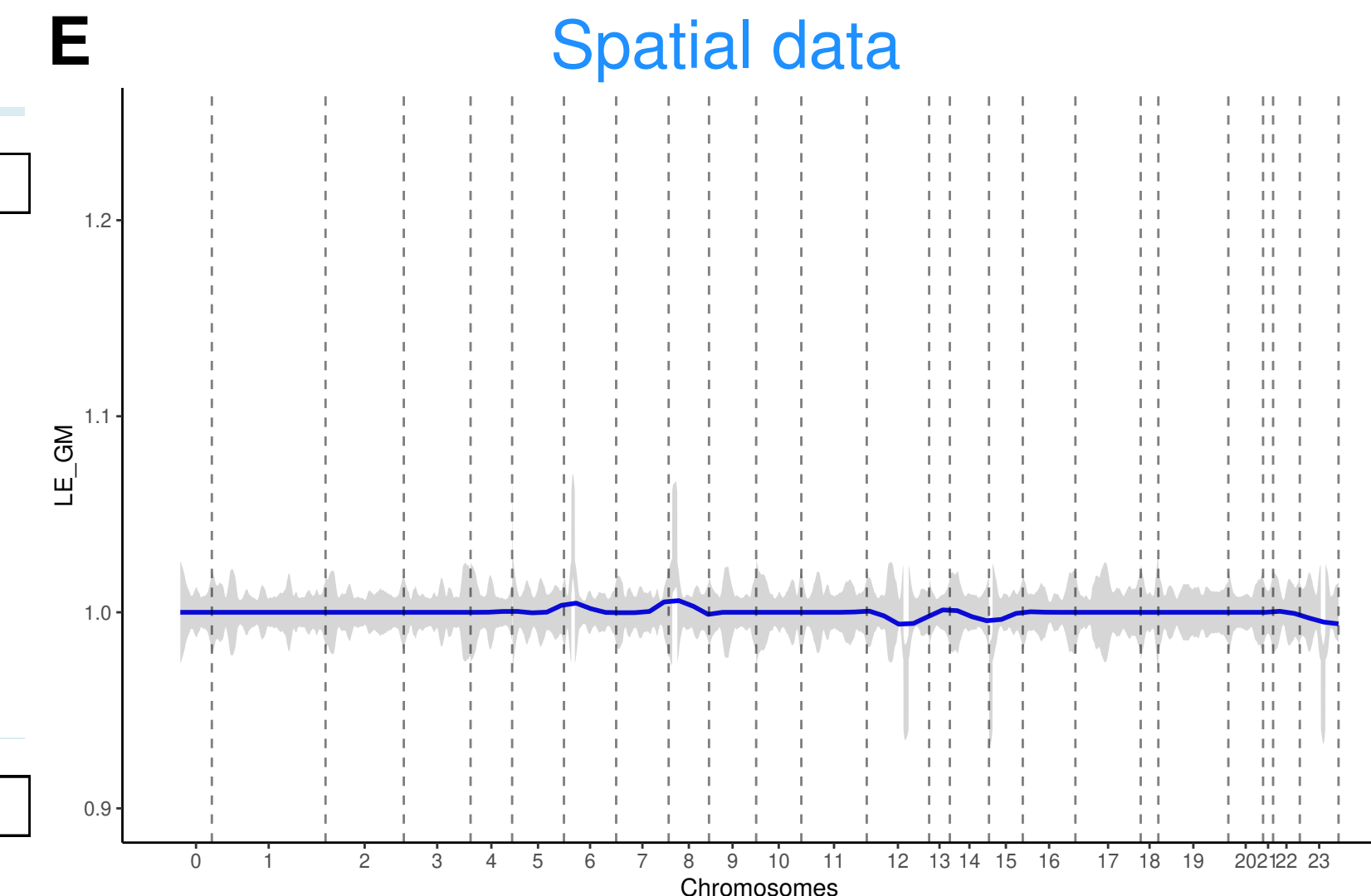
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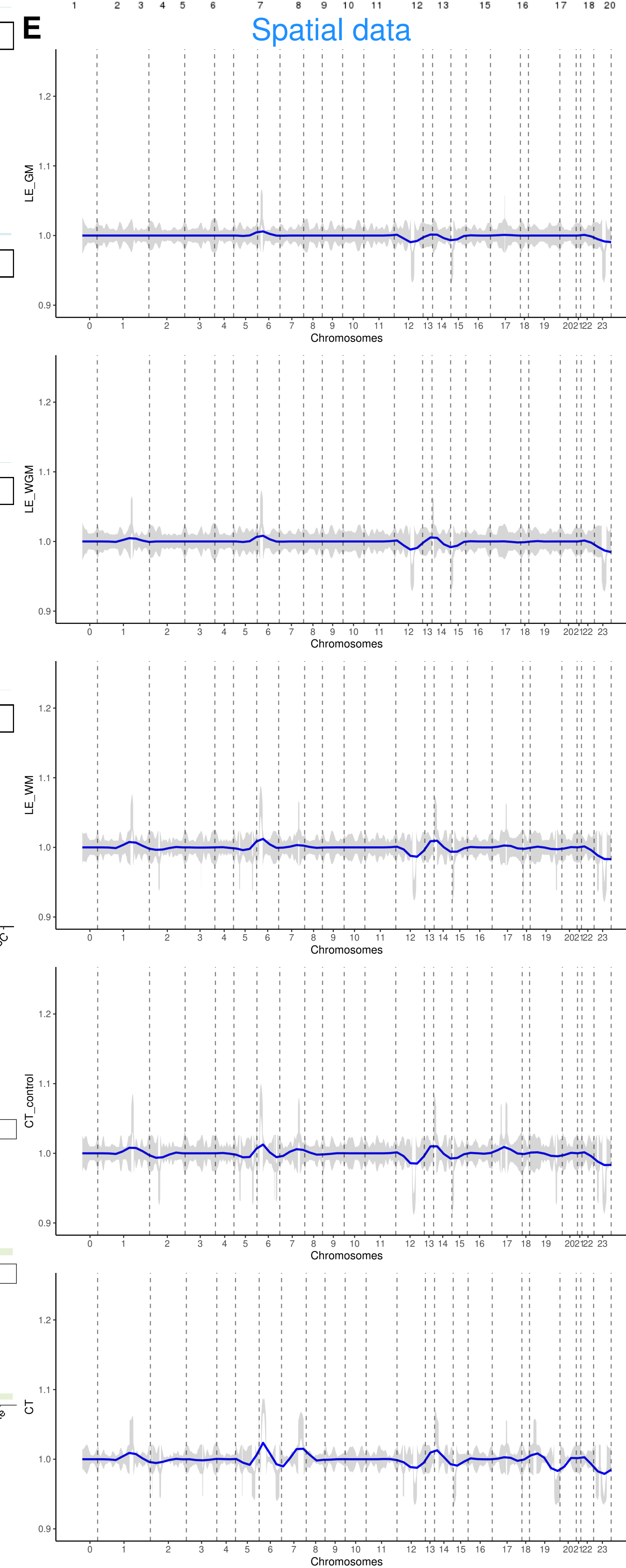
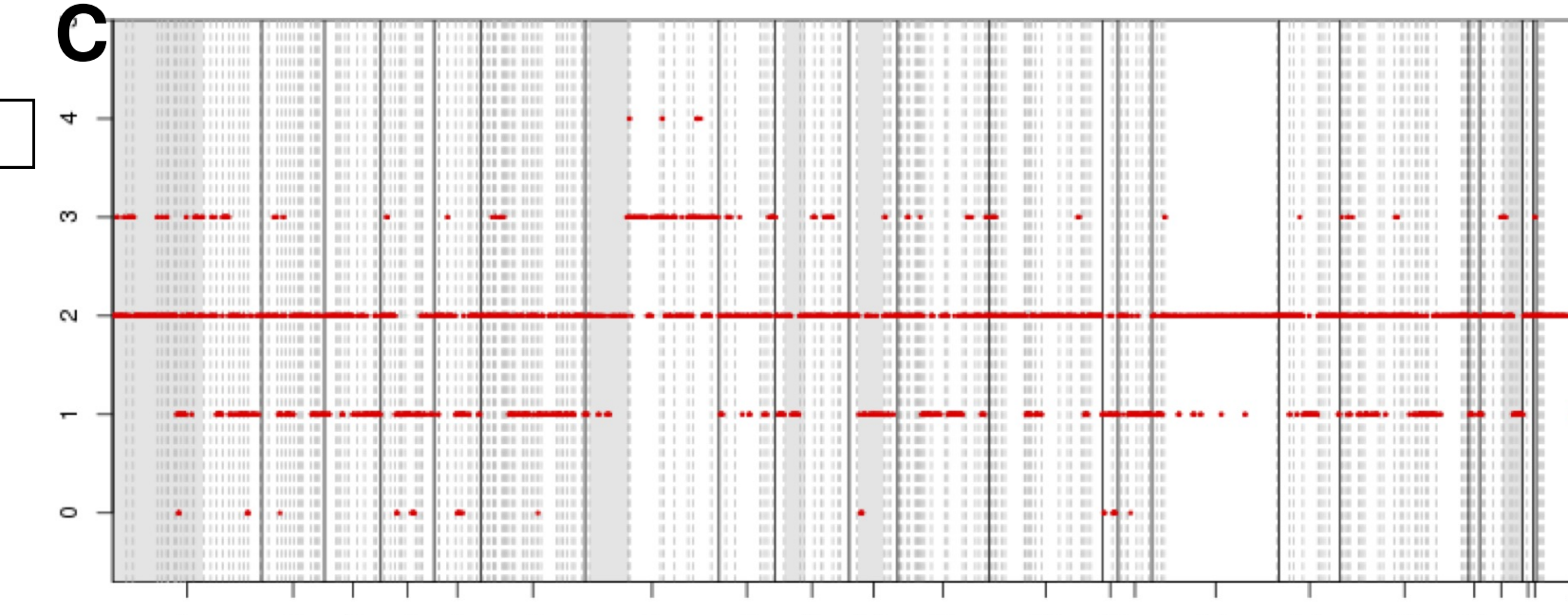
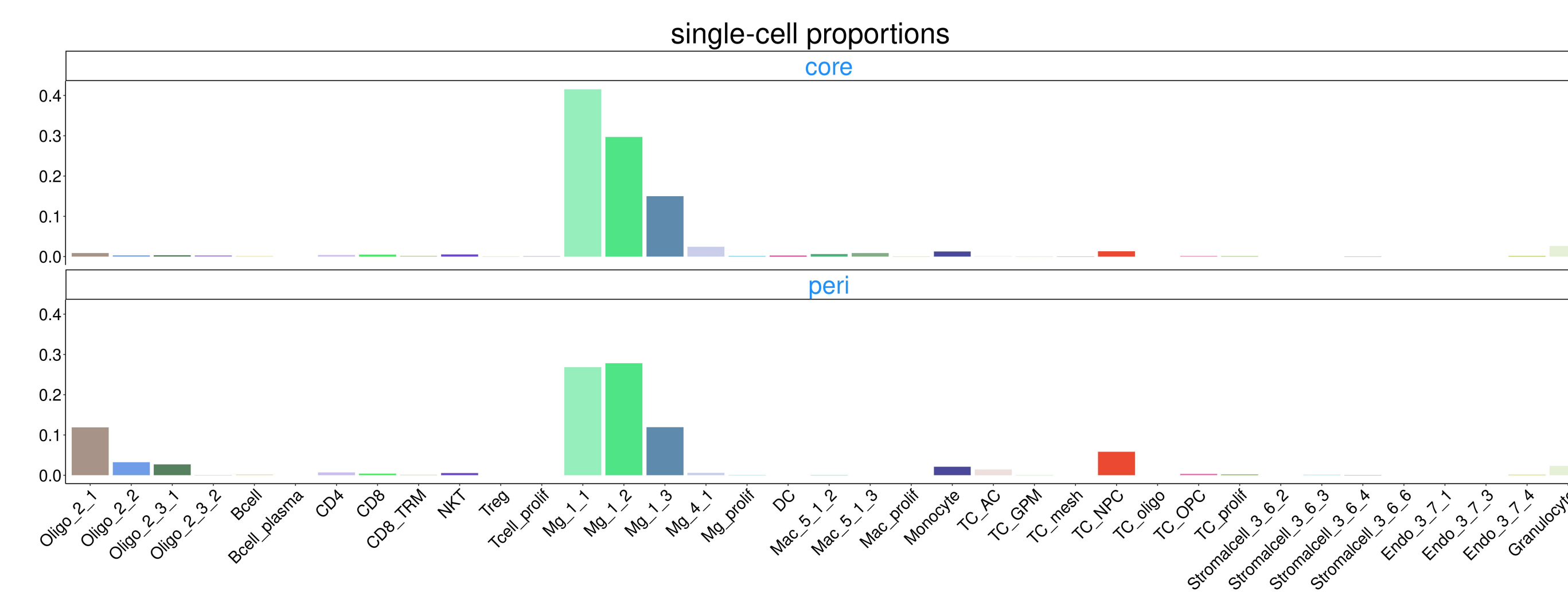
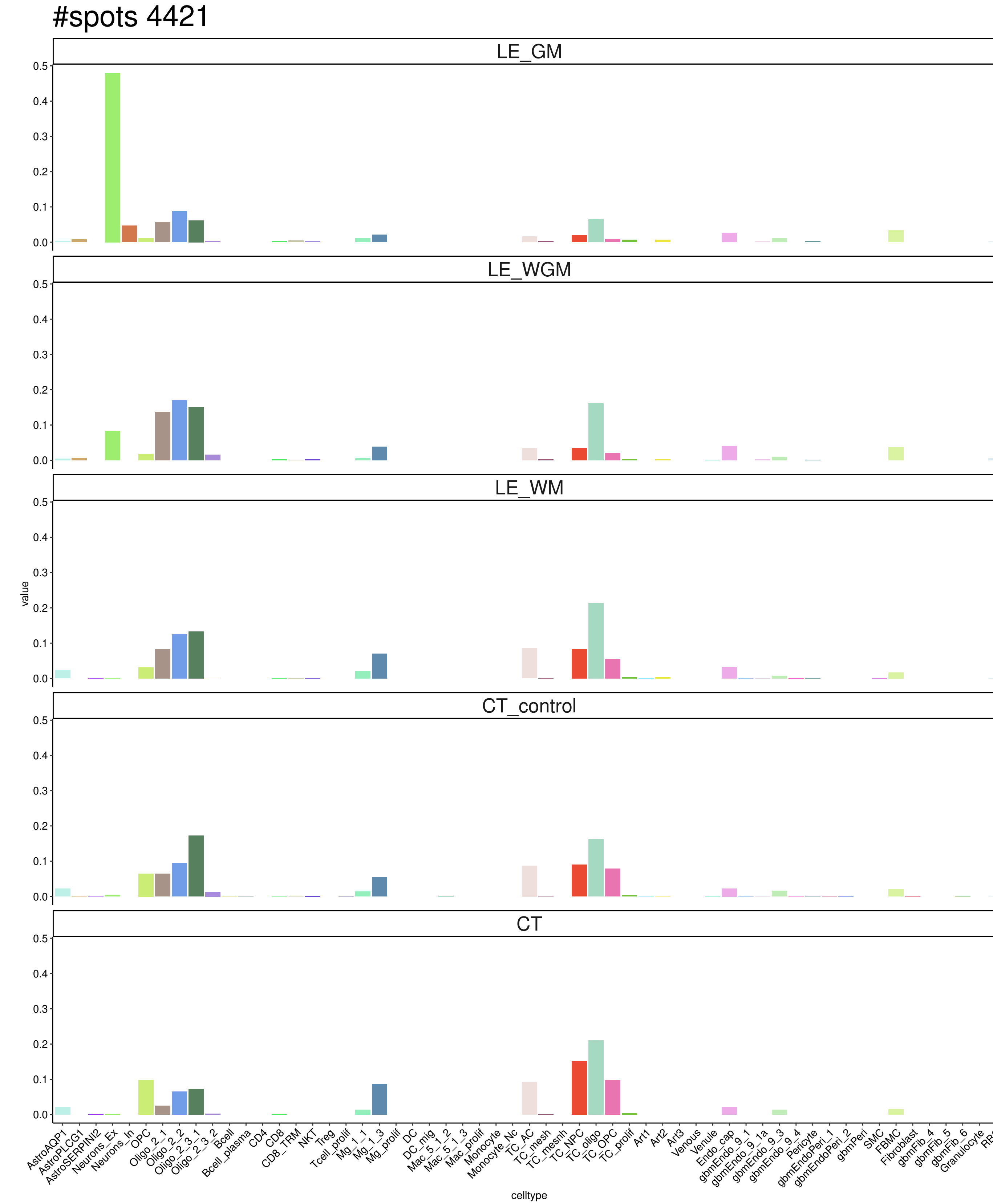
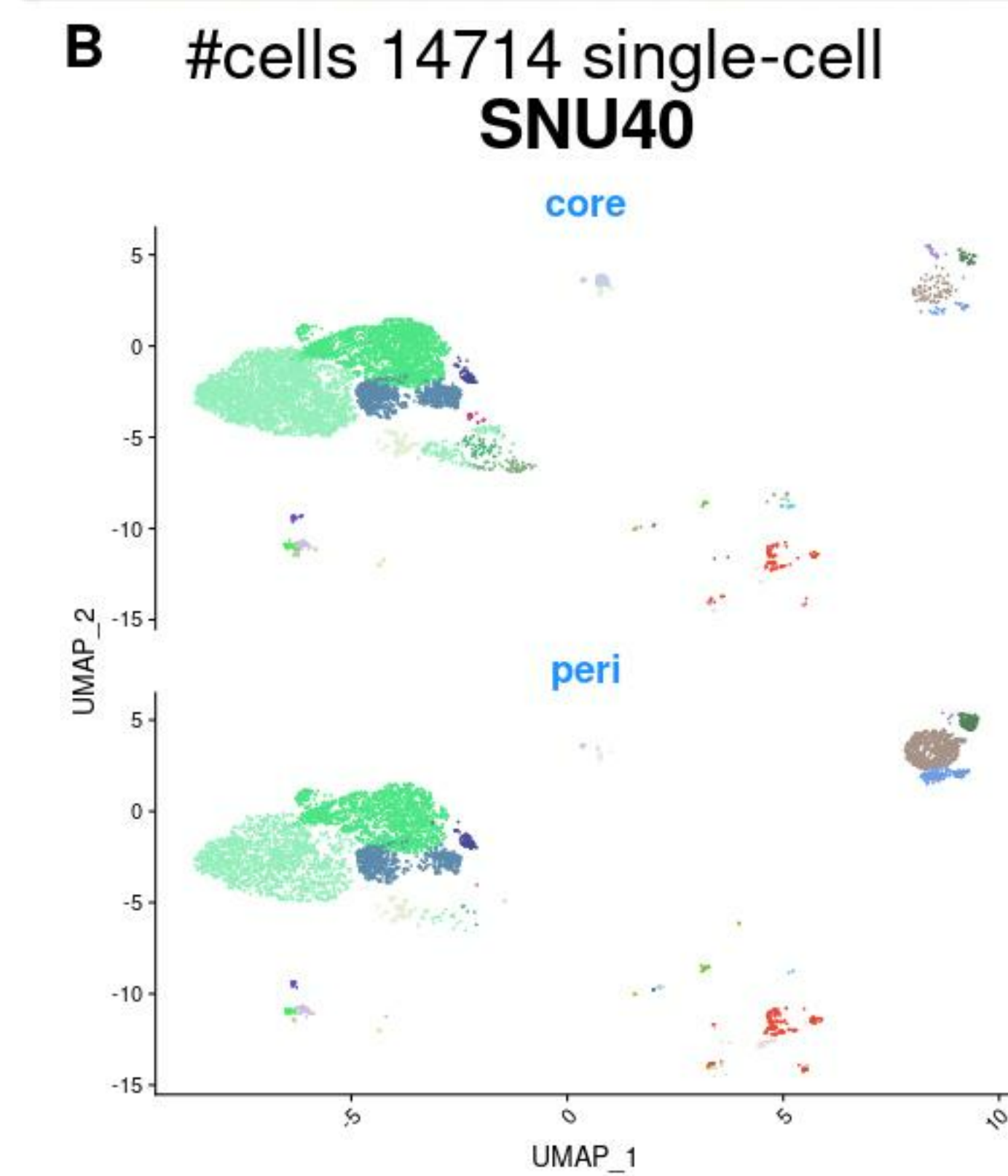
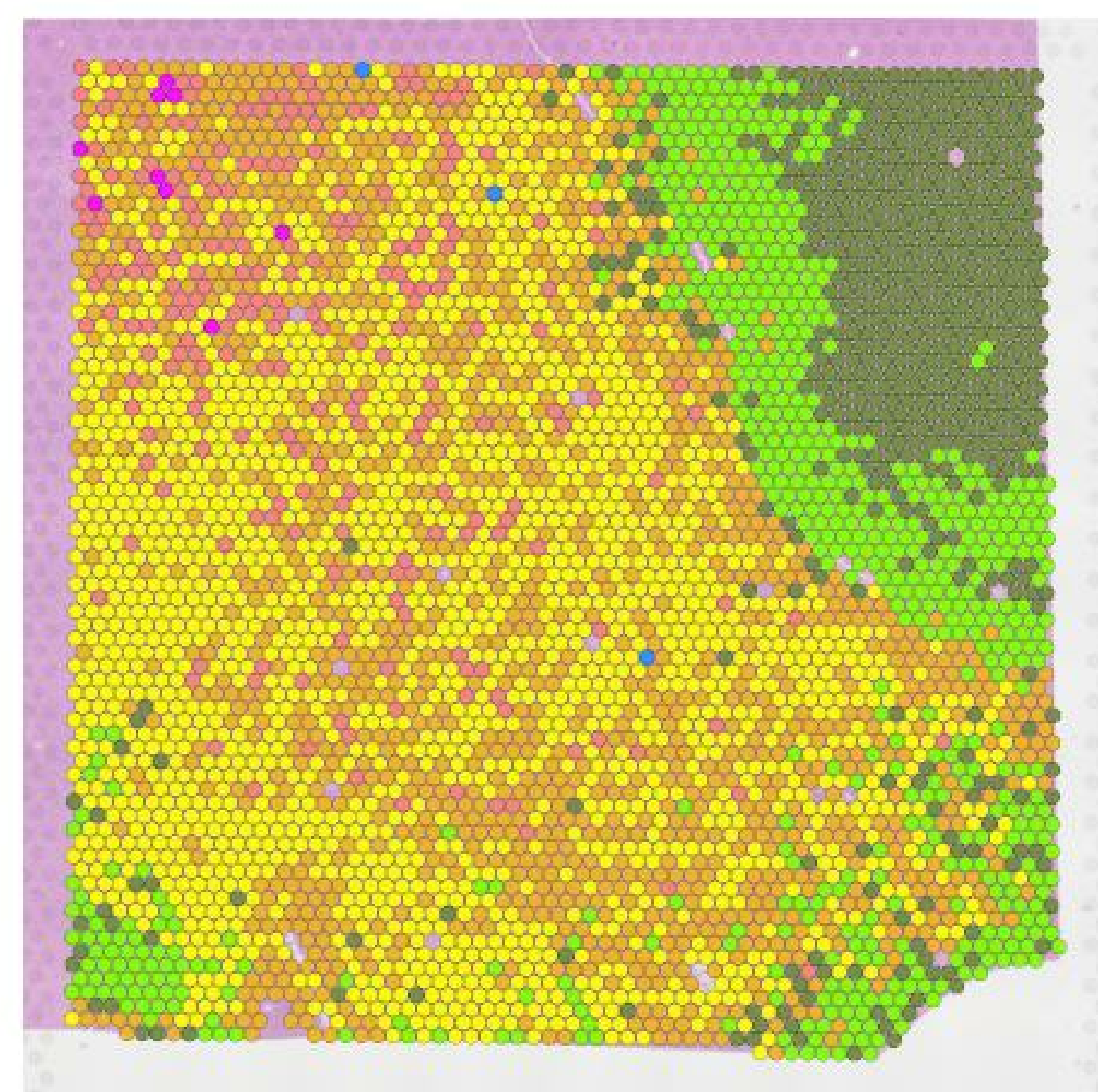
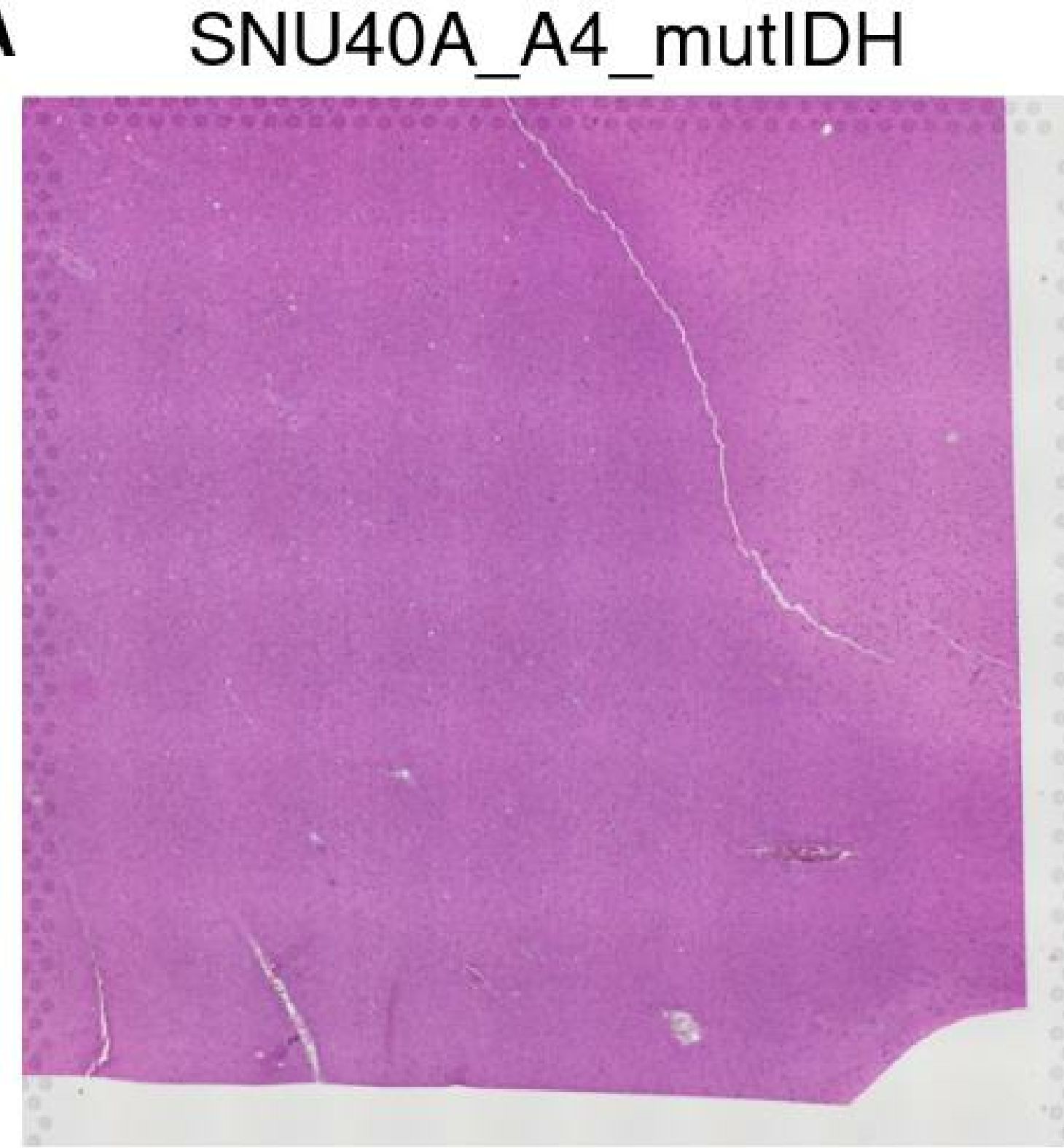


#spots 4907



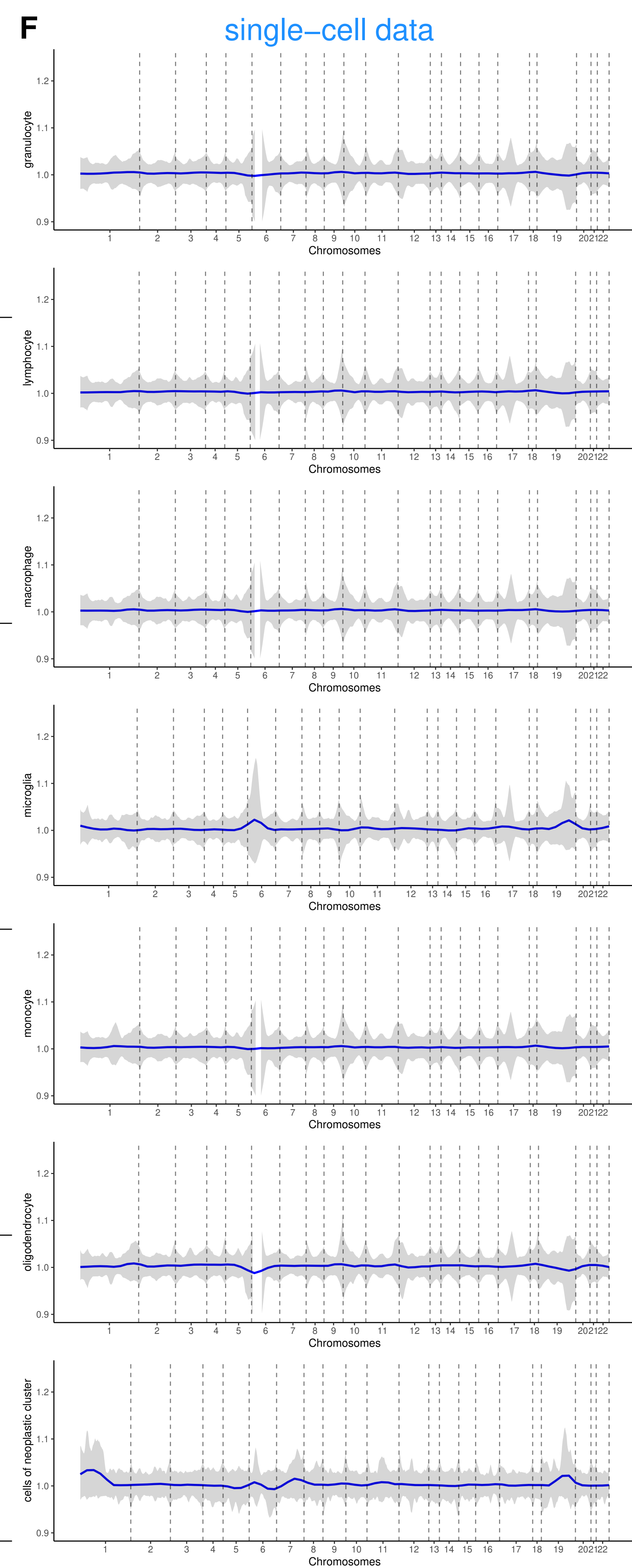
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IDH1 mutation	mutant (p.Arg132His, c.395G>A)	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p/19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	absent
ATRX mutation	VUS (p.Arg180His, c.5408G>A)	NF1 mutation	wildtype
TER1P mutation	wildtype	NF1 deletion	absent
TP53 mutation	mutant (p.Gly596, c.168_175dupAGACCCAG)	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		





D

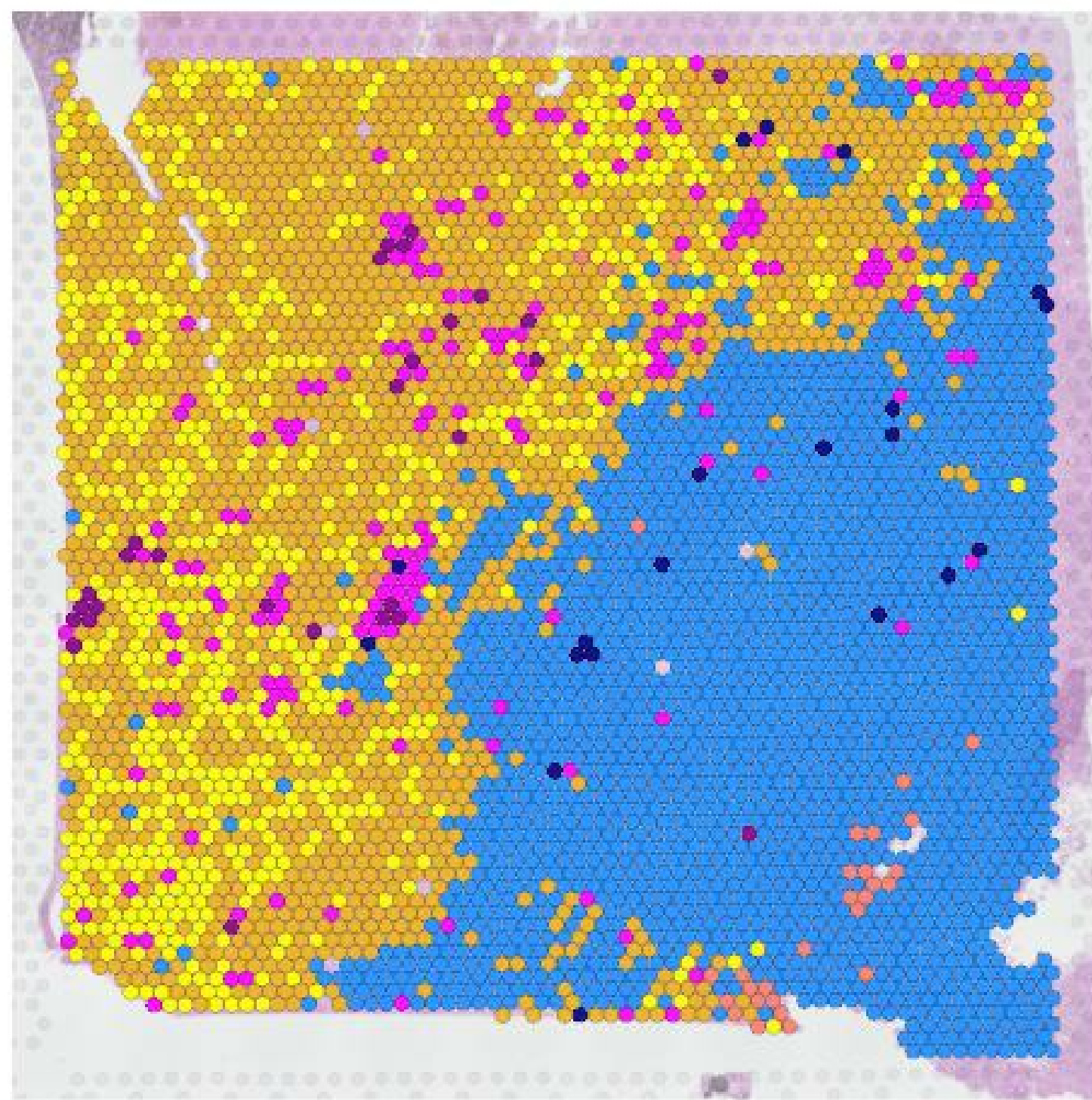
Marker	Alteration	Marker	Alteration
IDH1 mutation	mutant (p.Arg132His, c.395G>A)	HSF3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	NF1 mutation	hemizygous deletion
ATRX mutation	mutant (p.Asp2066Leu, c.6195dupA)	NF1 mutation	wildtype
TERP mutation	wildtype	NF1 deletion	absent
TP53 mutation	mutant (p.Tyr236His, c.706T>C)	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		



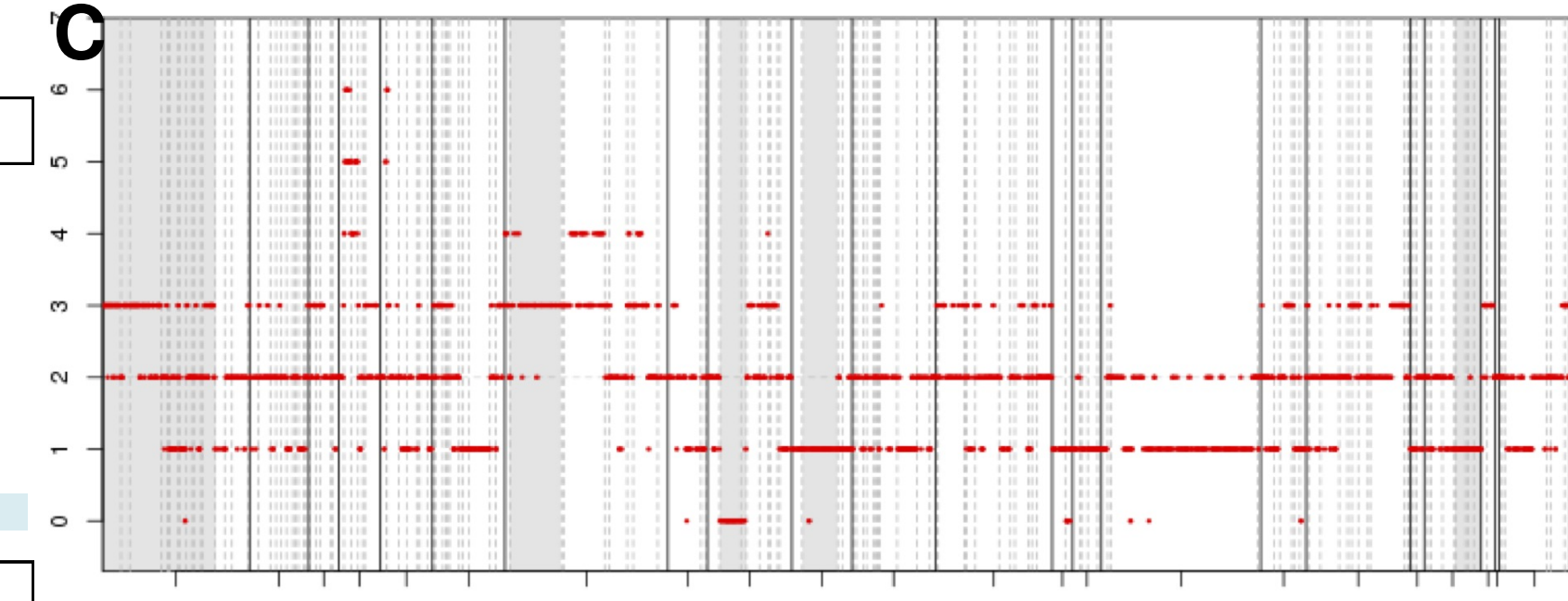
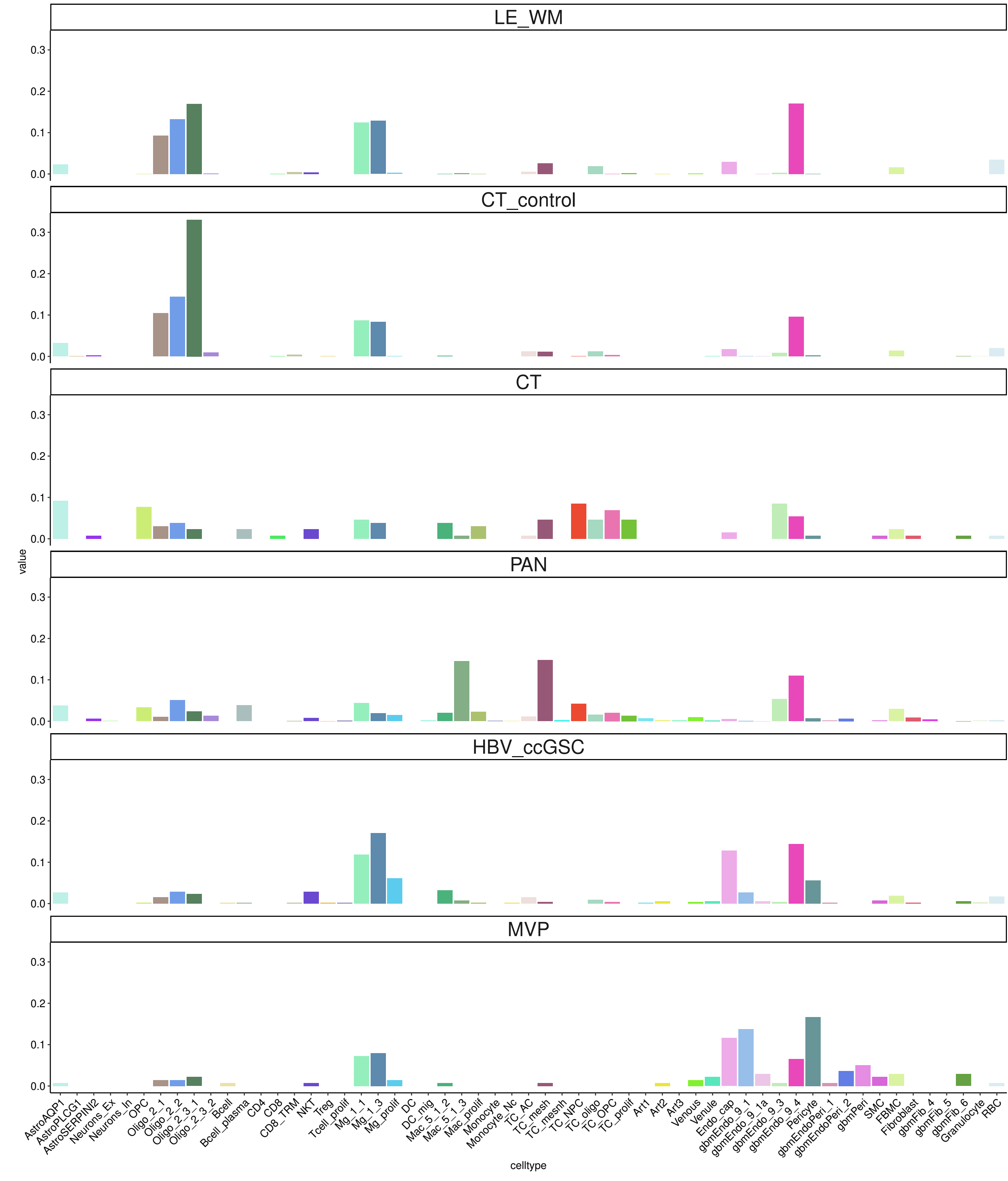
SNU16A_GBM



slide 1 of 2

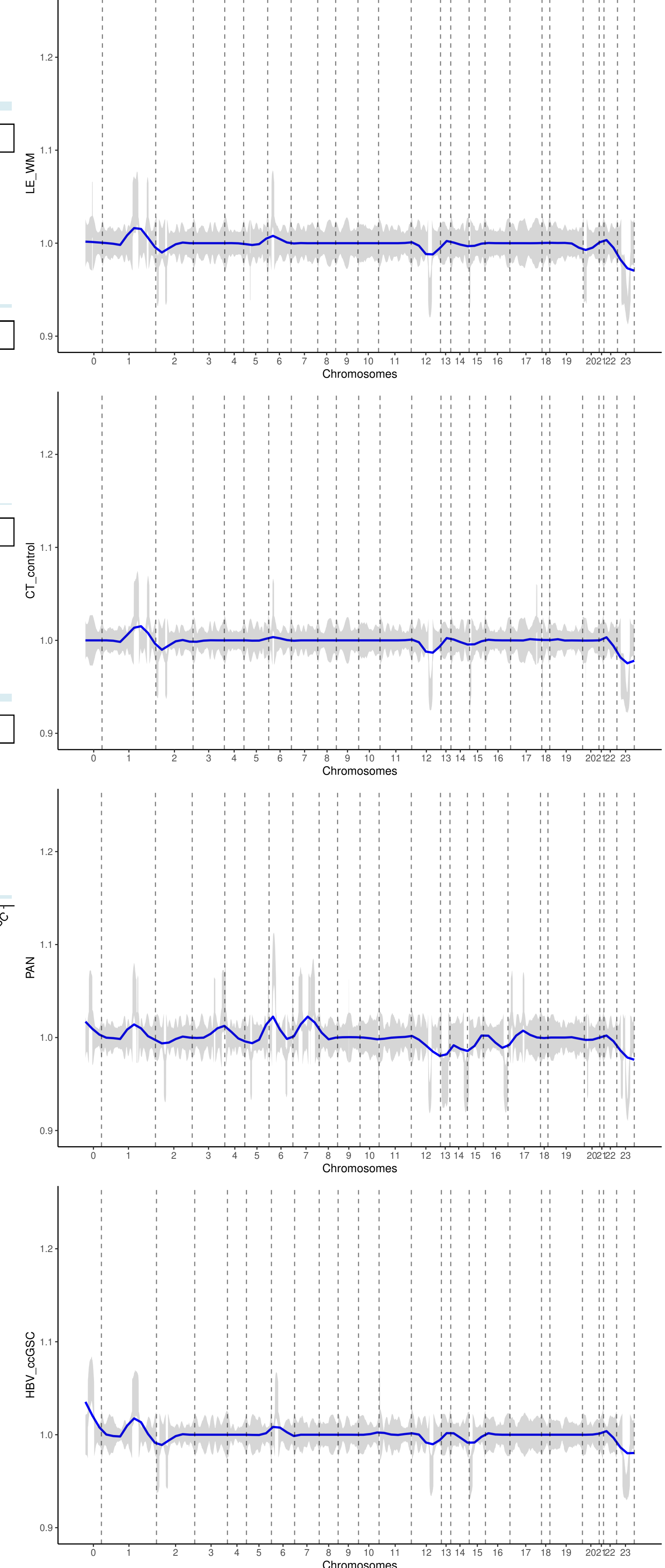


#spots 4712



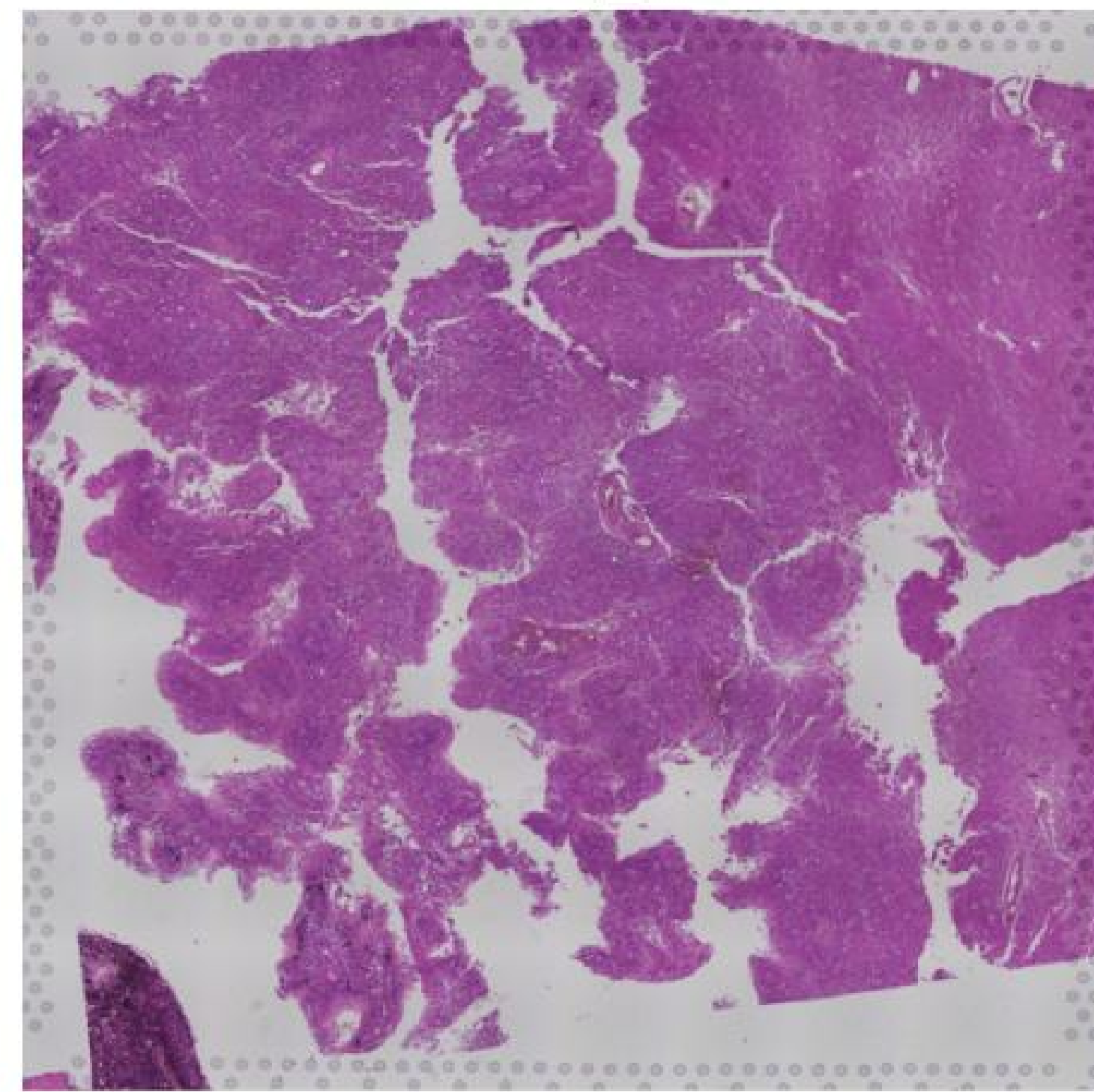
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	19q only deleted	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TERTp mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	mutant (p.Tyr236Cys, c.707A>G); mutant (p.Ser94fs, c.273_278dupGCCCCCTG)	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

E Spatial data

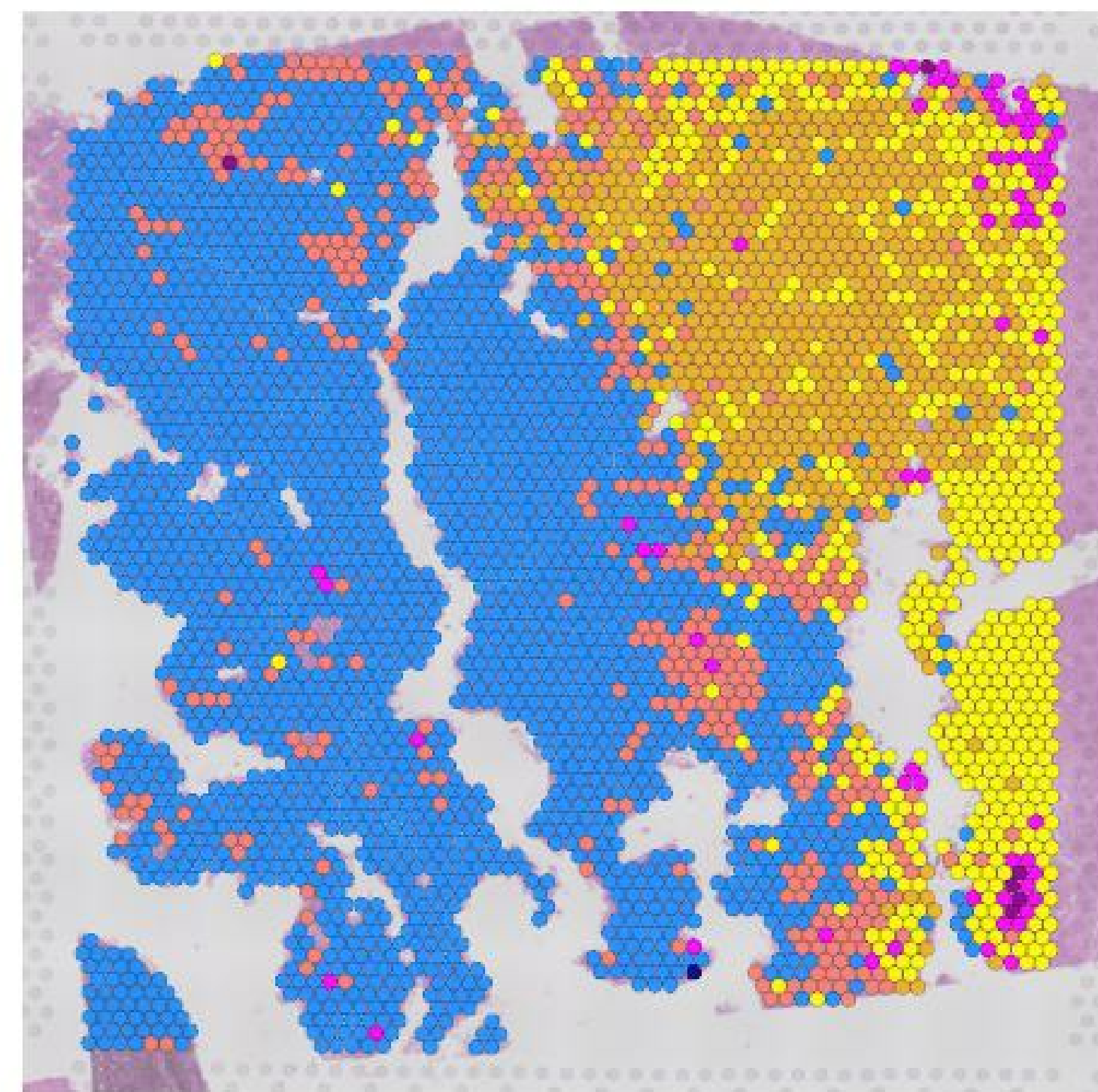


F single-cell data

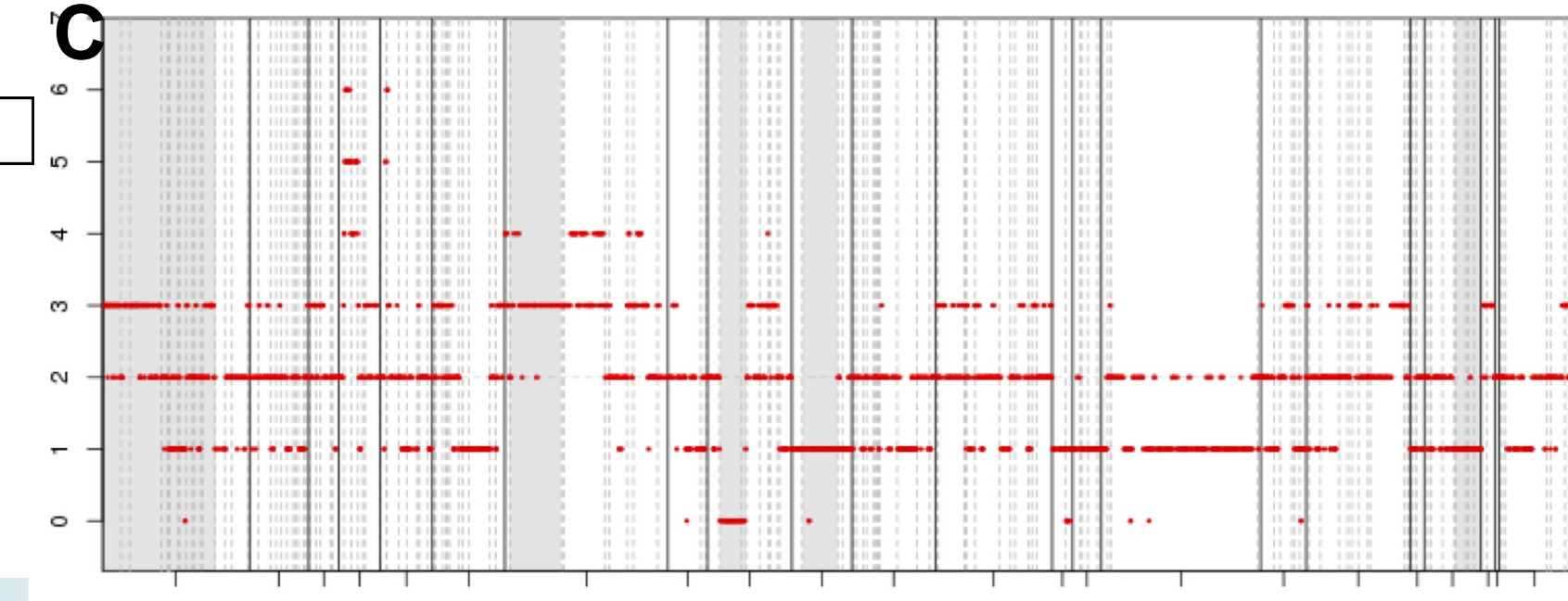
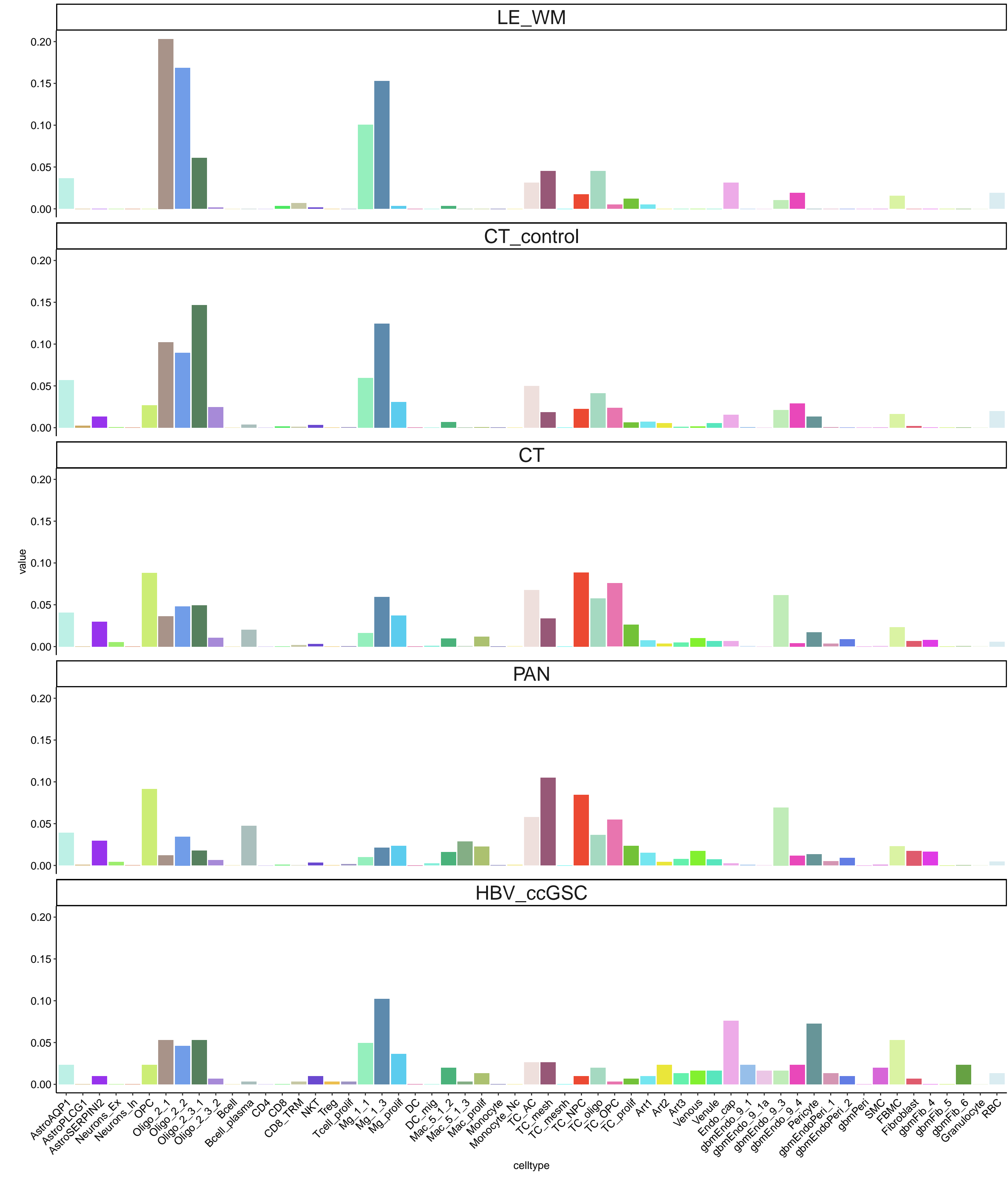
A SNU16B_GBM



slide 2 of 2

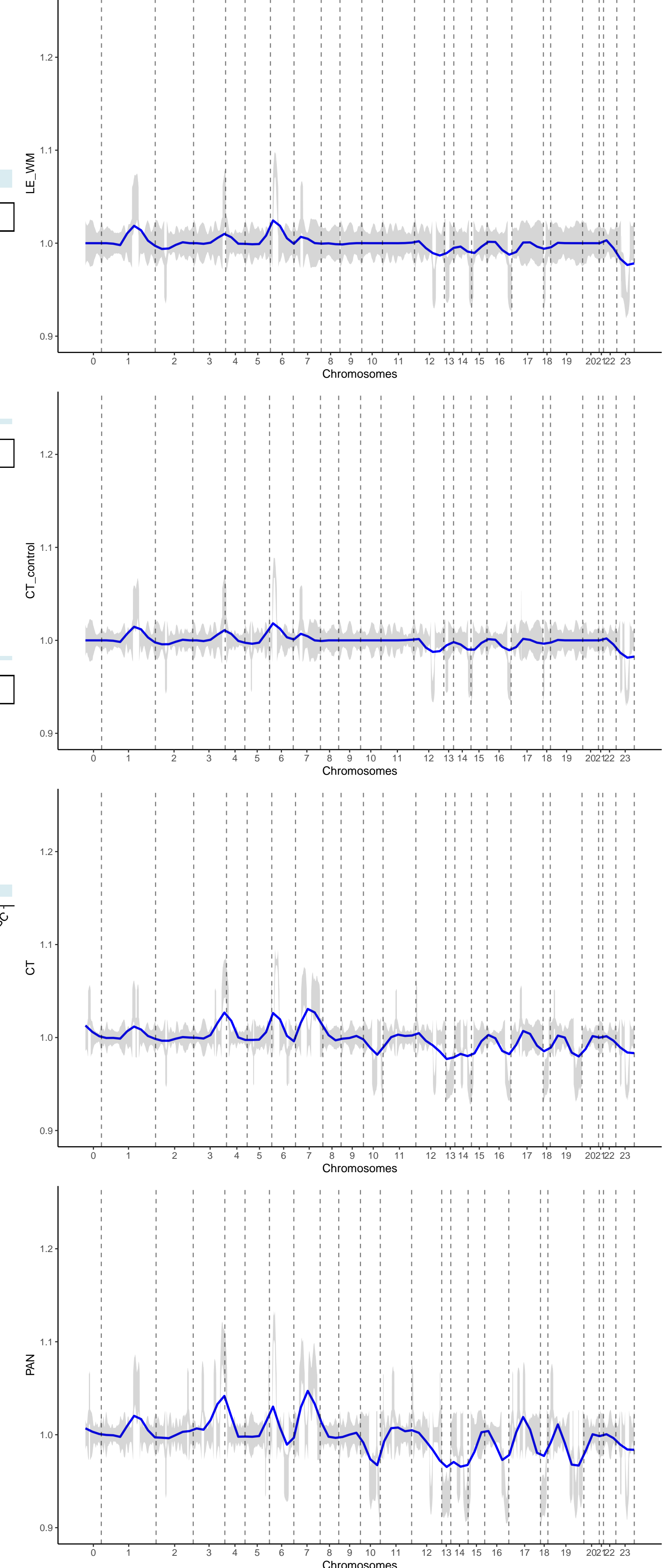


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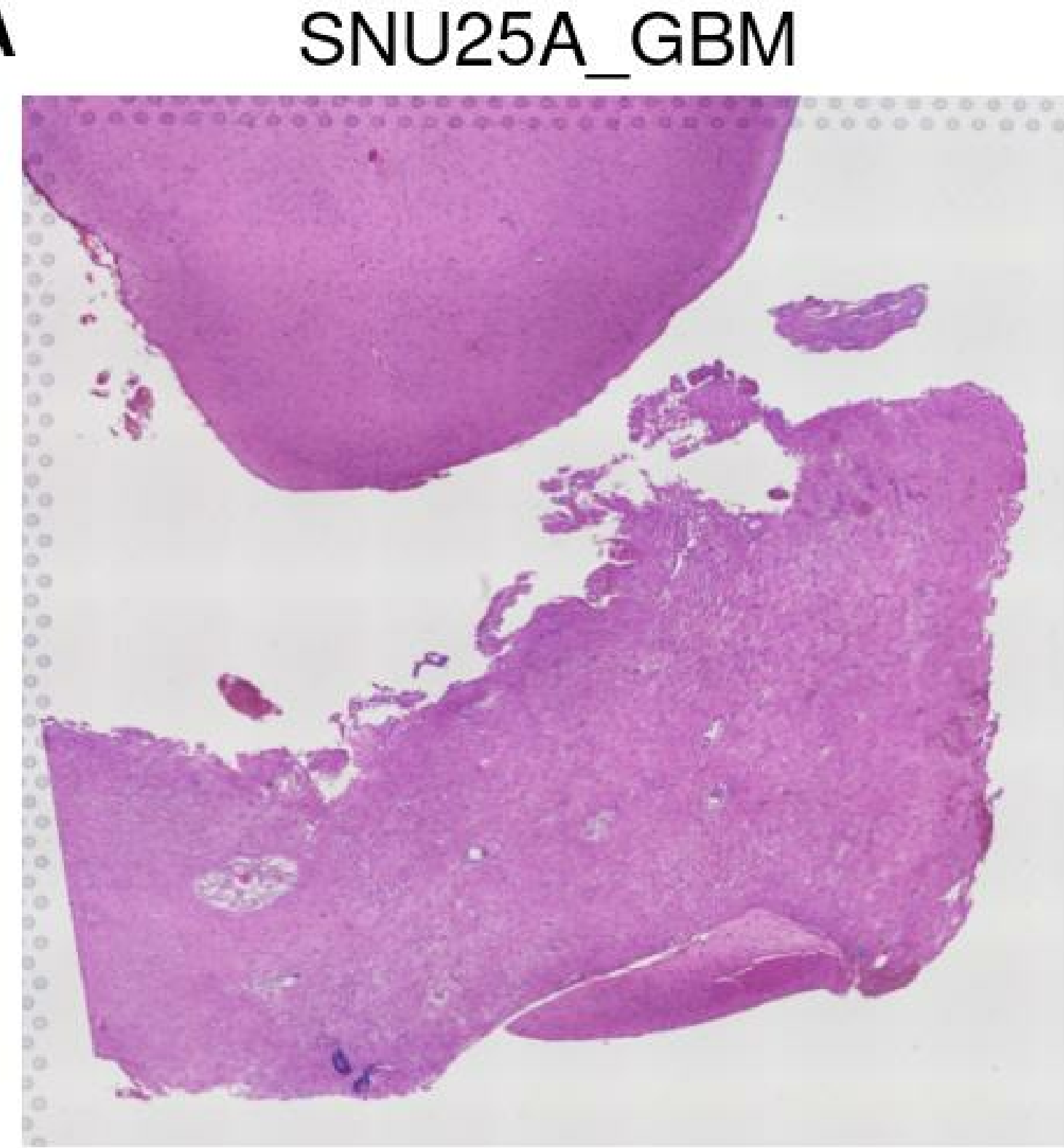


Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	19q only deleted	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TERTp mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	mutant (p.Tyr236Cys, c.707A>G); mutant (p.Ser94fs, c.273_278dupGCCCCCTG)	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

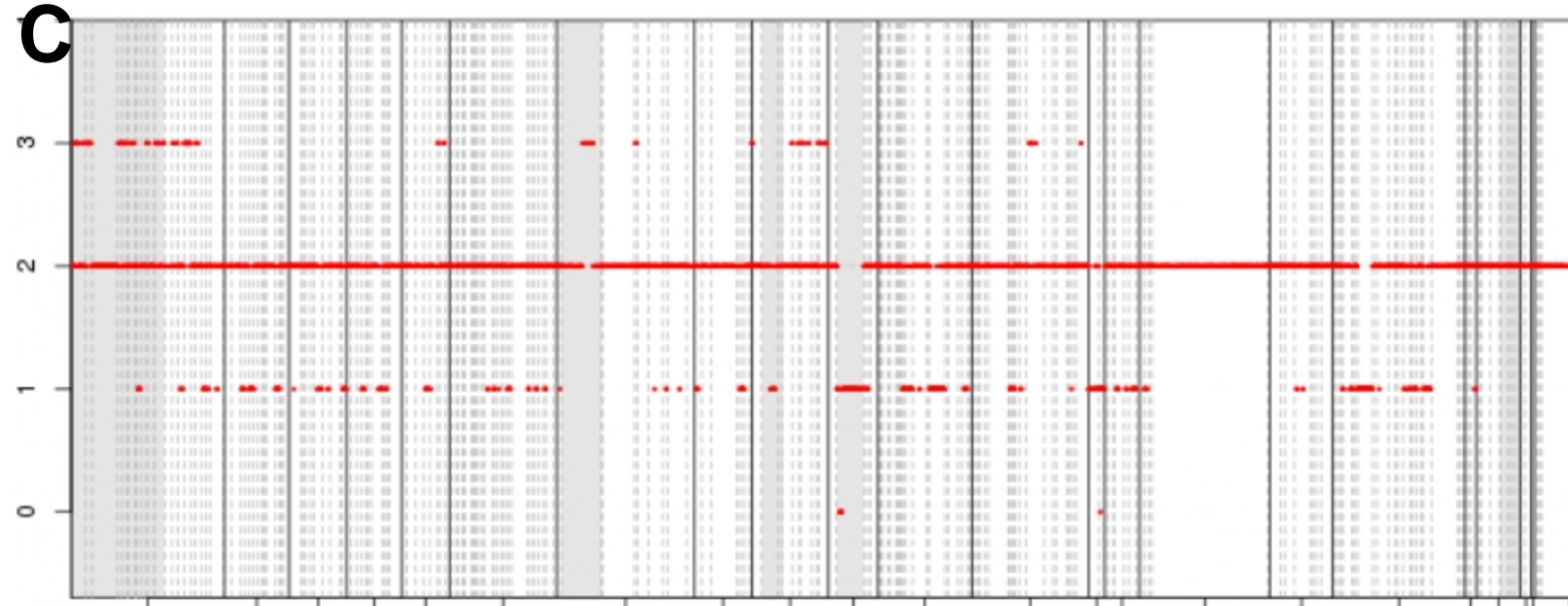
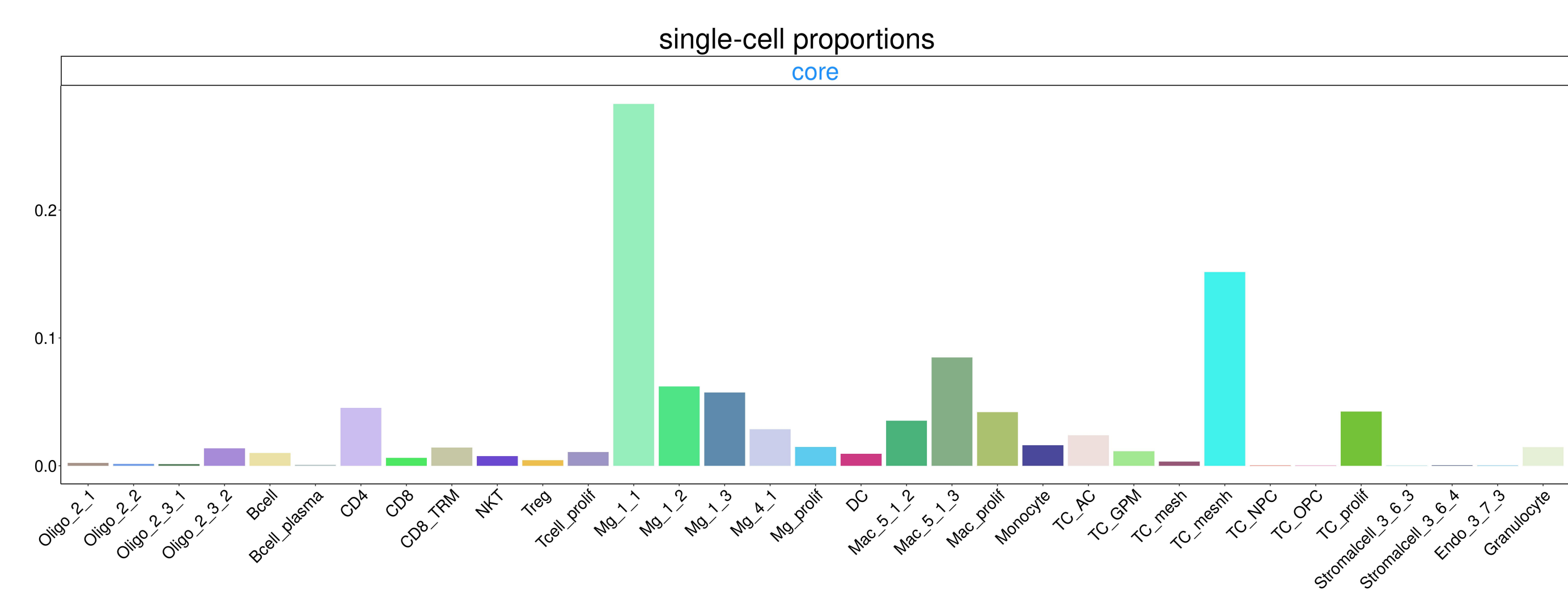
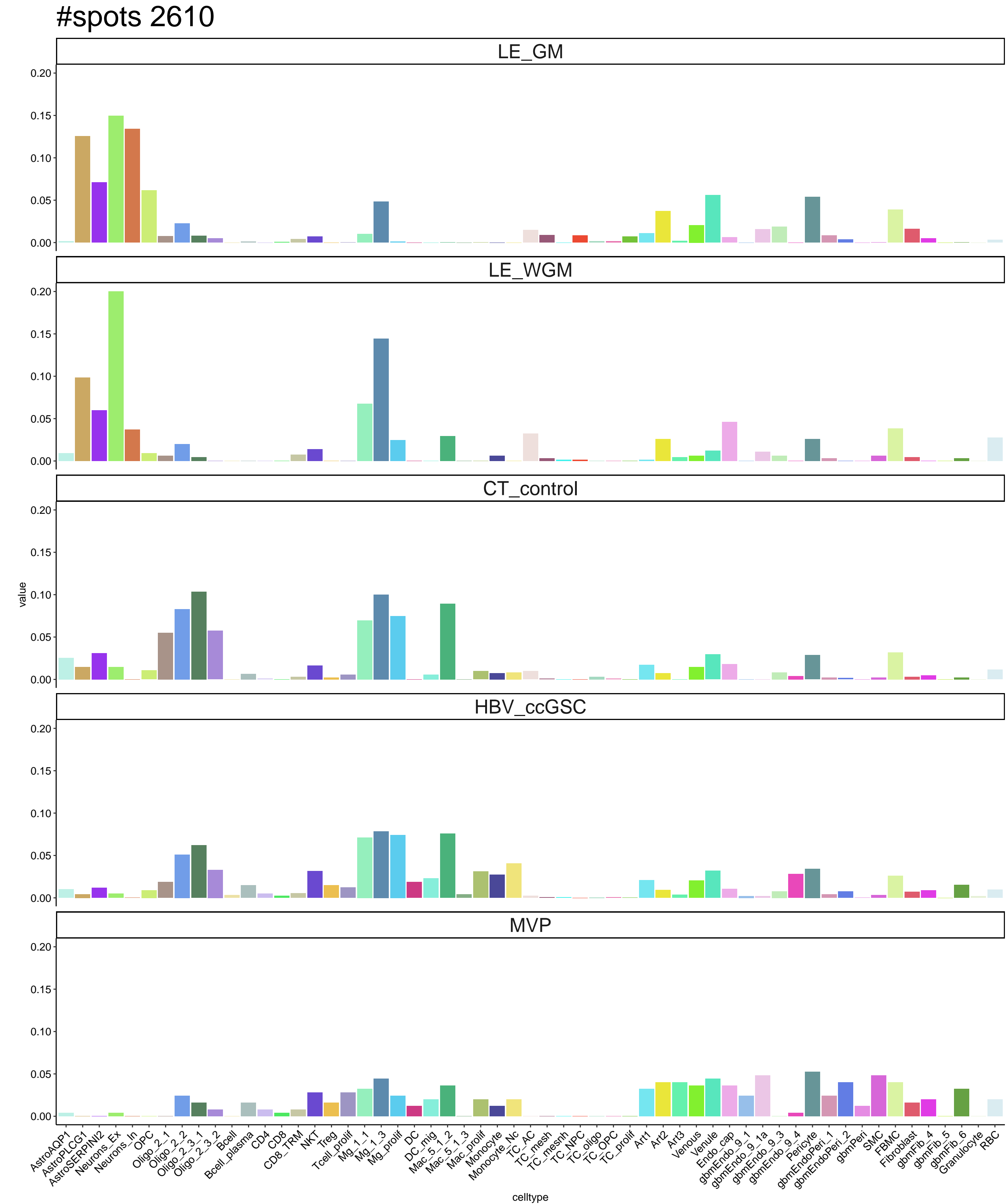
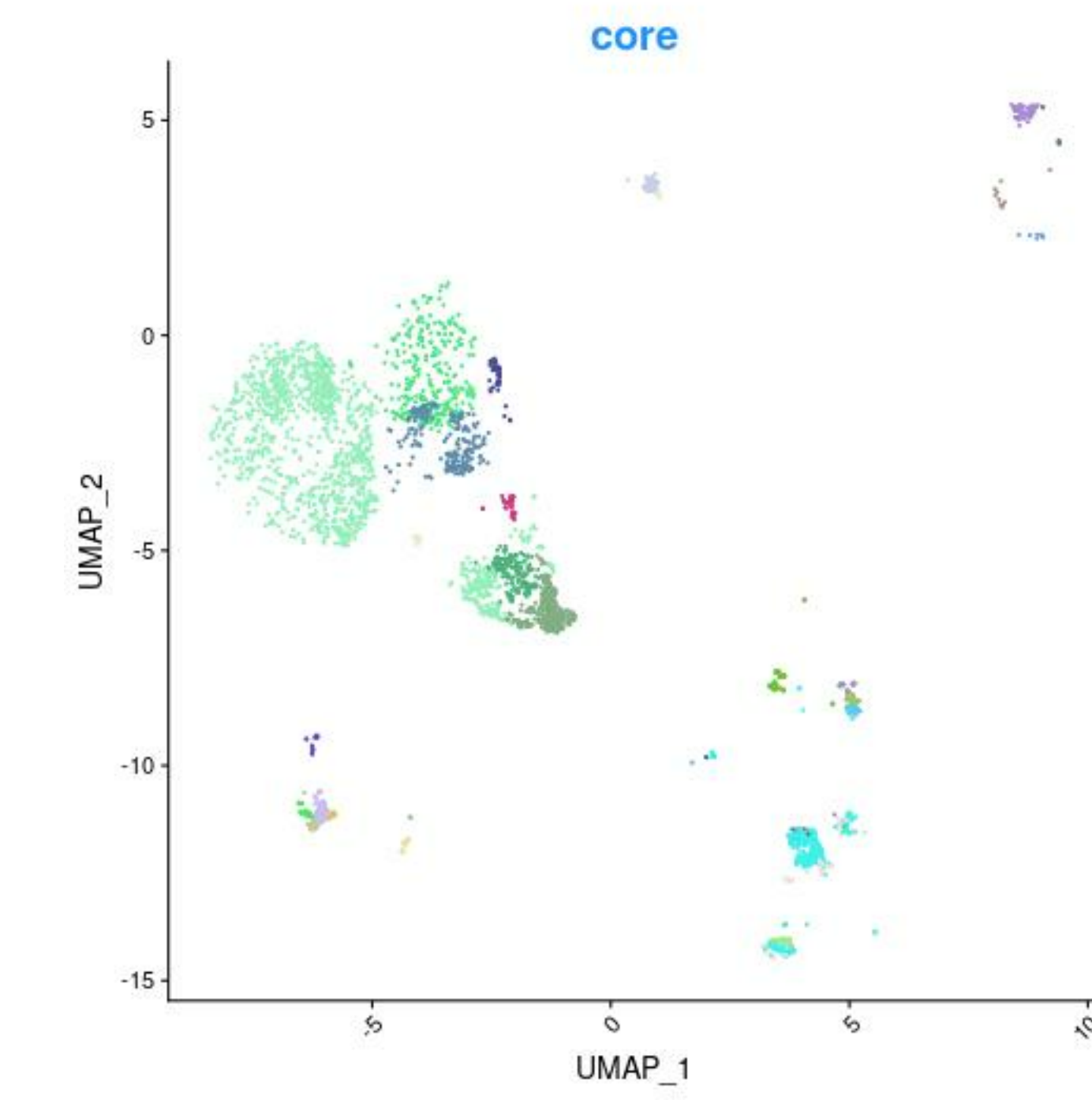
E Spatial data



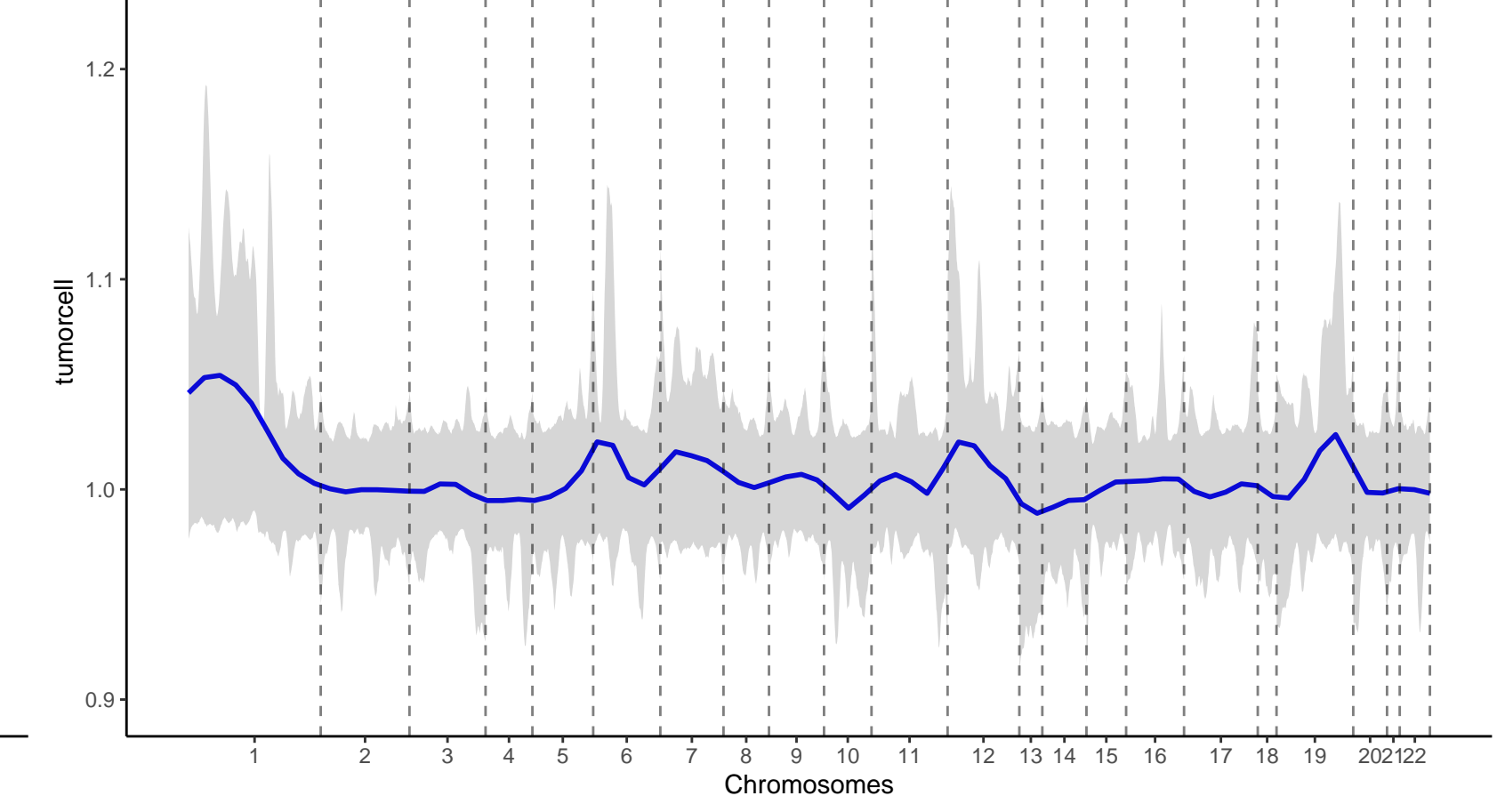
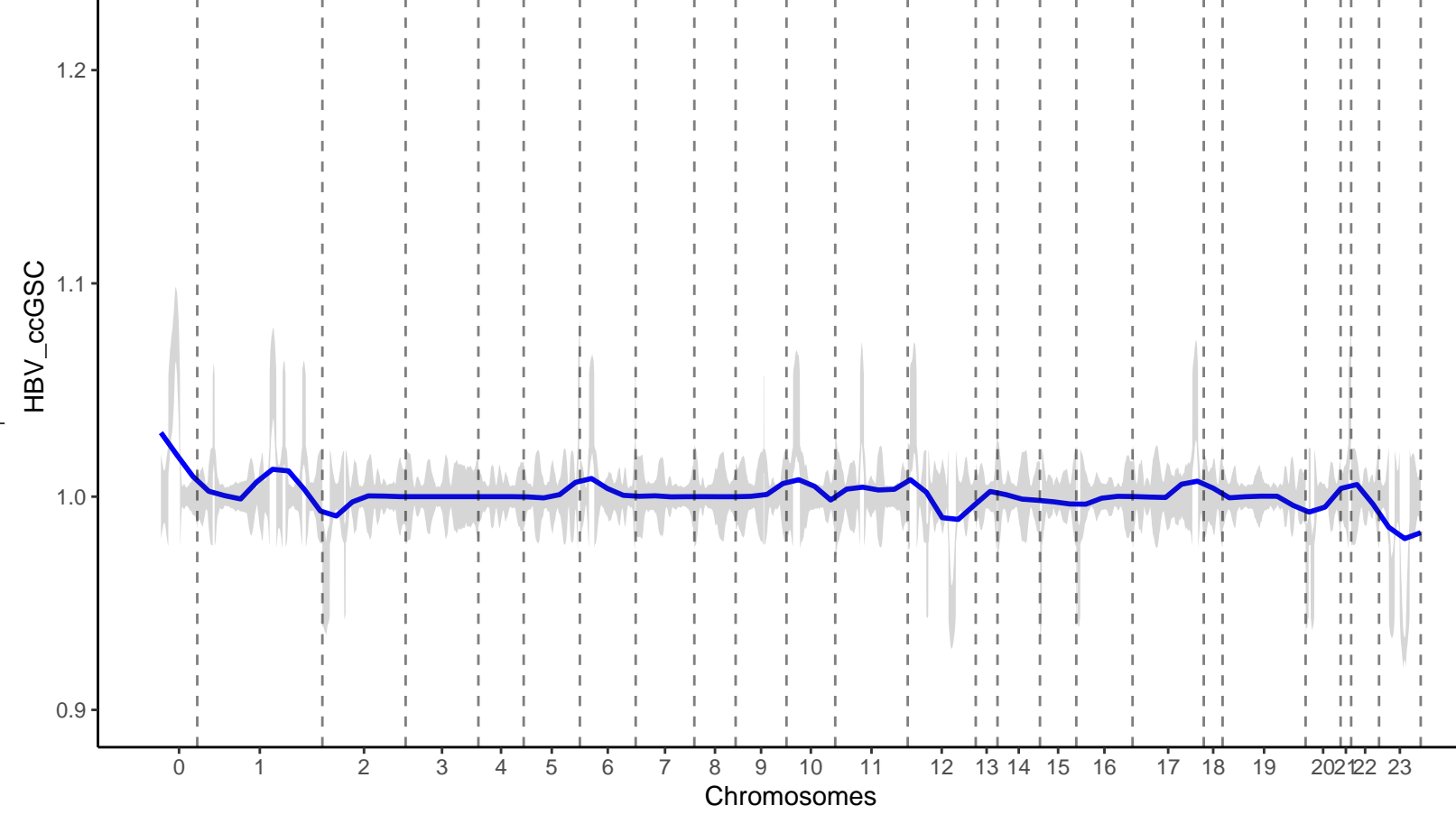
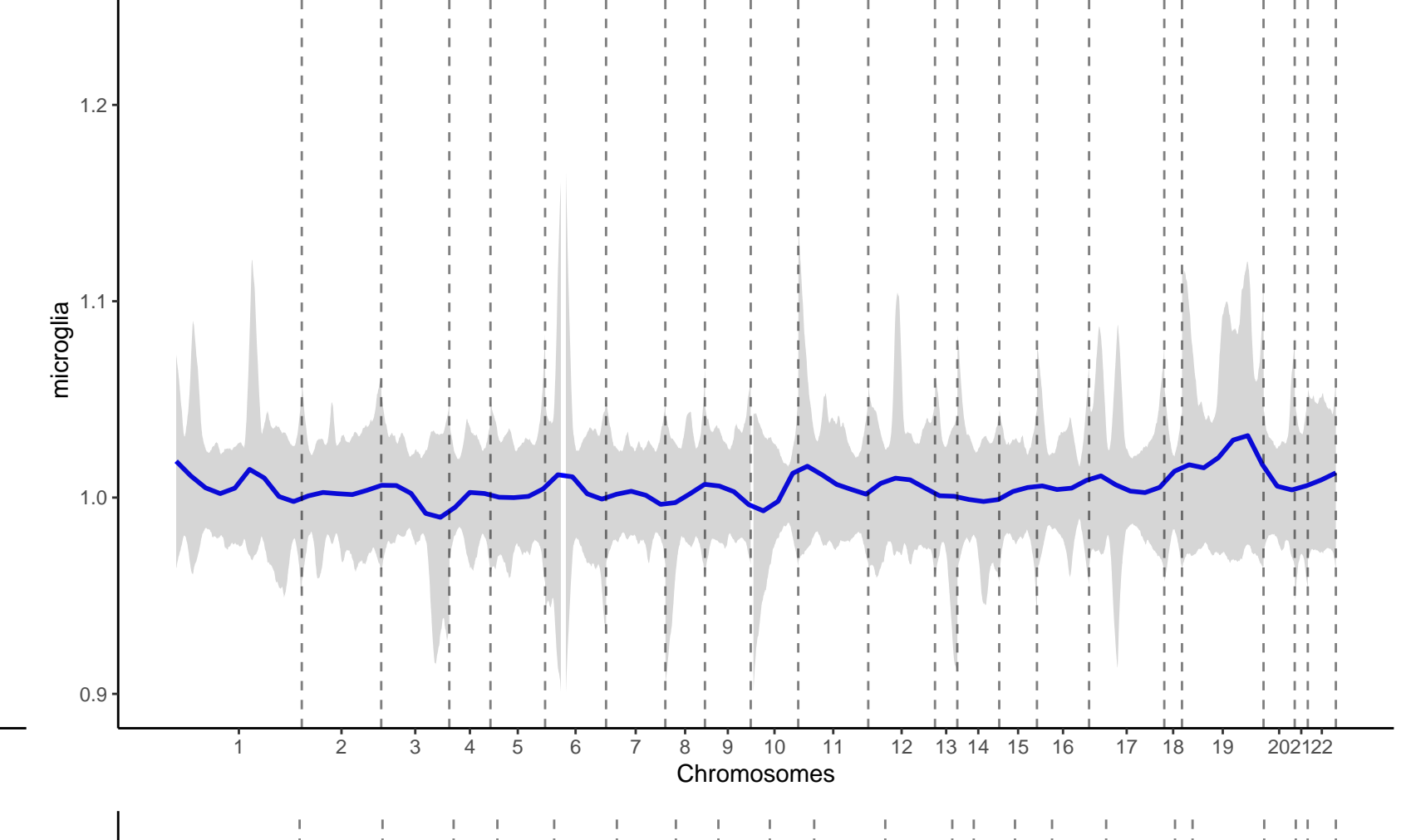
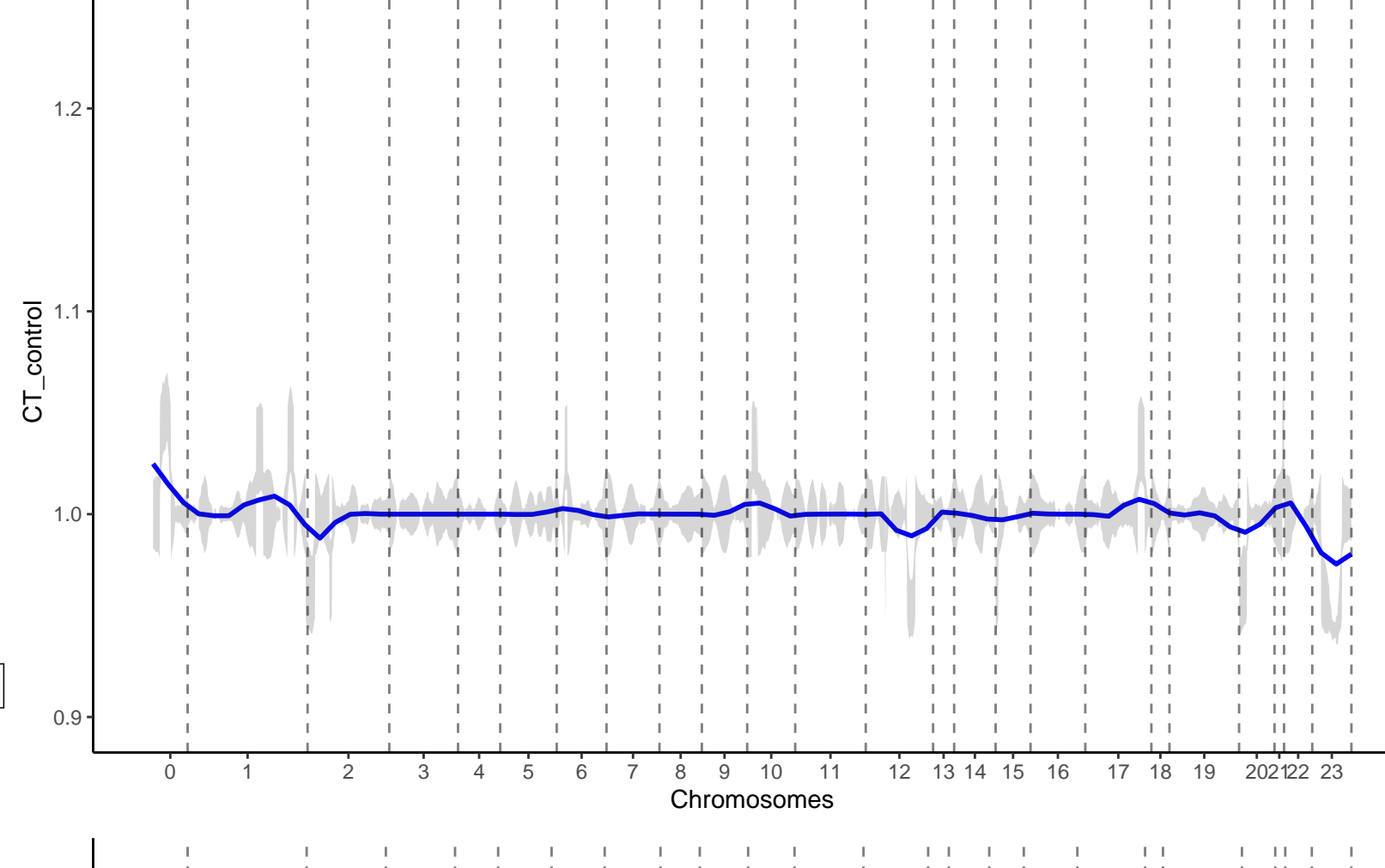
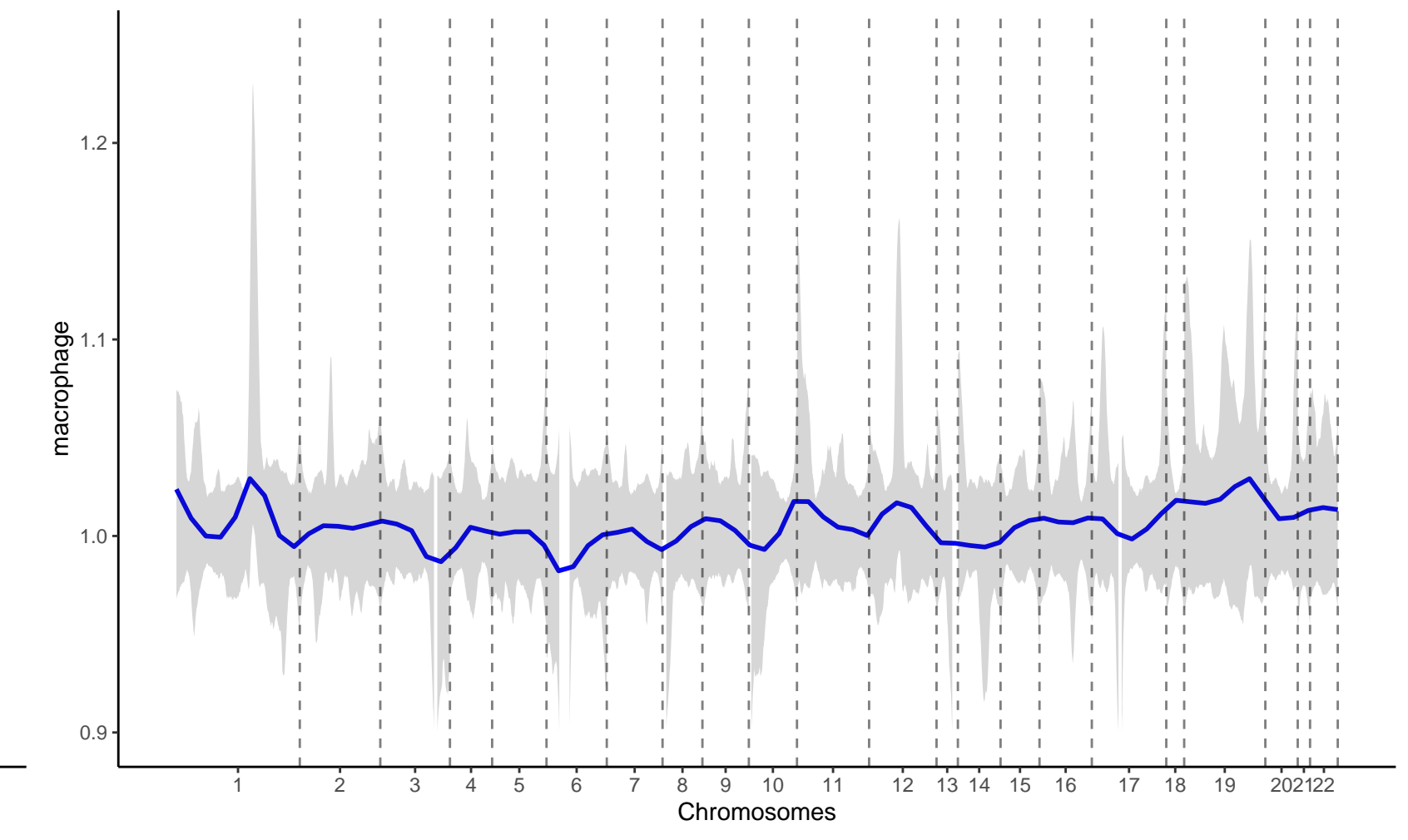
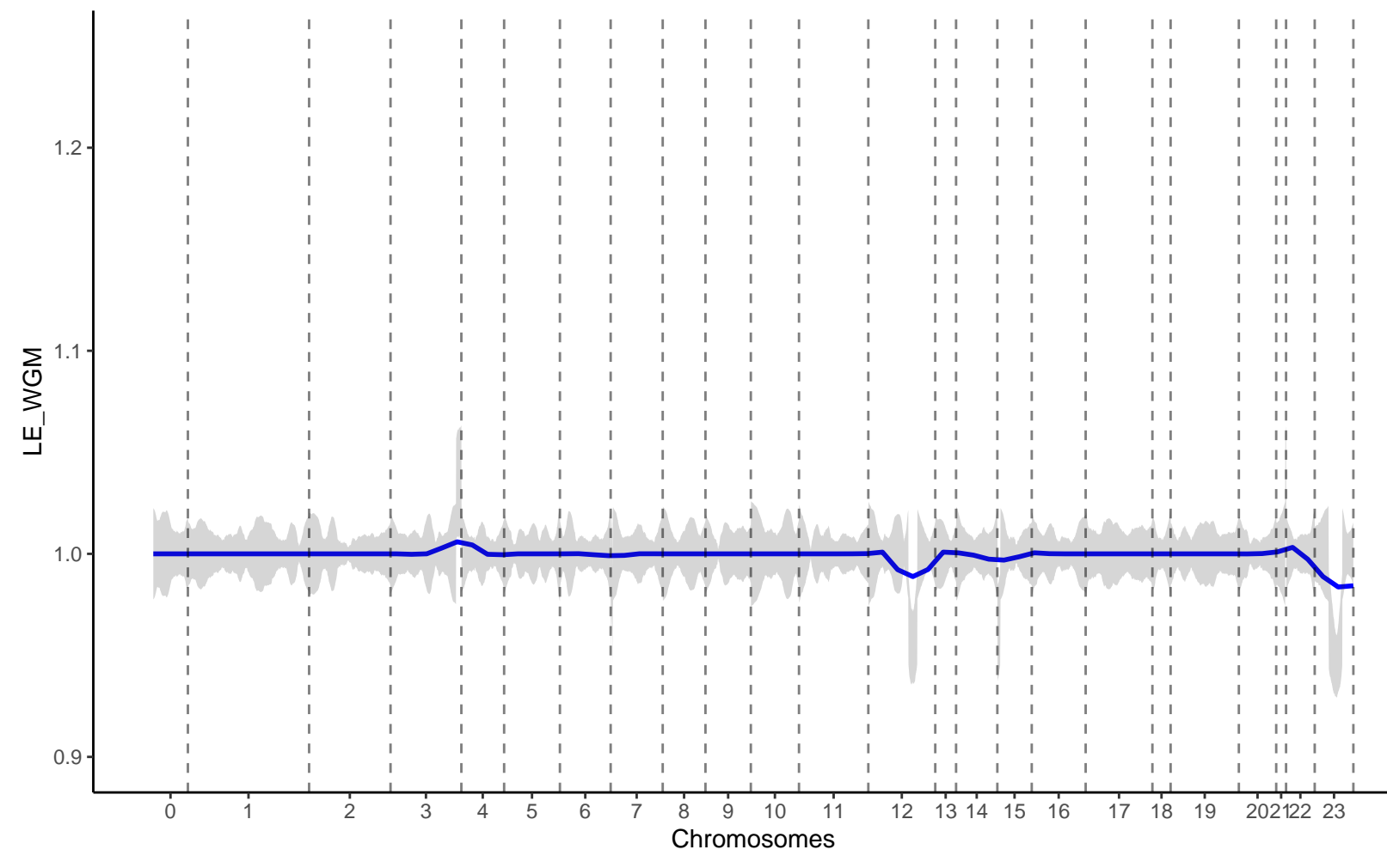
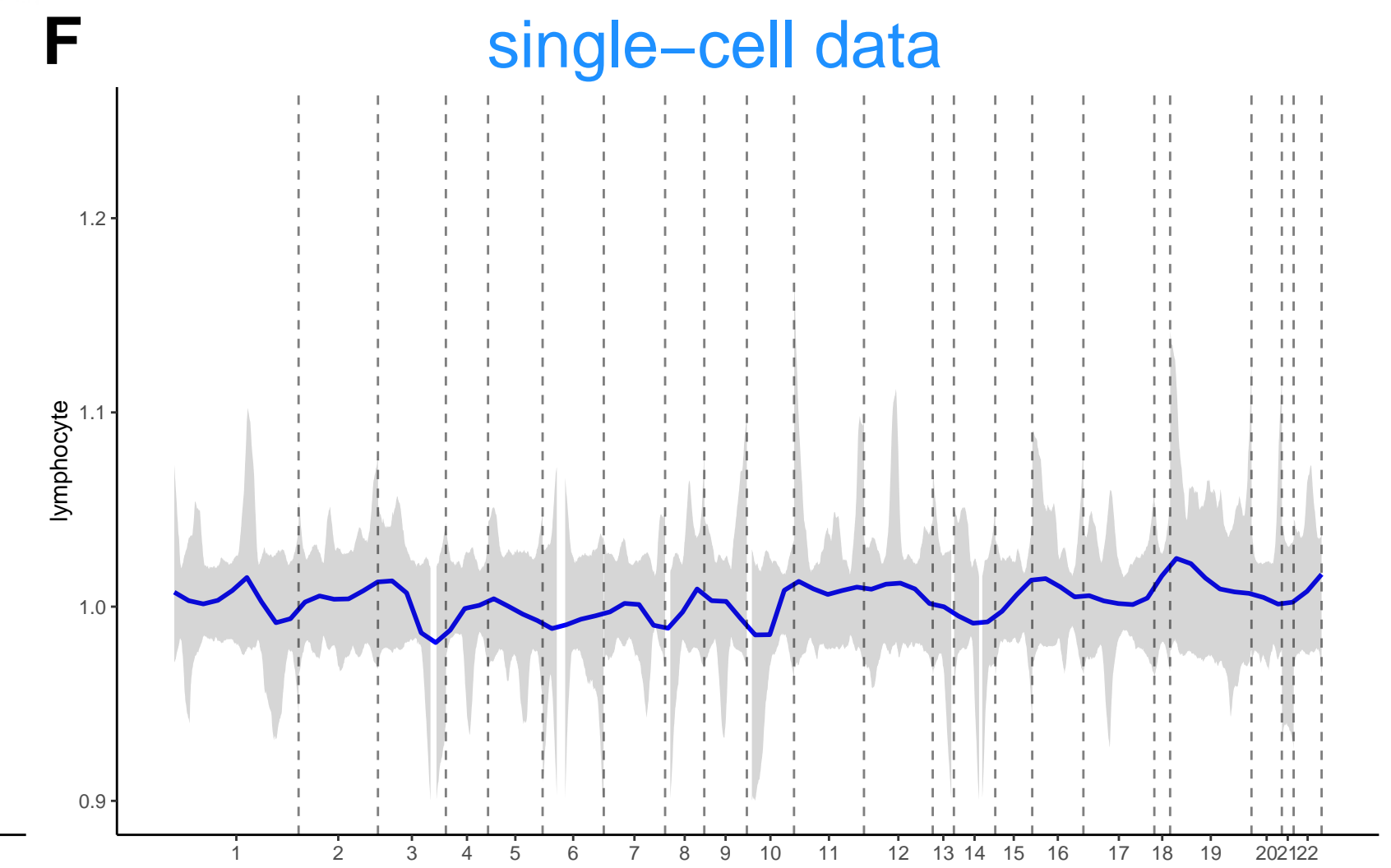
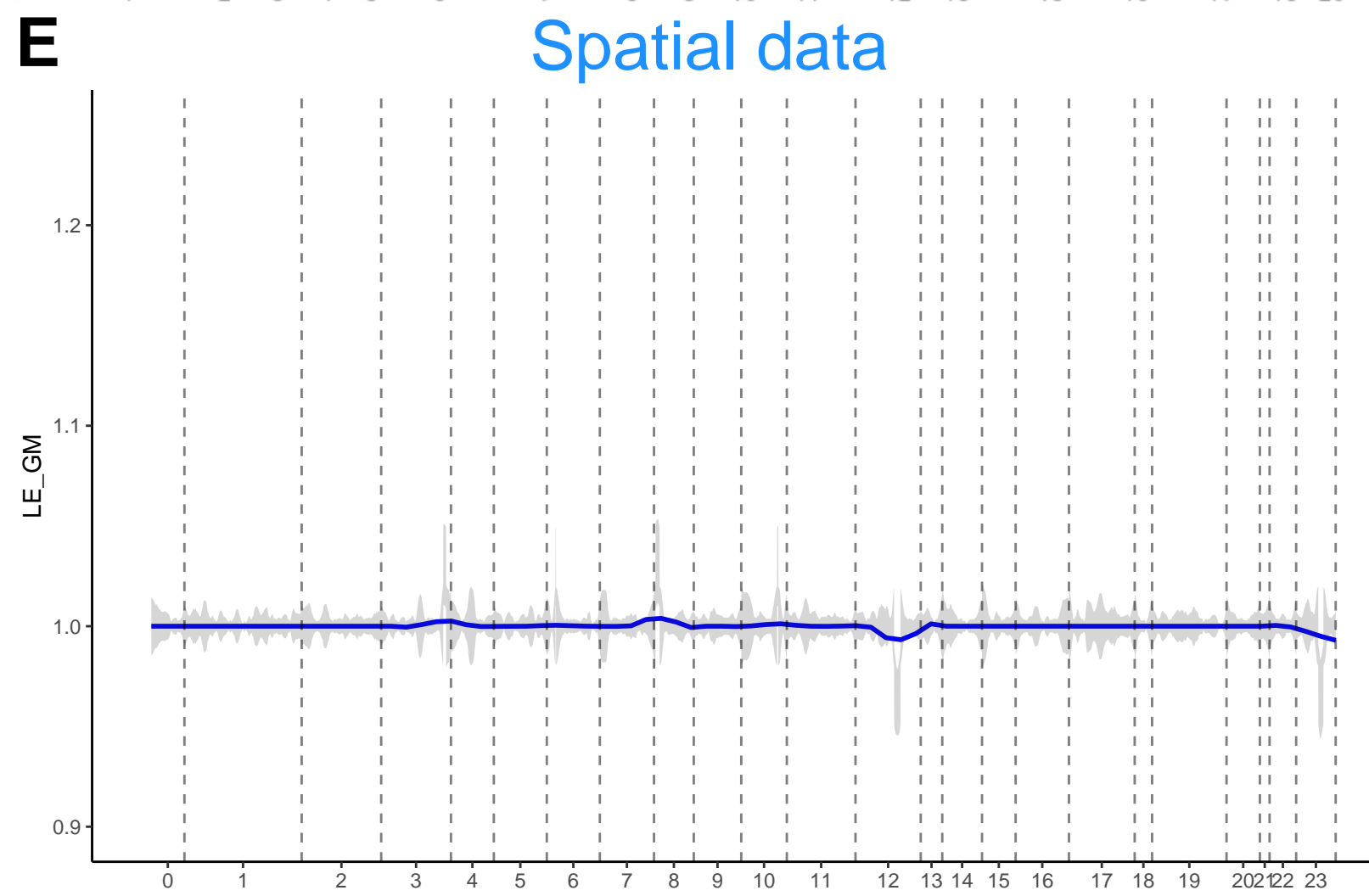
F single-cell data

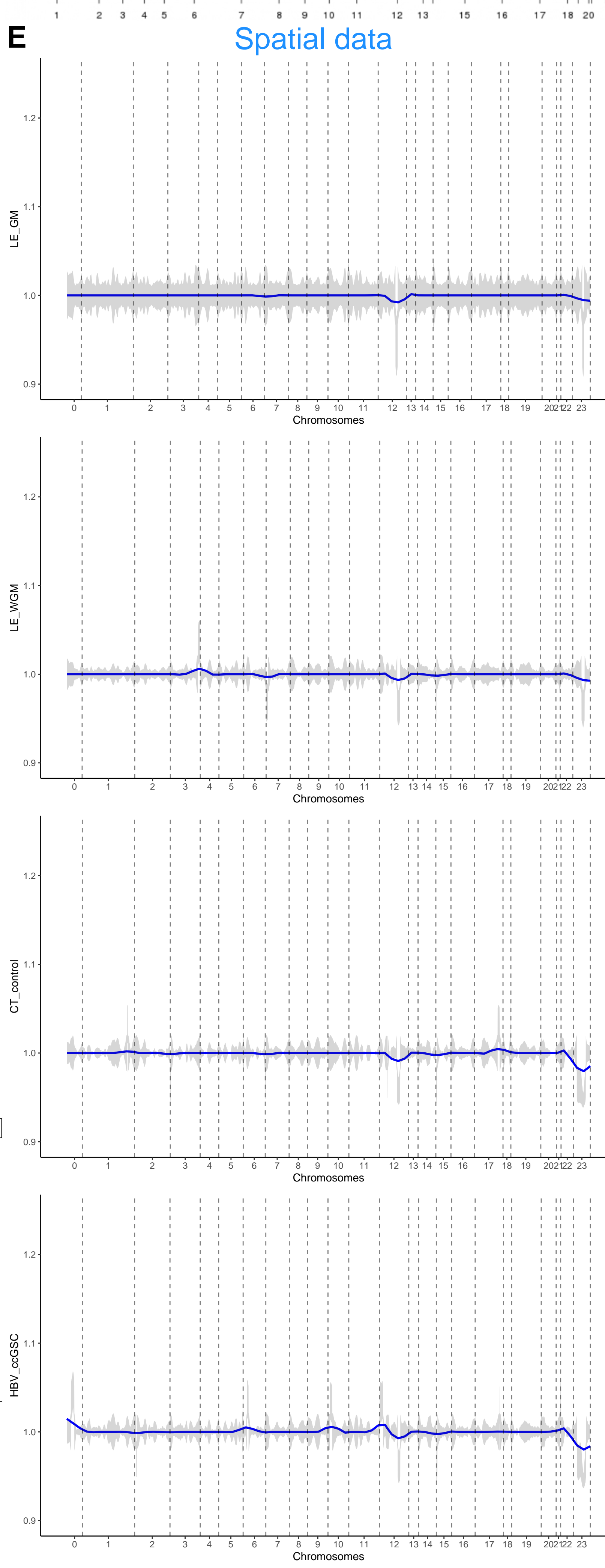
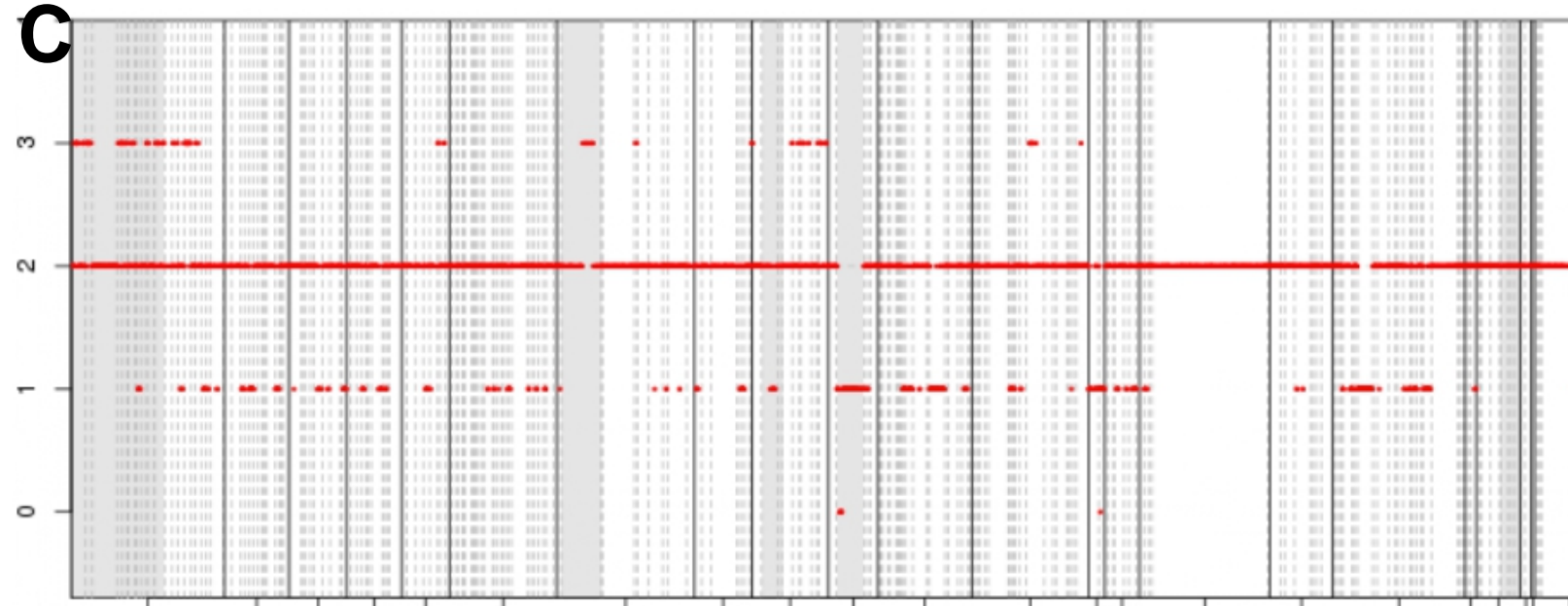
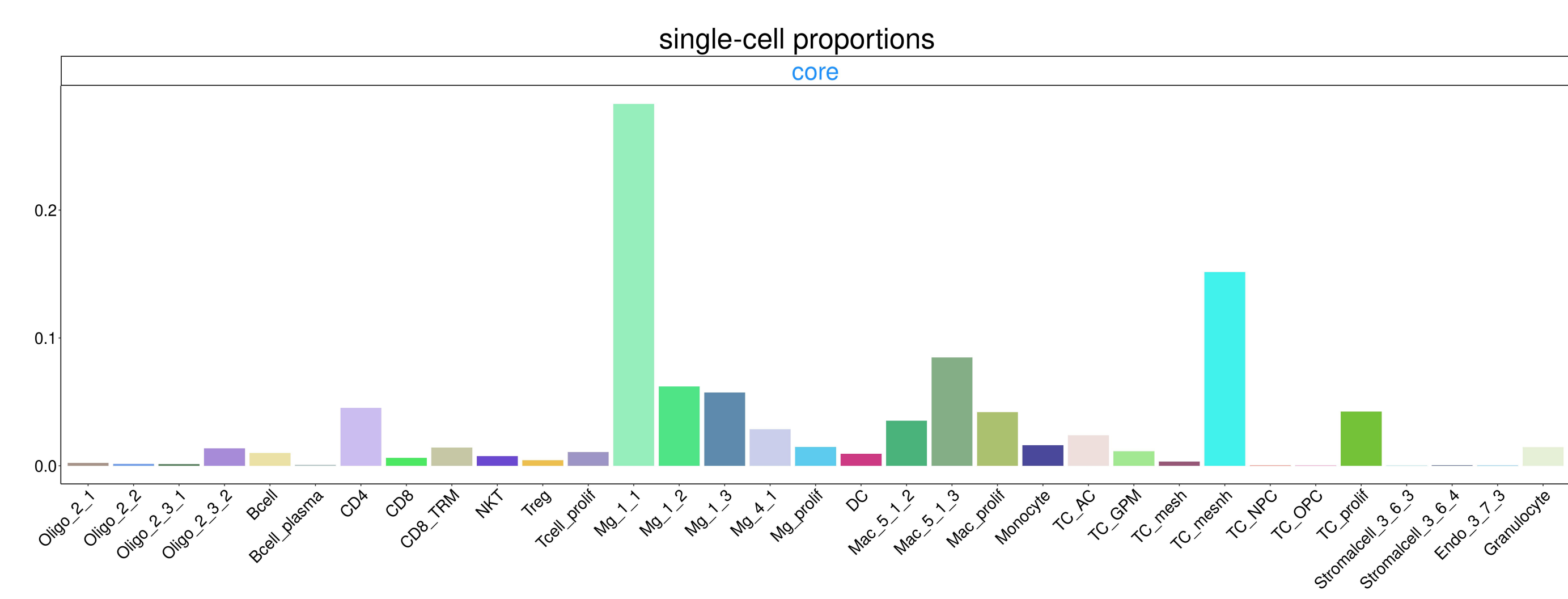
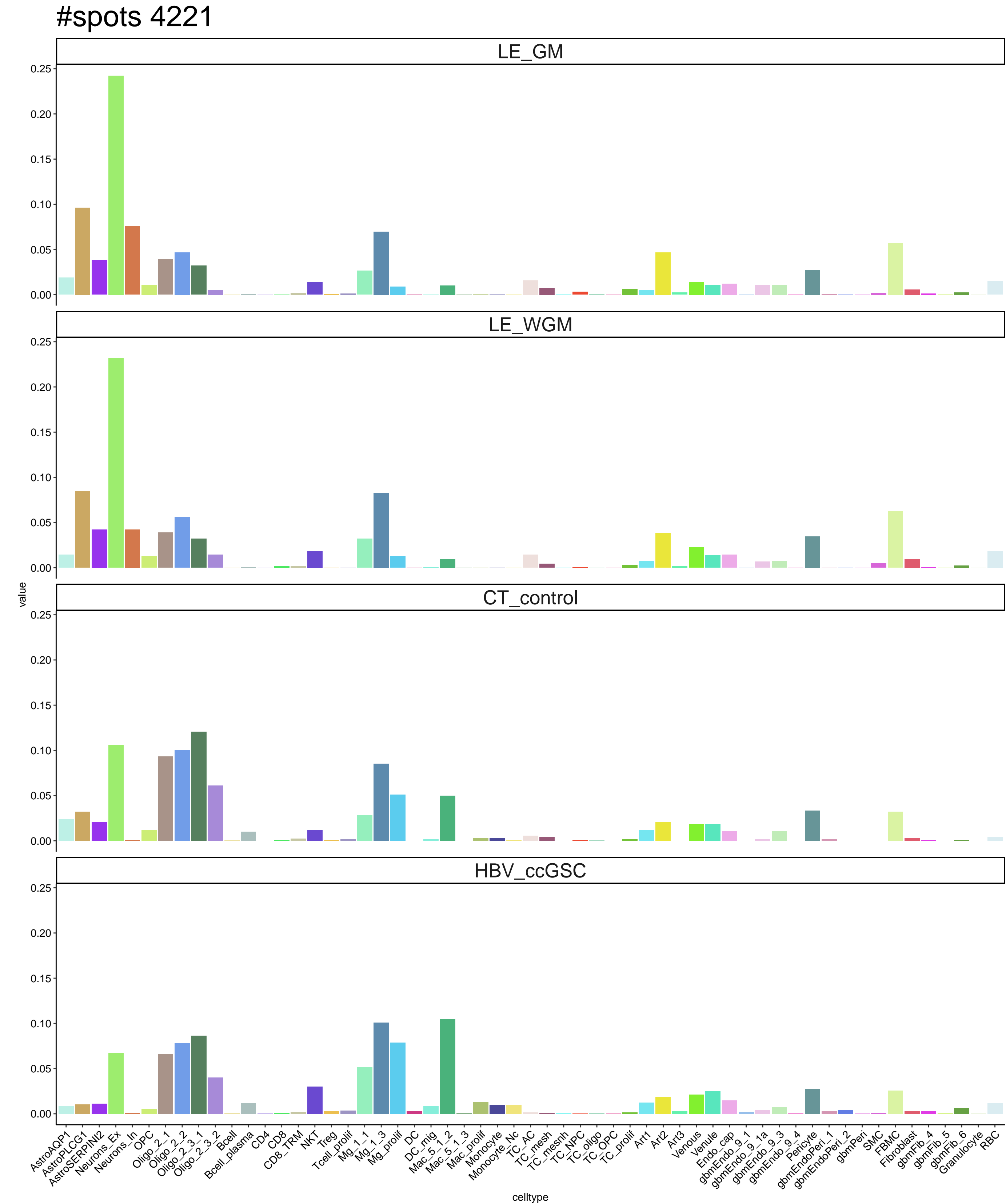
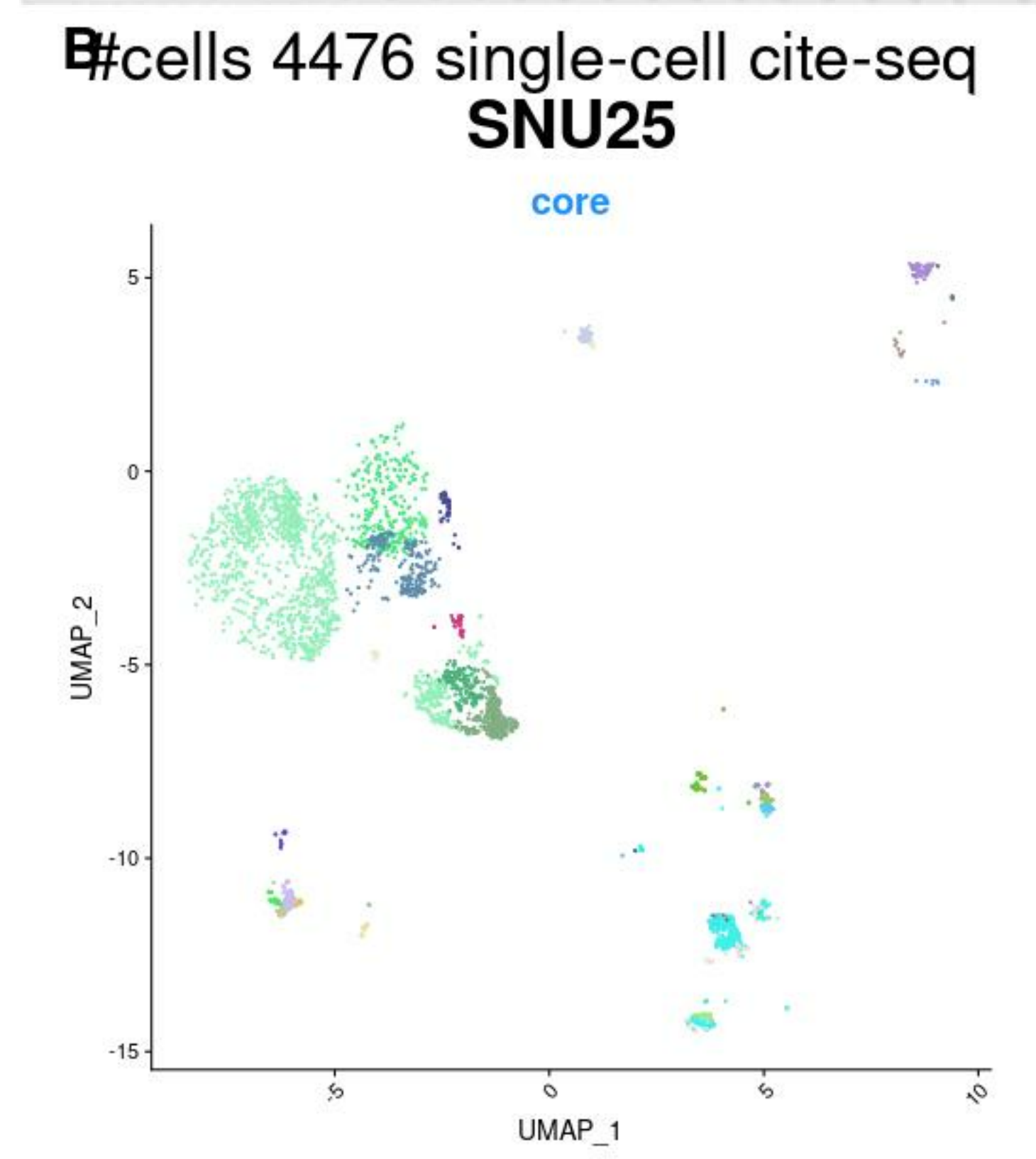
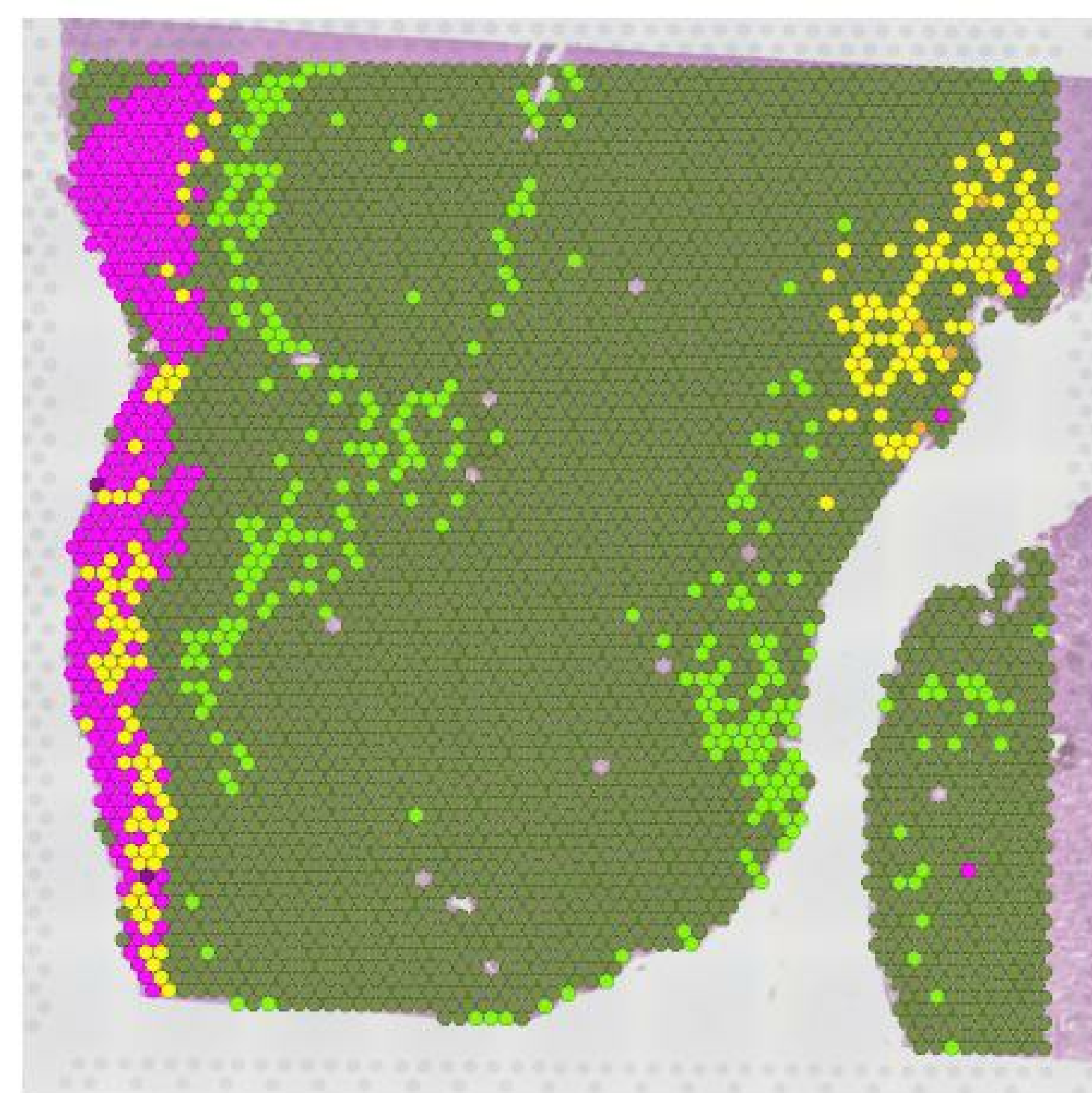


#cells 4476 single-cell cite-seq SNU25



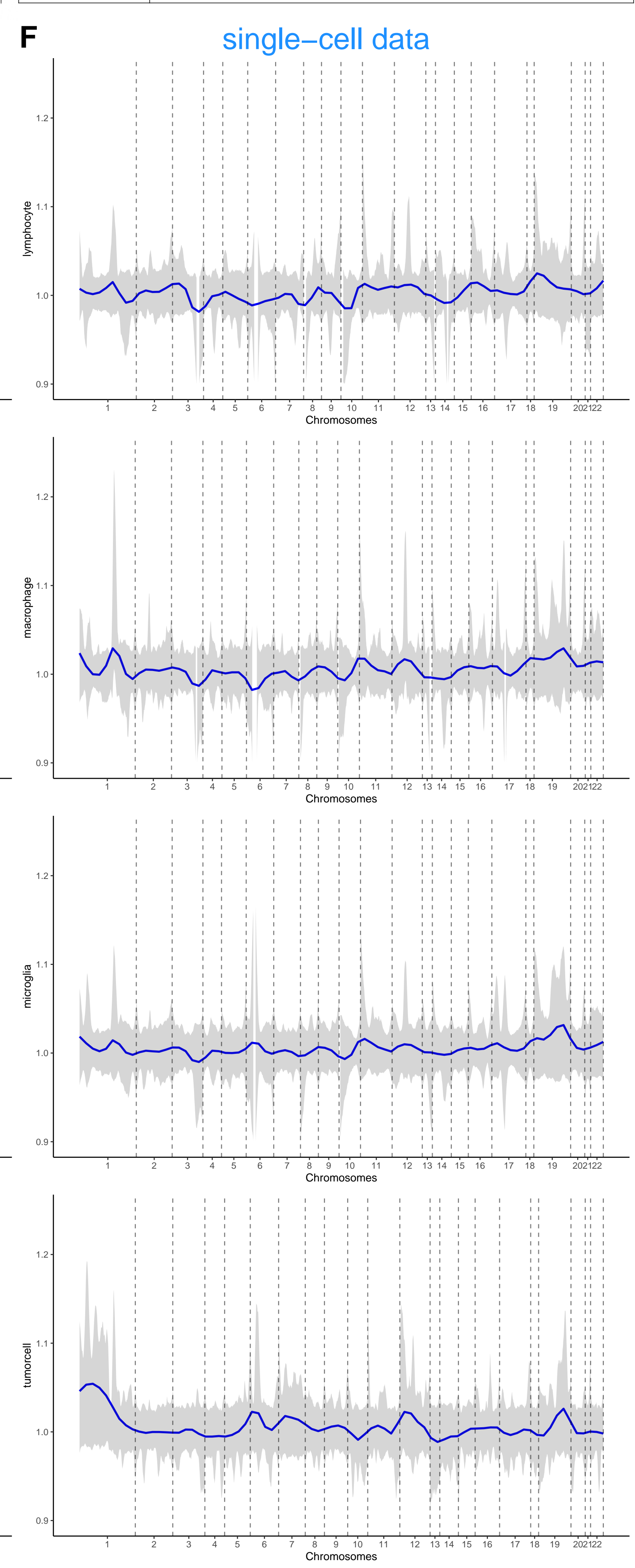
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	mutant (p.Lys643fs, c.1928_1929delAA)
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	mutant (C228T, c.-124C>T)	NF1 deletion	hemizygous deletion
TP53 mutation	mutant (p.Gln271Lys, c.811G>A)	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

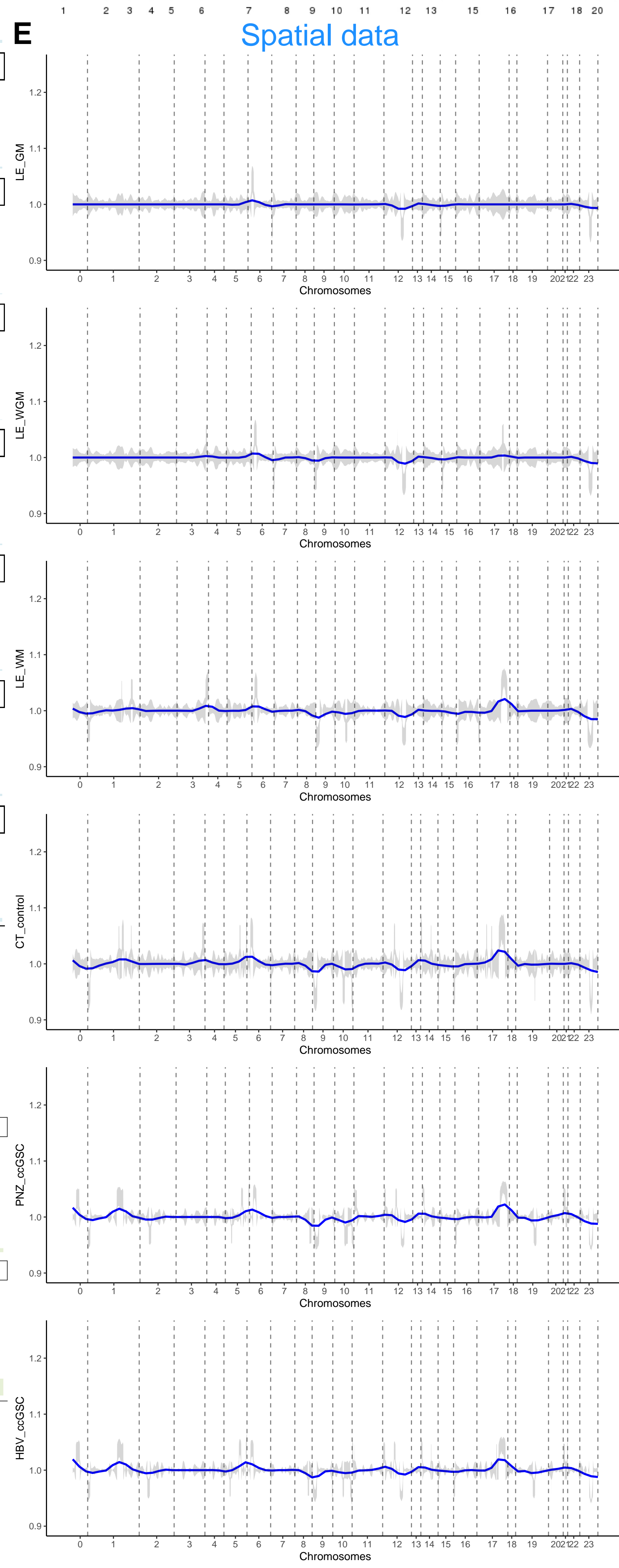
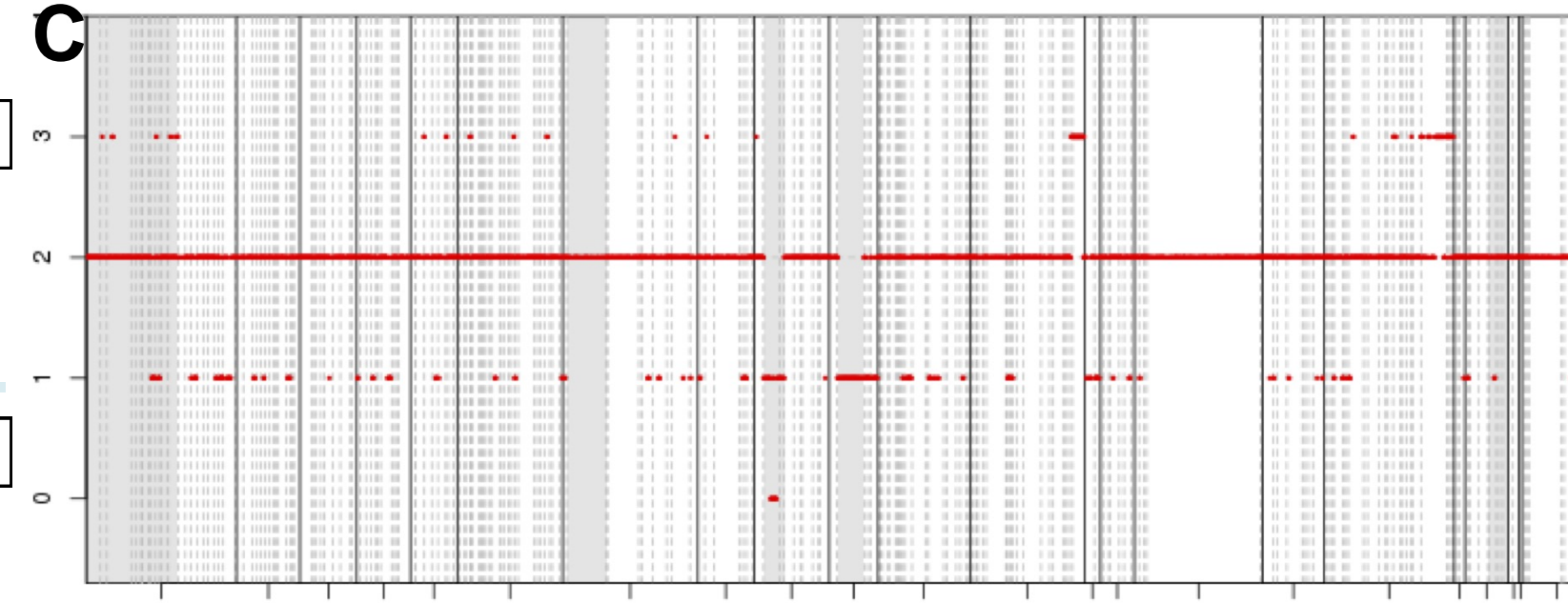
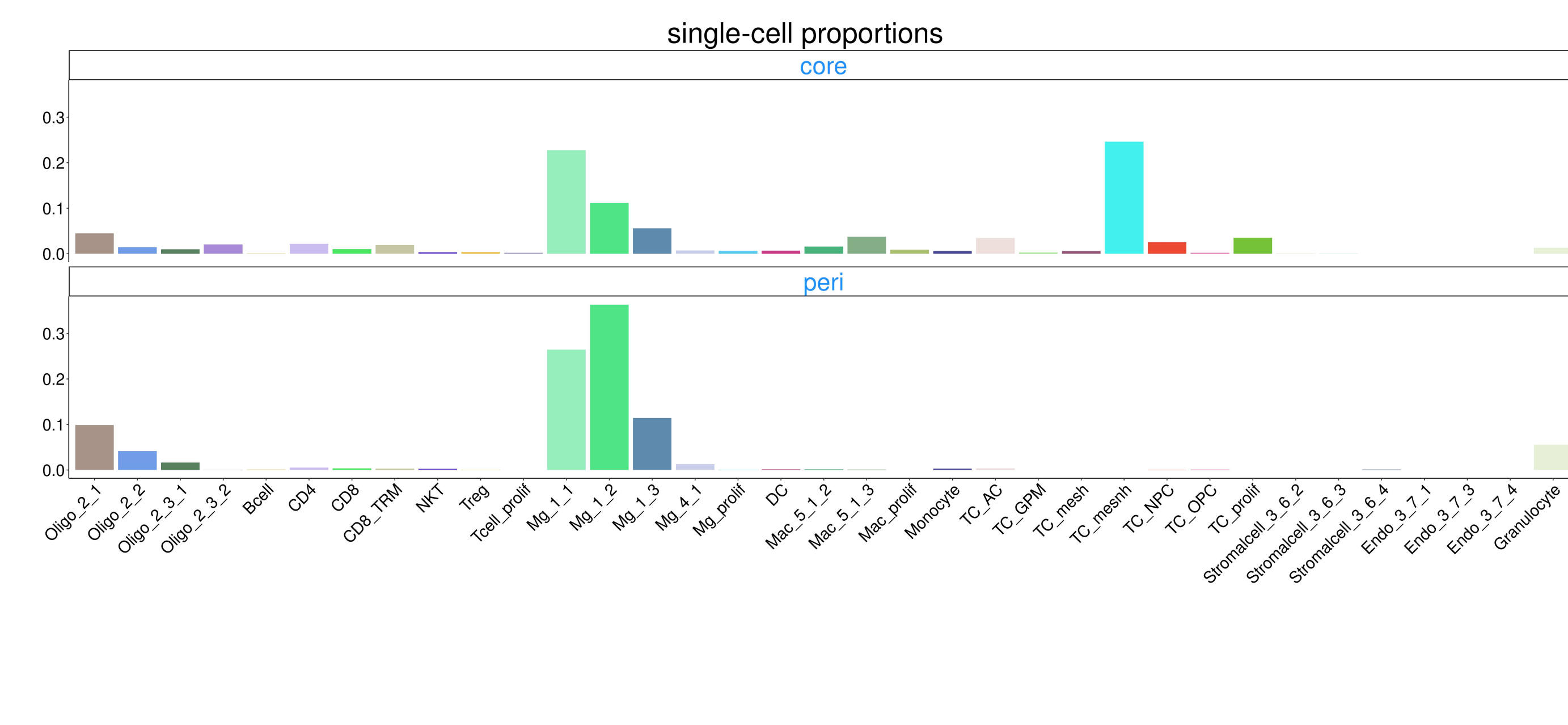
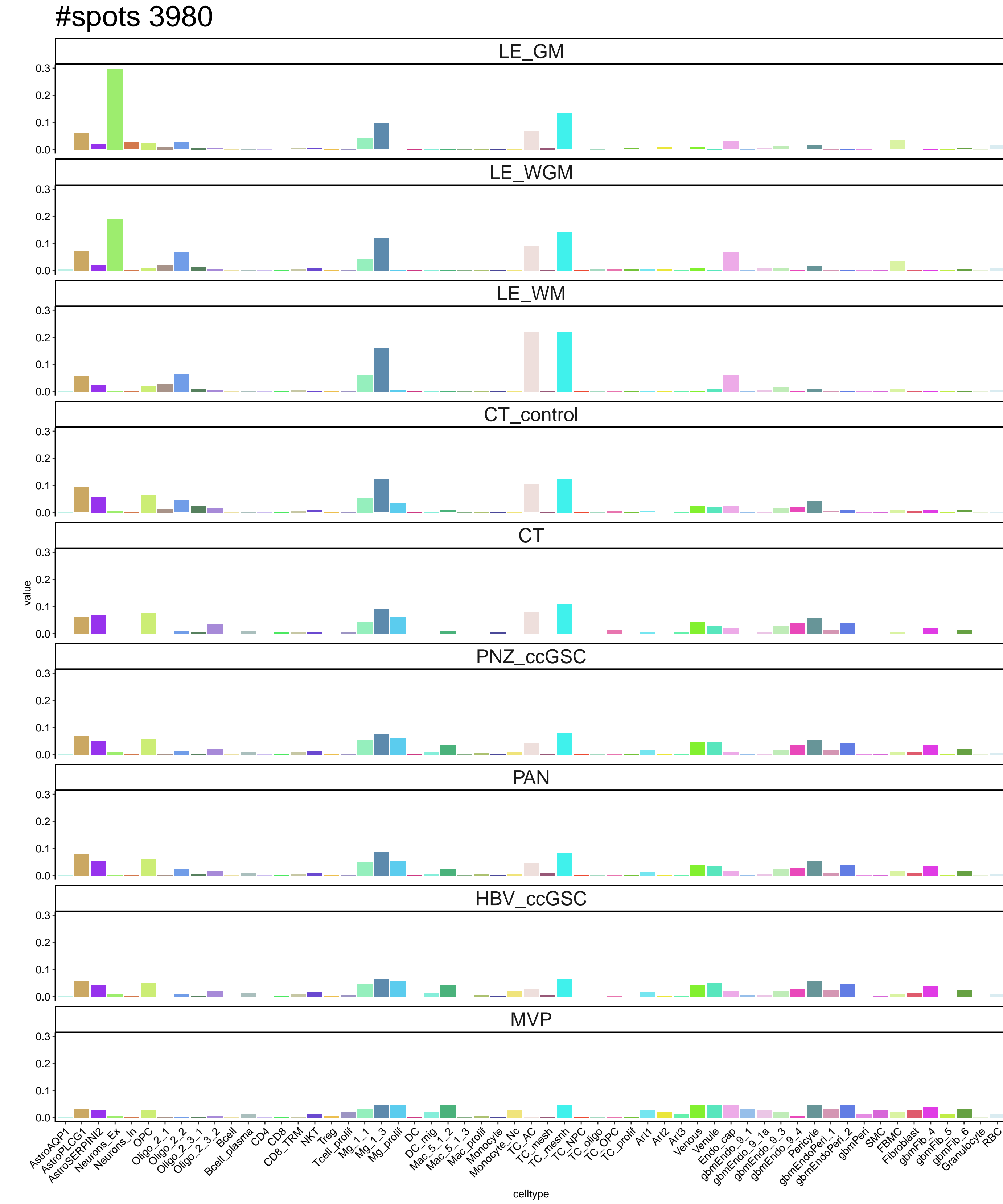
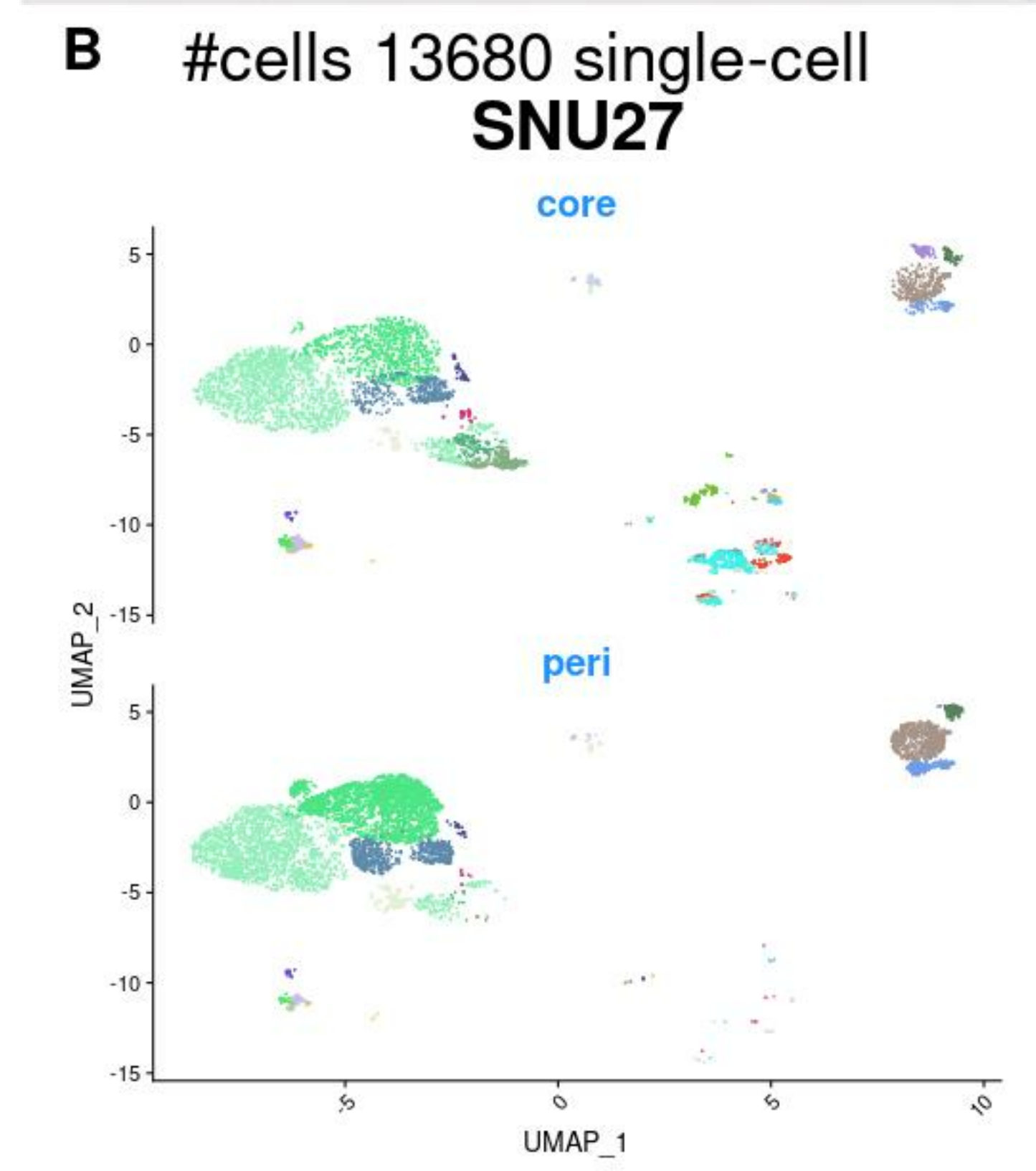
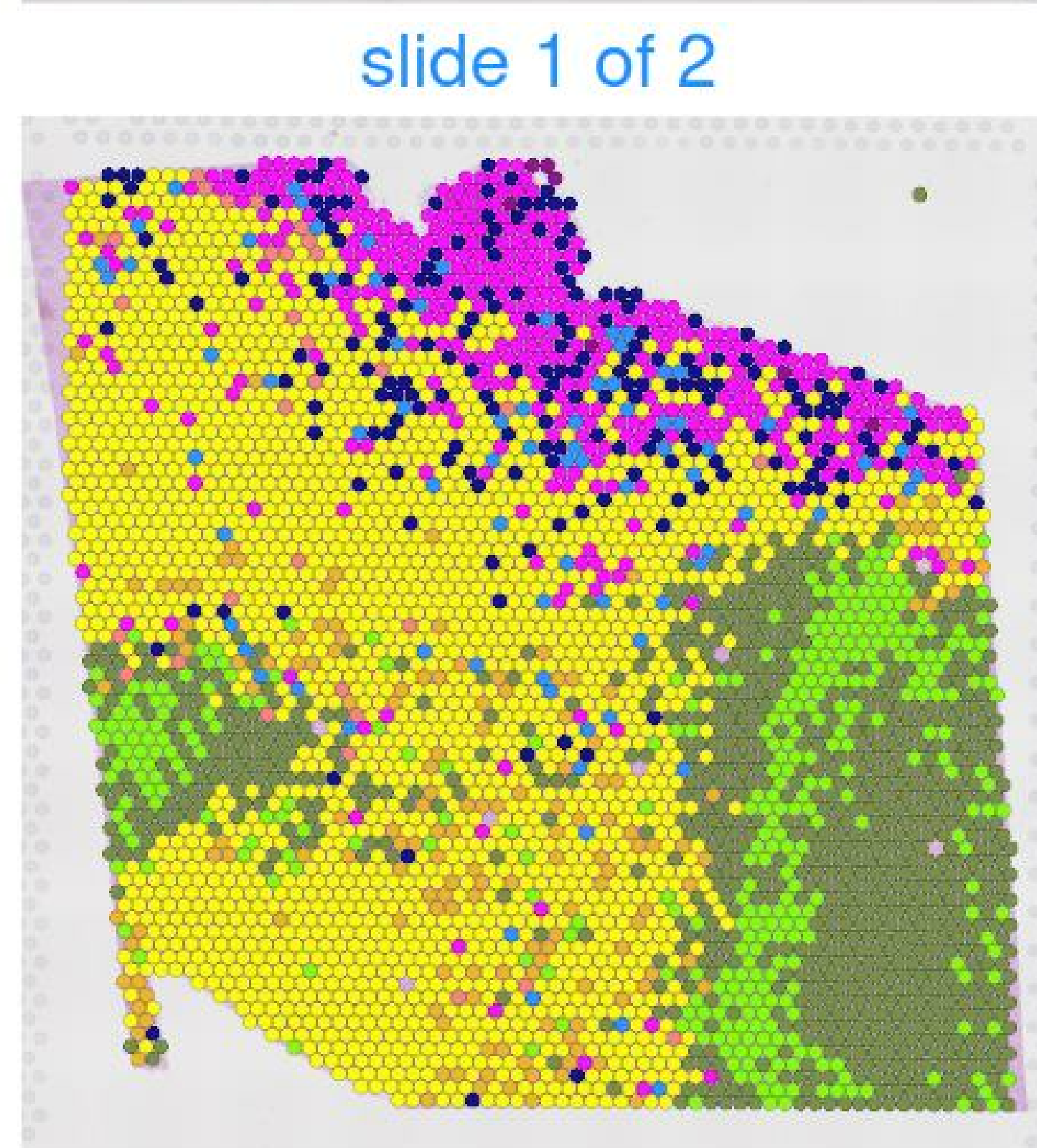
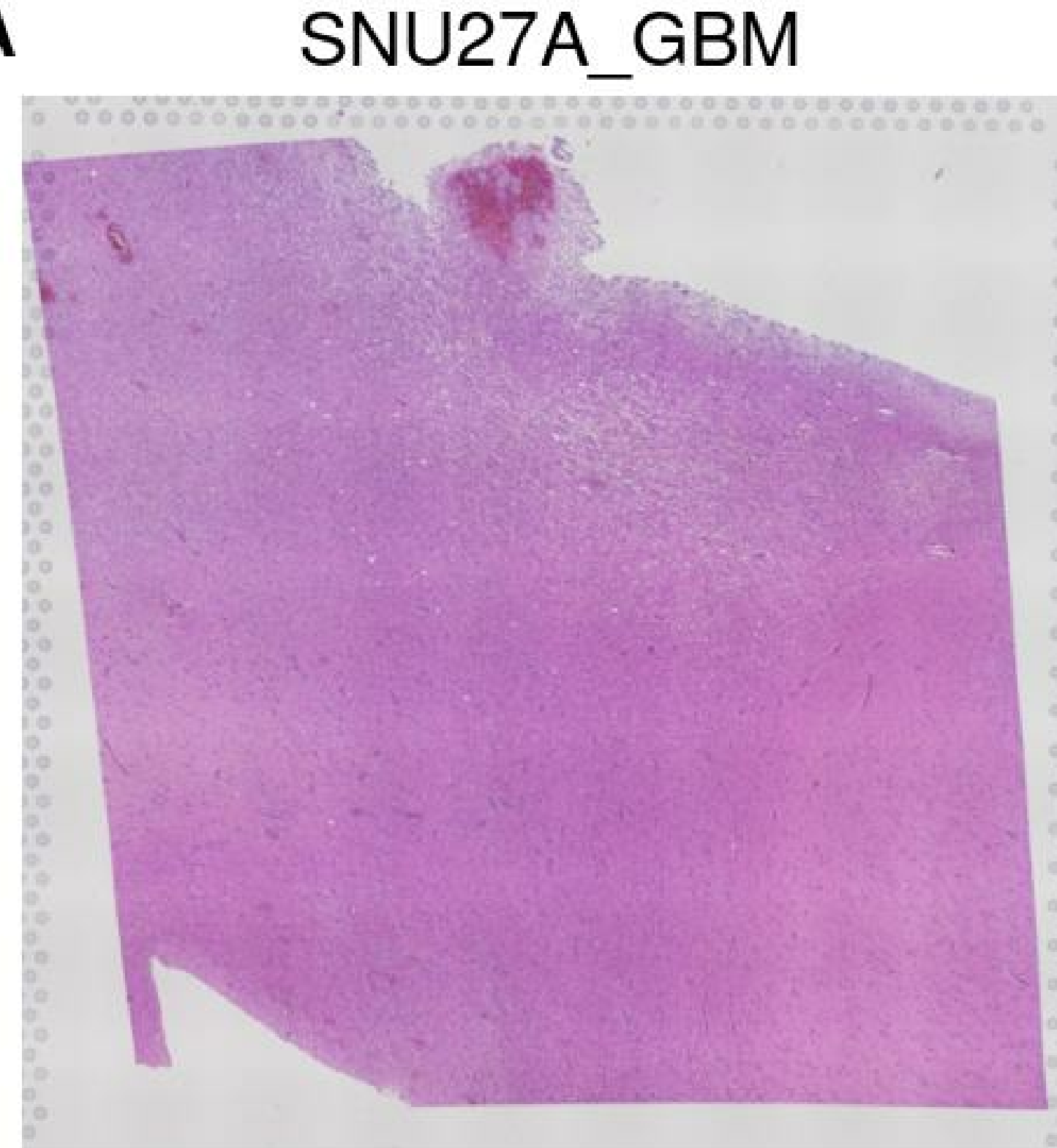




D

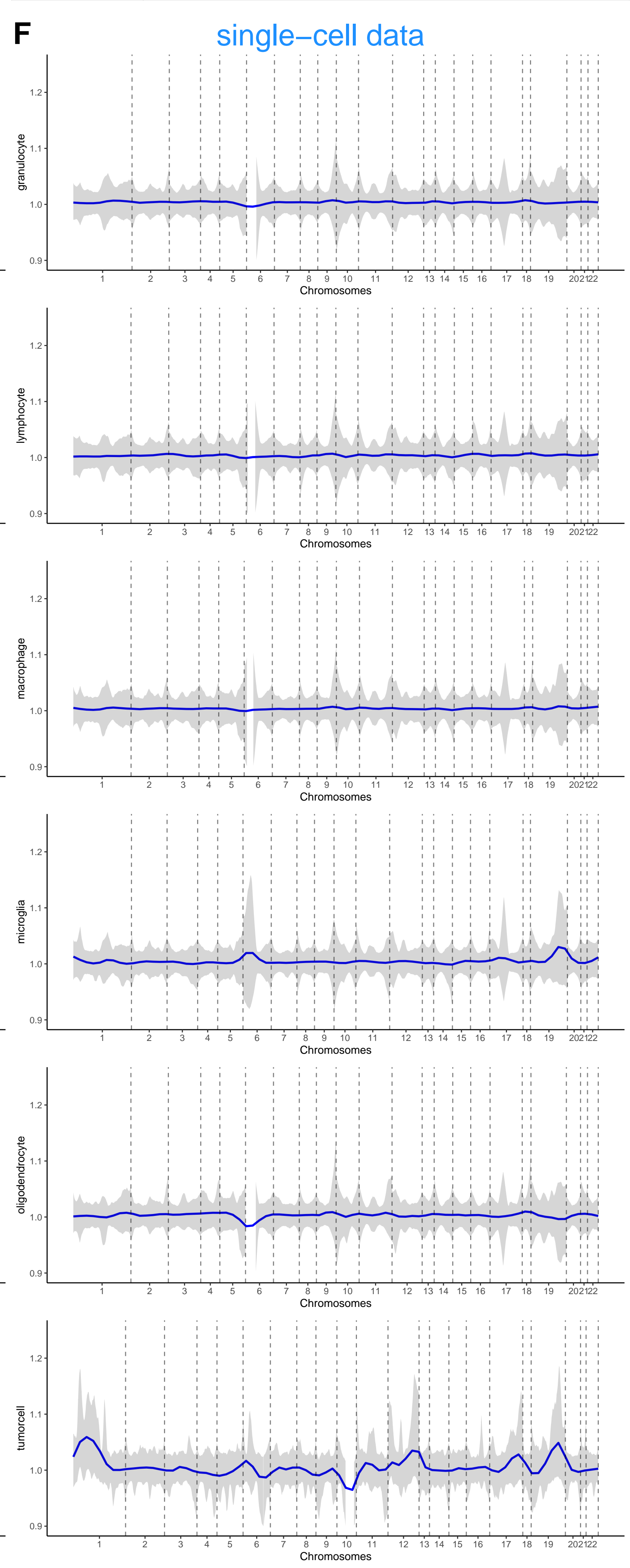
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
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10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	mutant (C228T, c.-124C>T)	NF1 deletion	hemizygous deletion
TP53 mutation	mutant (p.Gln271Lys, c.811G>A)	NF2 deletion	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

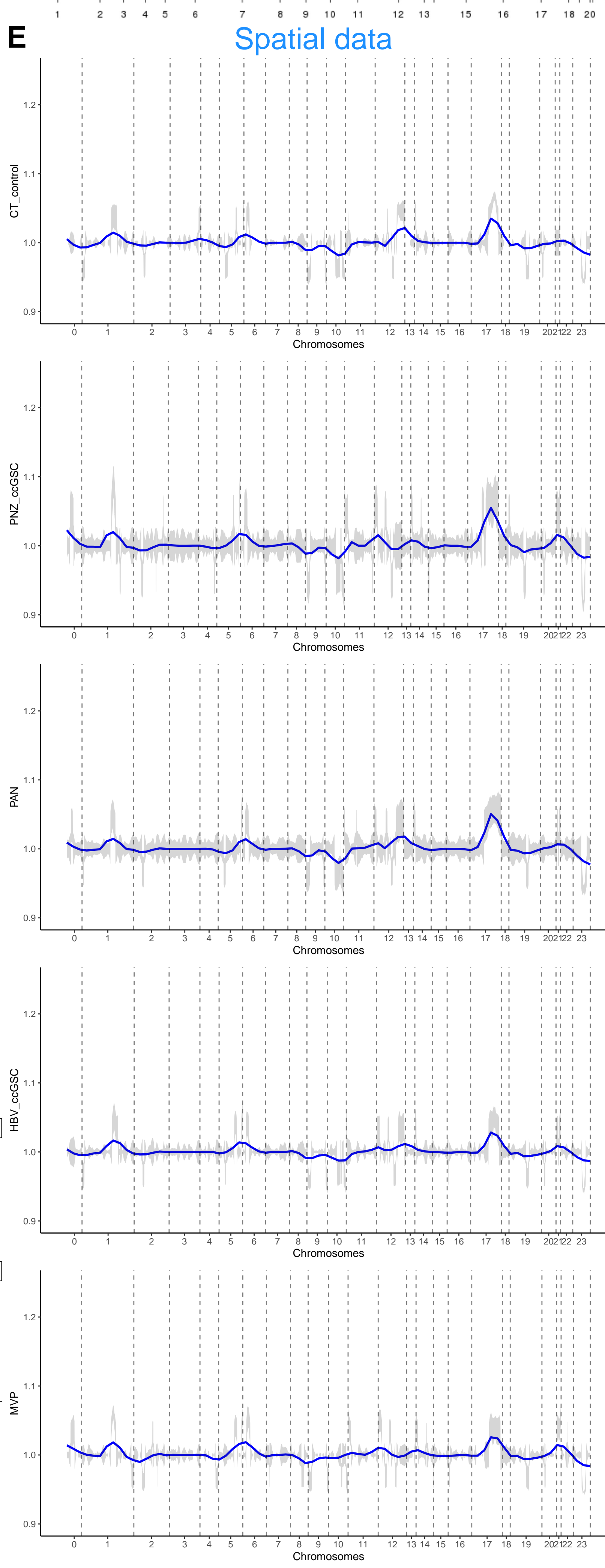
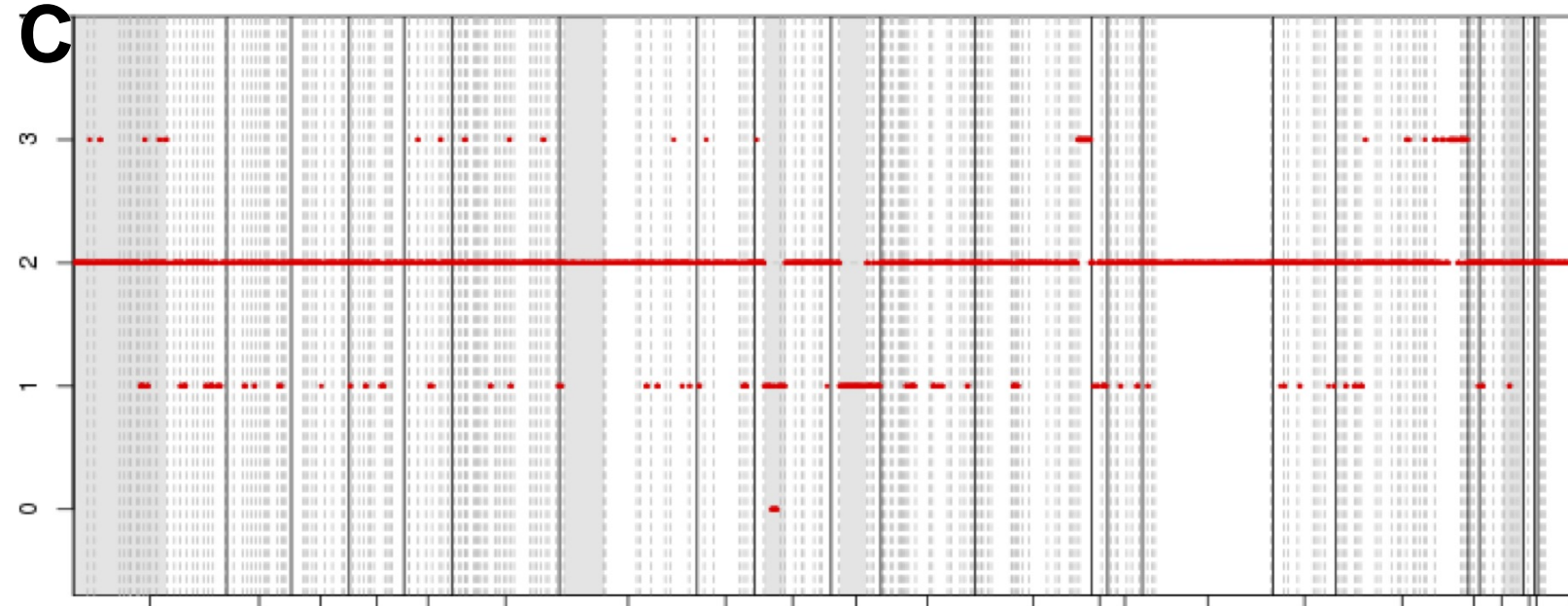
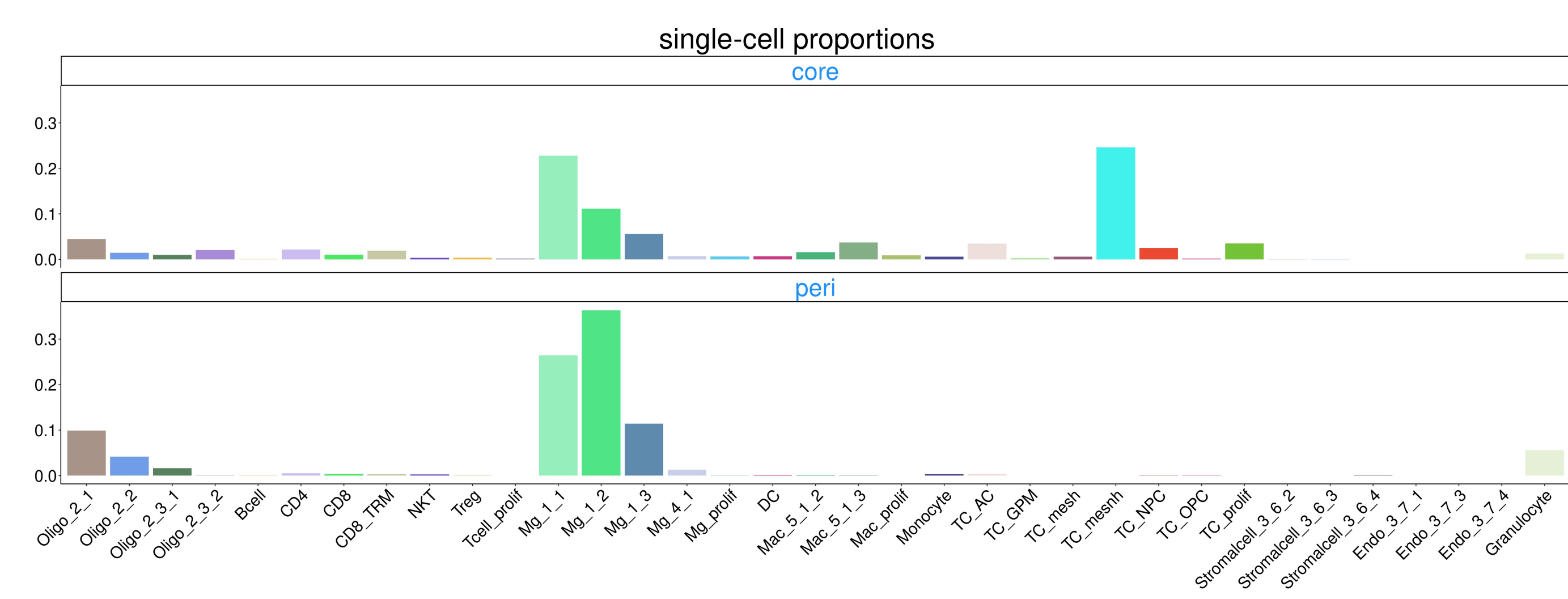
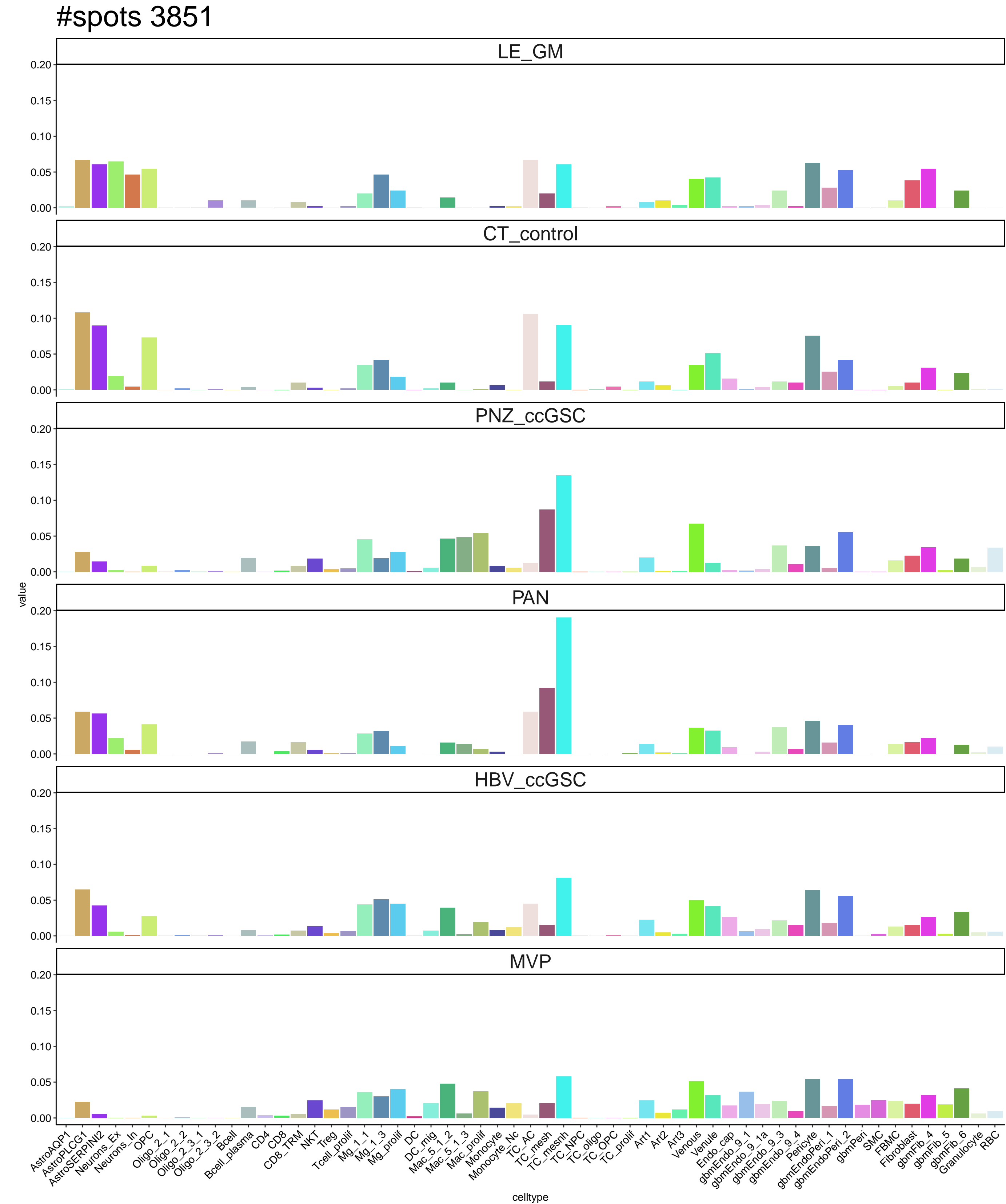
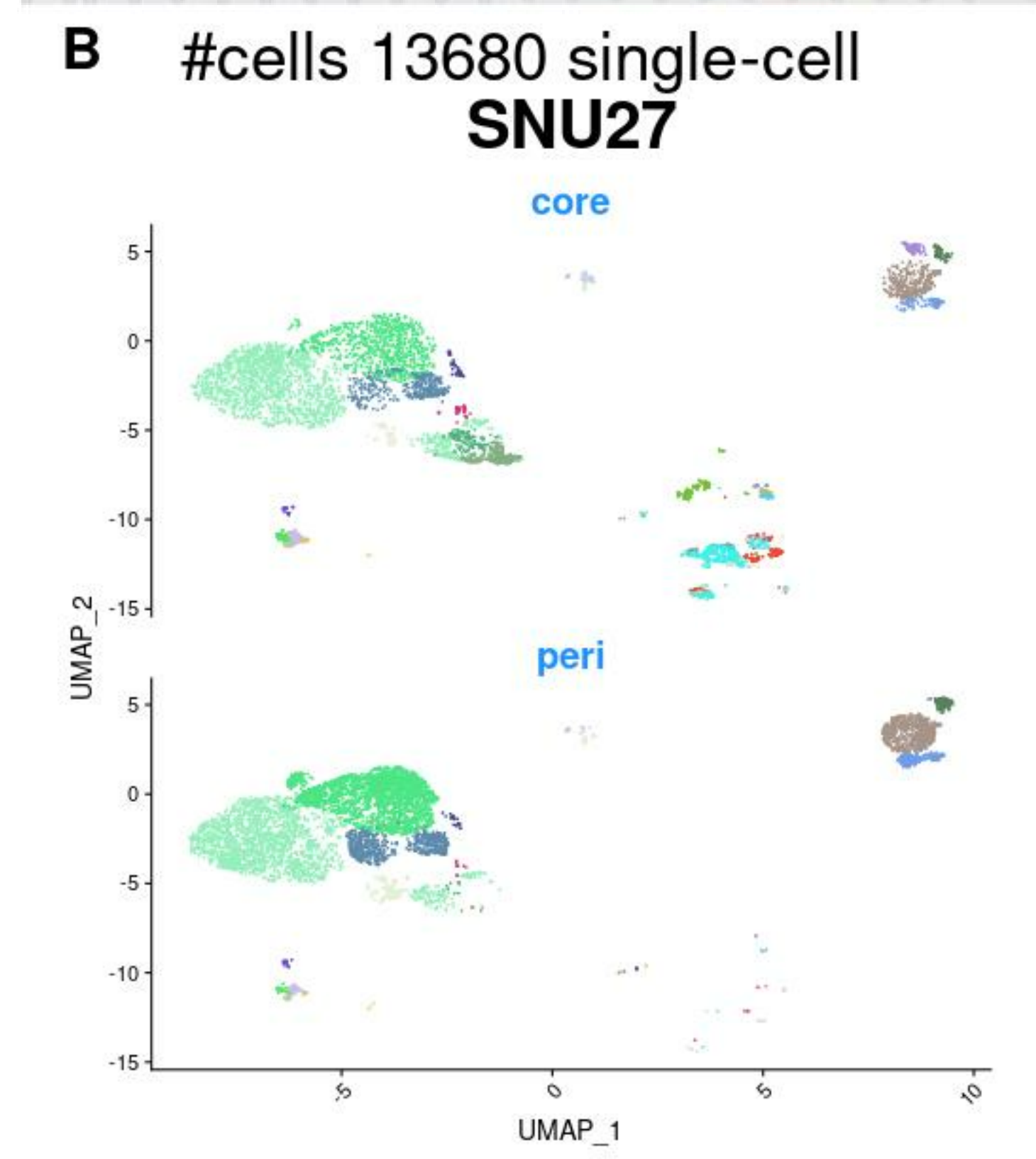
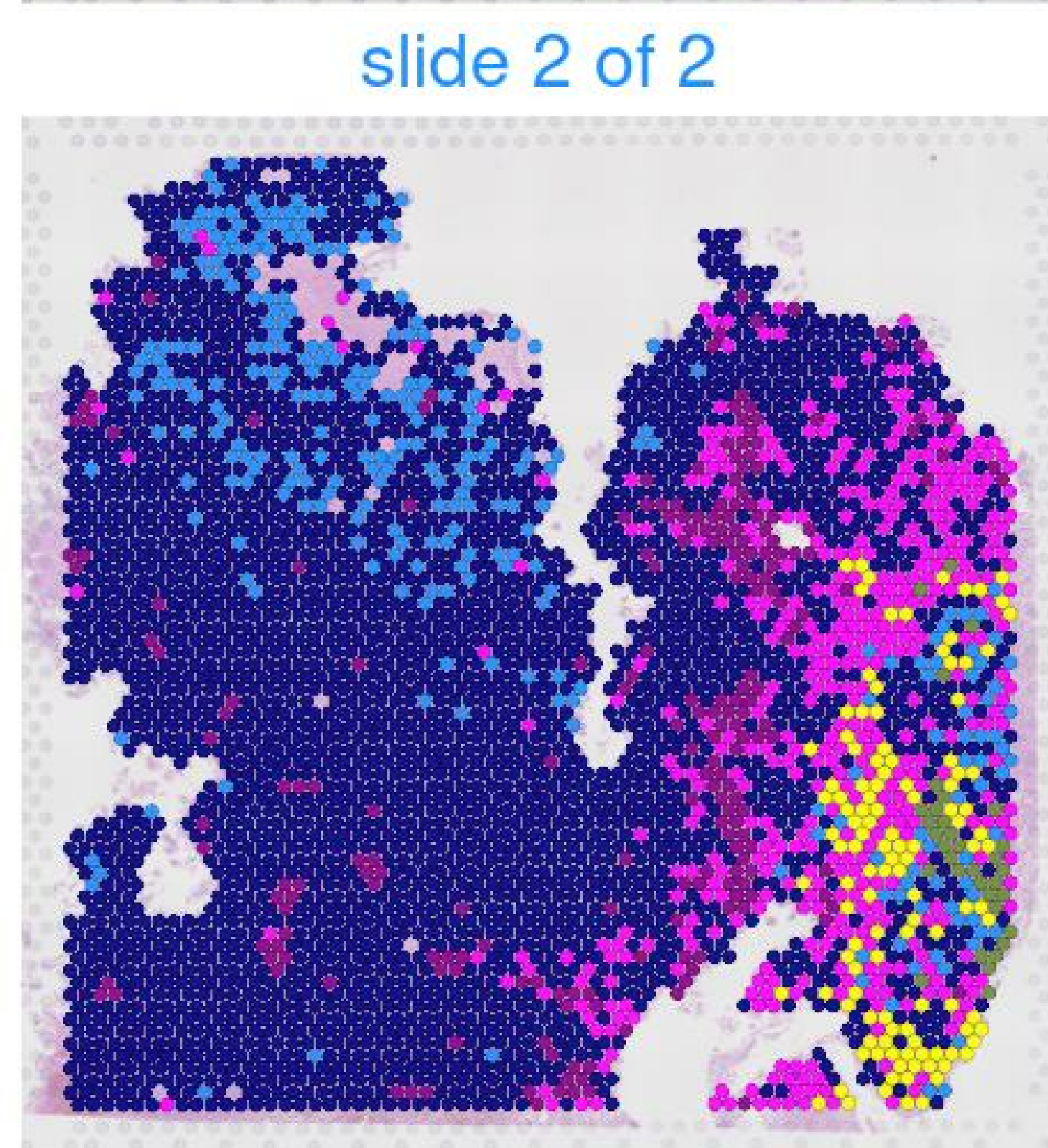
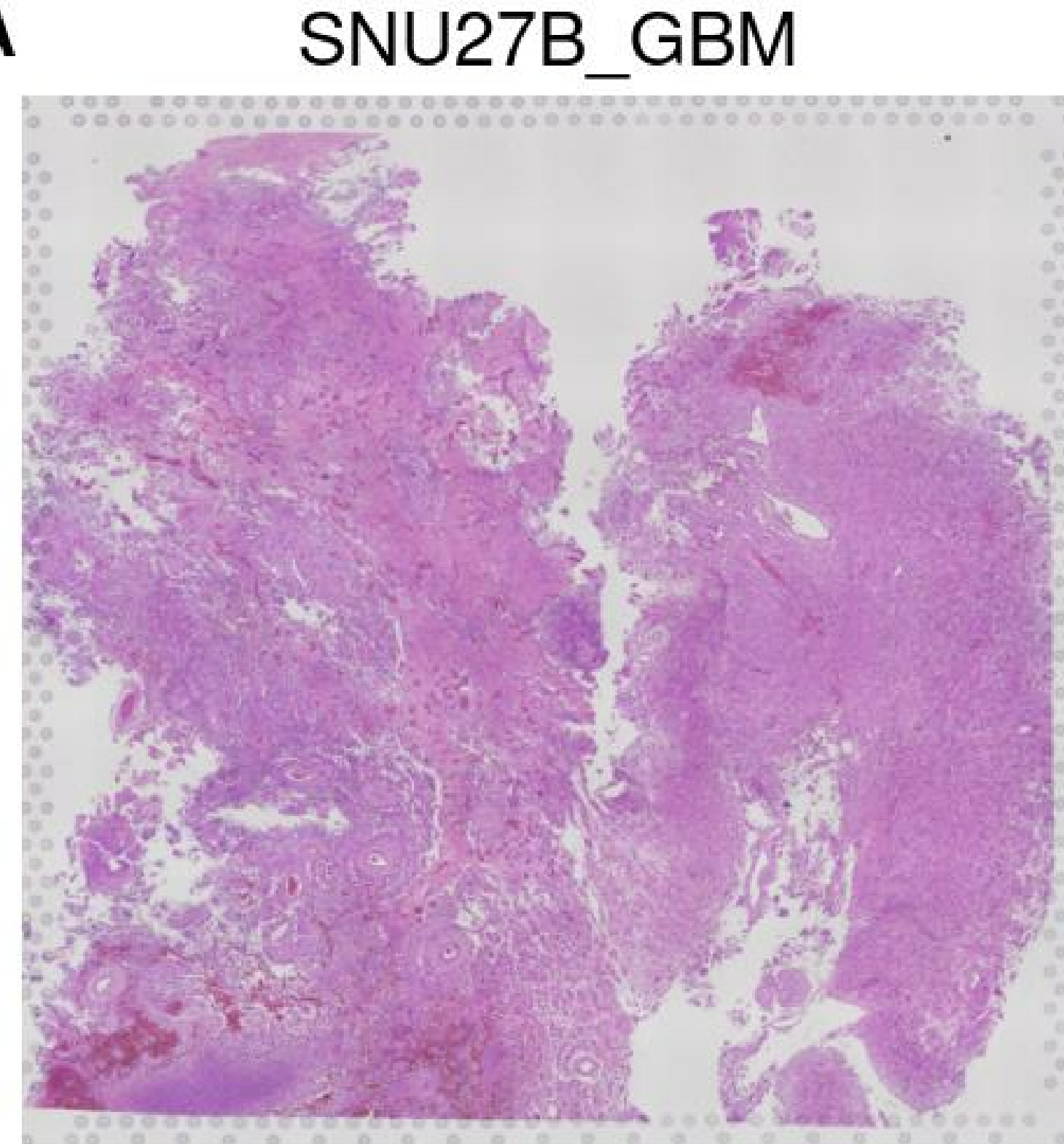




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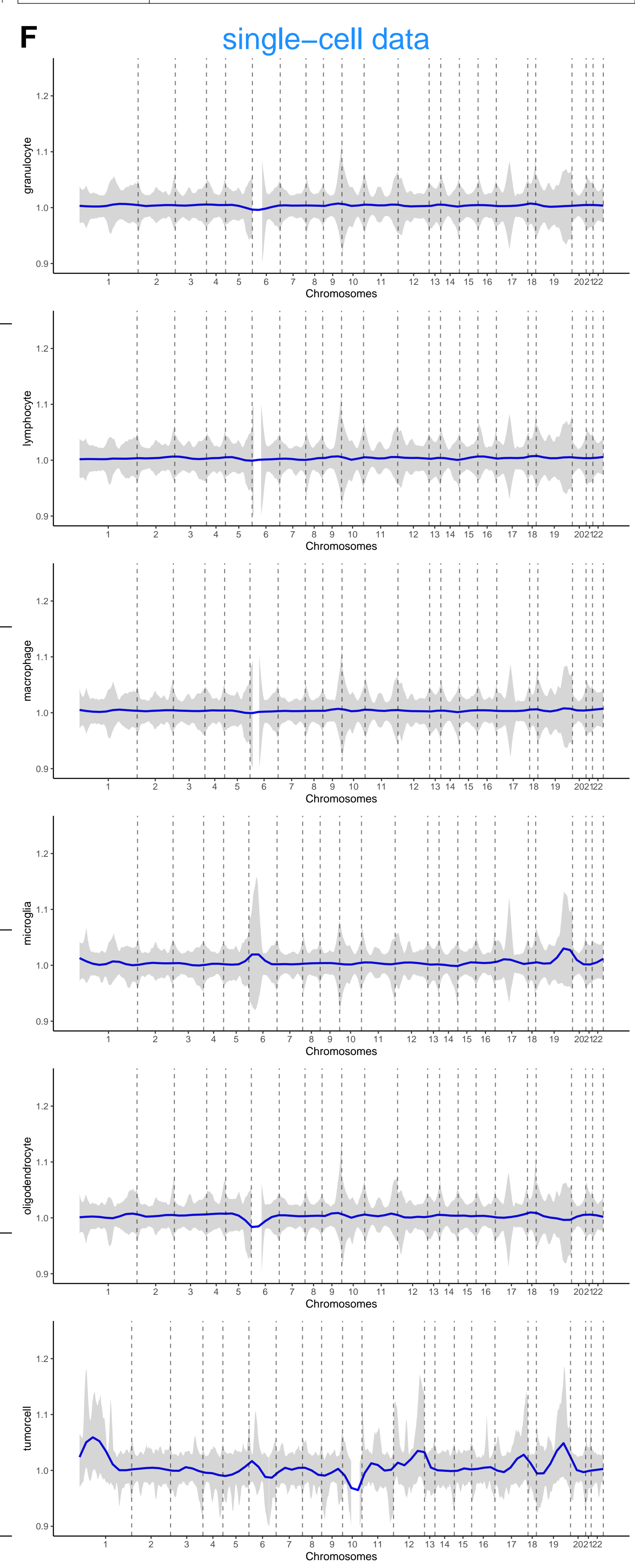
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI deletion	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	NF1 mutation	absent
ATRX mutation	mutant (p.Lys496L, c.1289_1290delAA)	NF1 deletion	wildtype
TP53 mutation	wildtype	NF2 mutation	absent
BRAF mutation	mutant (p.Val600Glu, c.1799T>A)	NF2 deletion	wildtype
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

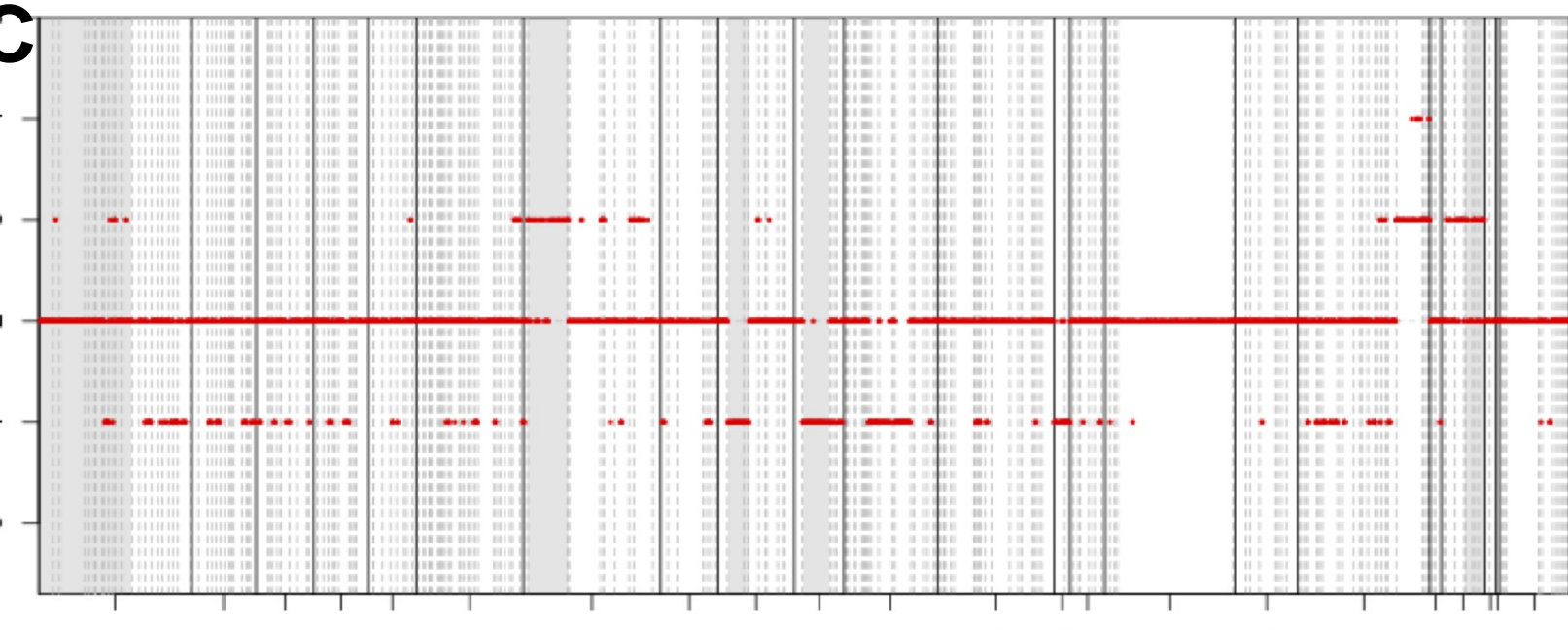
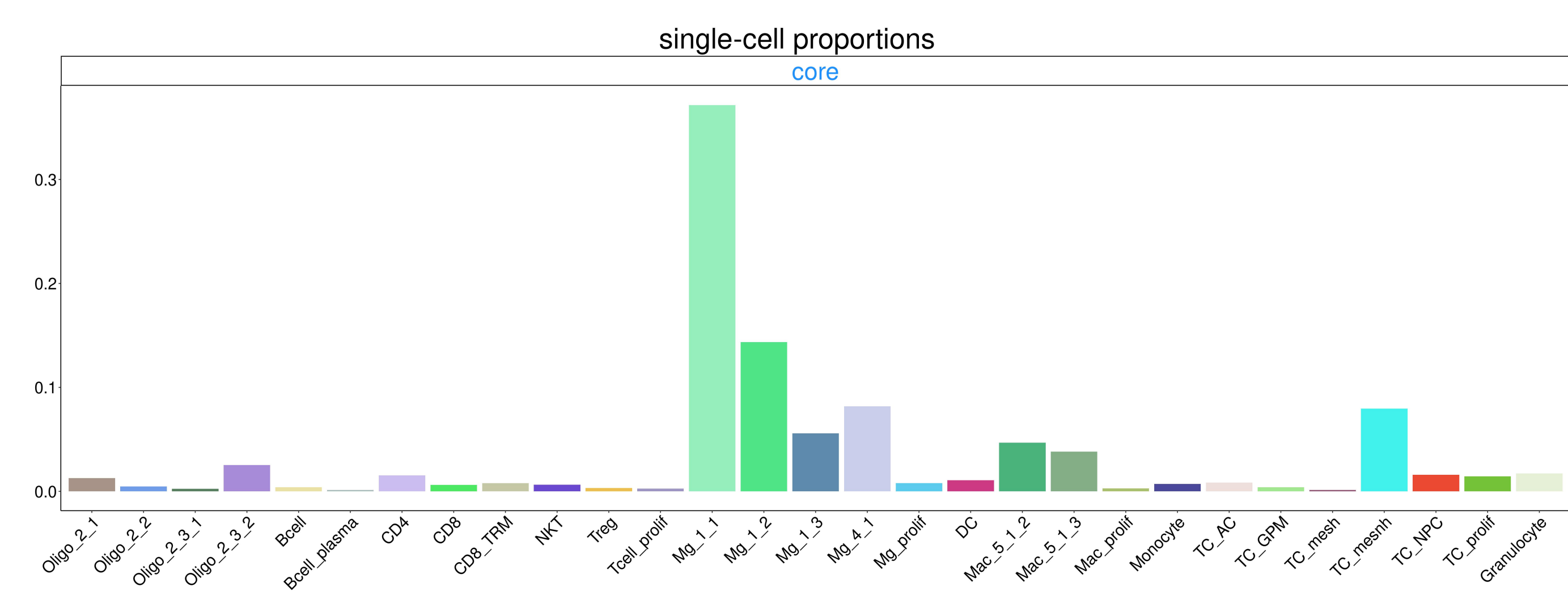
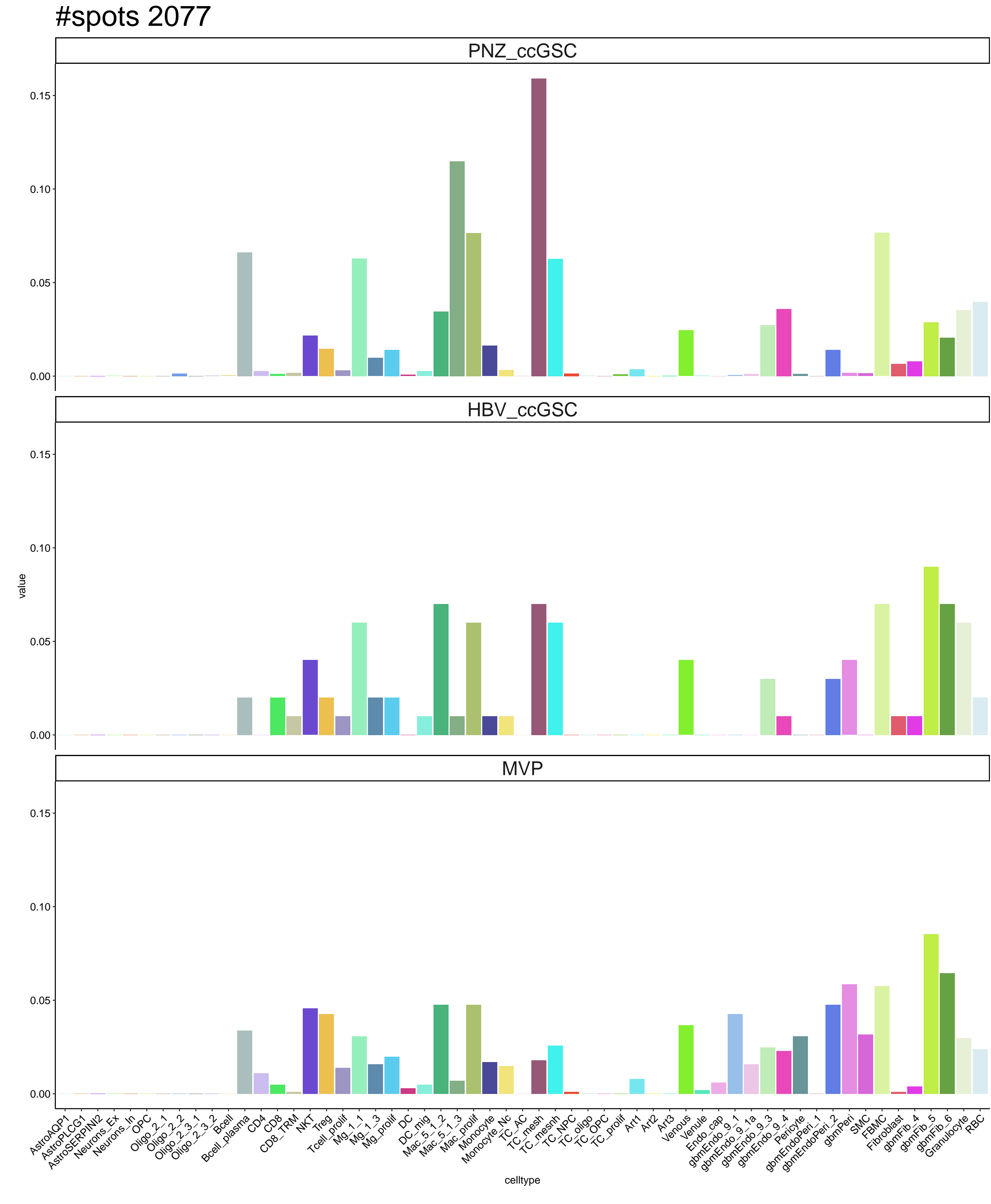
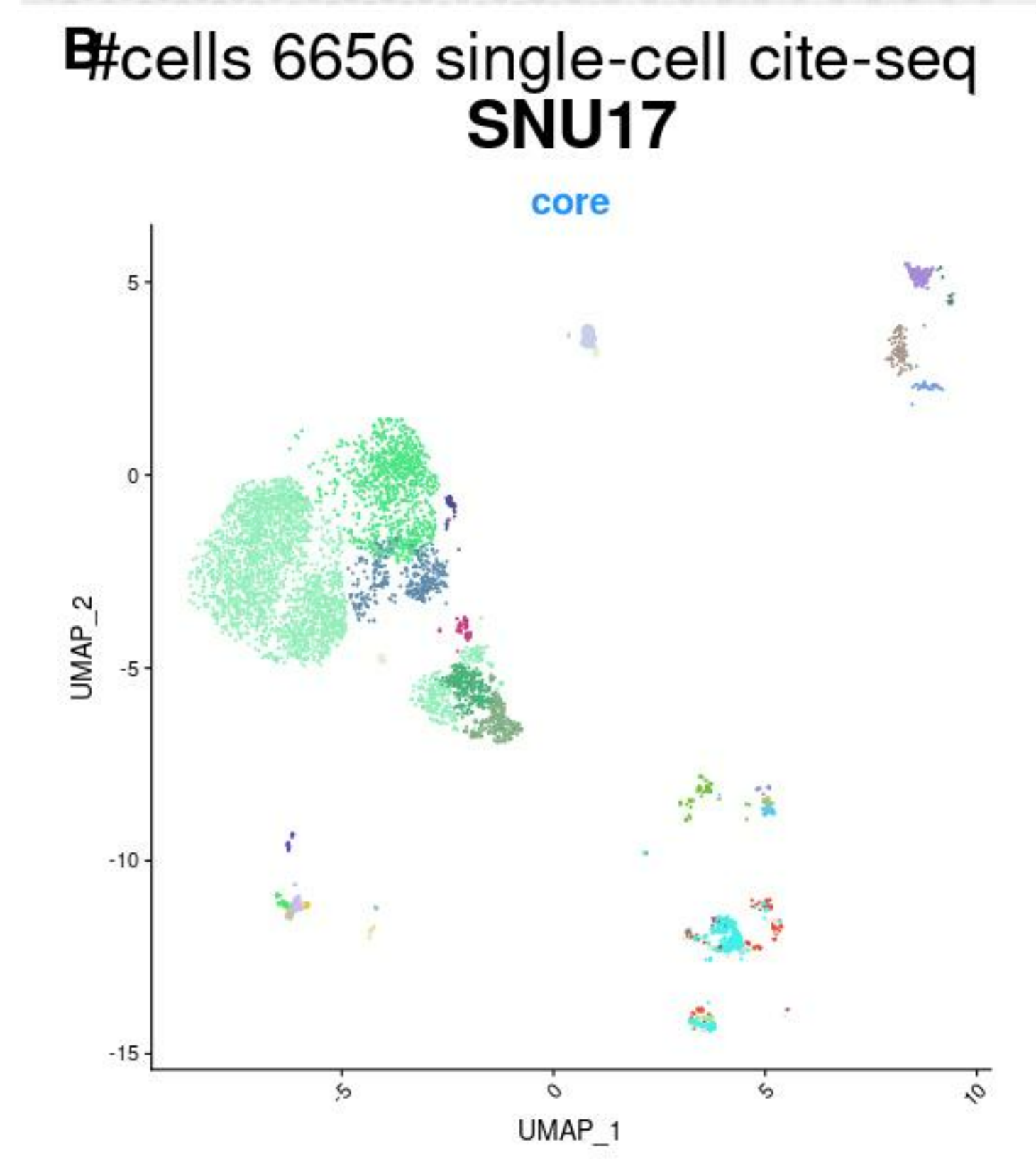
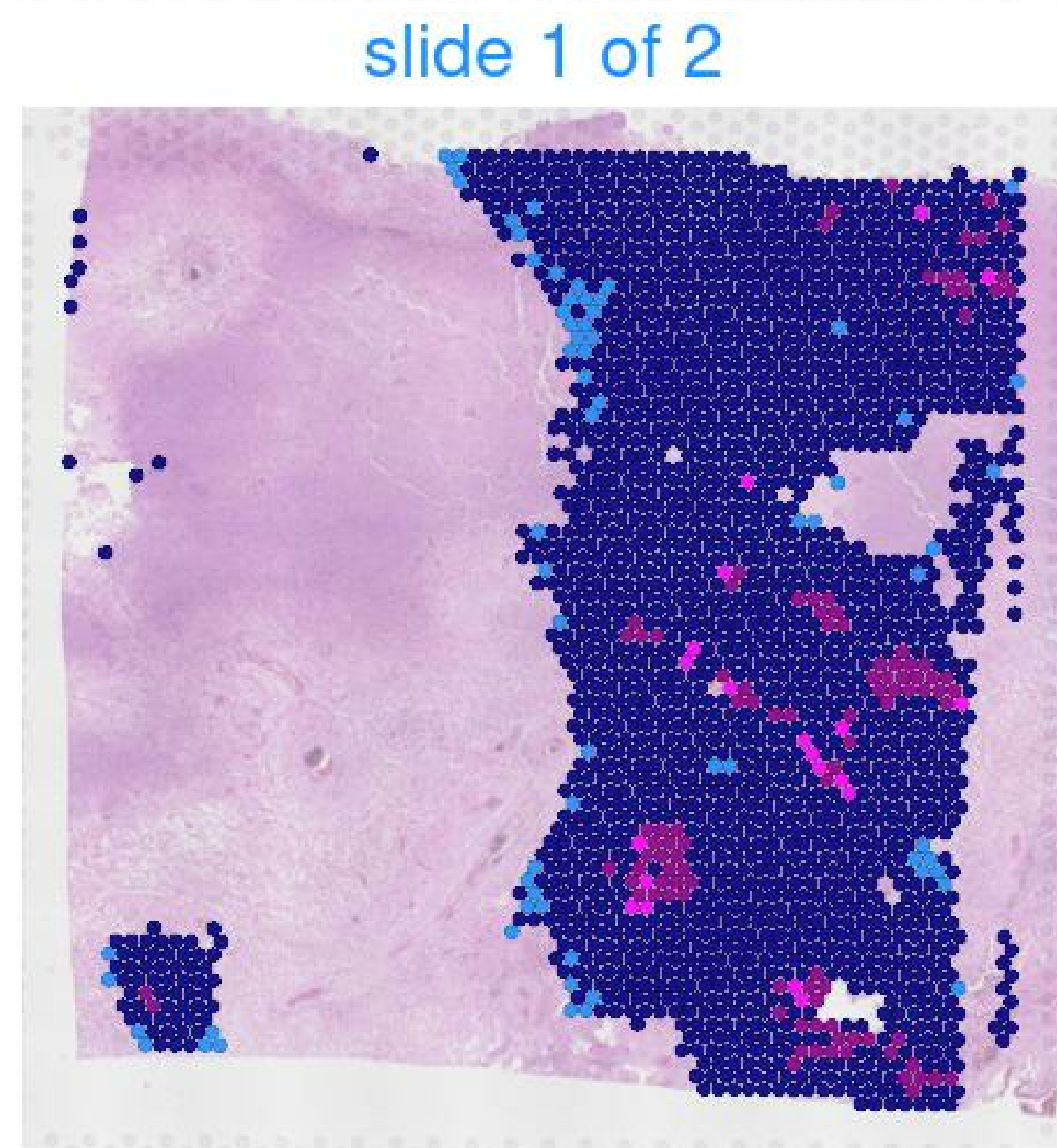
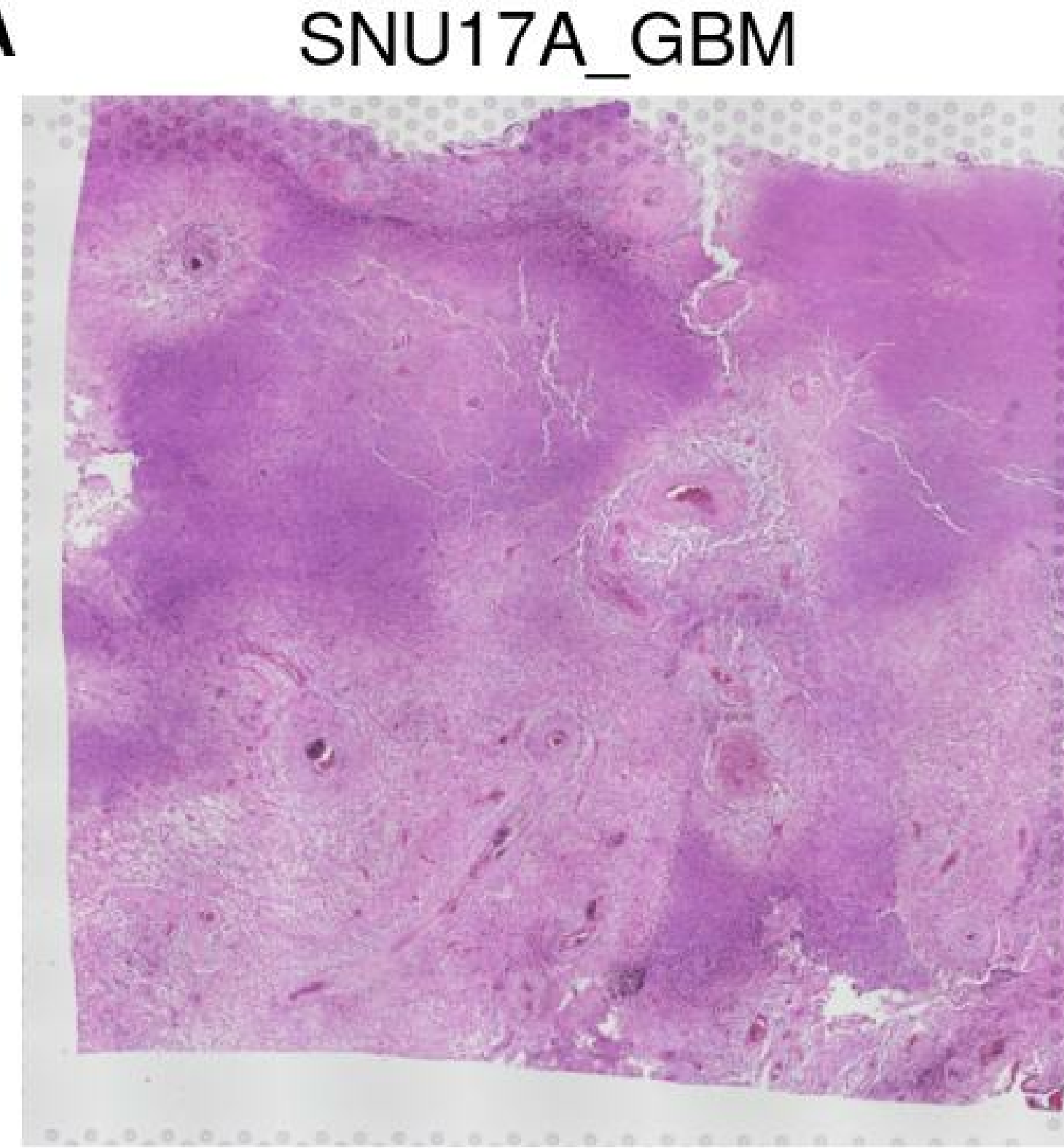




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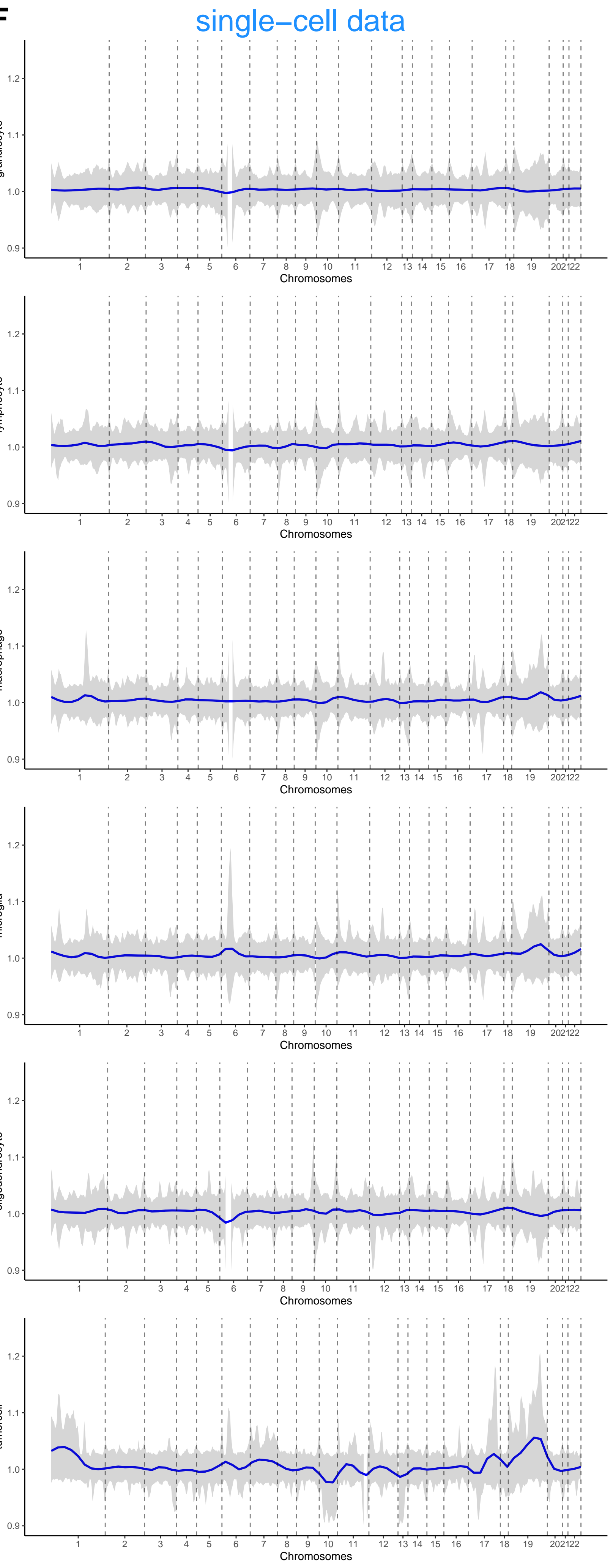
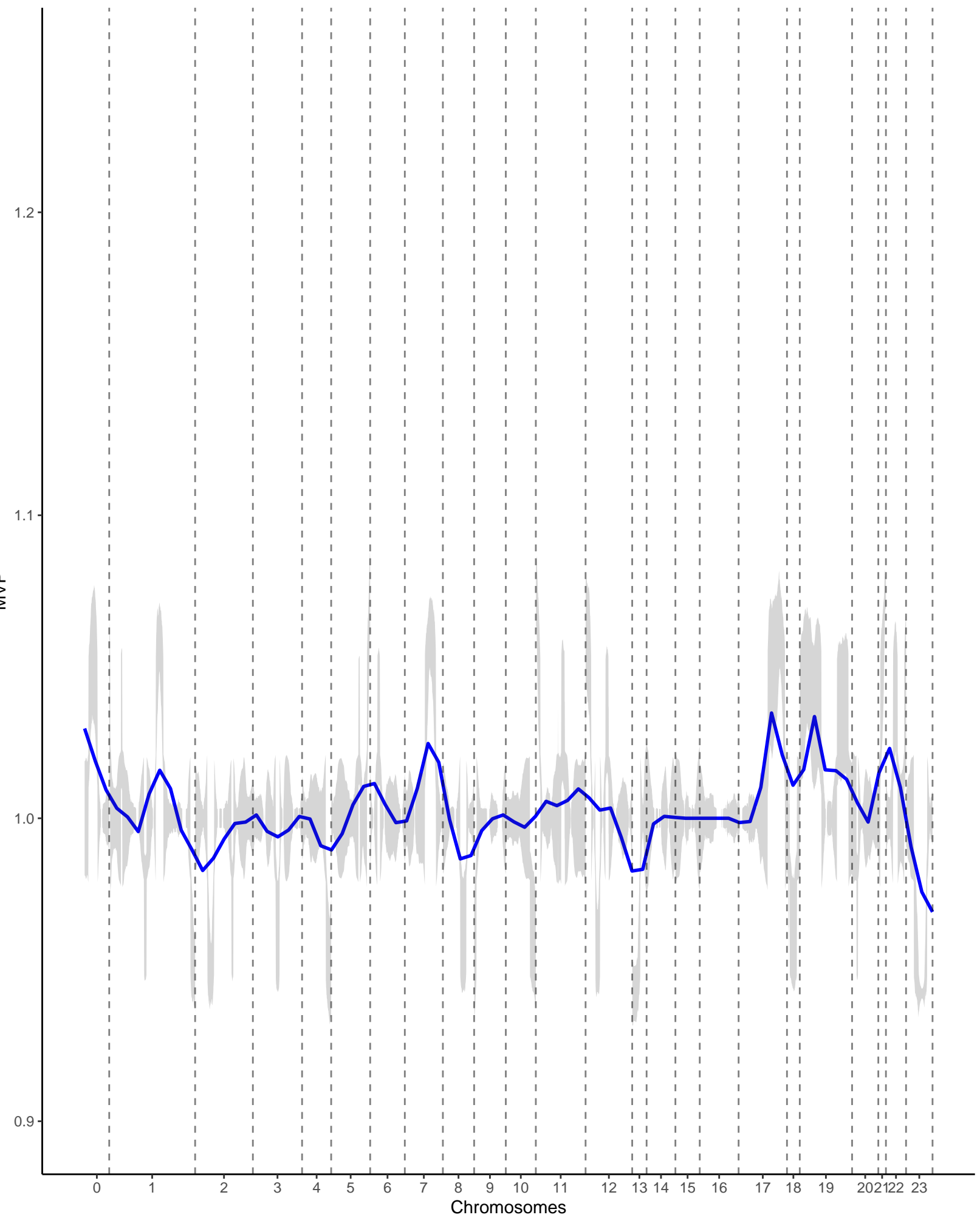
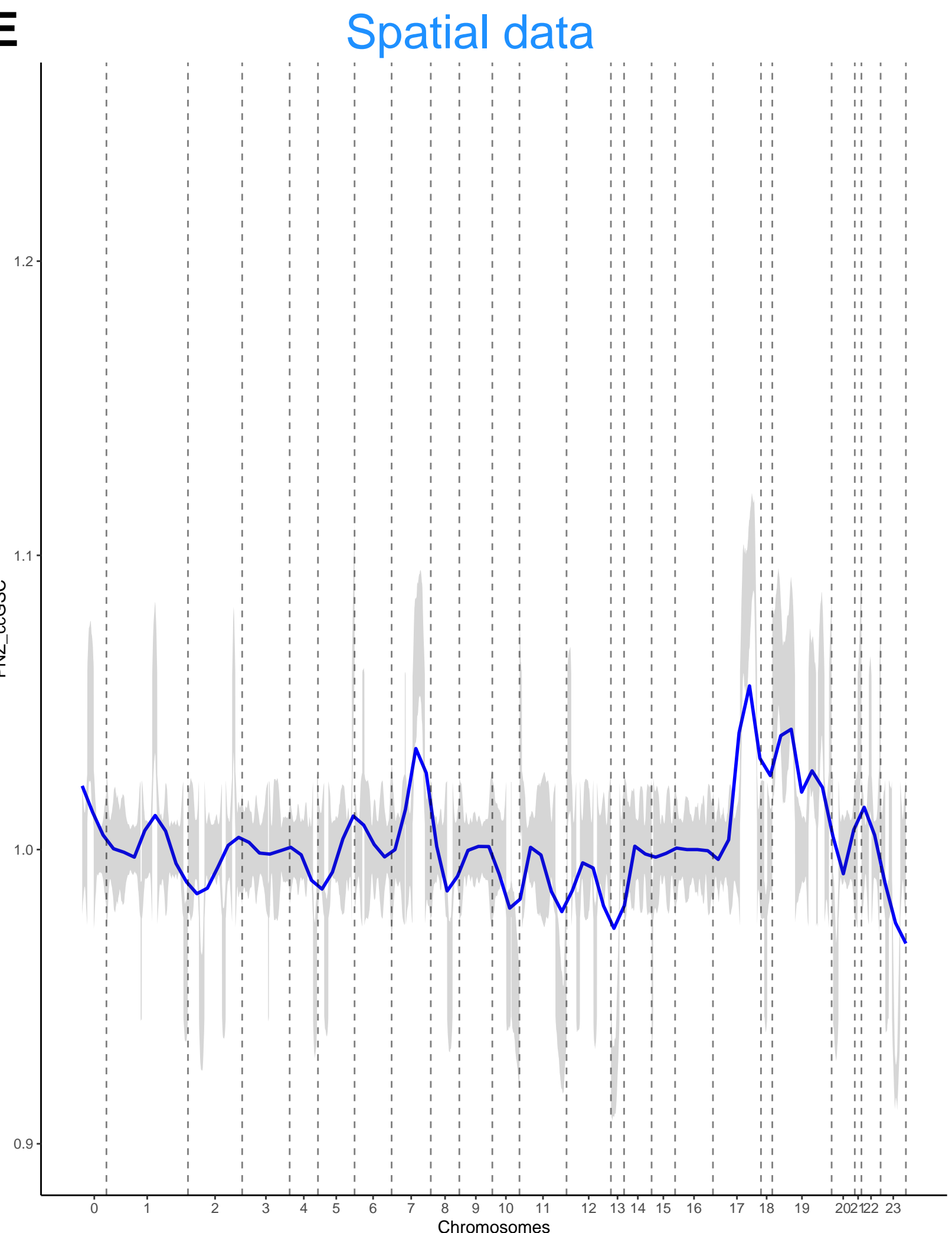
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p/19q	no-deletion	FGFR1 mutation	wildtype
EGRF amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI1 mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI1 mutation	absent
ATRX mutation	mutant (p.Lys436fs, c.1289_1296delAAA)	NF1 mutation	wildtype
TERF1P mutation	wildtype	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	mutant (p.Val600Glu, c.1799T>A)	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

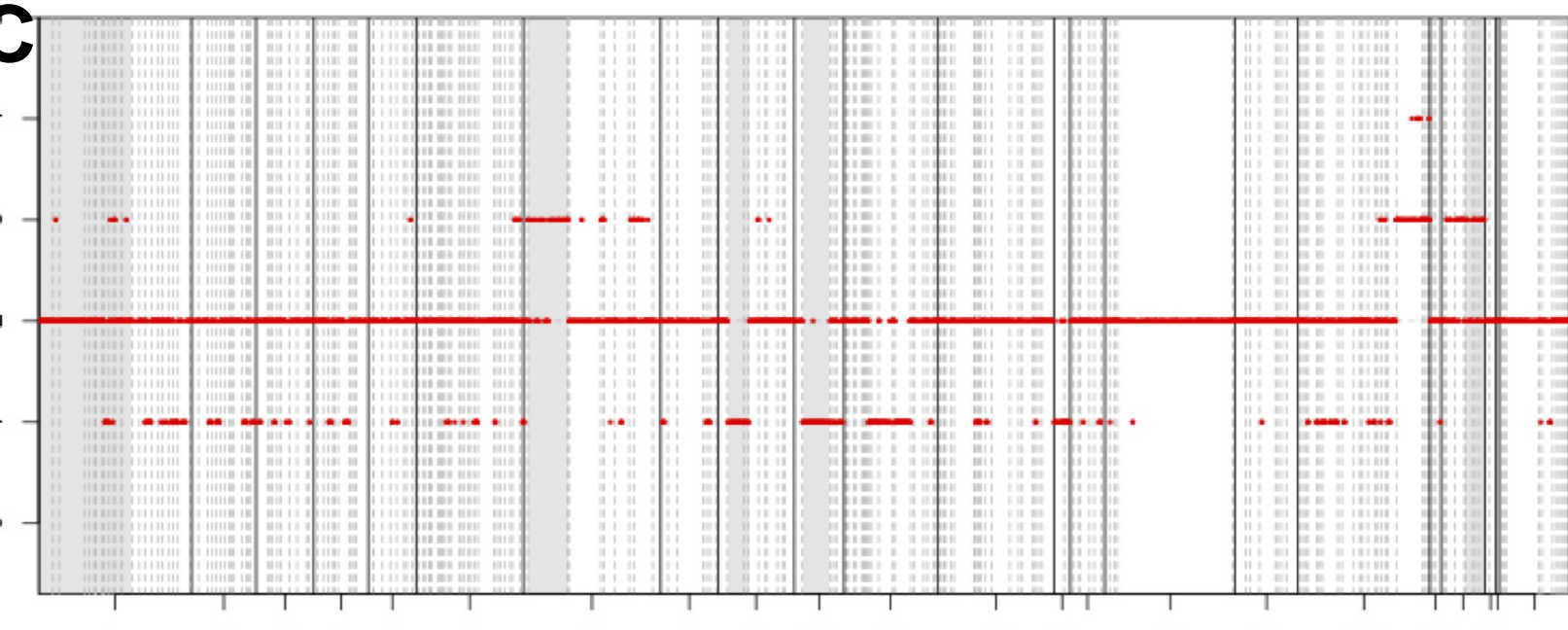
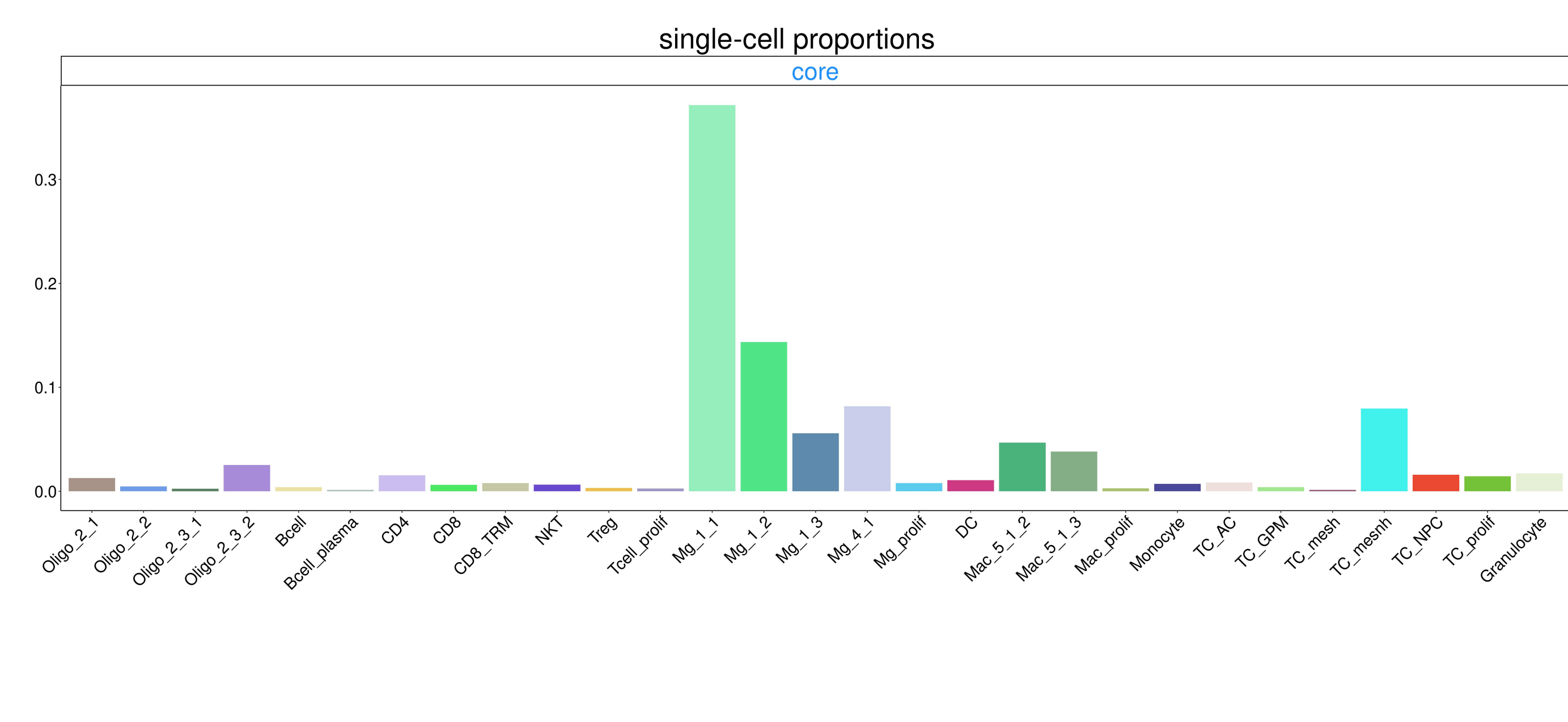
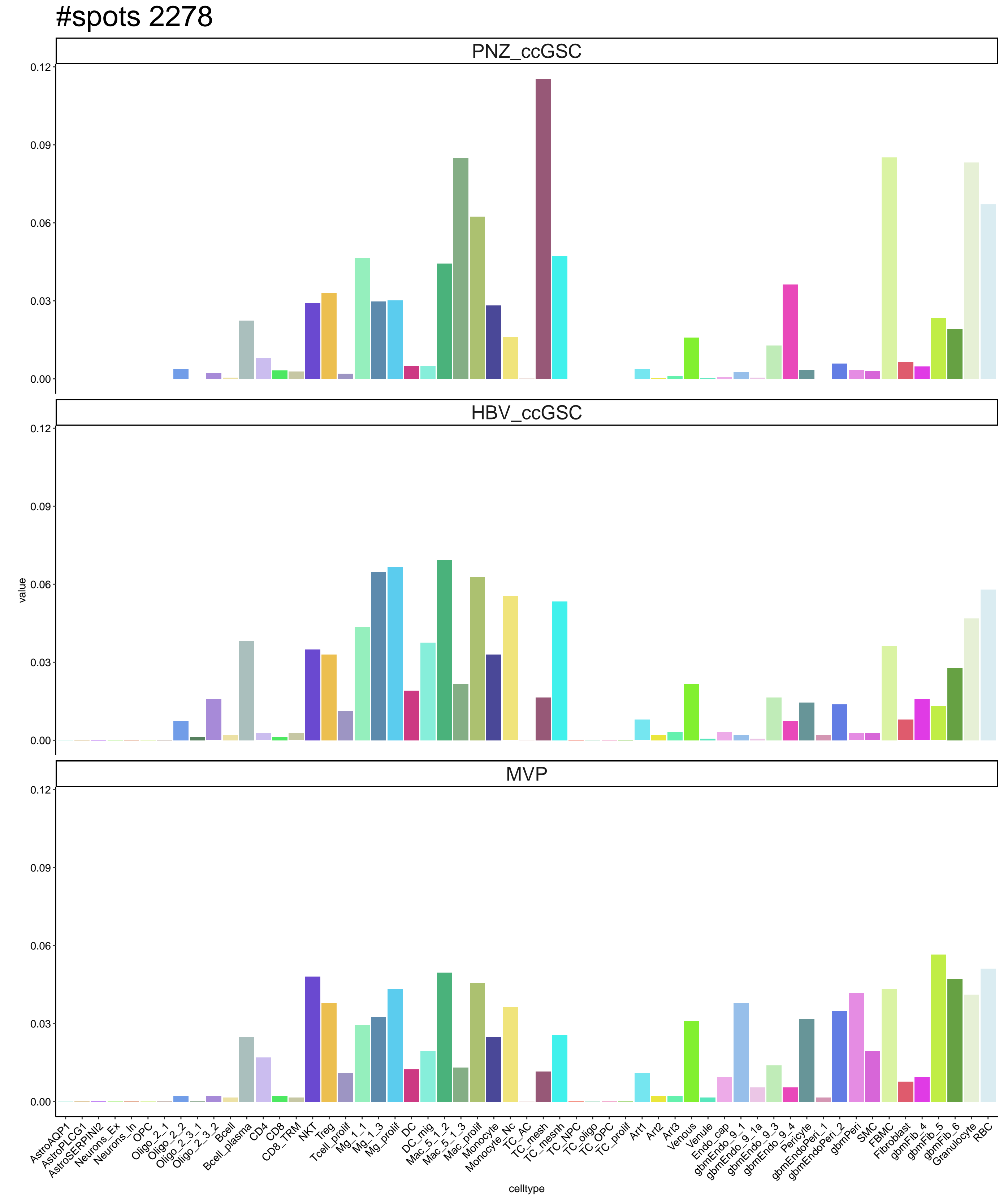
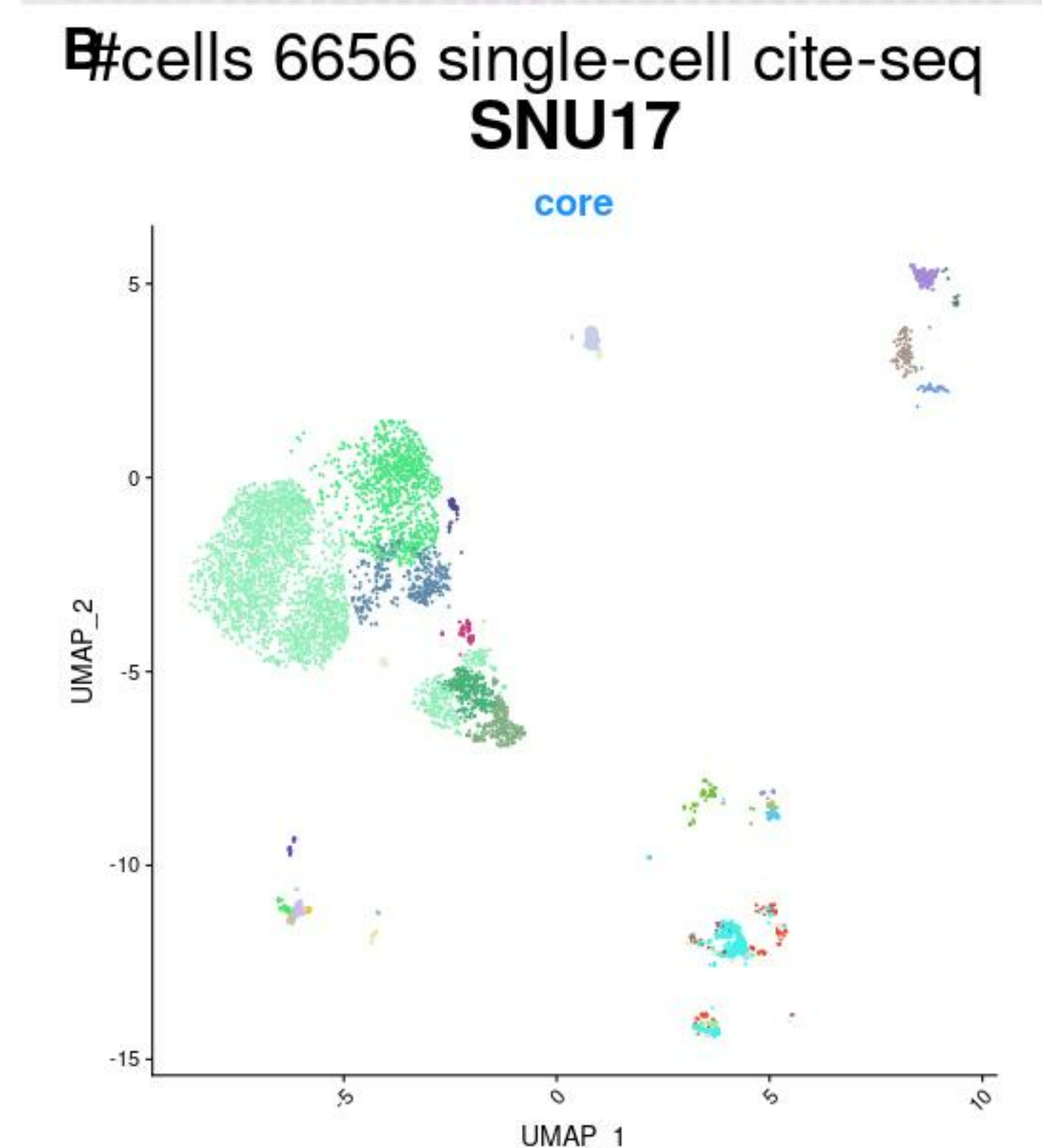
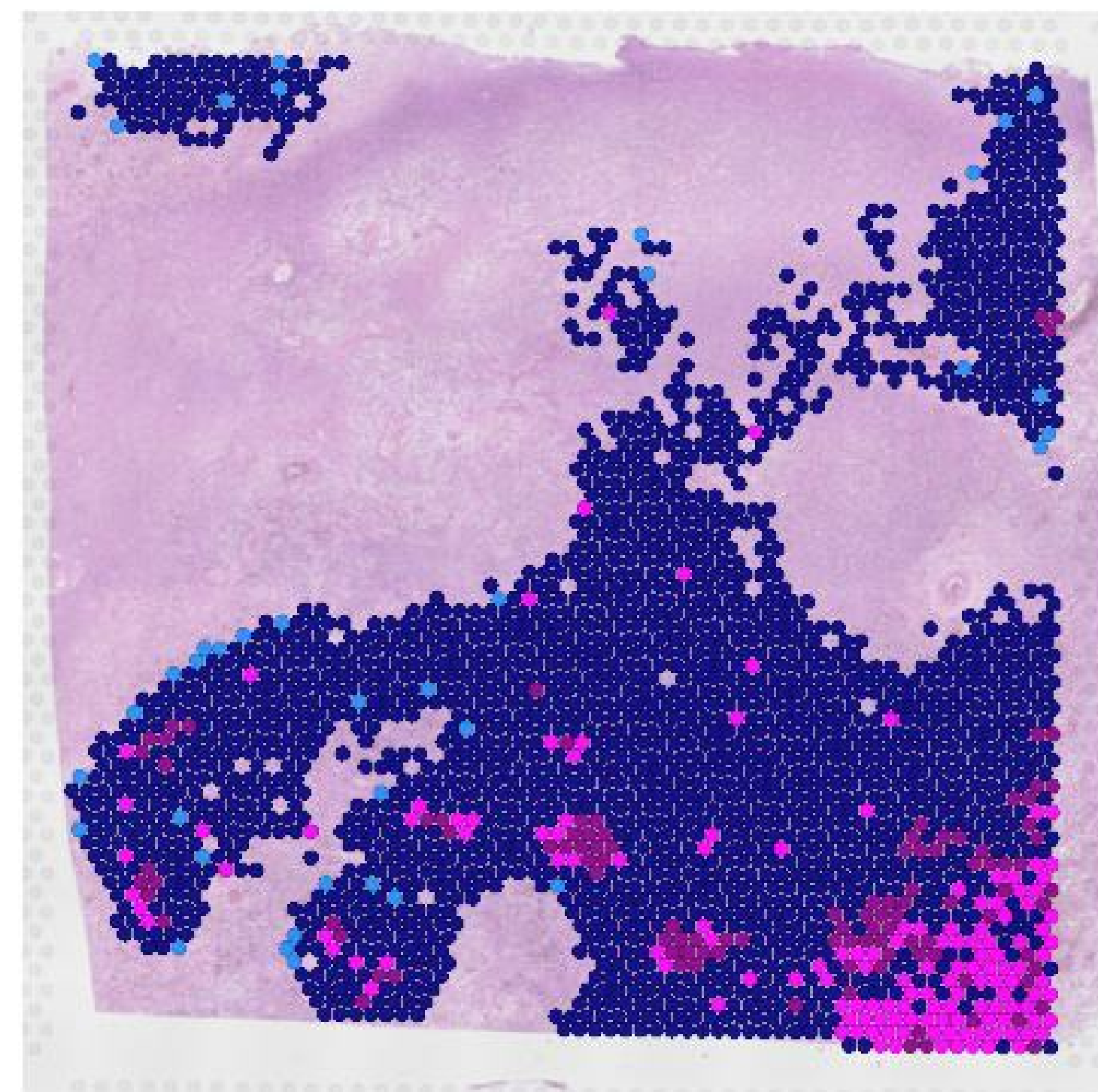
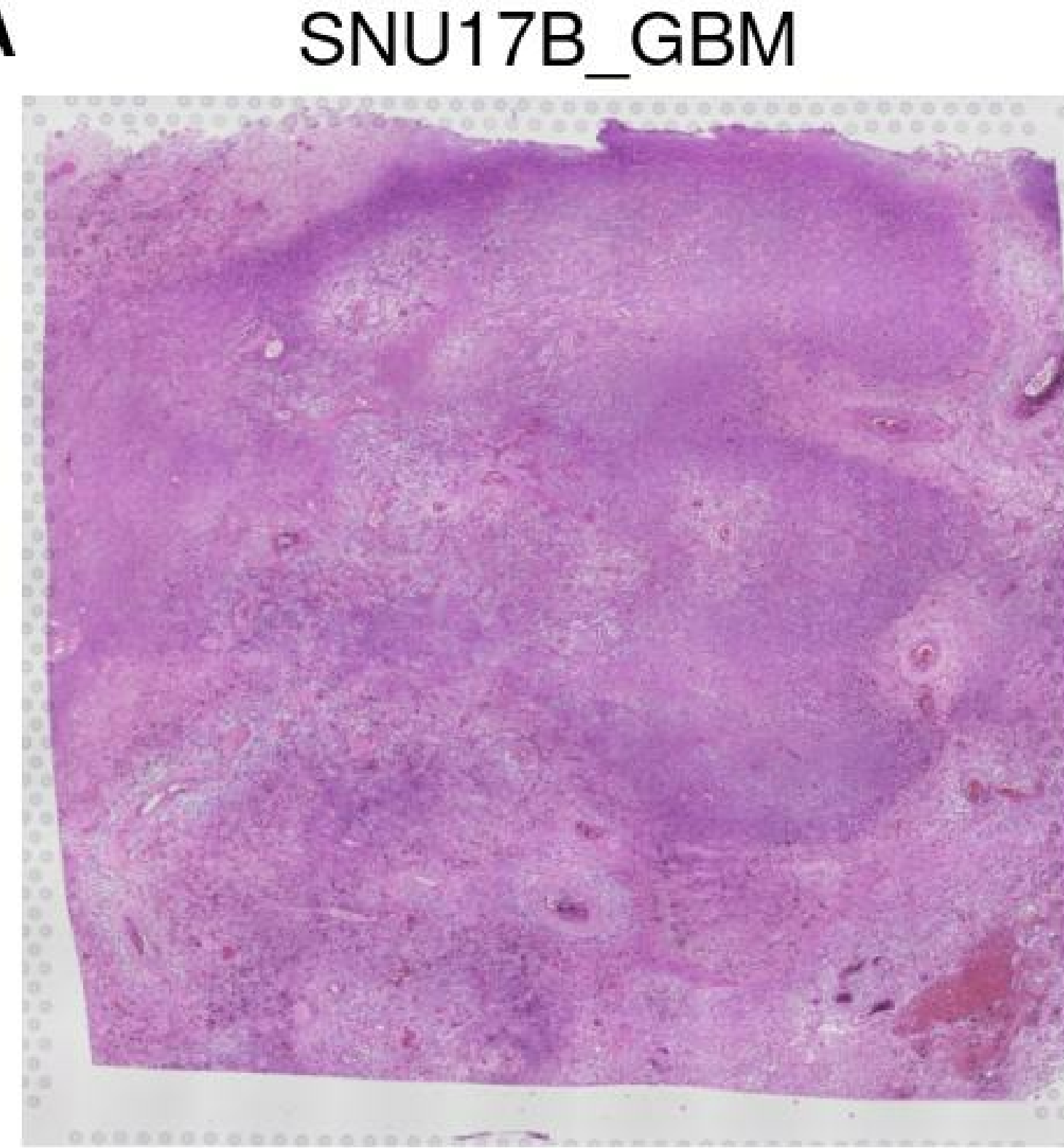




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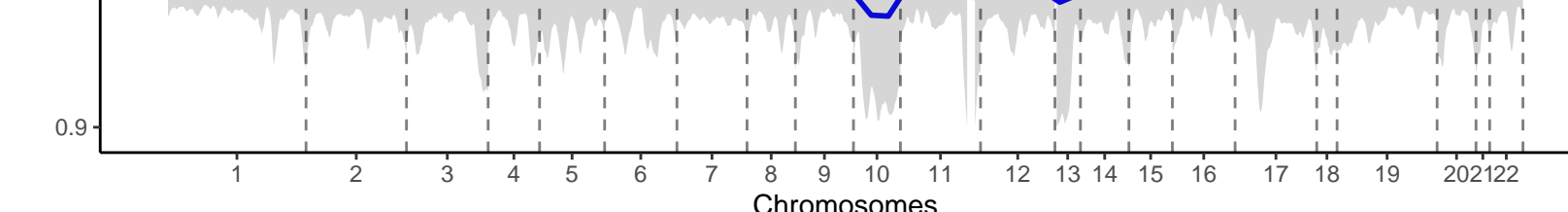
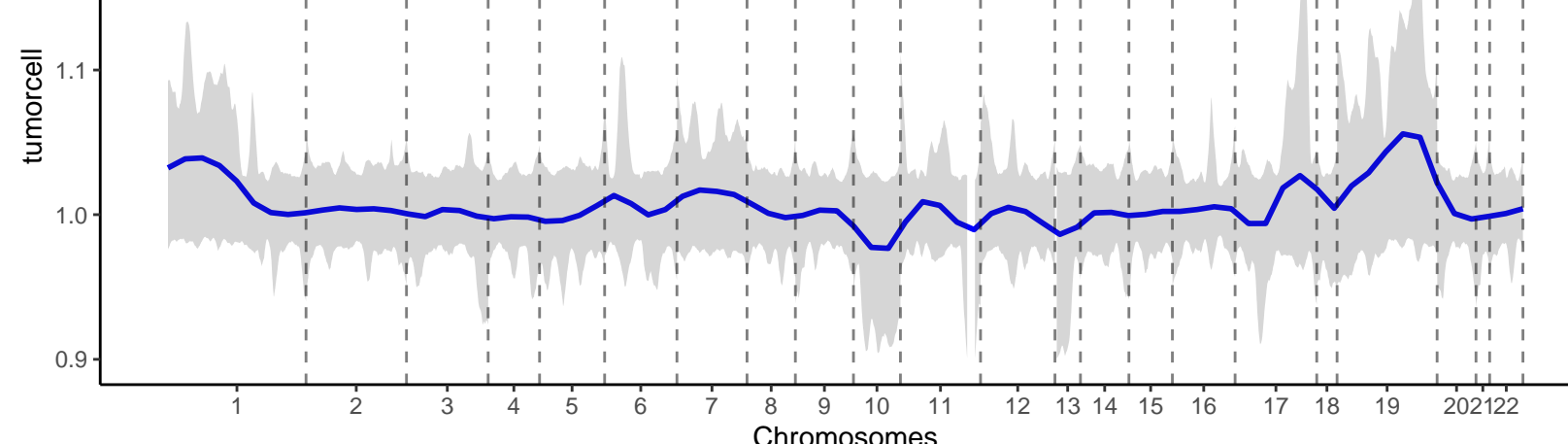
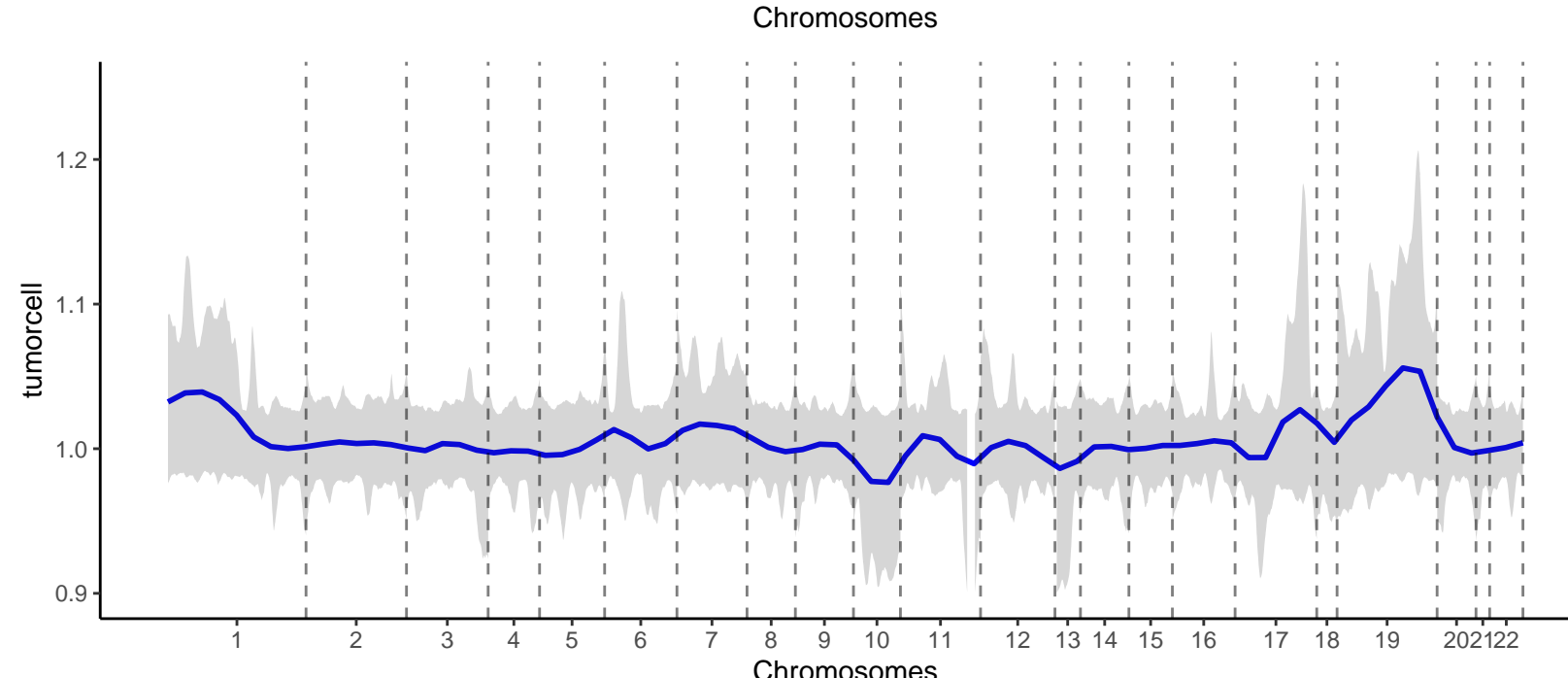
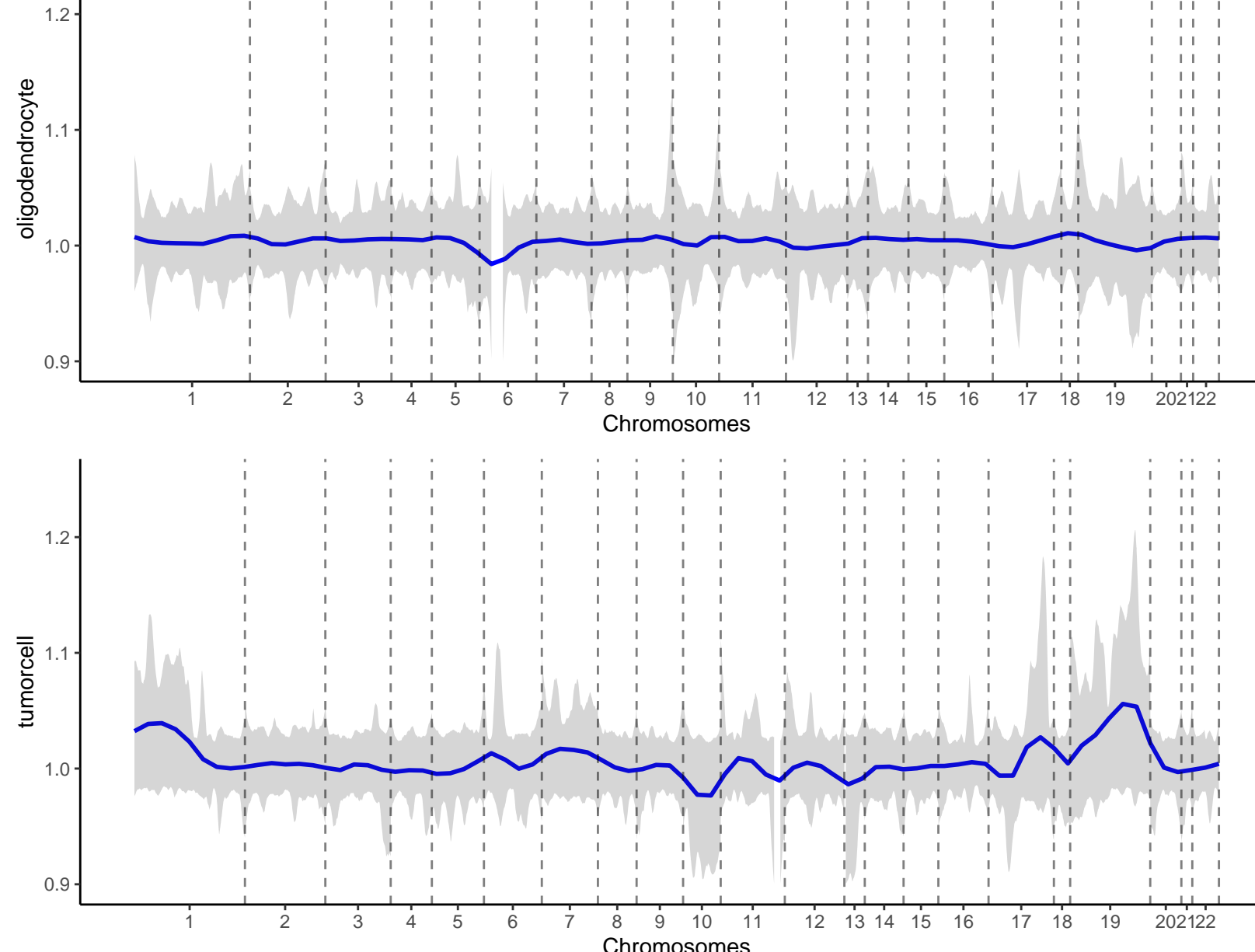
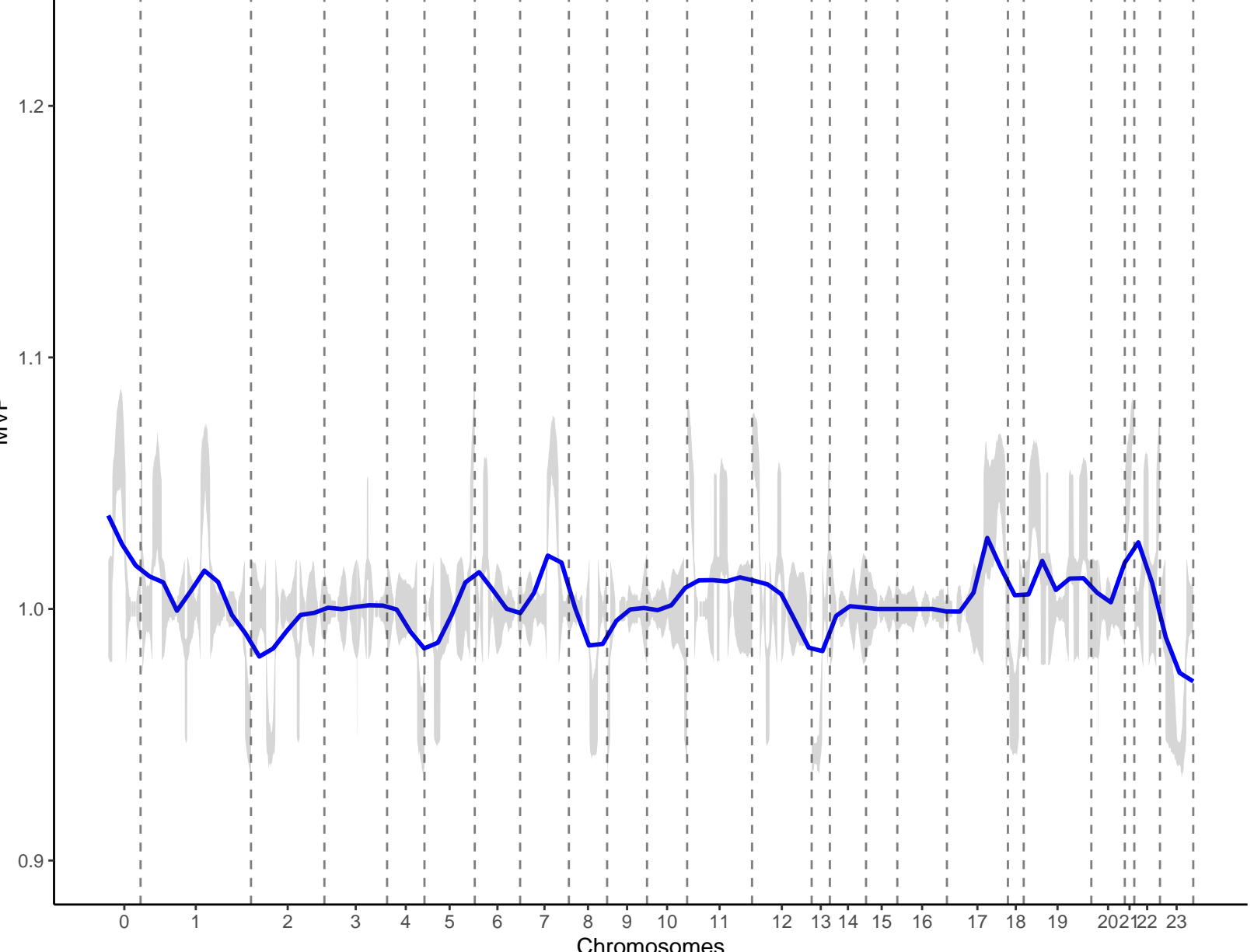
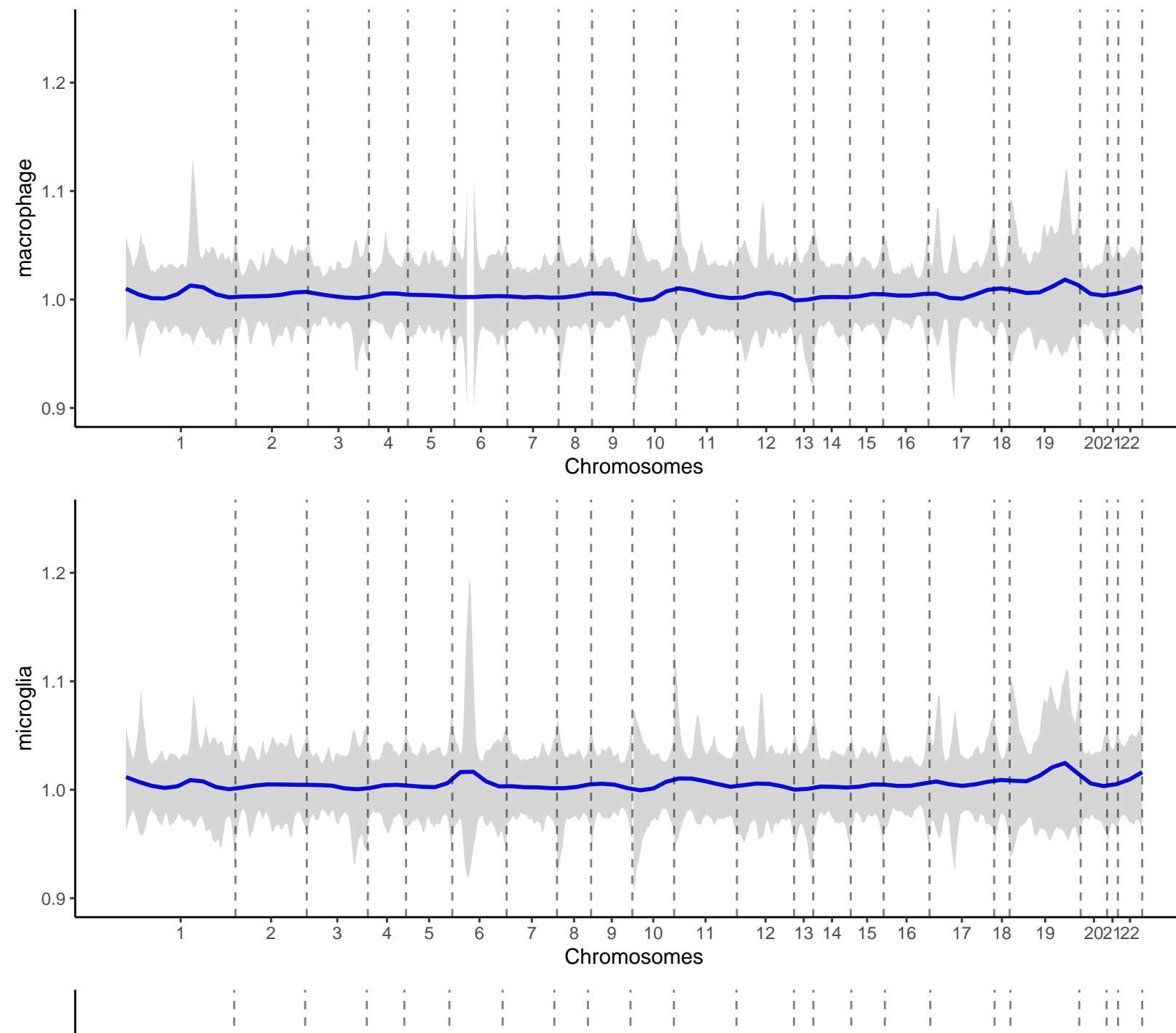
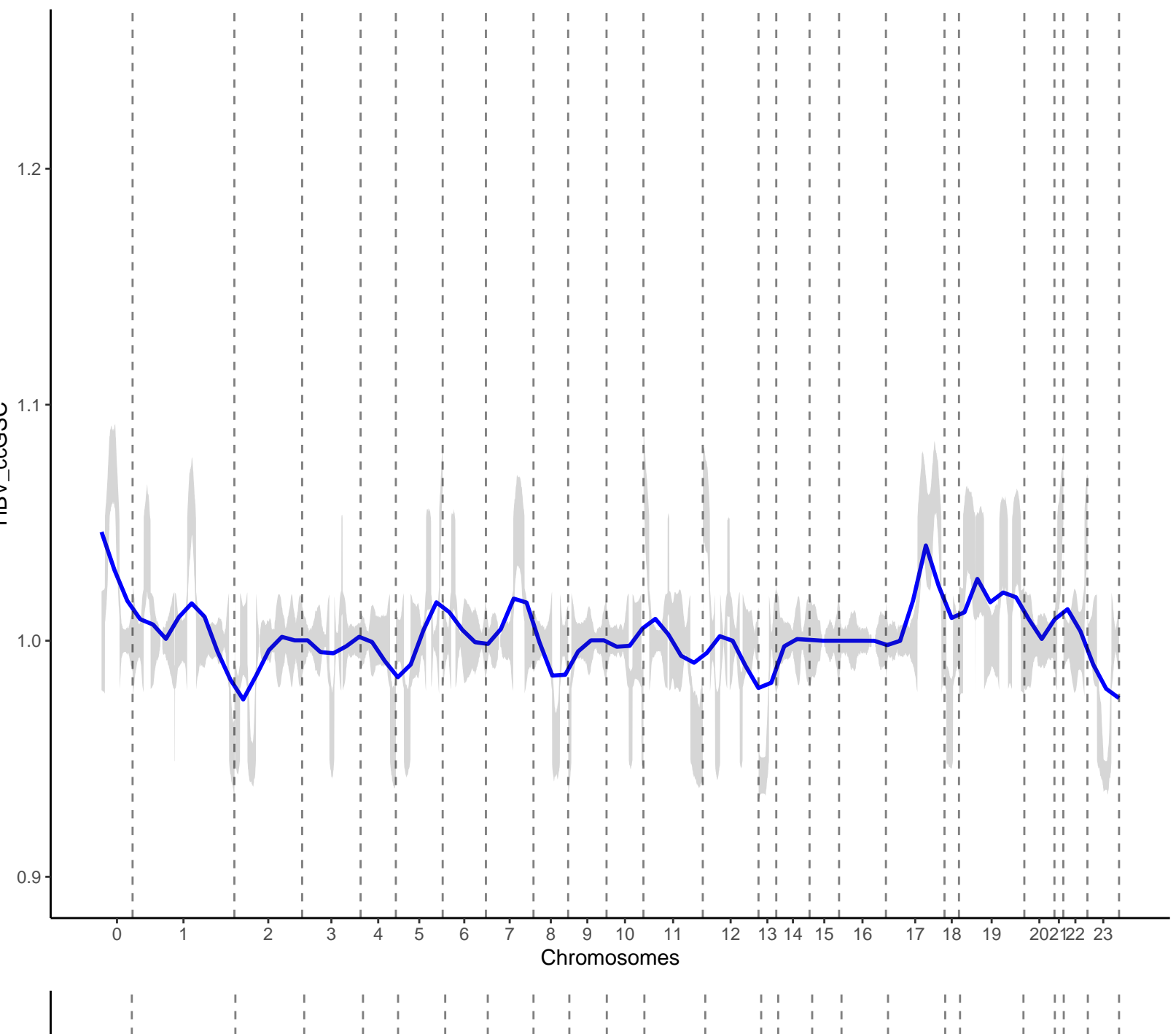
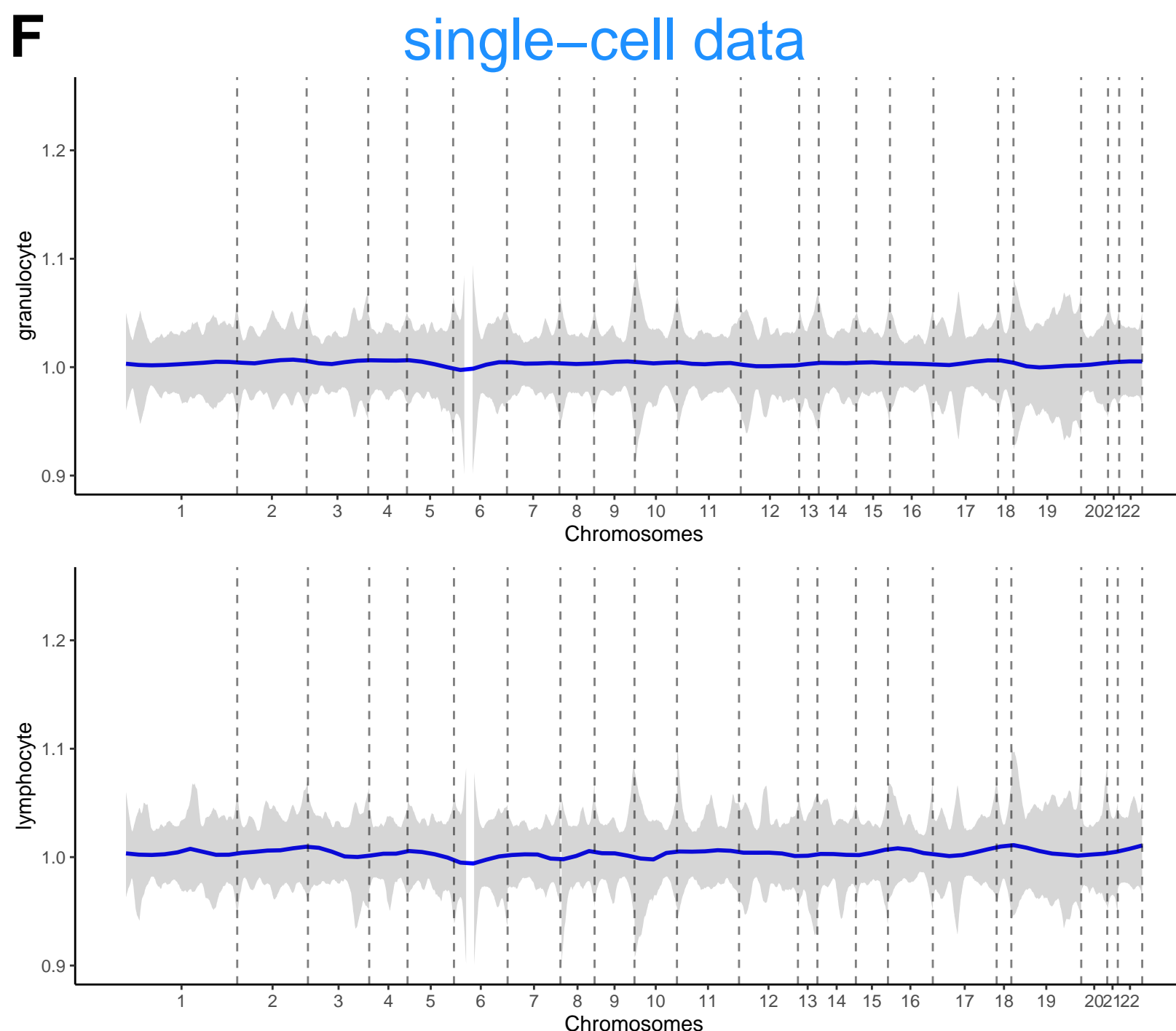
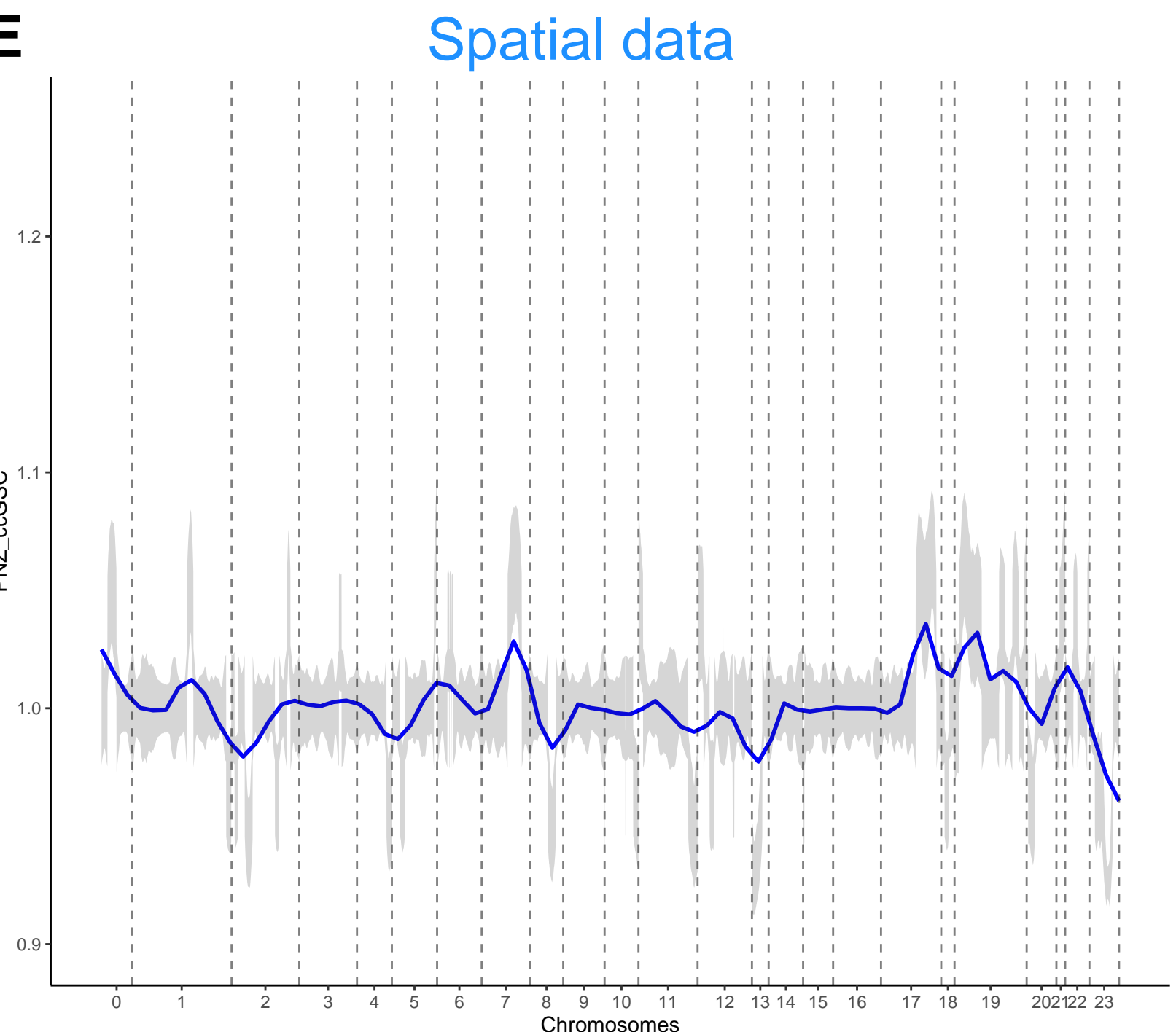
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI1 mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI1 mutation	mutant (p.Leu1427fs, c.4280dupT)
ATRX mutation	wildtype	NF1 mutation	NF1 deletion
TER1P mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

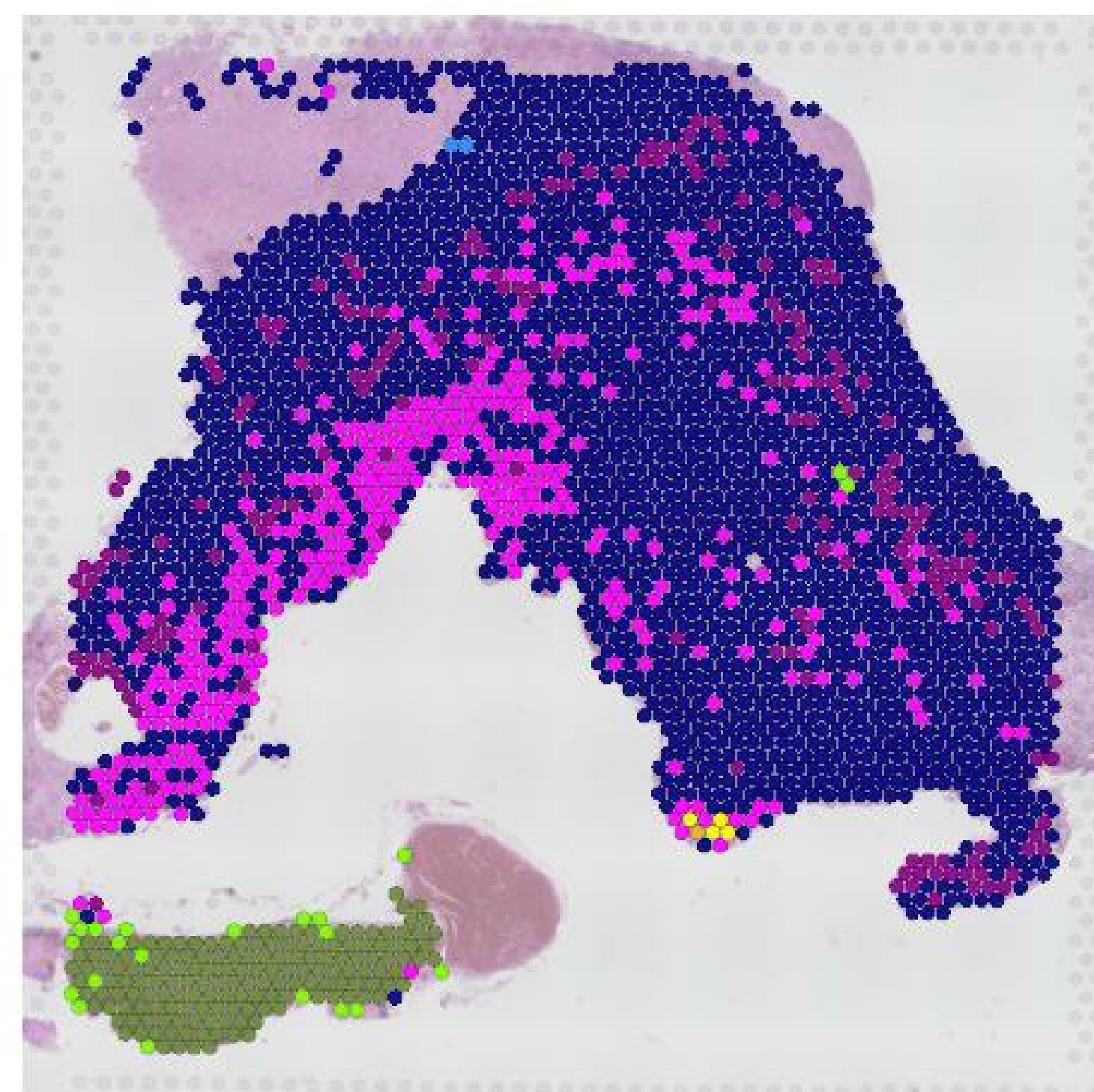
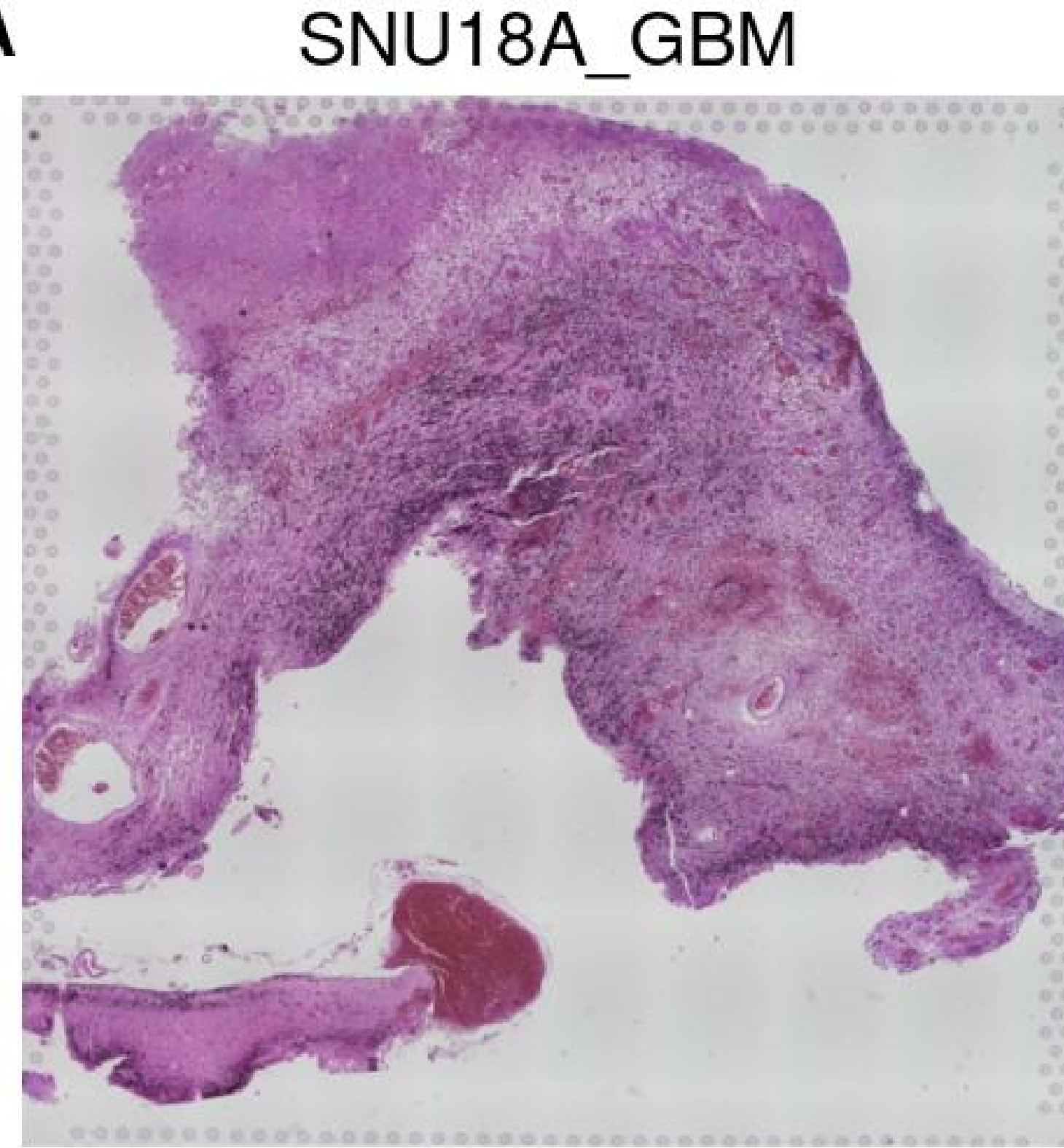




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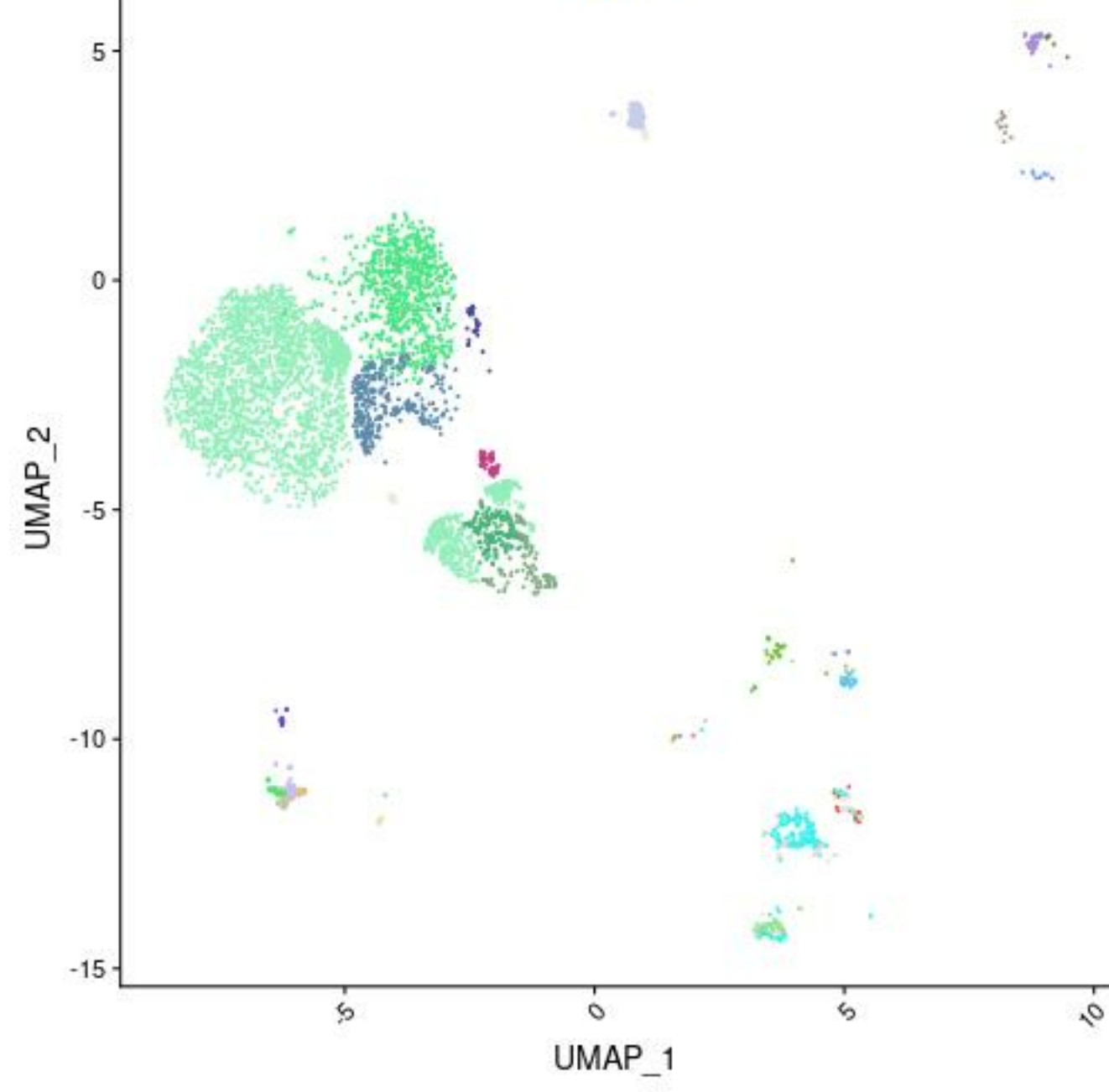
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	mutant (p.Leu1427fs, c.4280dupT)
TER1P mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		



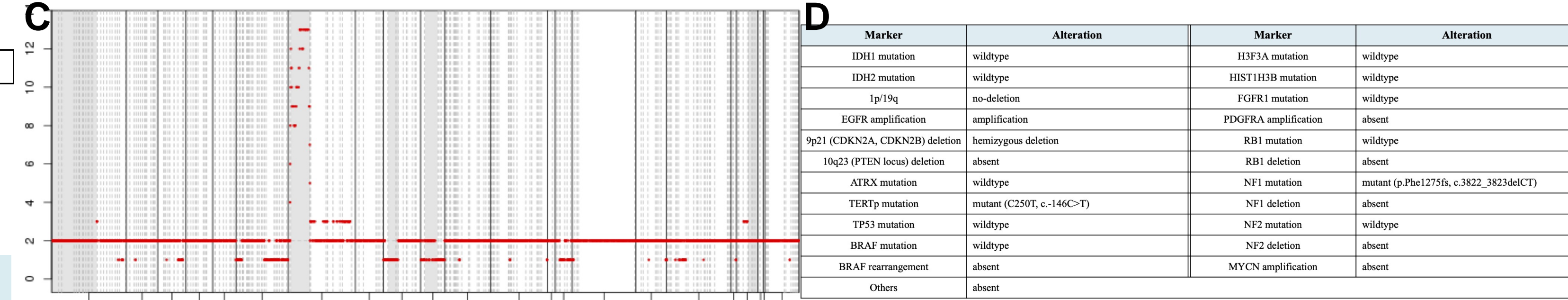
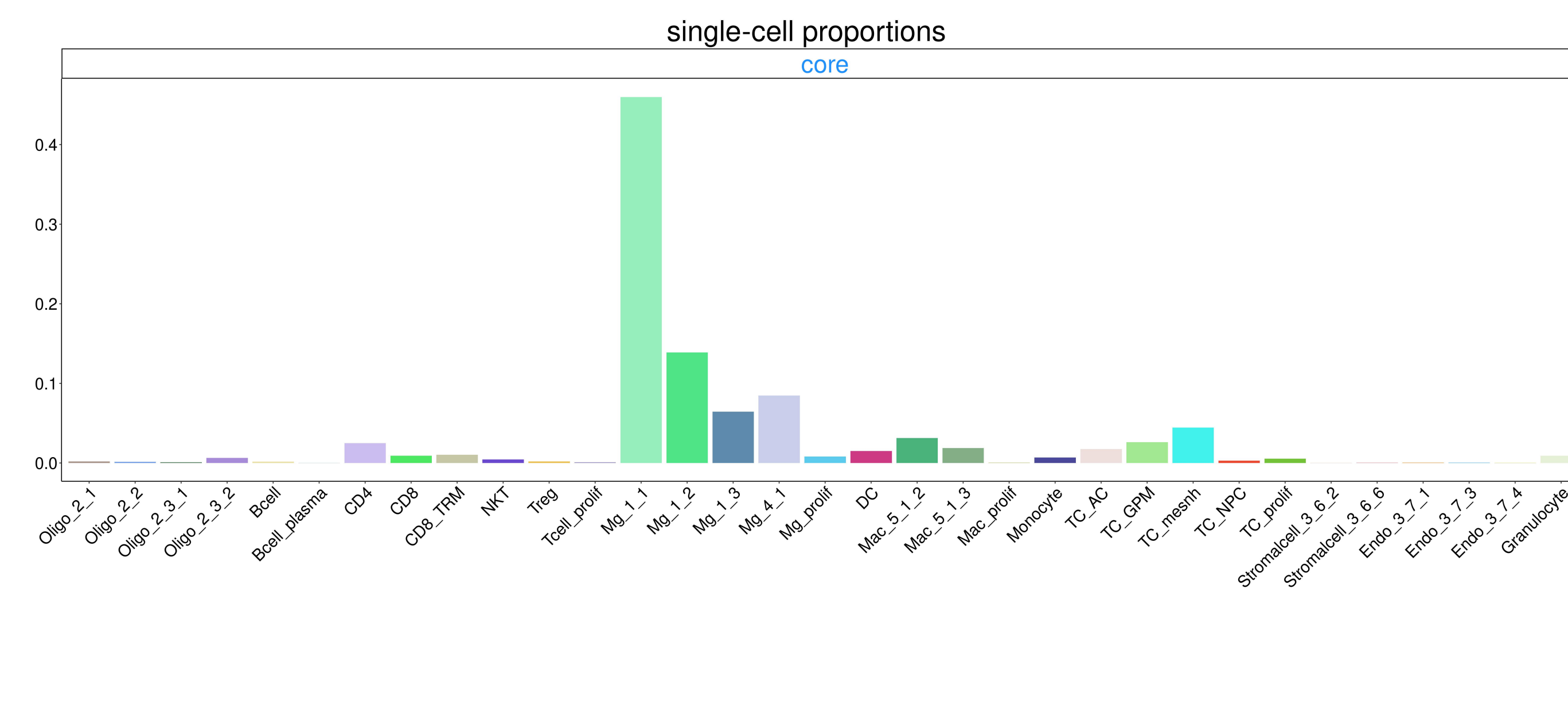
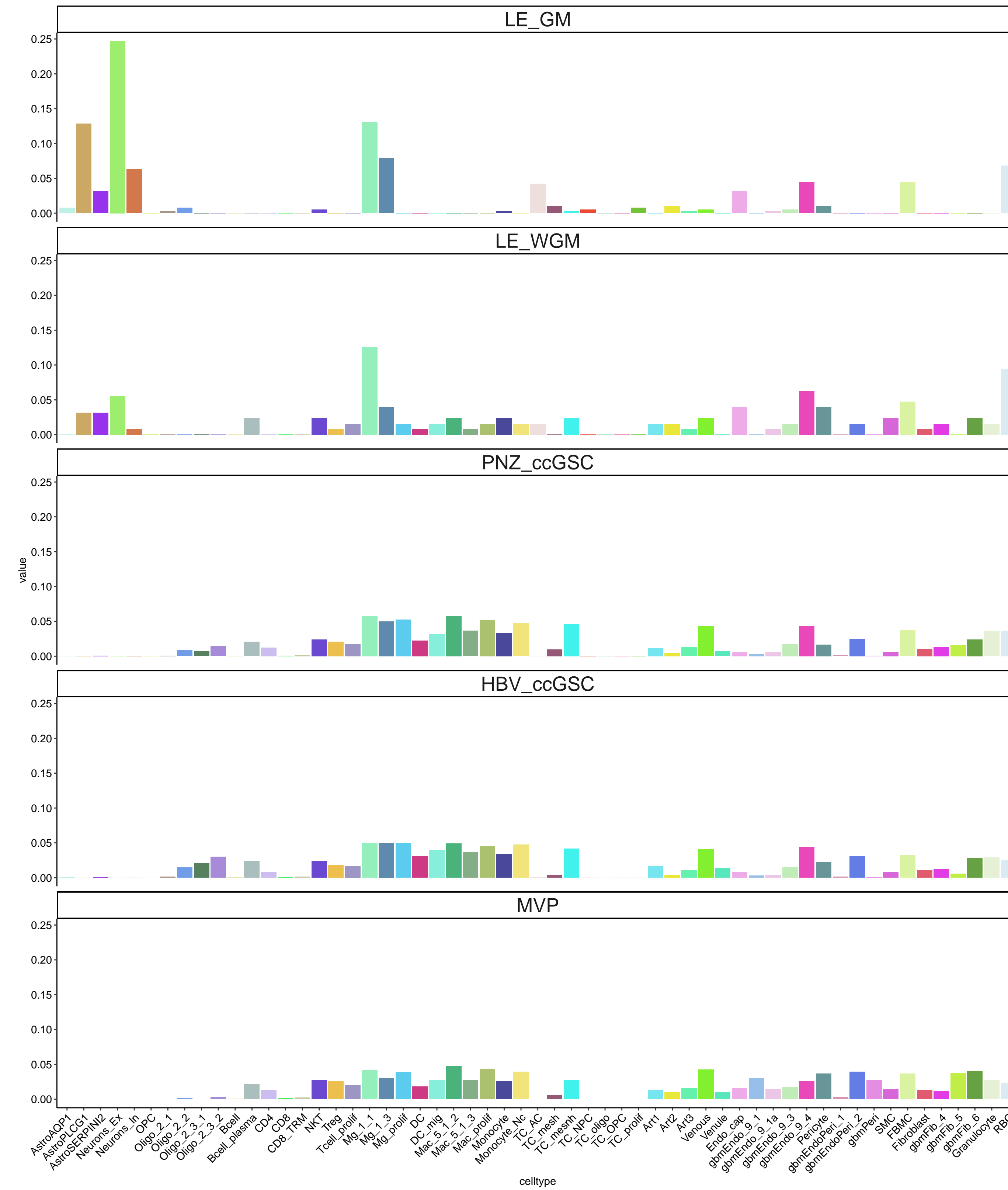


#cells 5559 single-cell cite-seq
SNU18

core

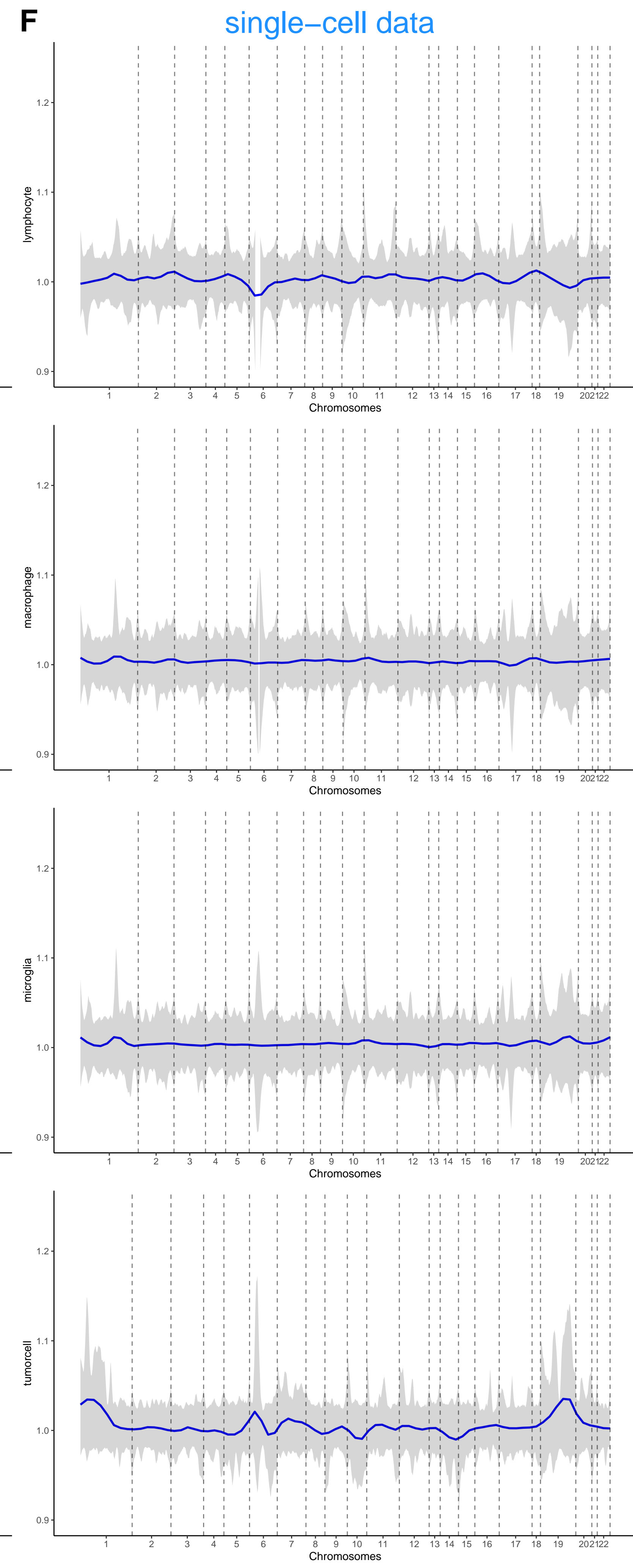
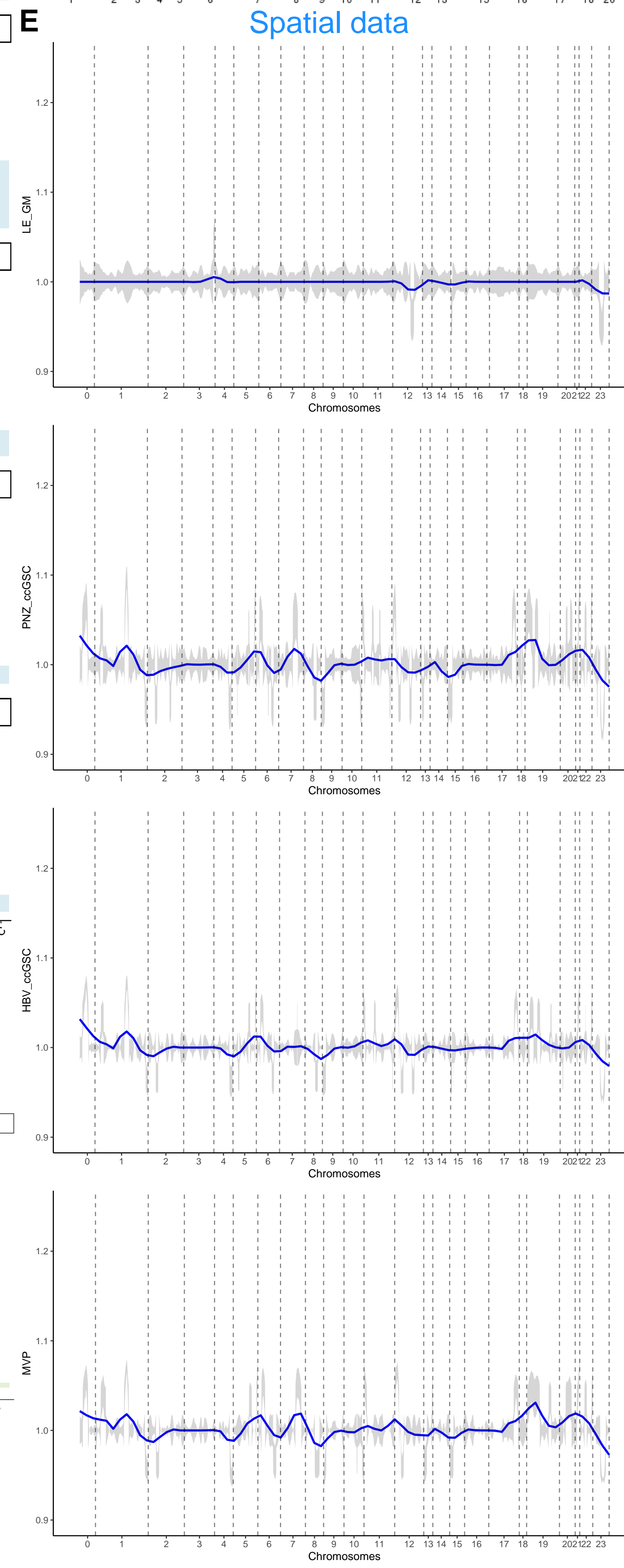


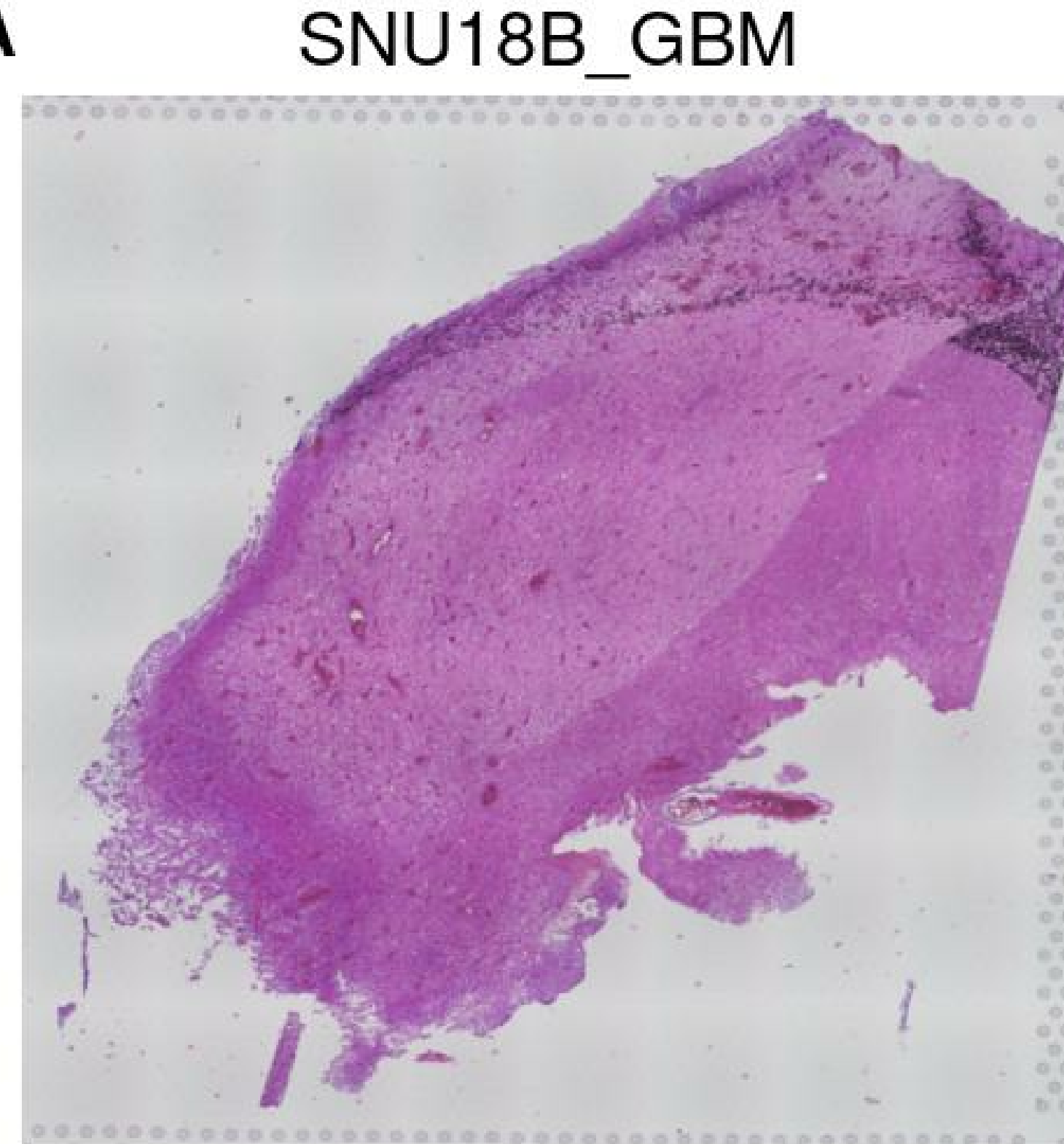
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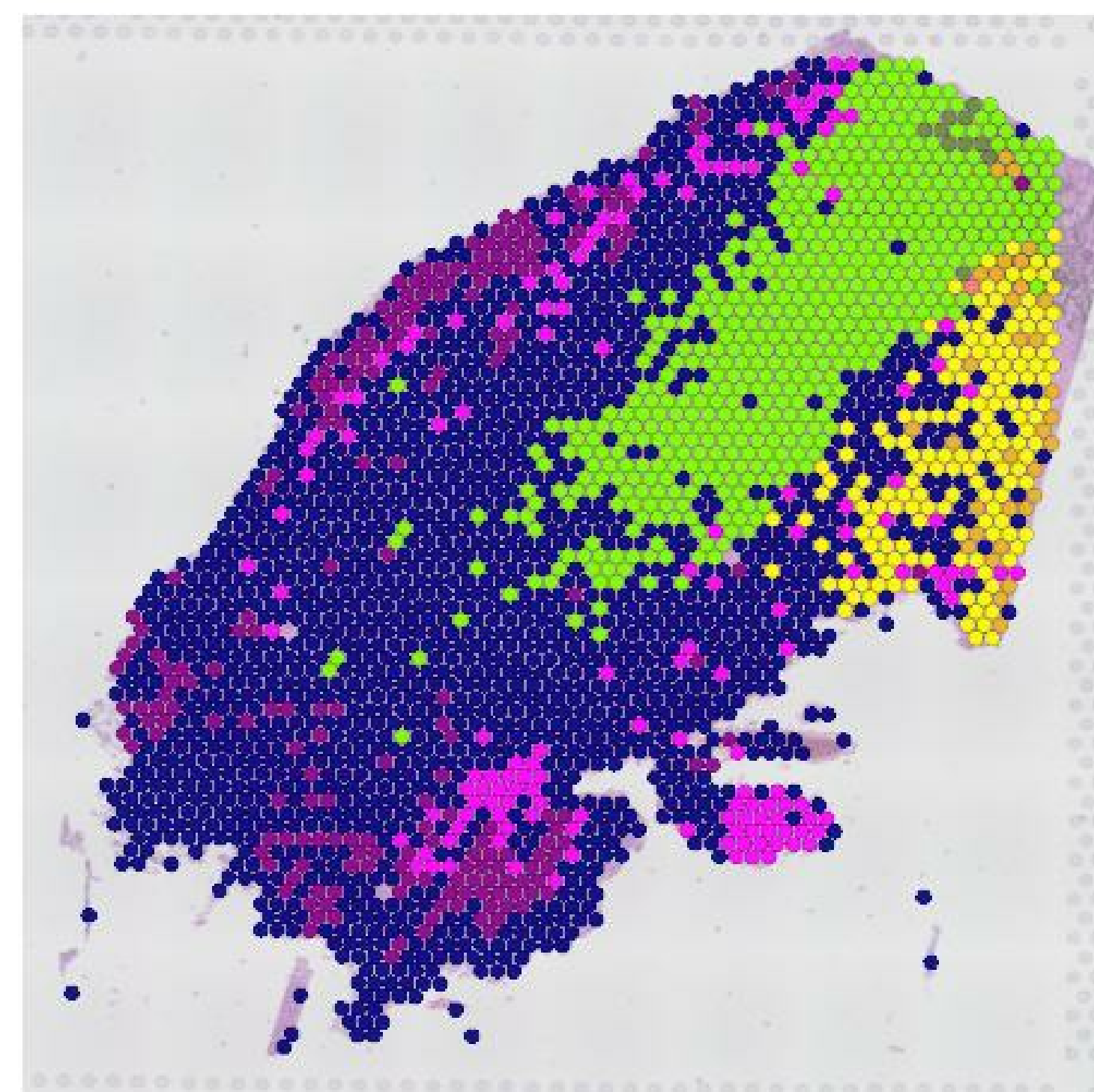
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Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	mutant (p.Phe1275fs, c.3822_3823delCT)
TER1P mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

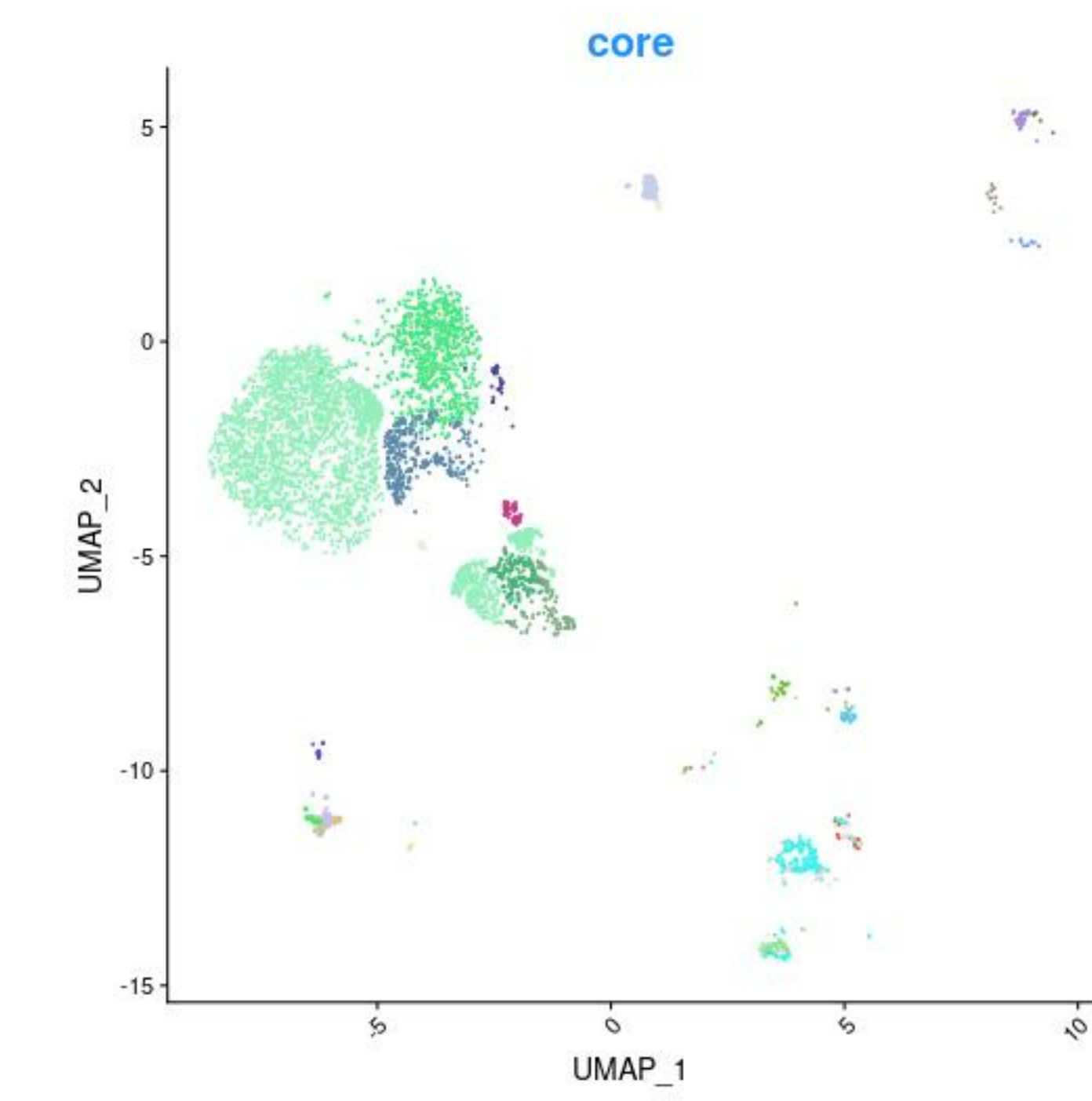




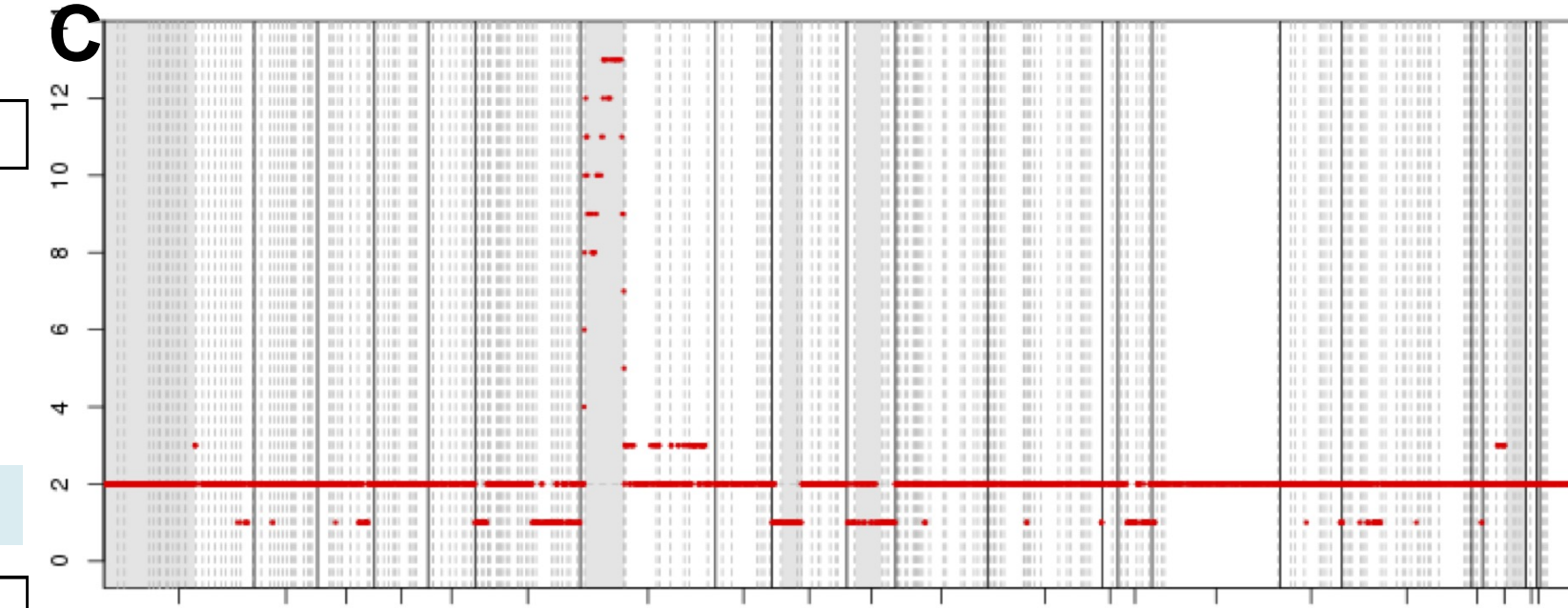
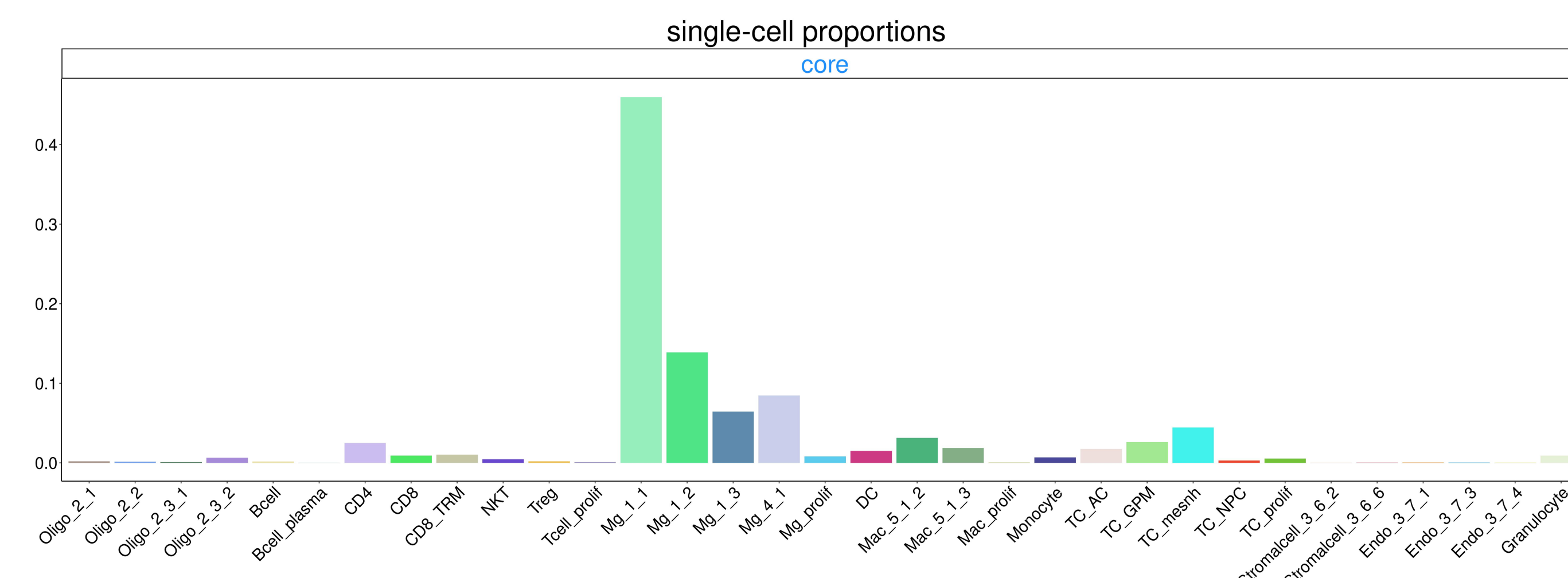
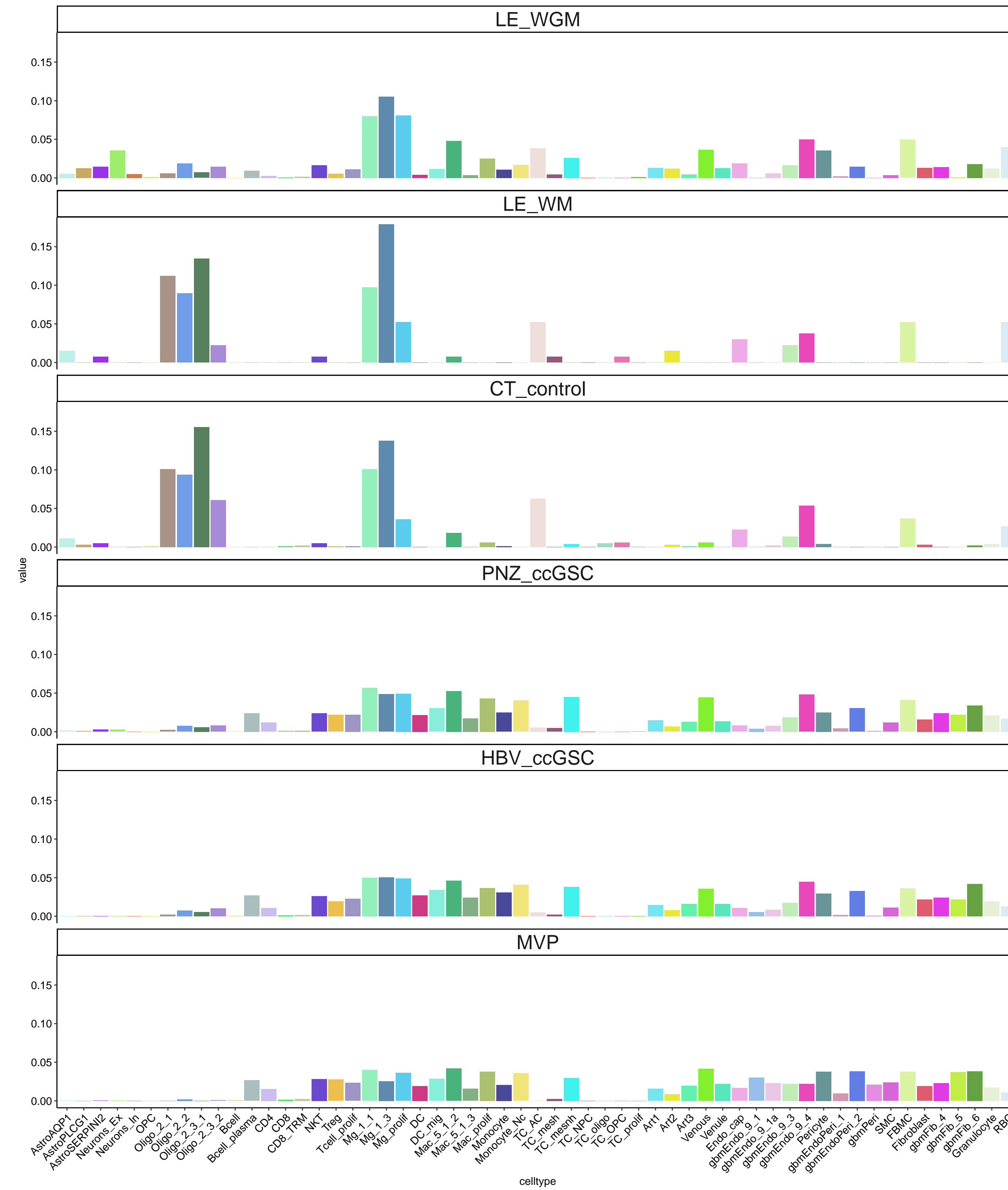
slide 2 of 3



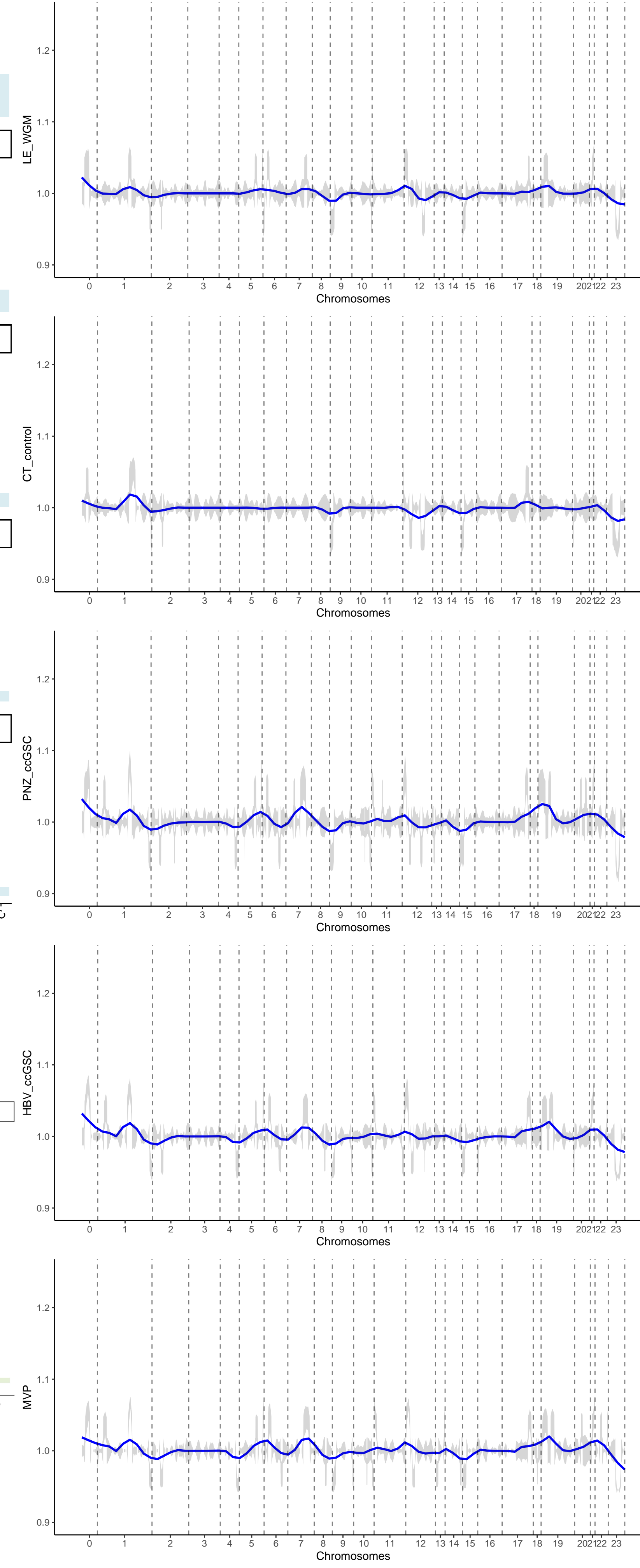
B #cells 5559 single-cell cite-seq SNU18



#spots 2638



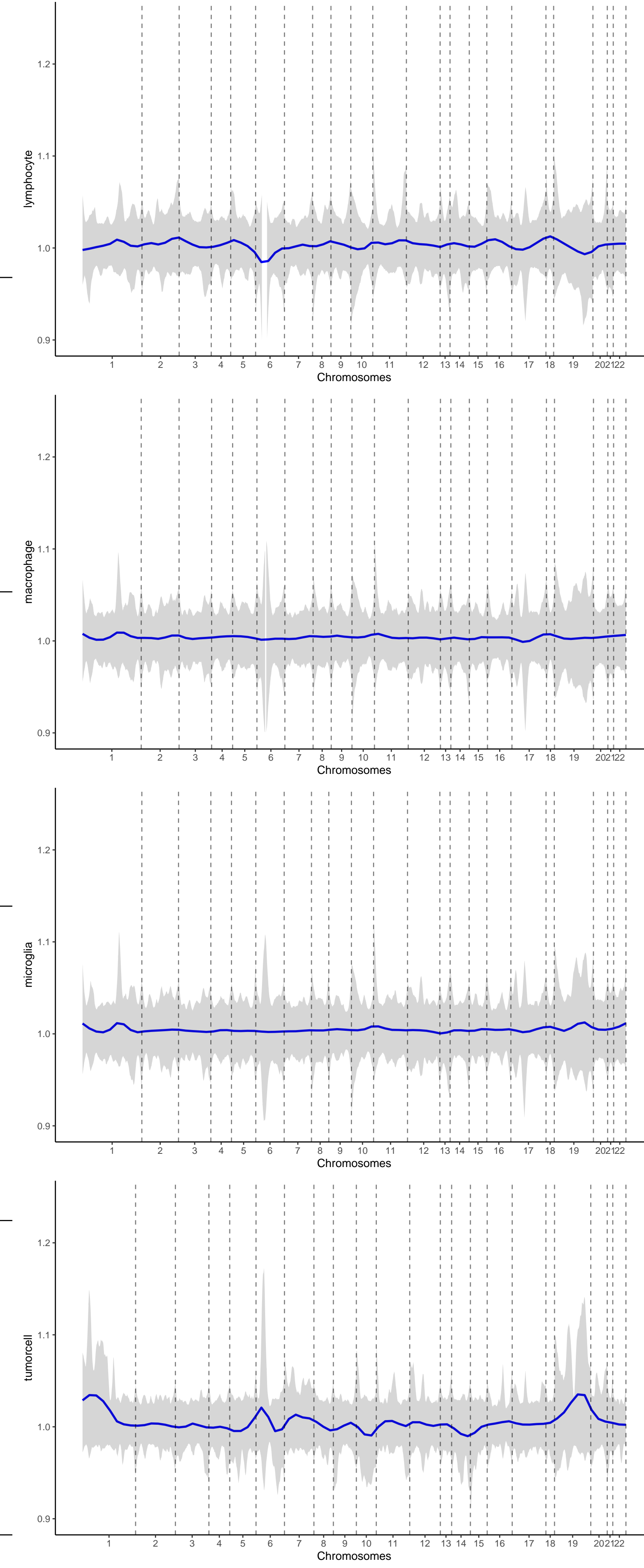
E Spatial data



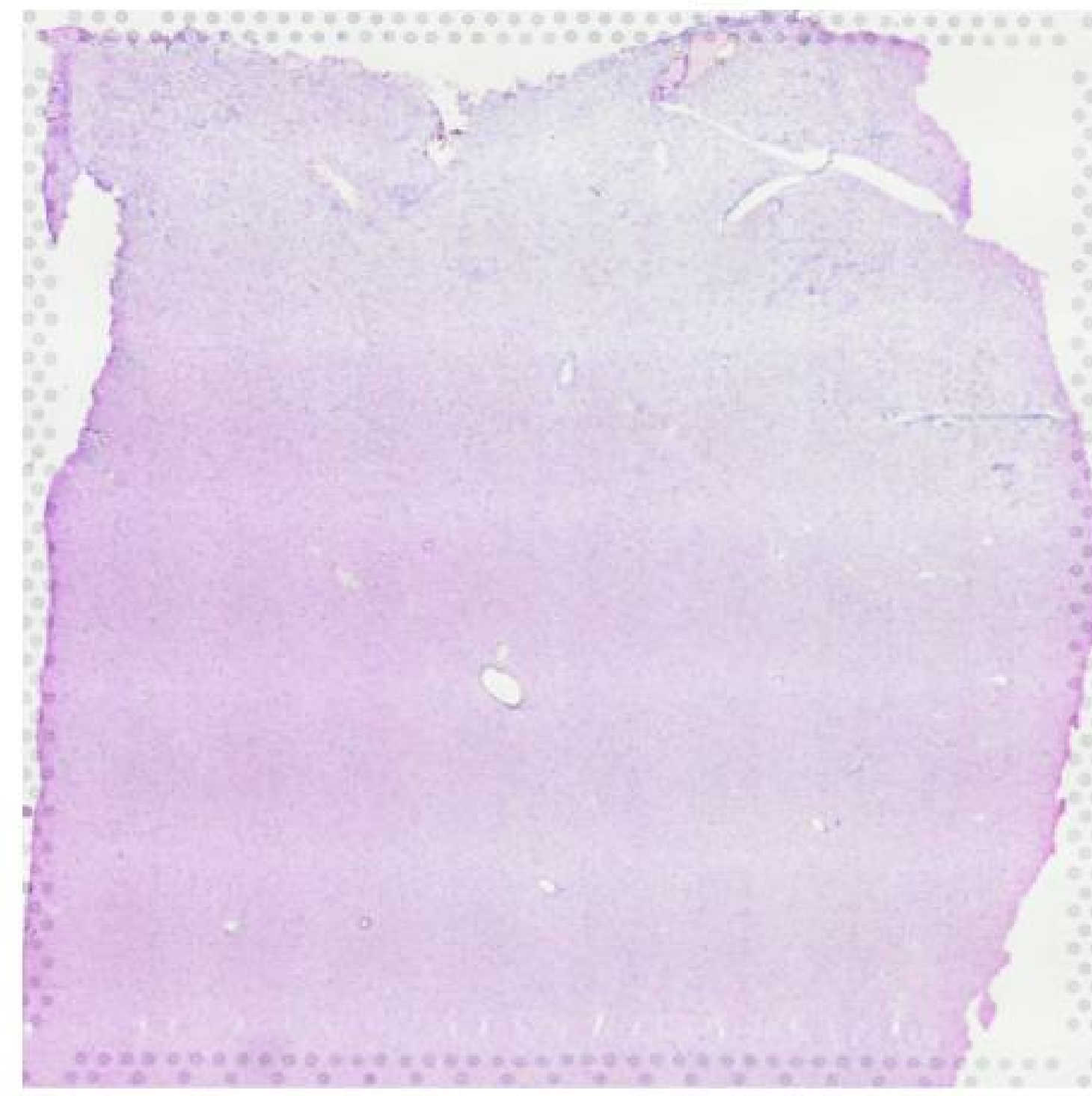
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Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	mutant (p.Phe1275fs, c.3822_3823delCT)
TP53 mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
BRAF mutation	wildtype	NF2 mutation	wildtype
BRAF rearrangement	absent	NF2 deletion	absent
Others	absent	MYCN amplification	absent

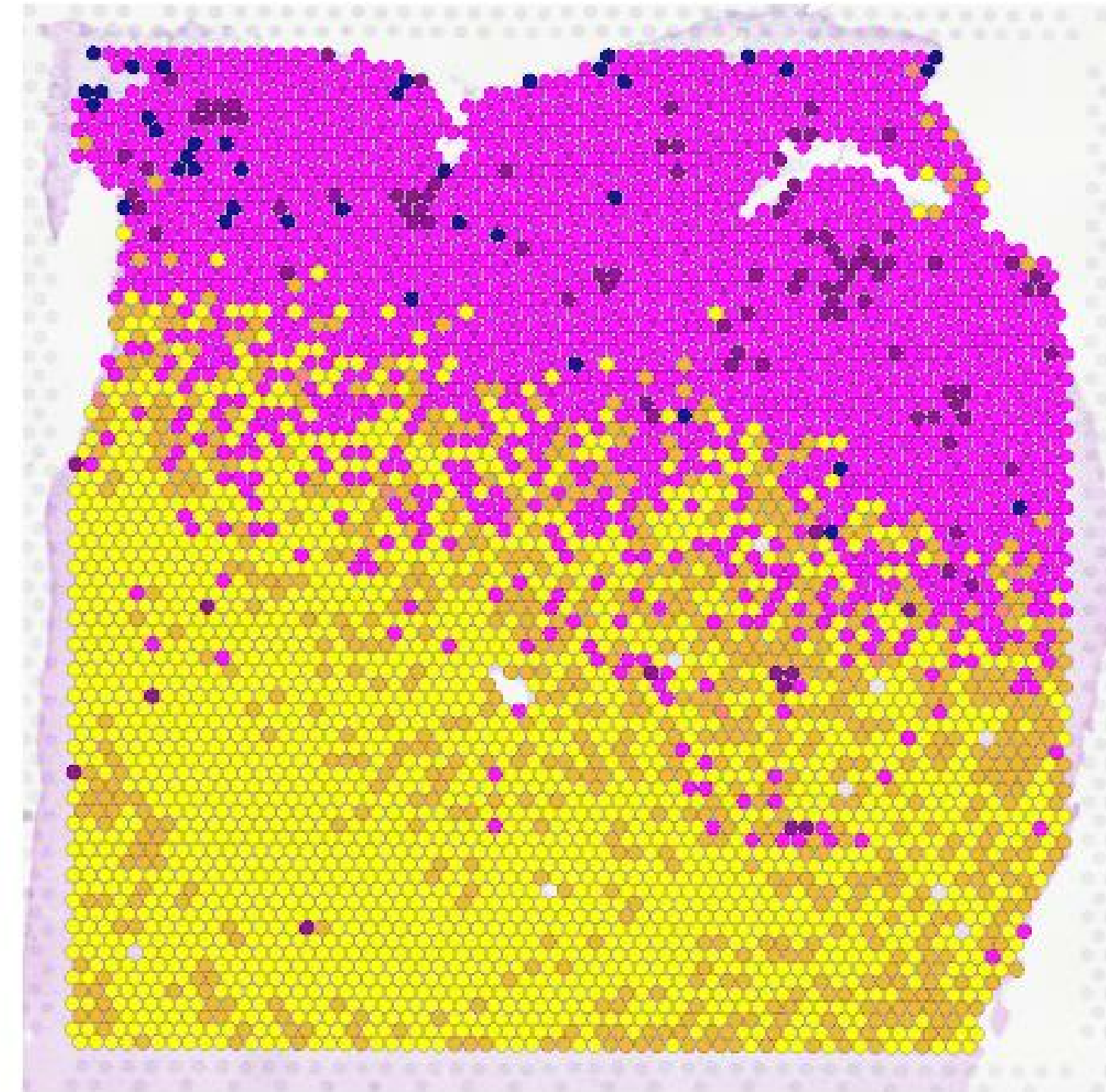
F single-cell data



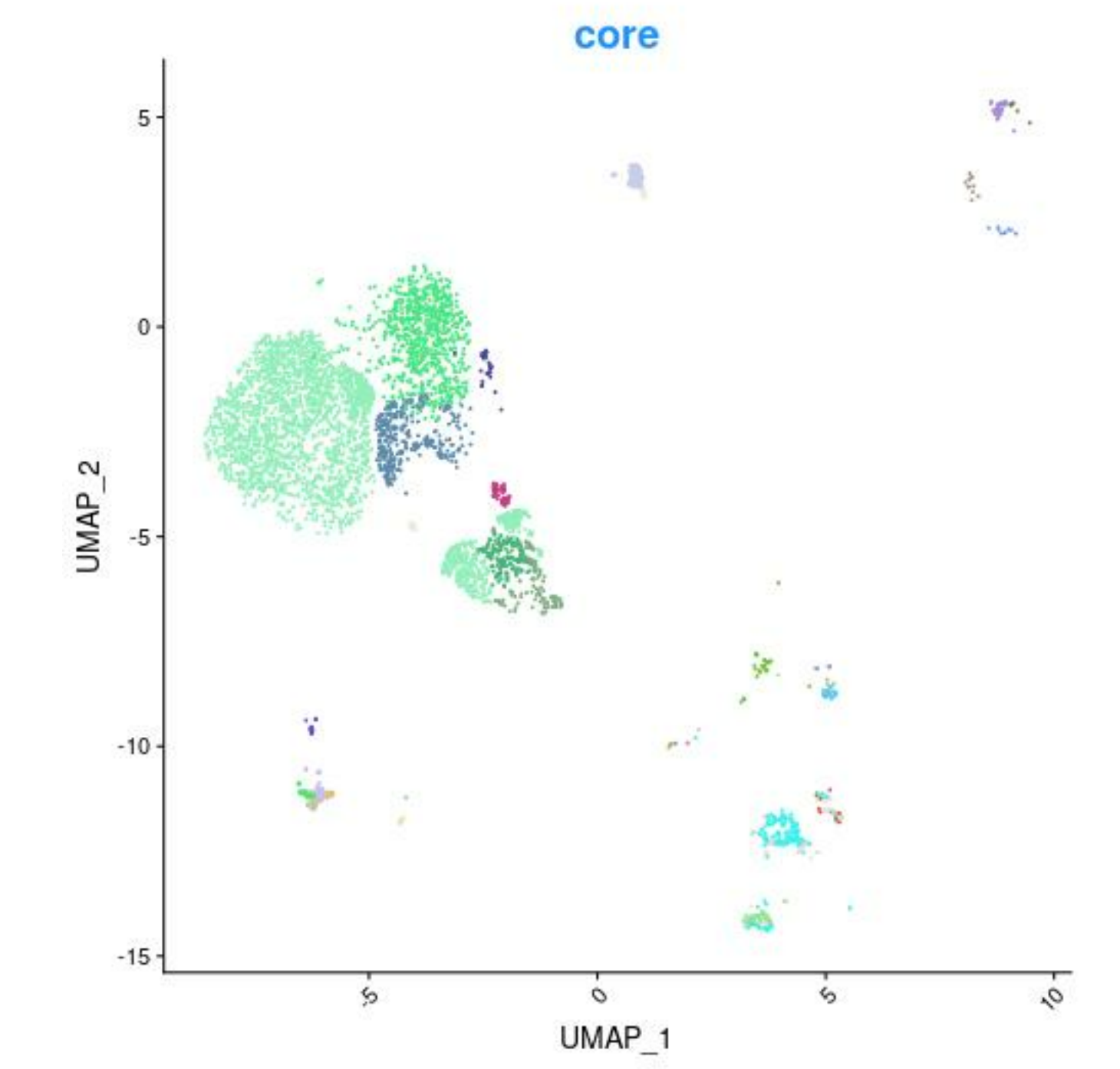
A SNU18Afrozen_GBM



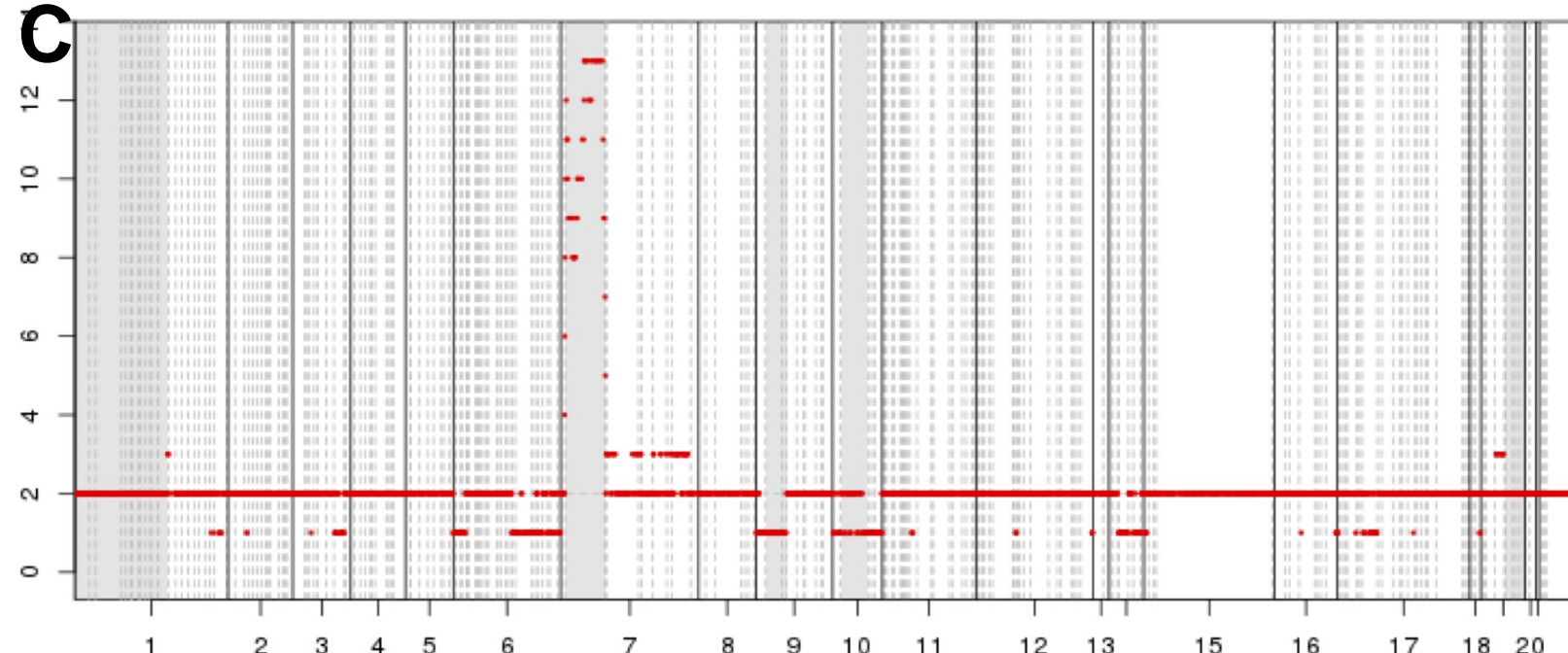
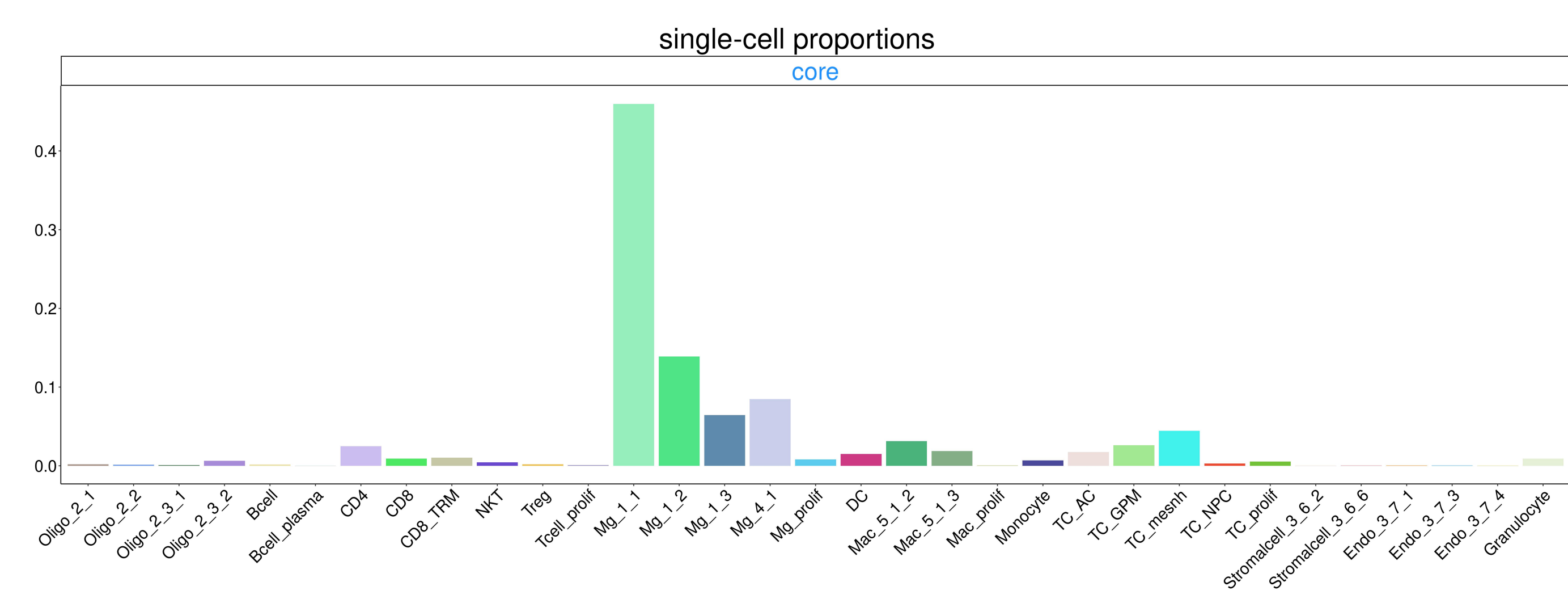
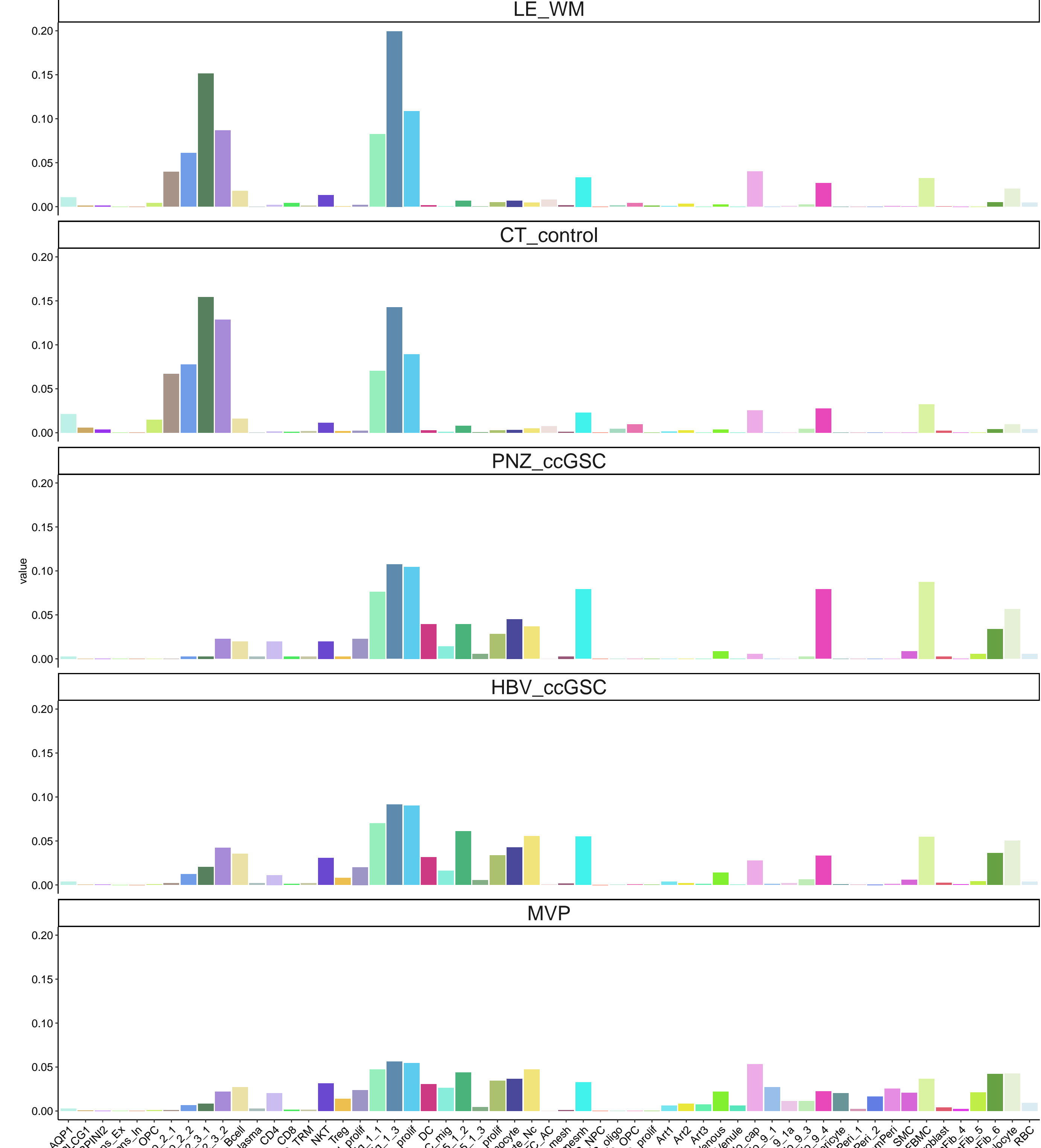
slide 3 of 3



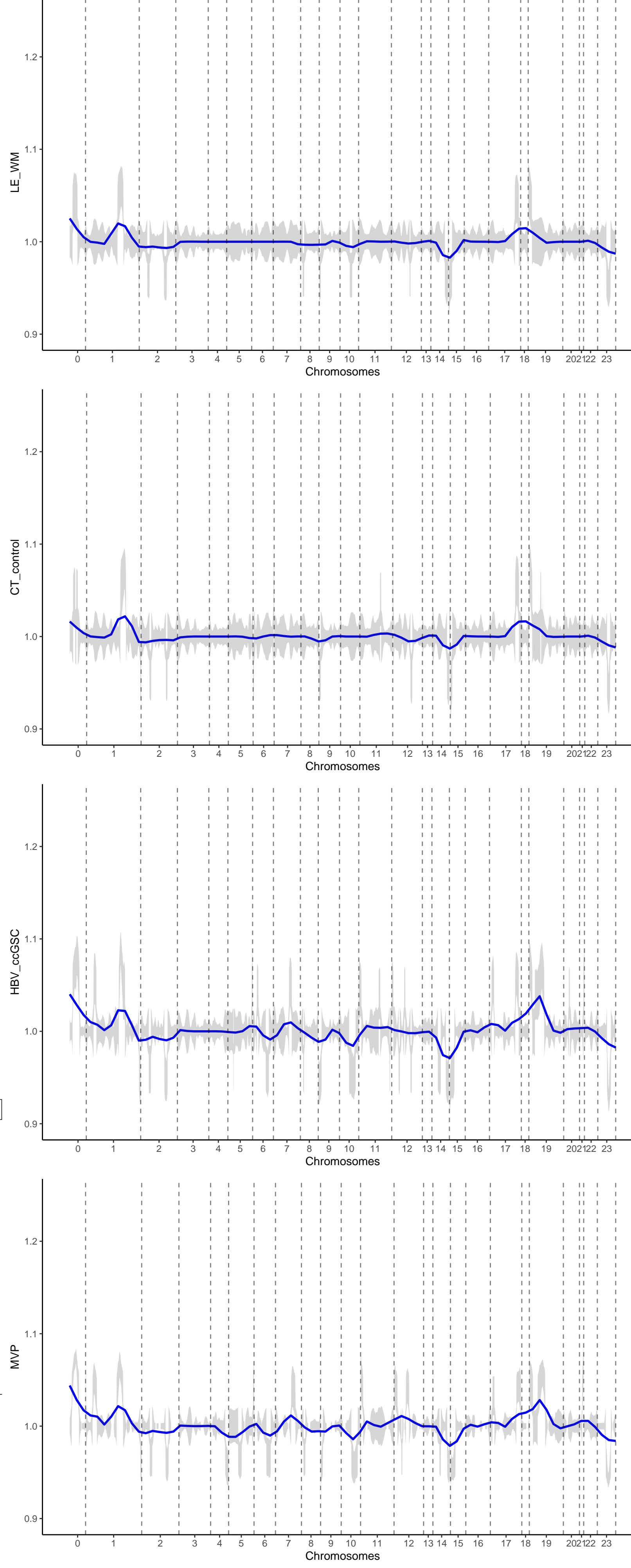
B #cells 5559 single-cell cite-seq SNU18



#spots 4689

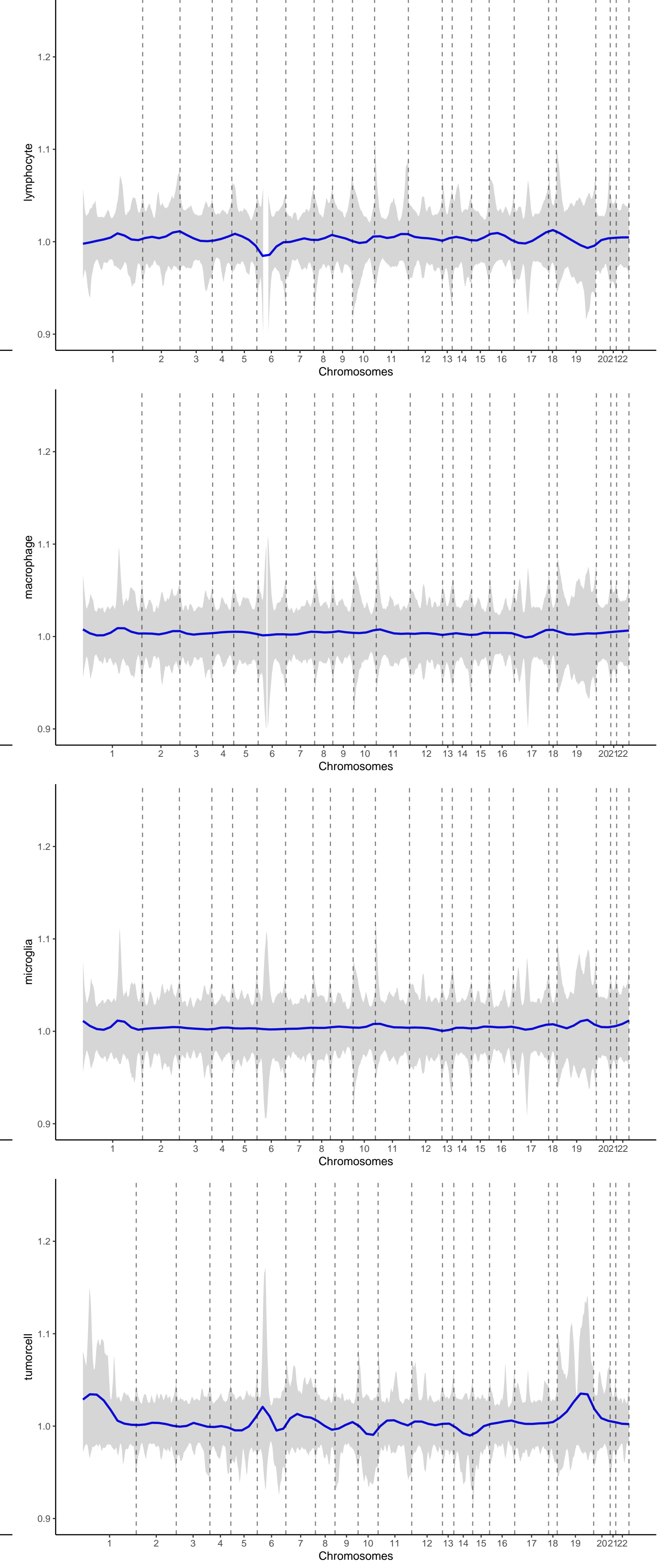


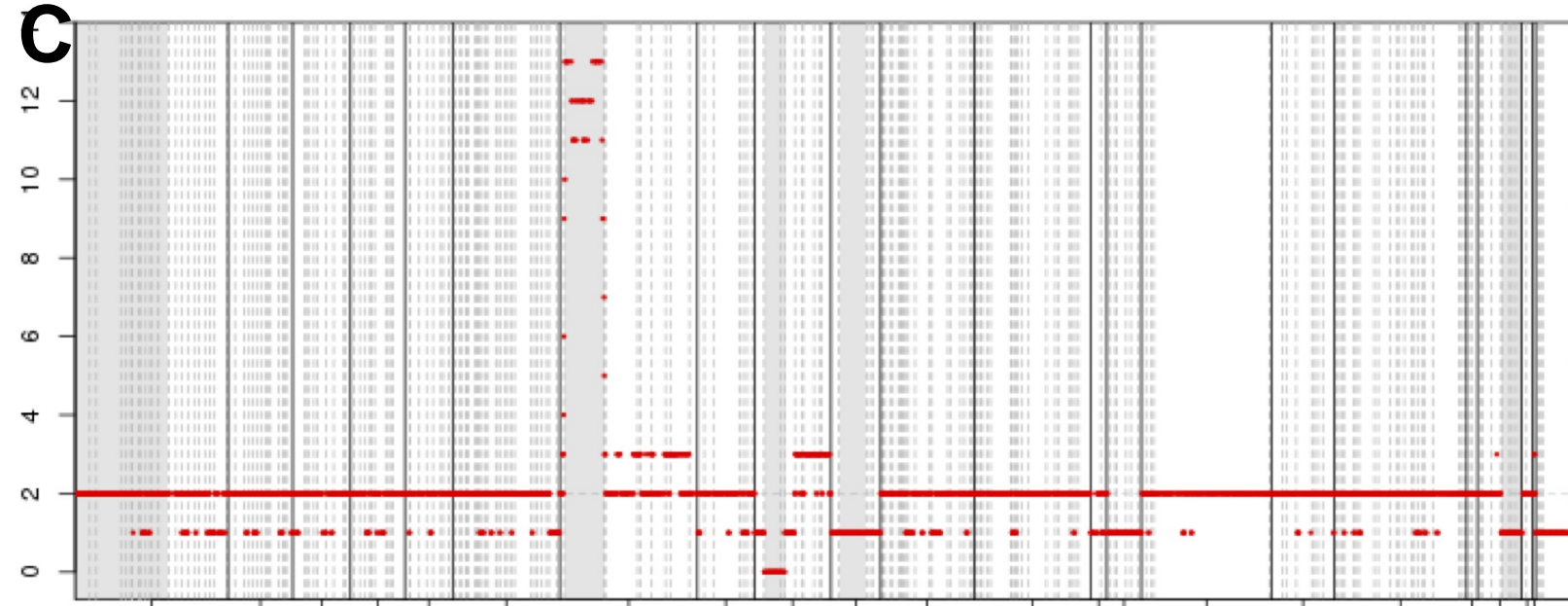
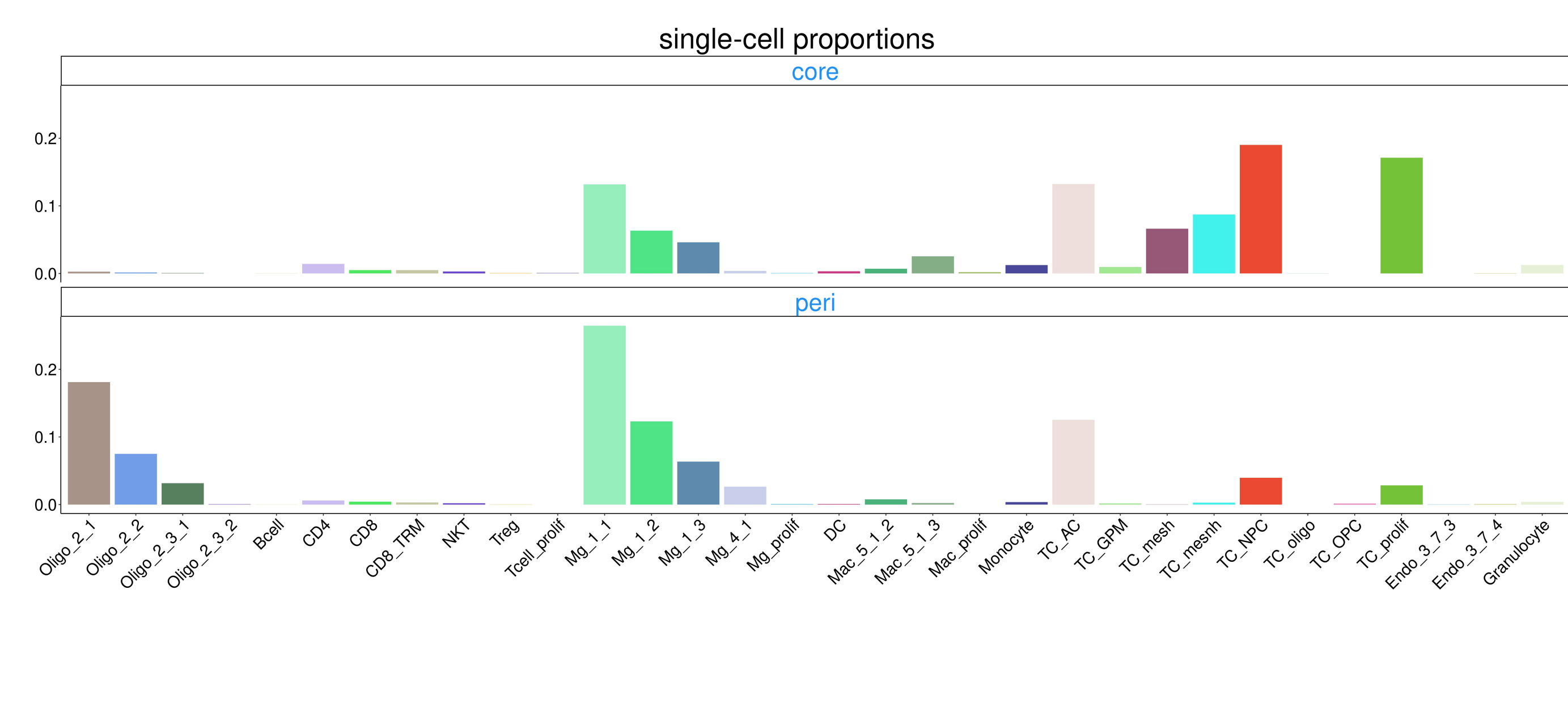
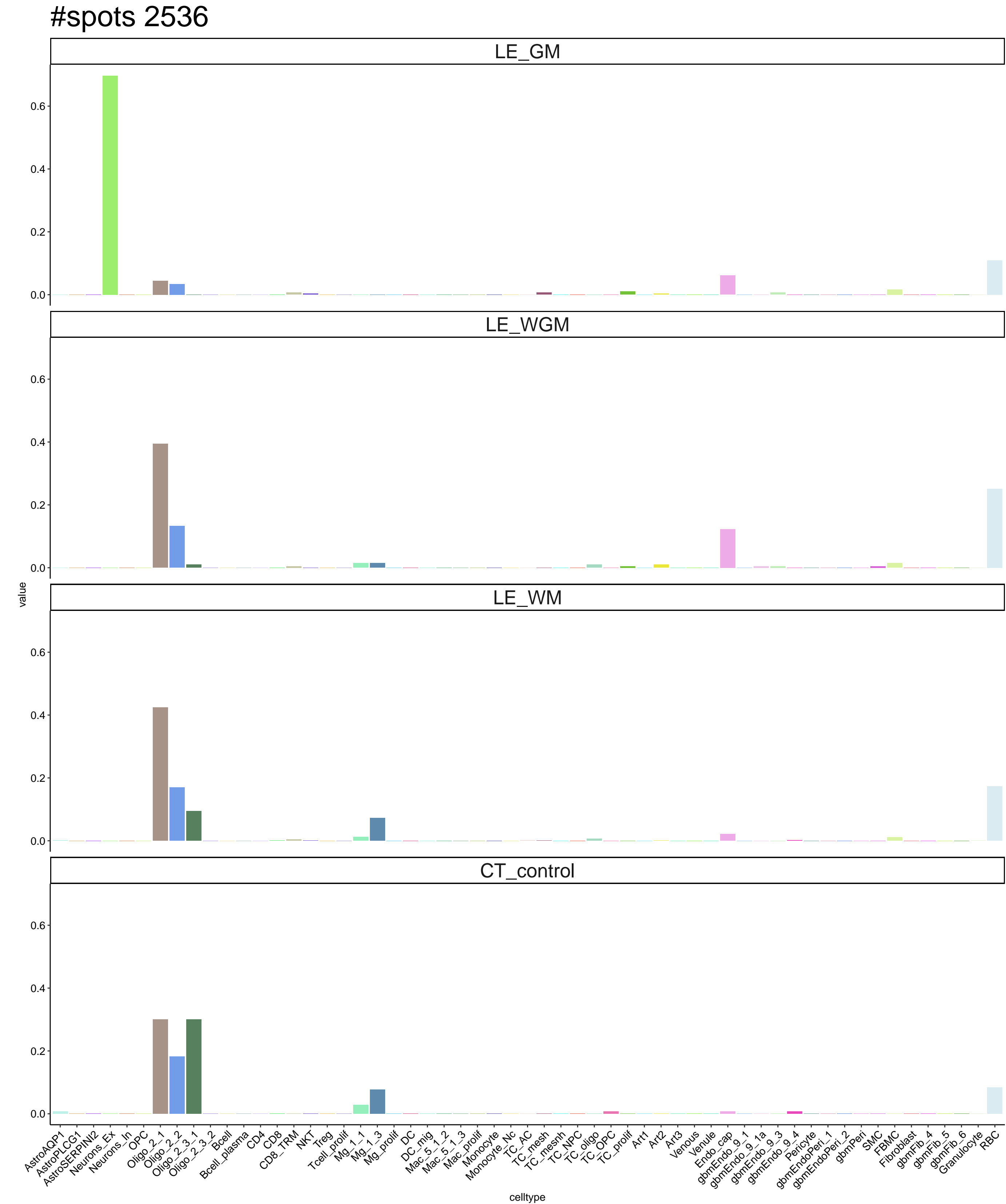
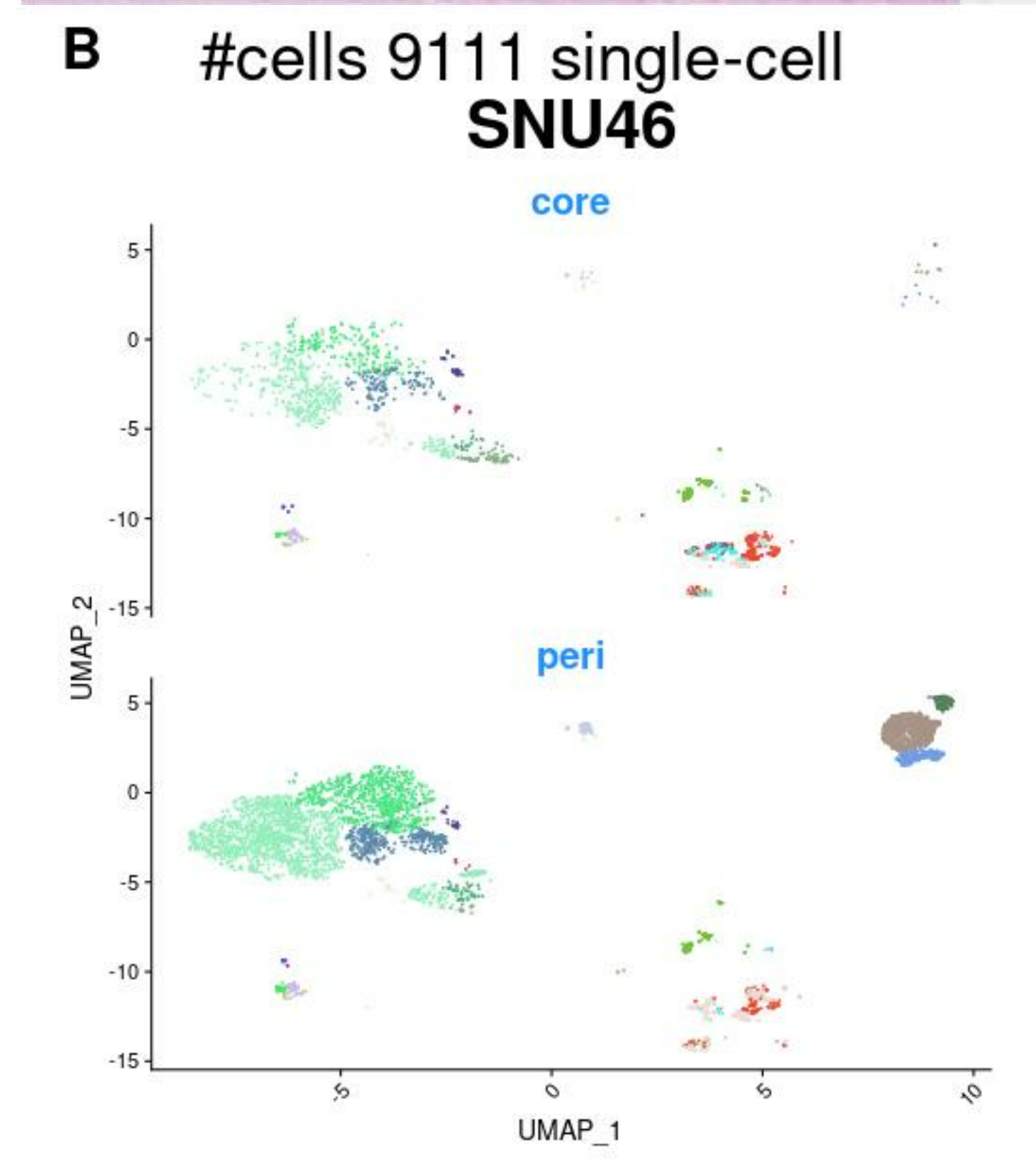
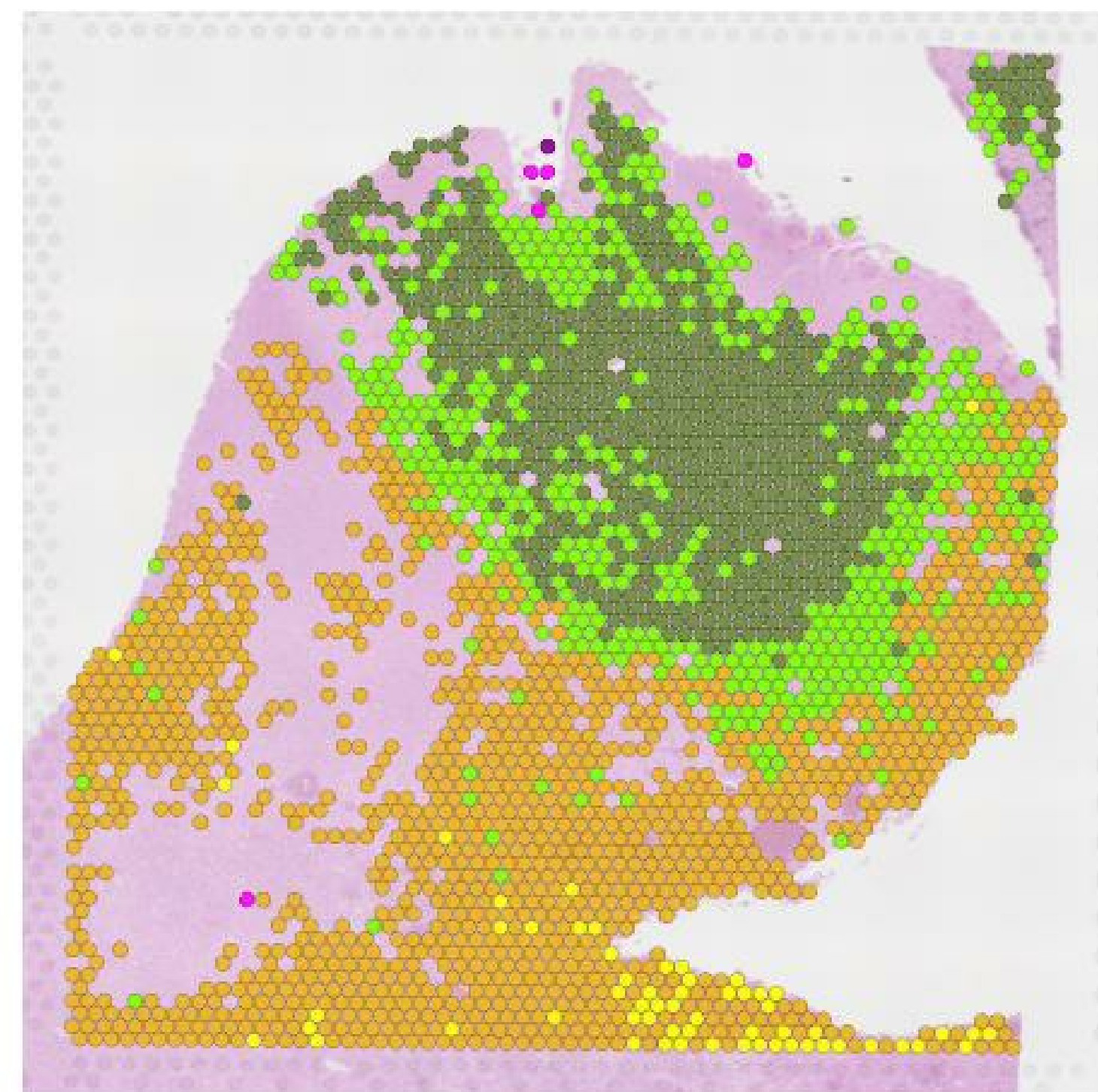
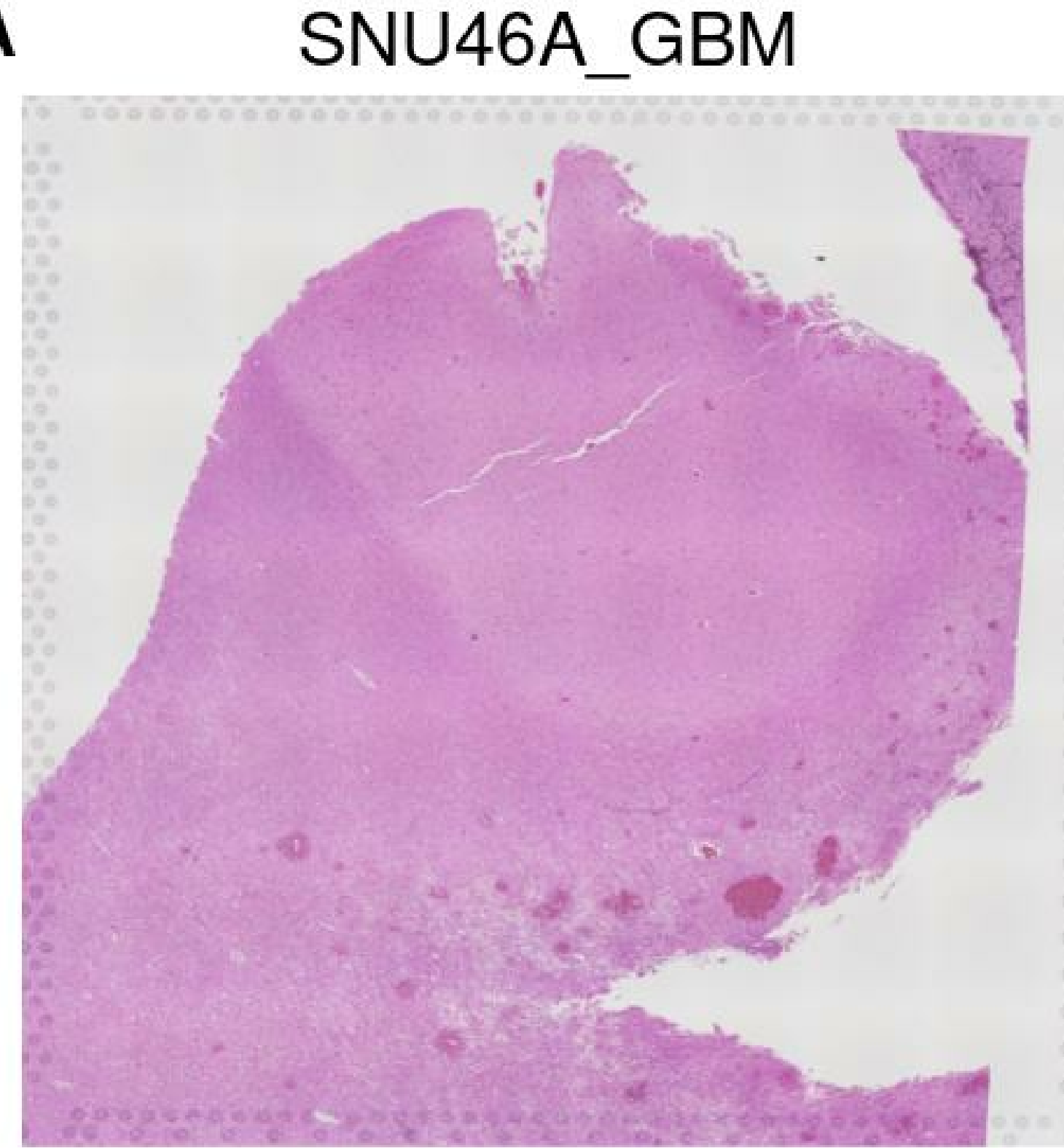
E Spatial data



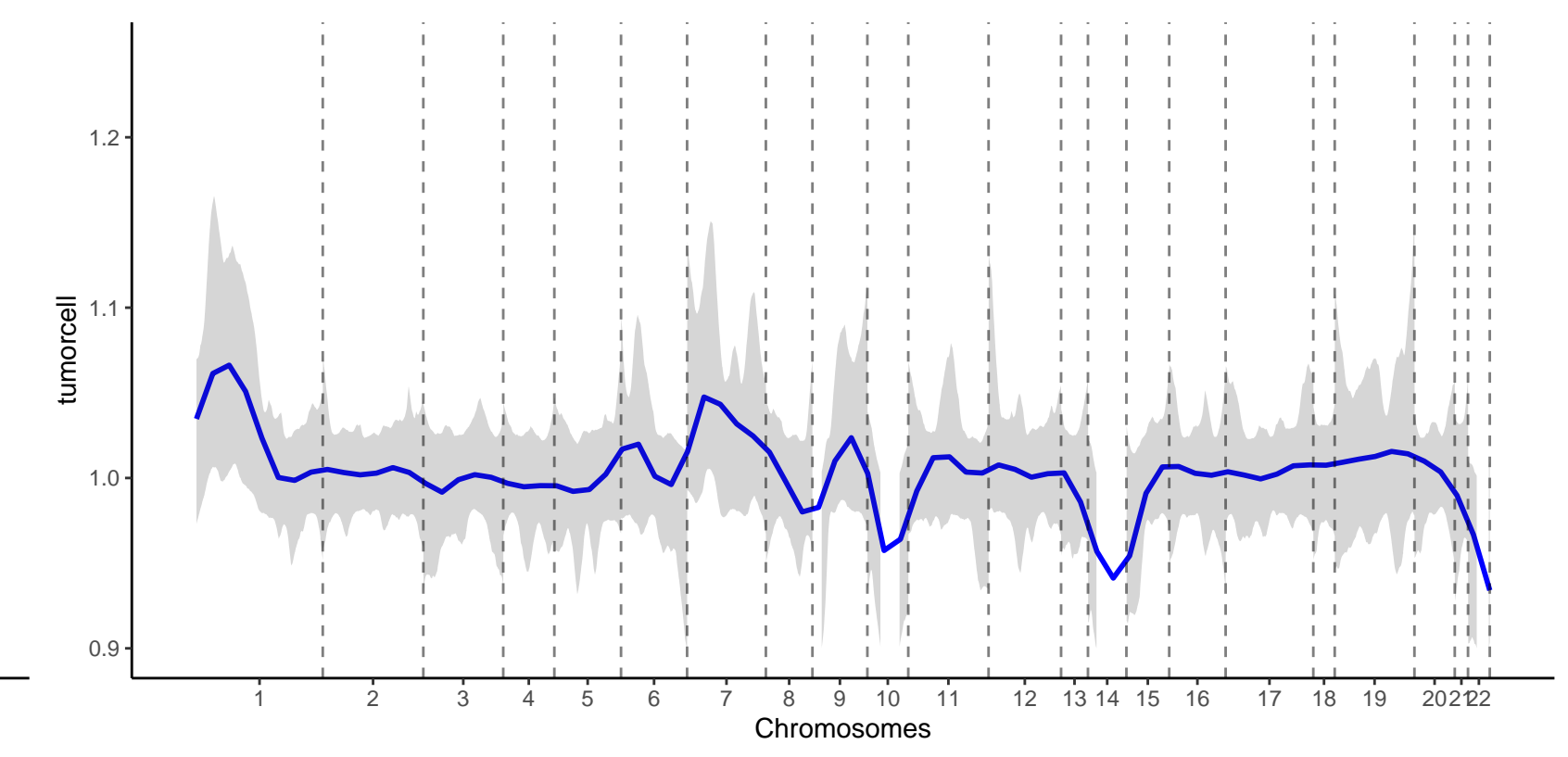
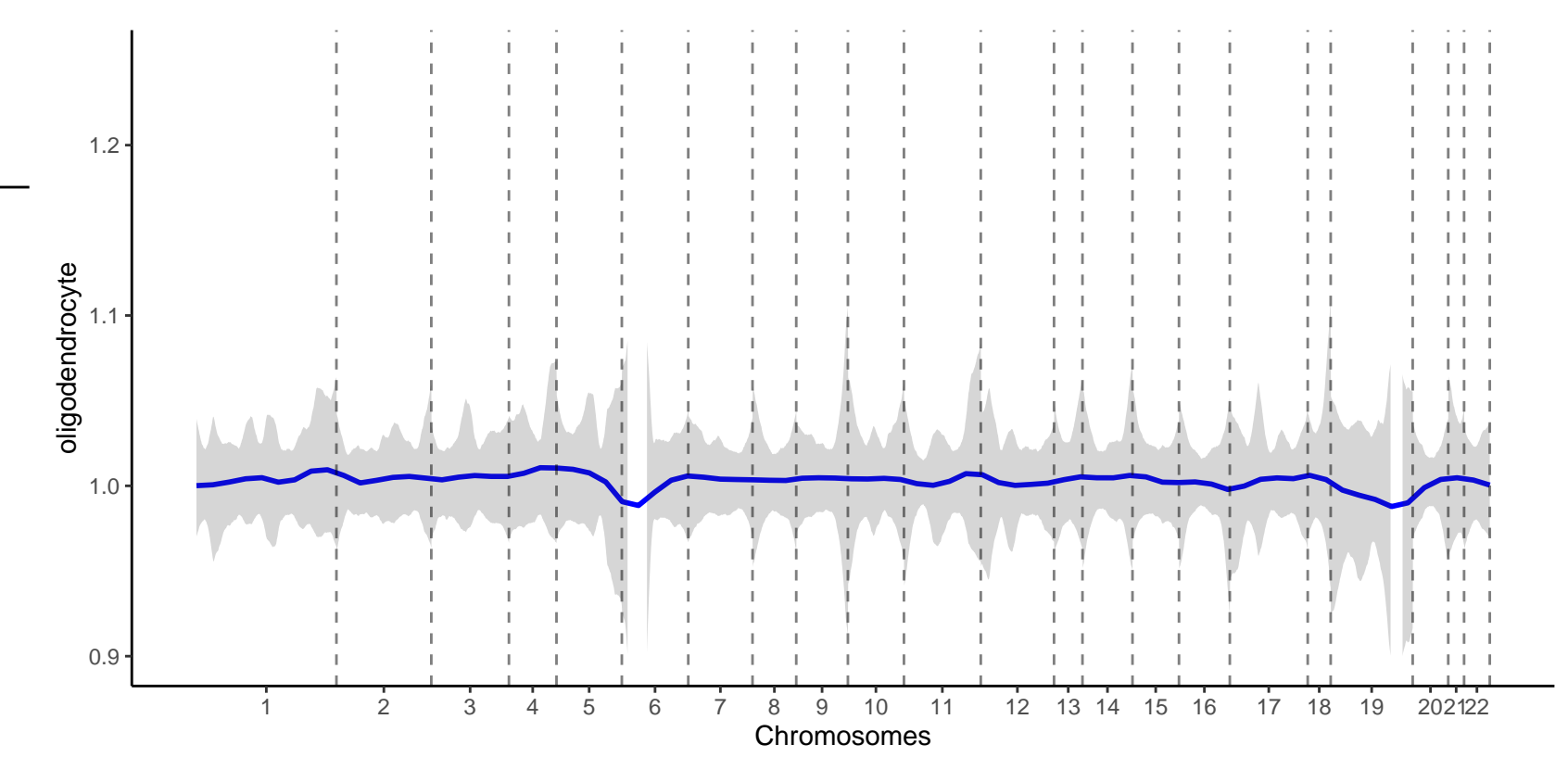
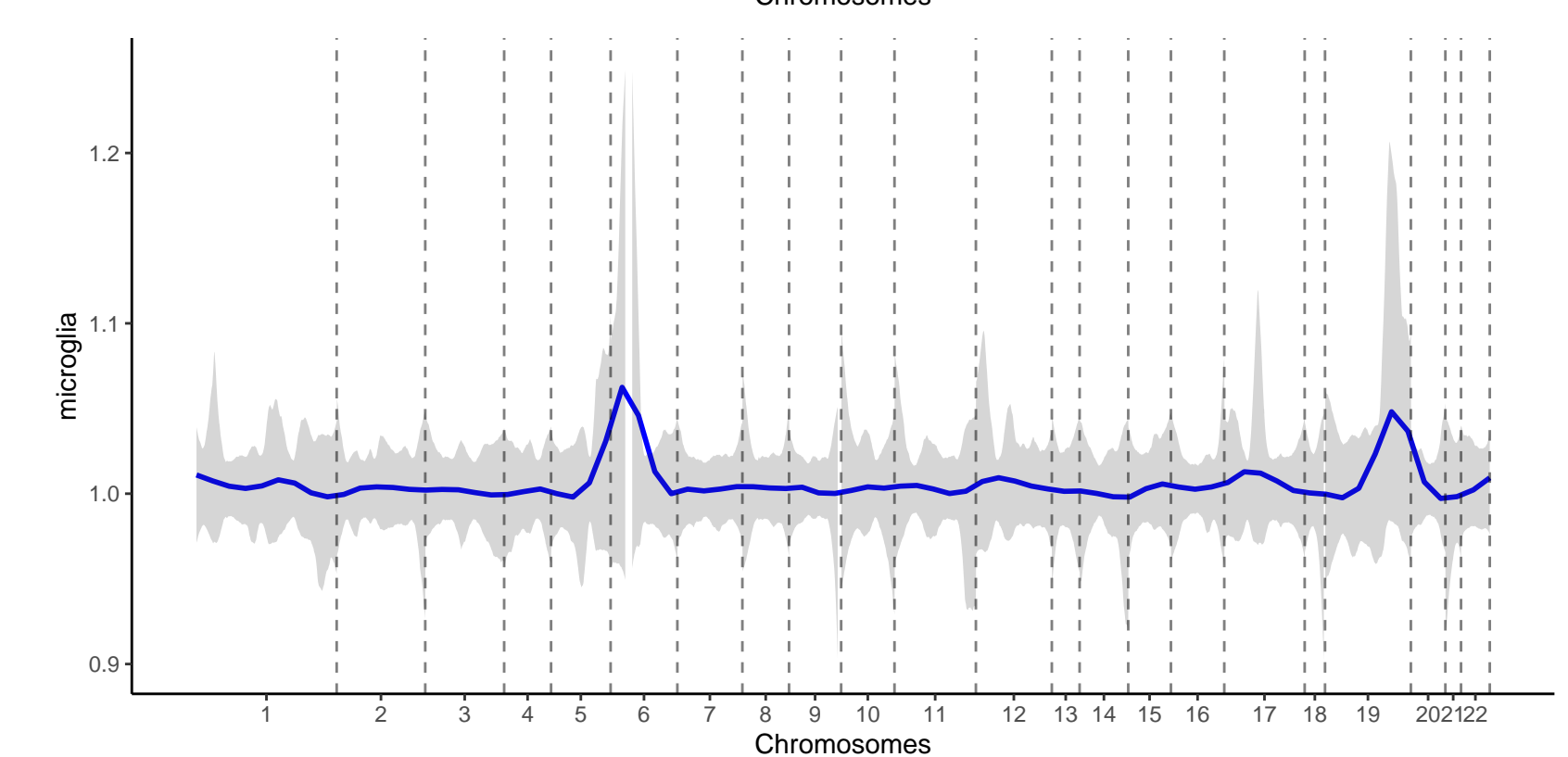
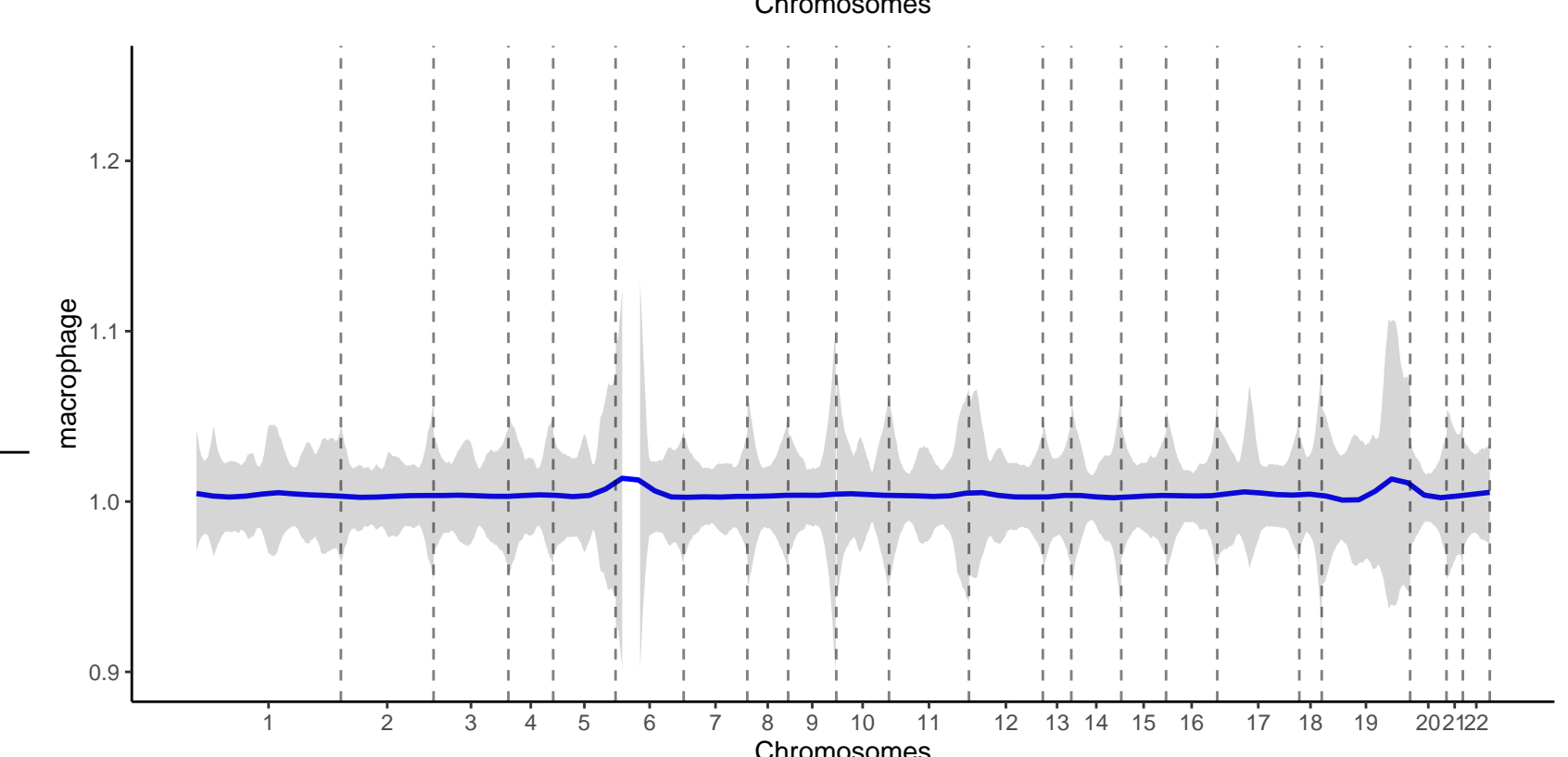
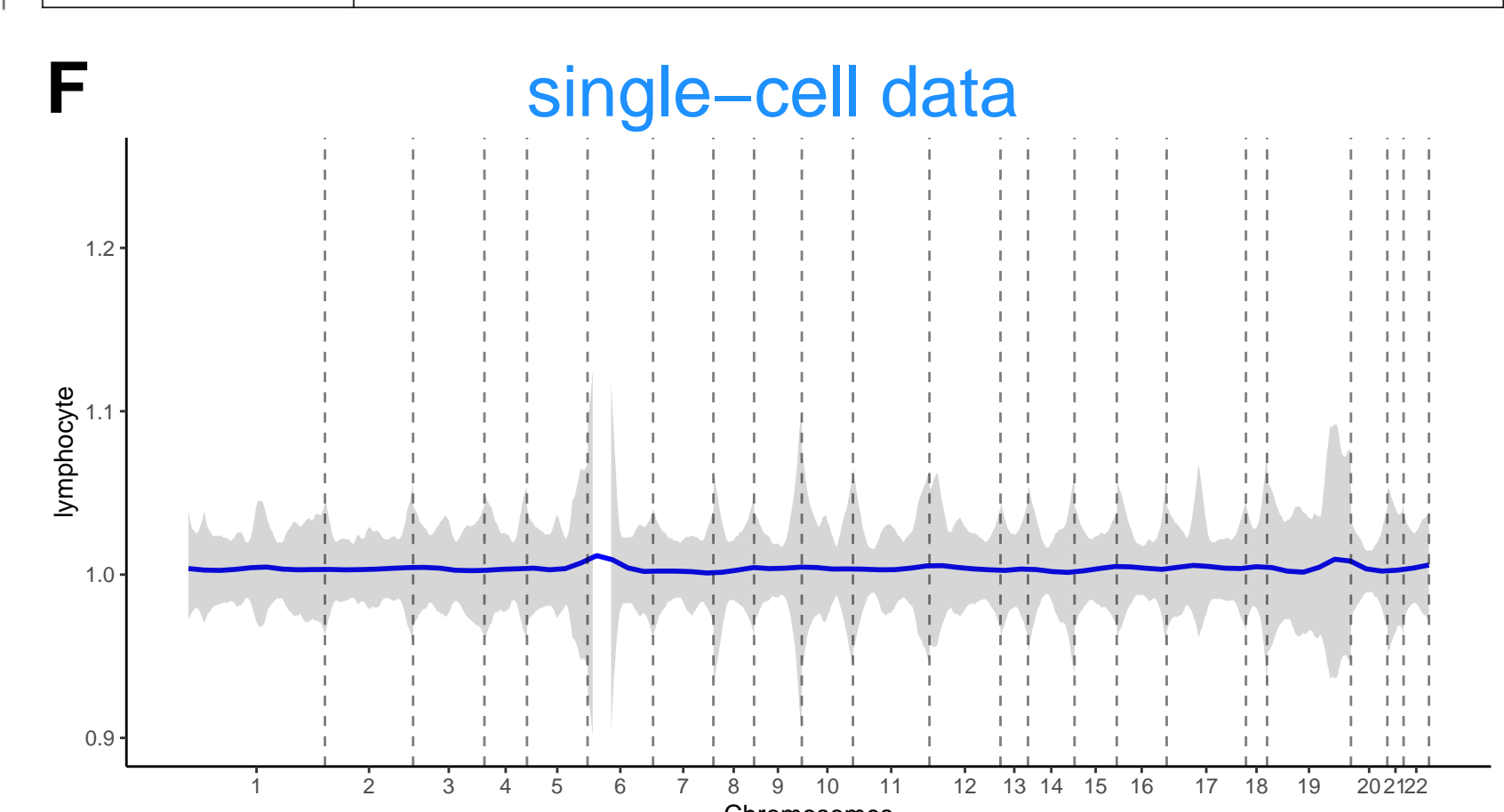
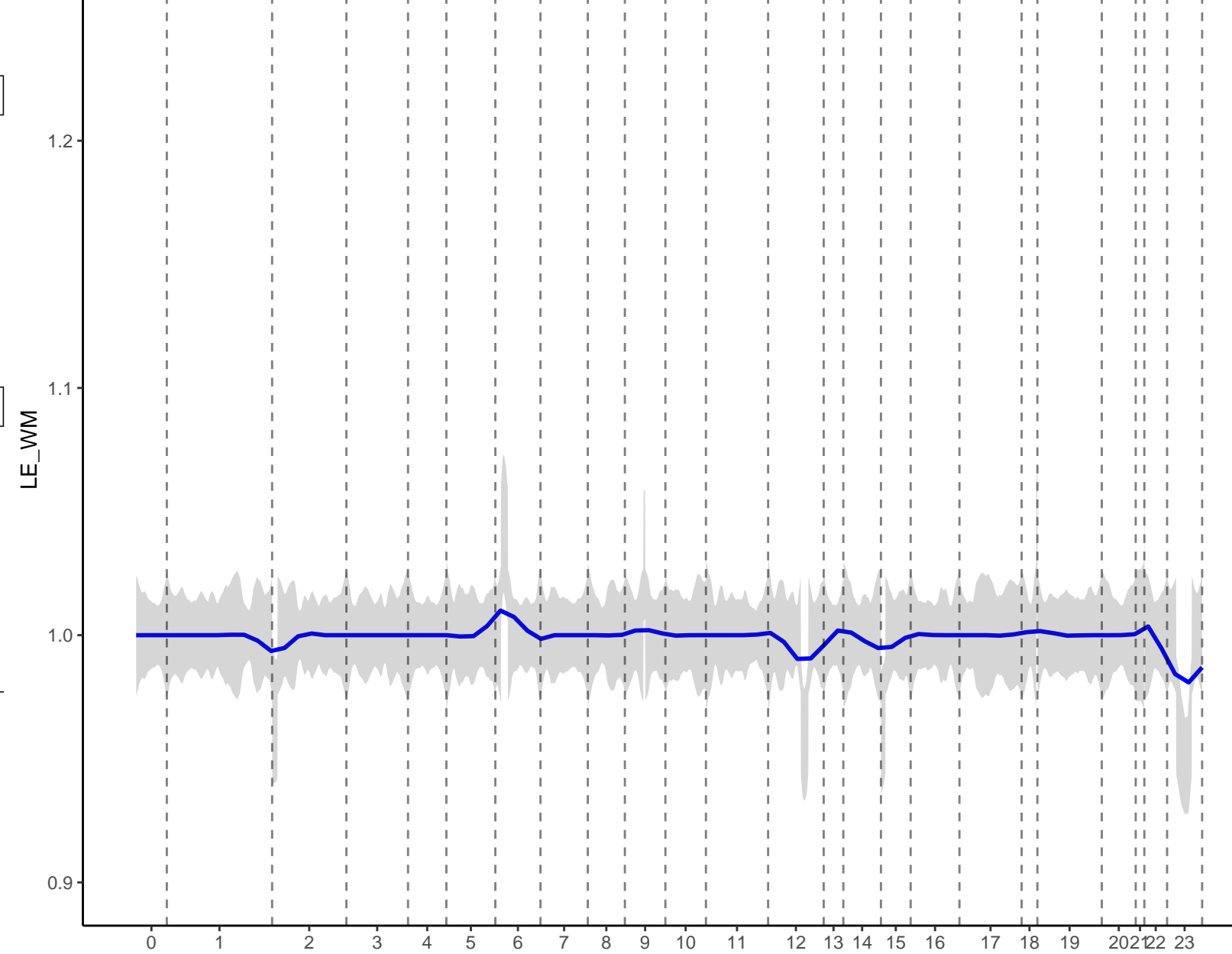
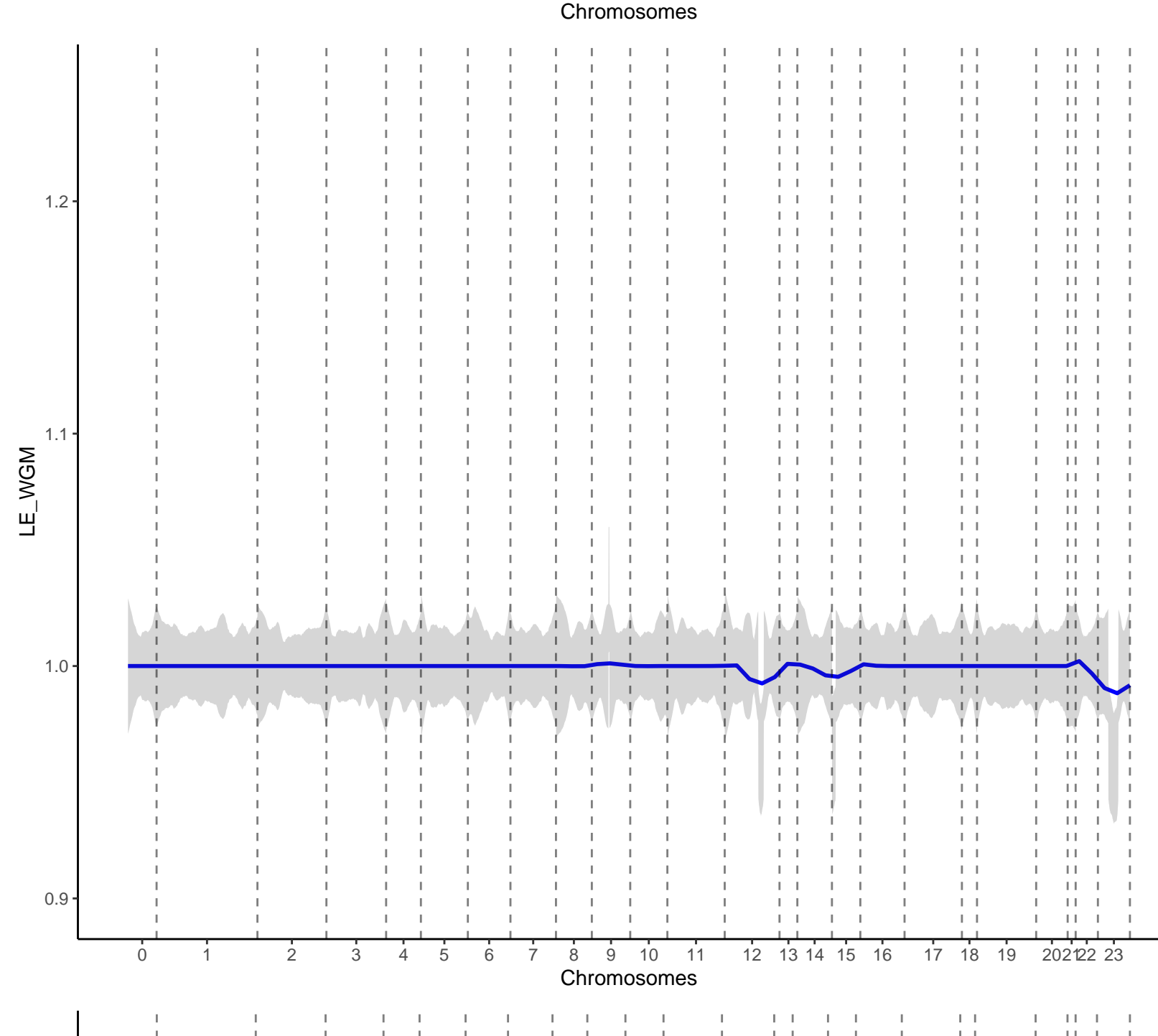
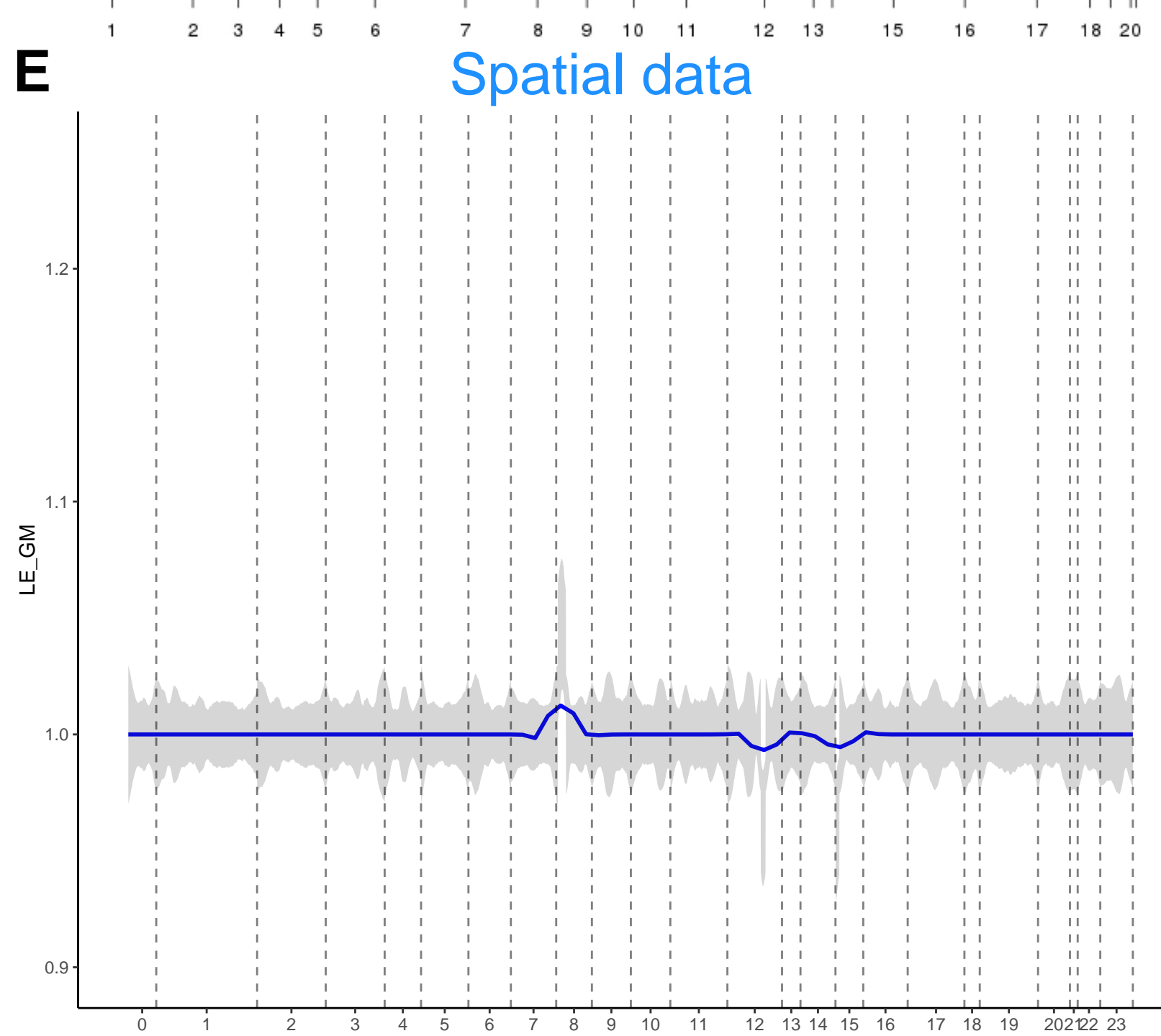
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI1 mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI1 deletion	absent
ATRX mutation	wildtype	NF1 mutation	mutant (p.Phe1275fs, c.3822_3823delCT)
TER1P mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

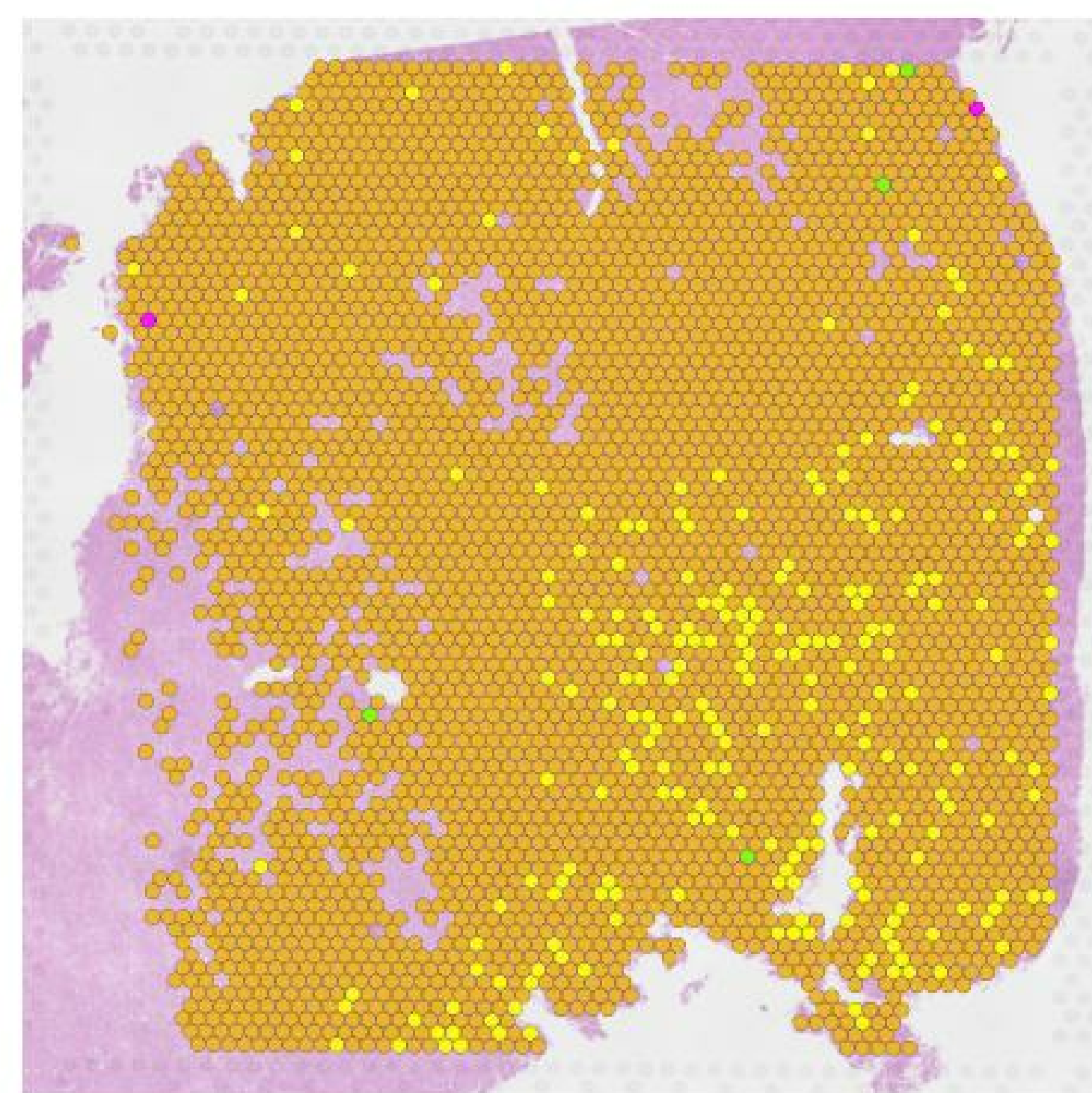
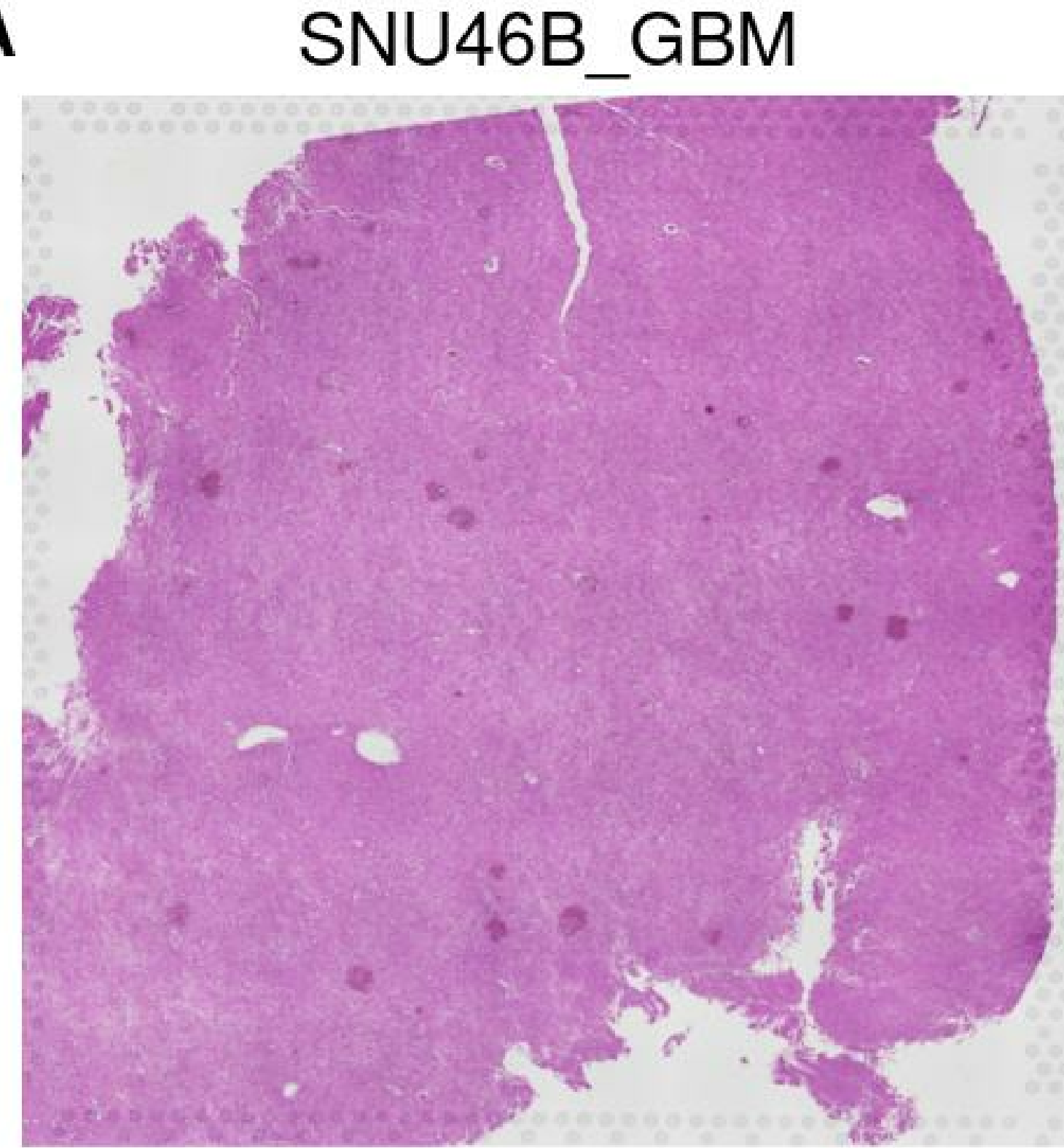
F single-cell data



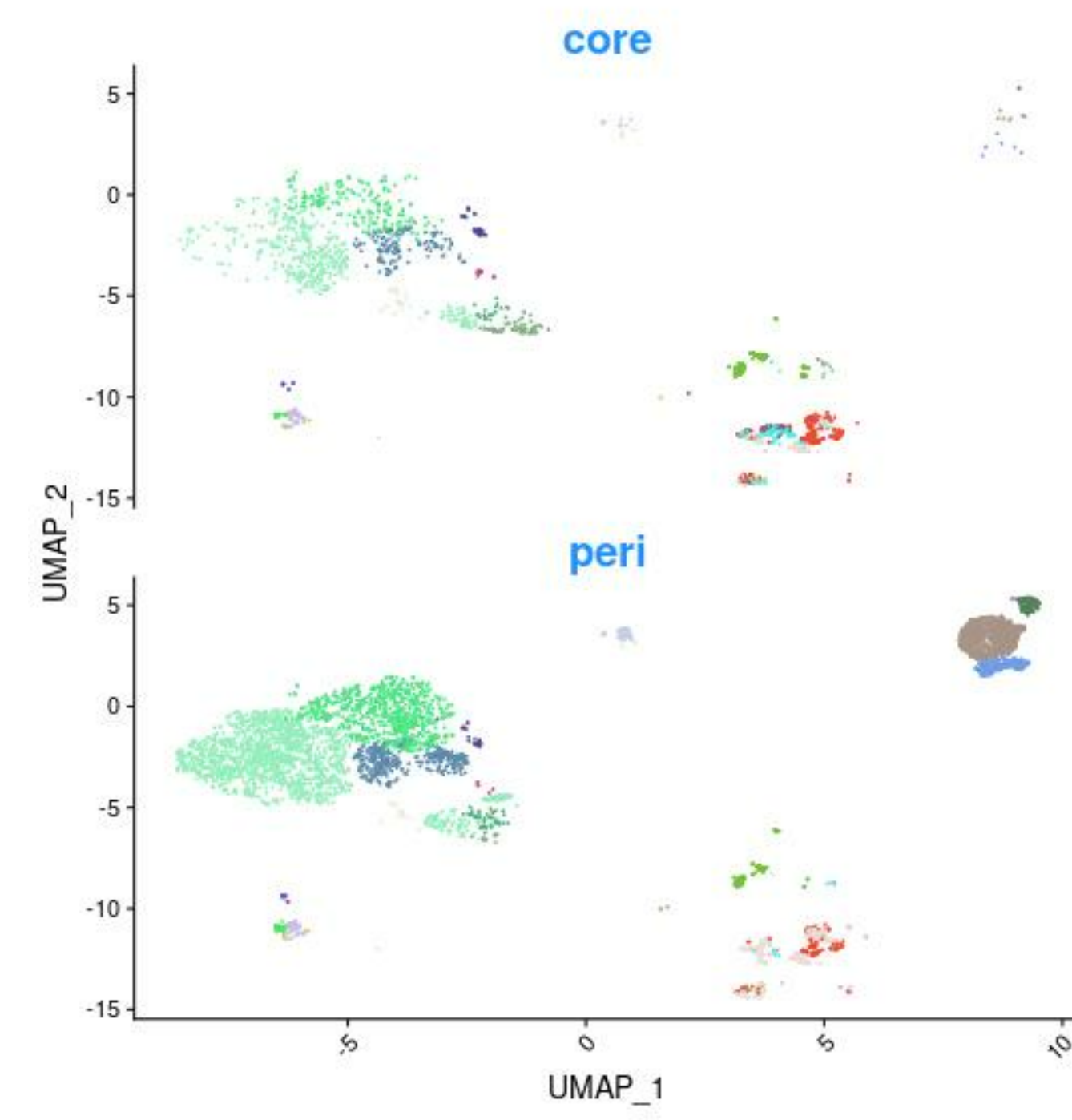


Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	19q only deleted	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
Sp21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	hemizygous deletion
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

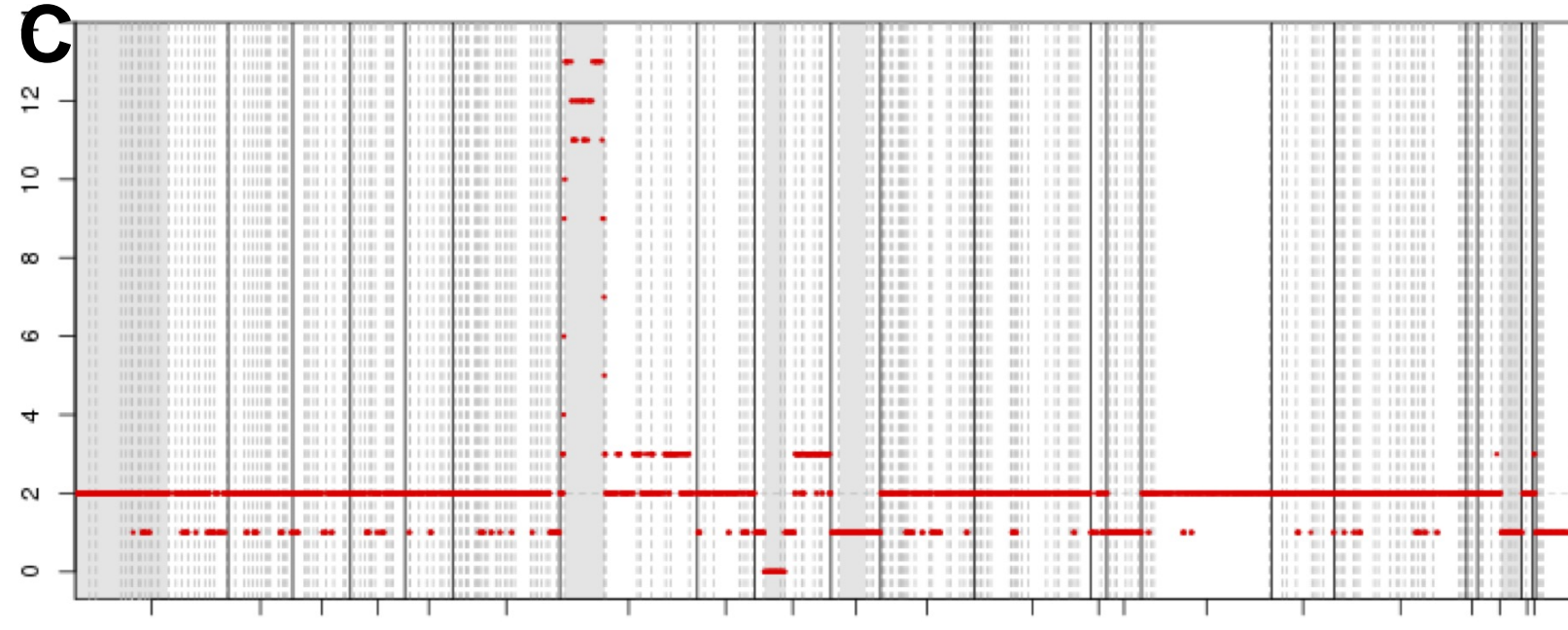
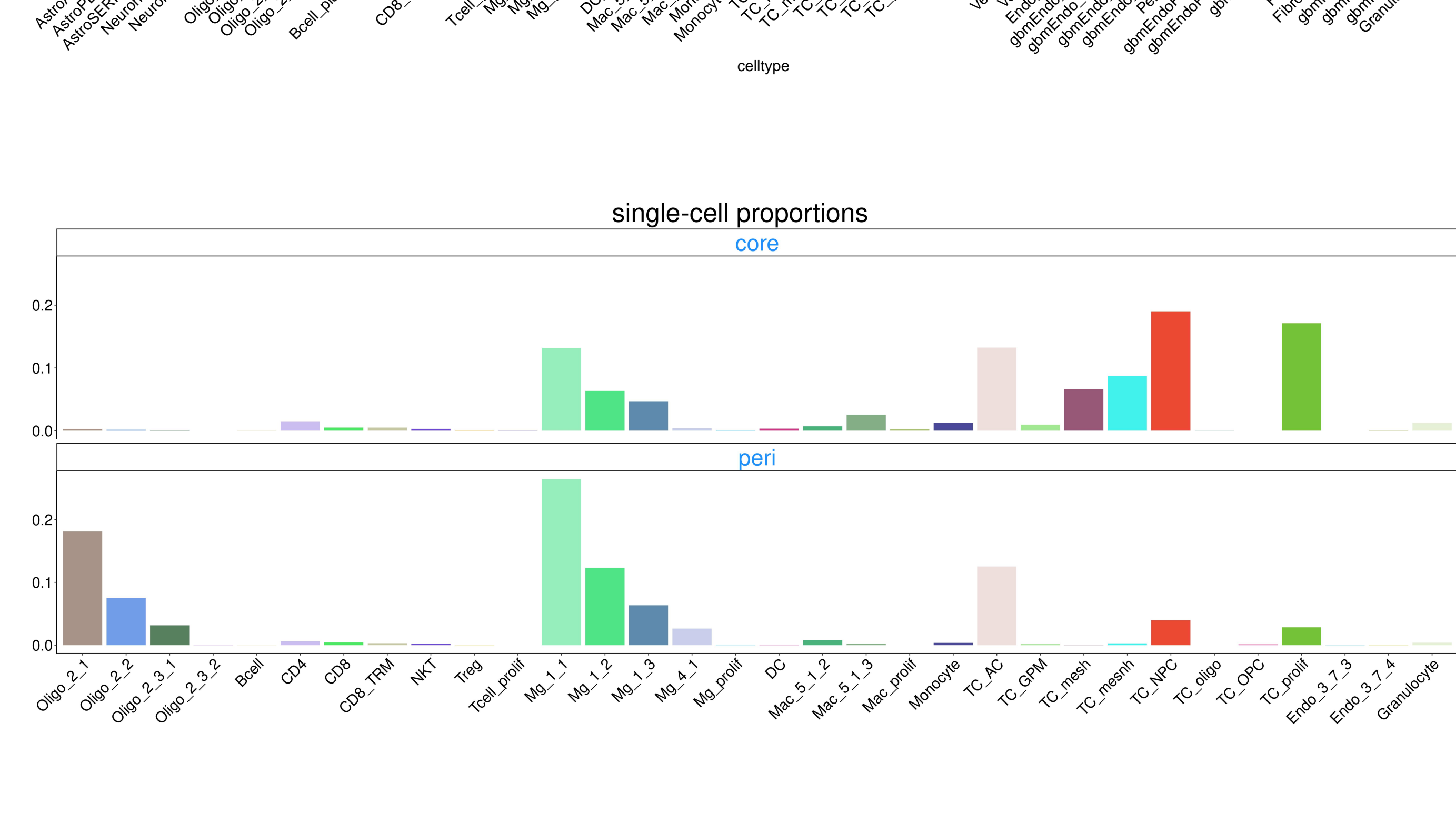
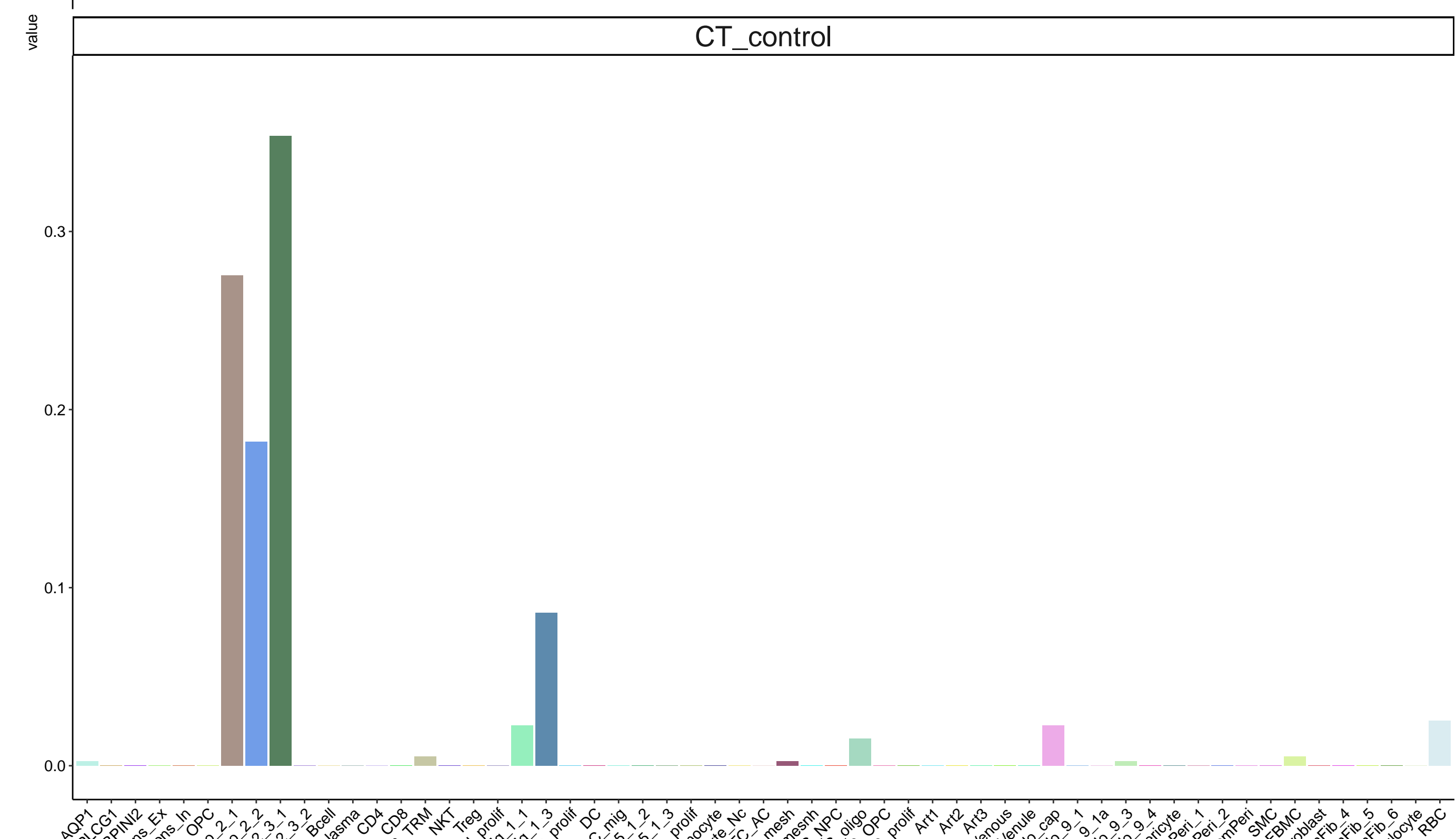
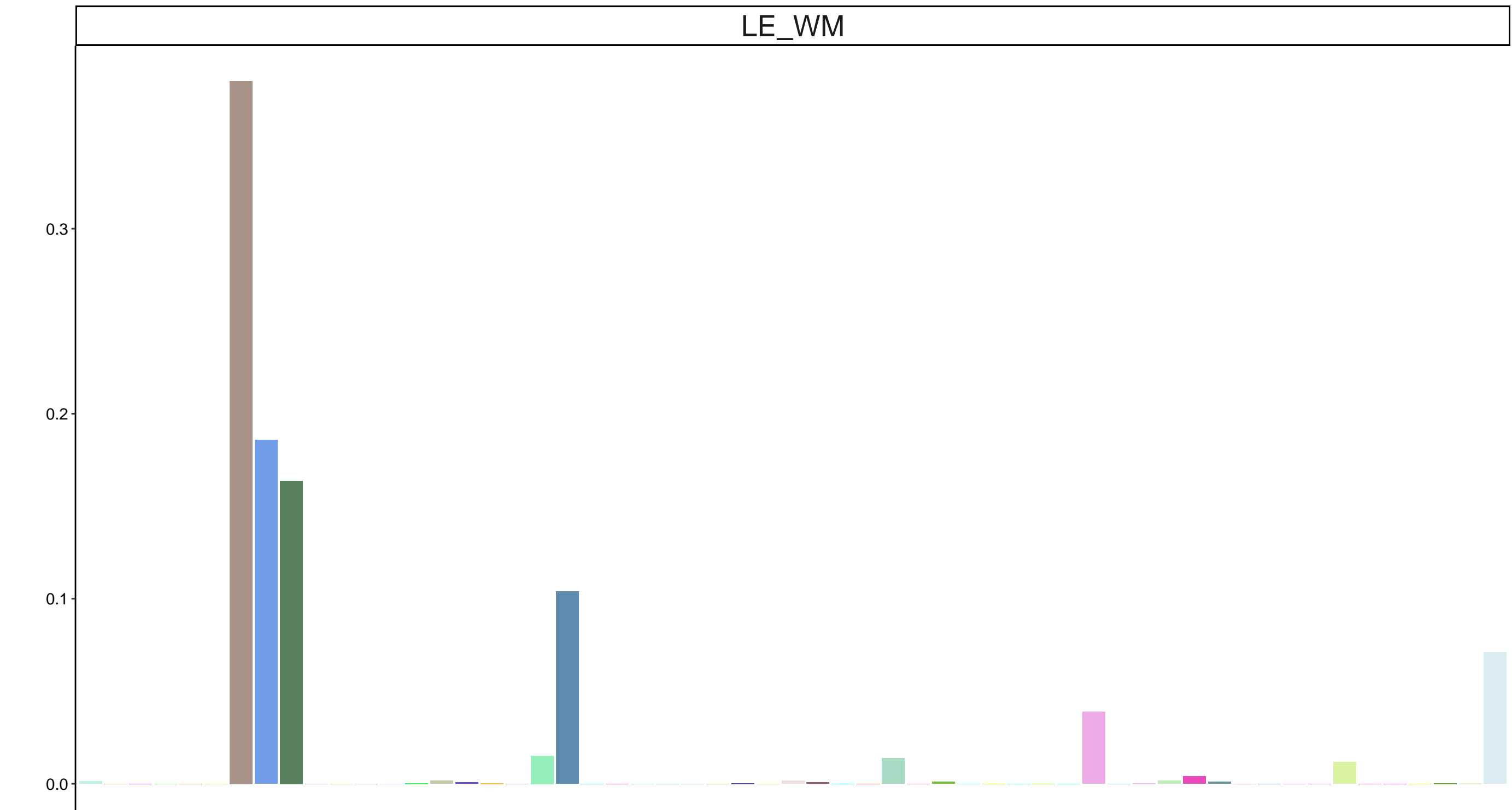




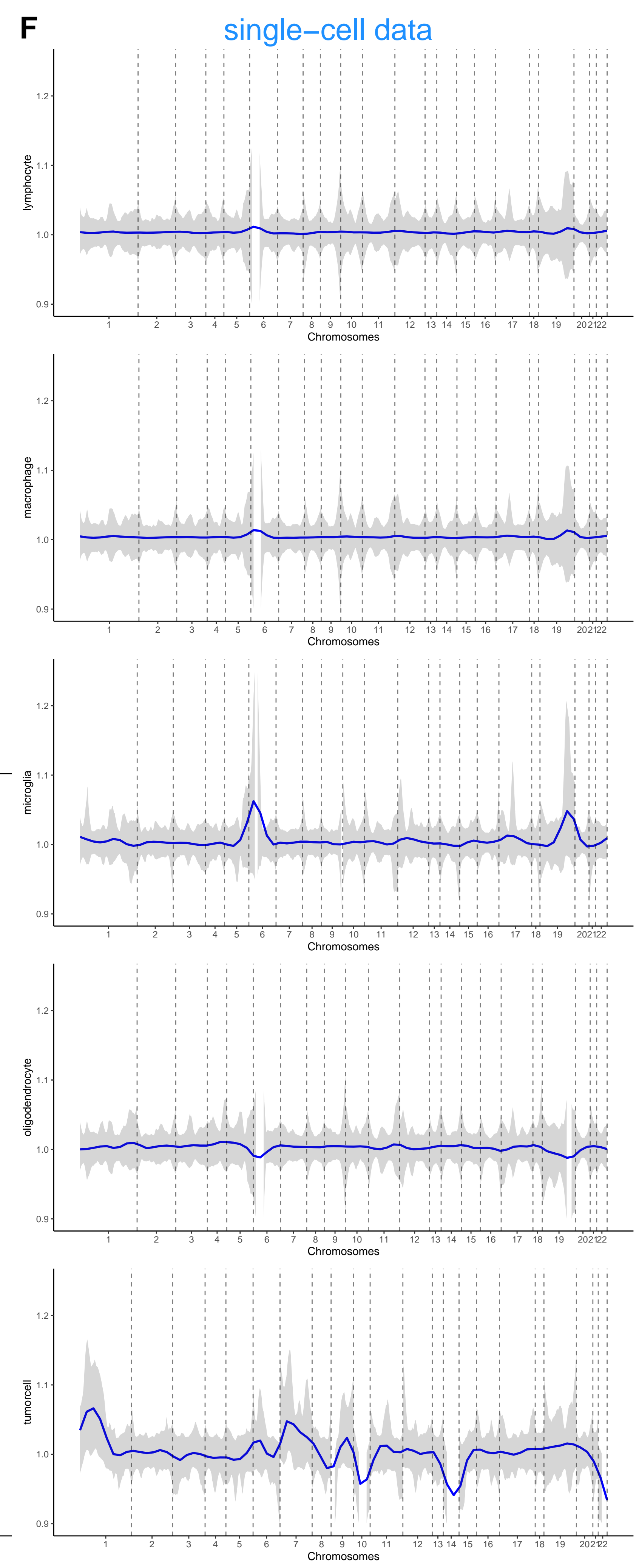
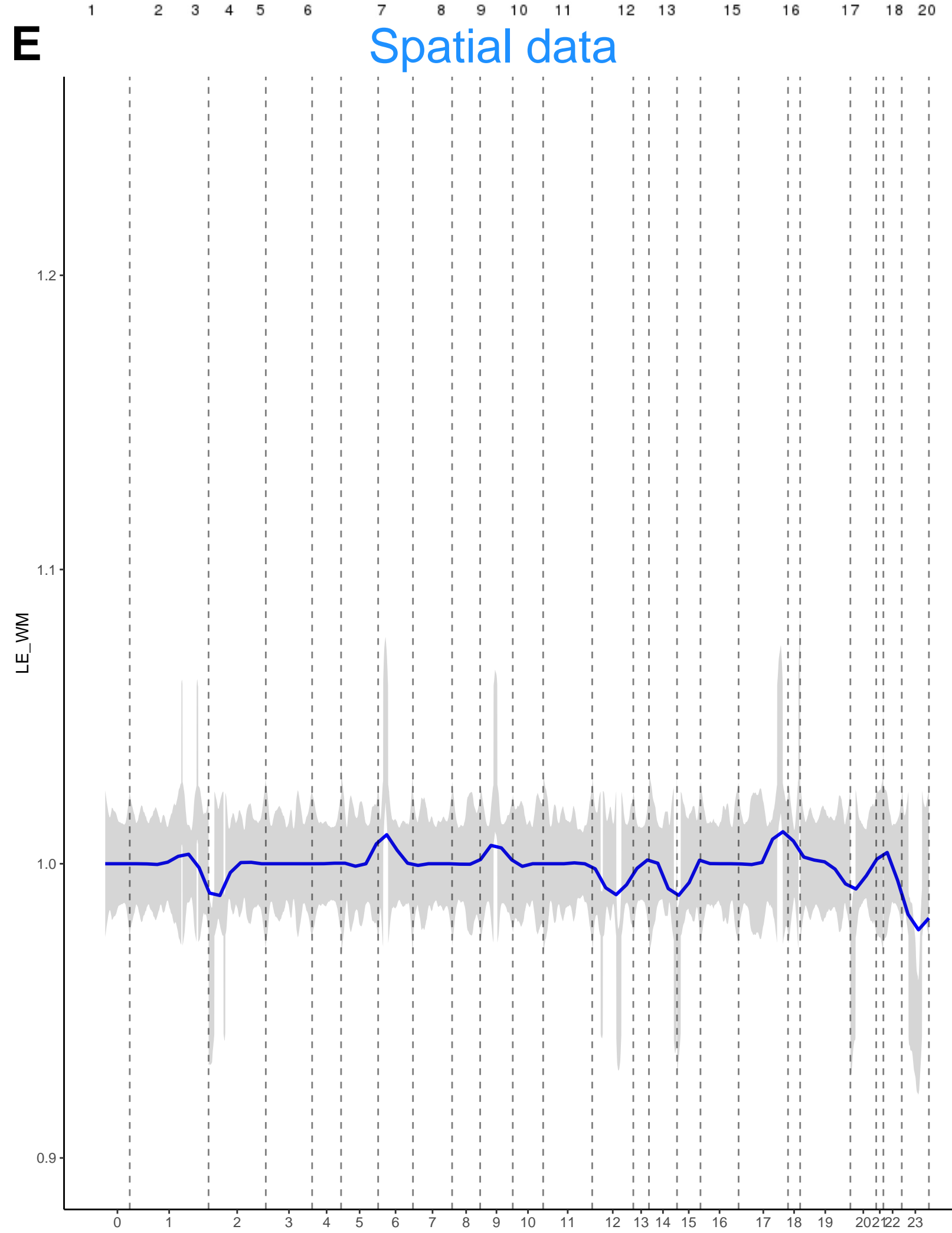
B #cells 9111 single-cell SNU46

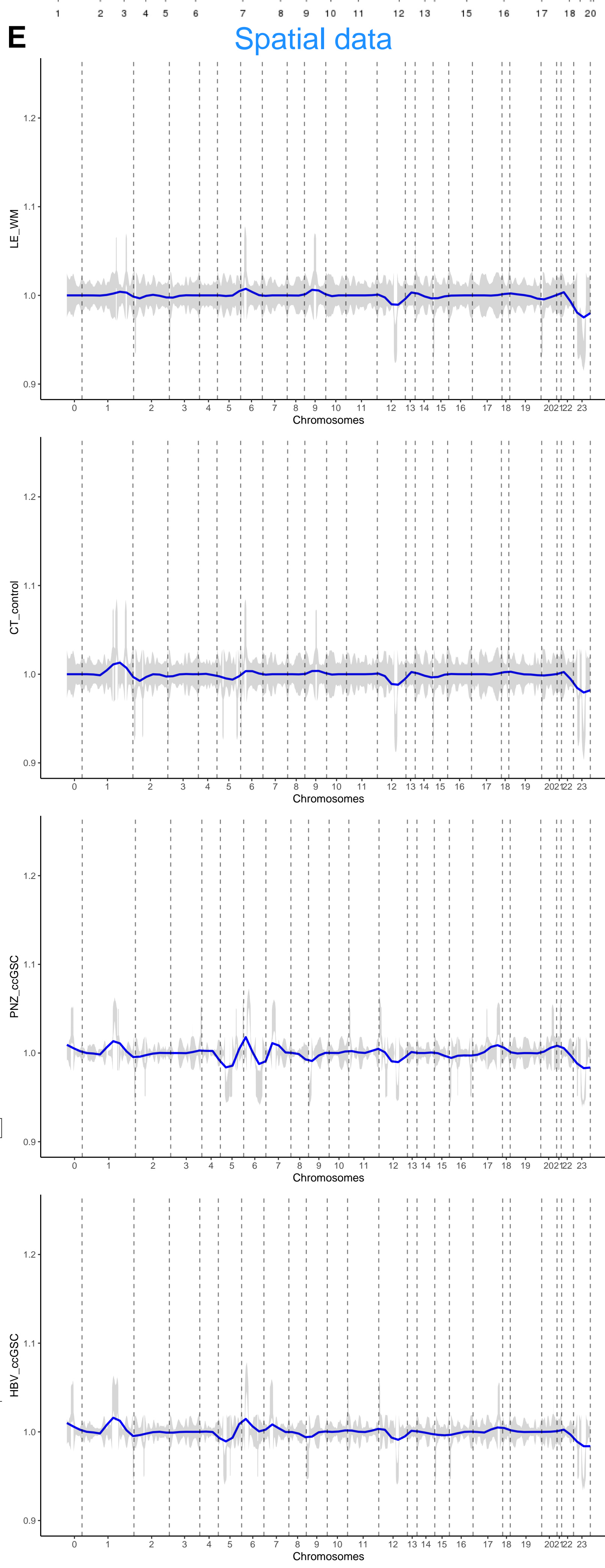
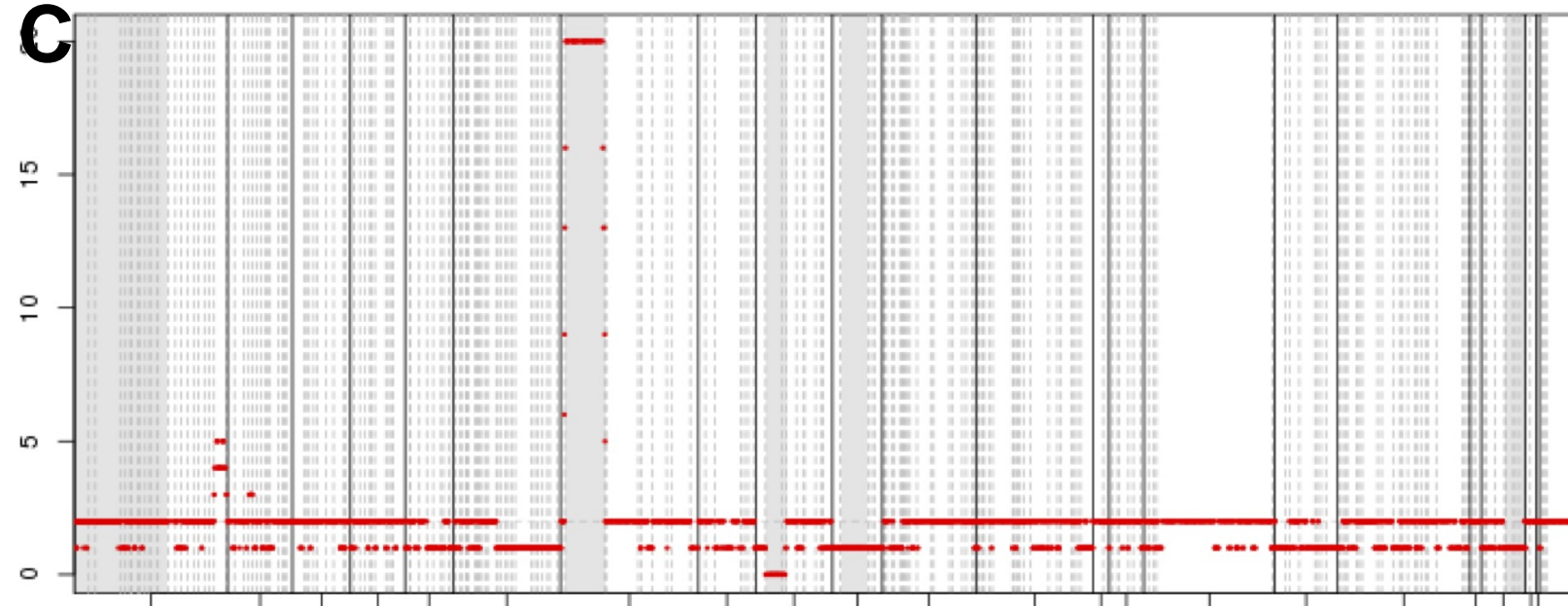
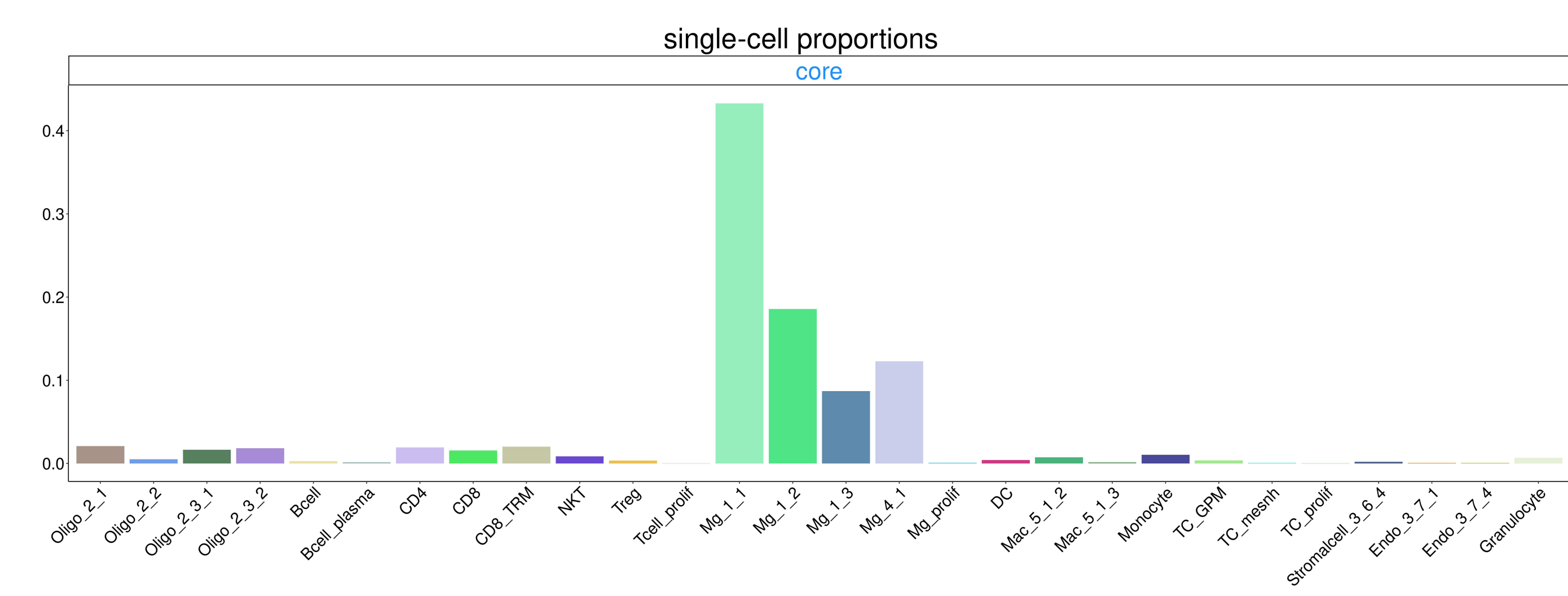
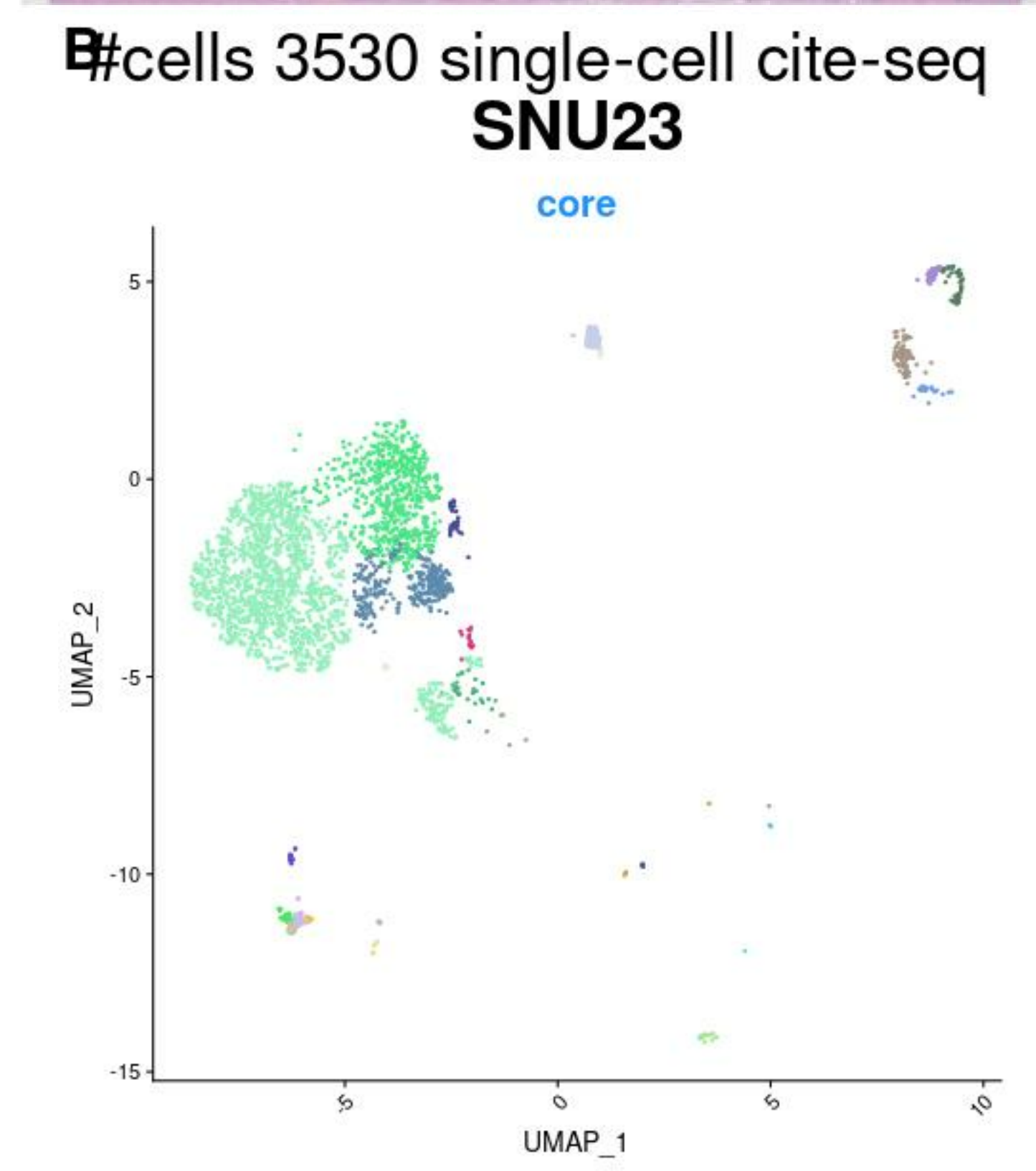
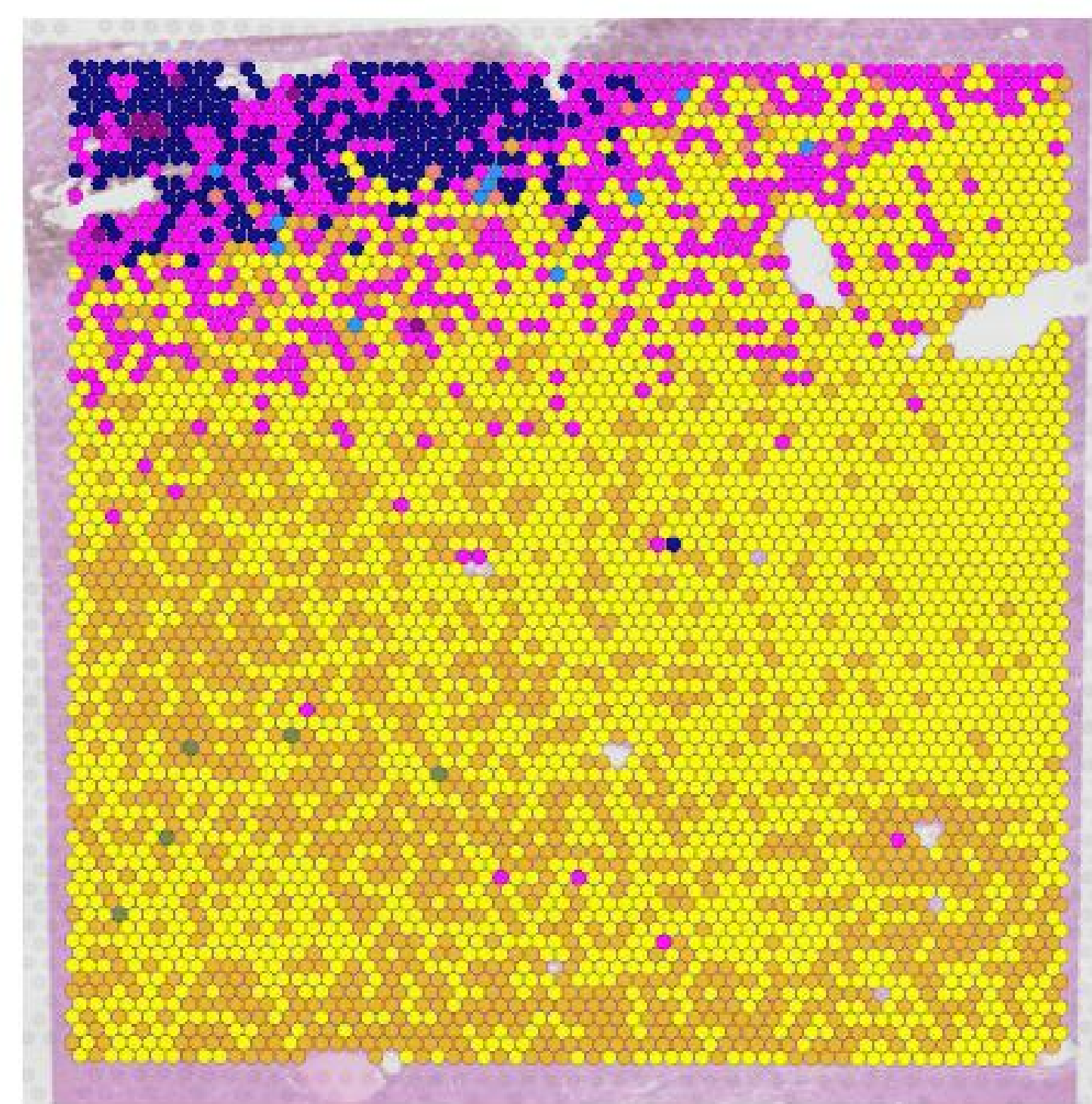
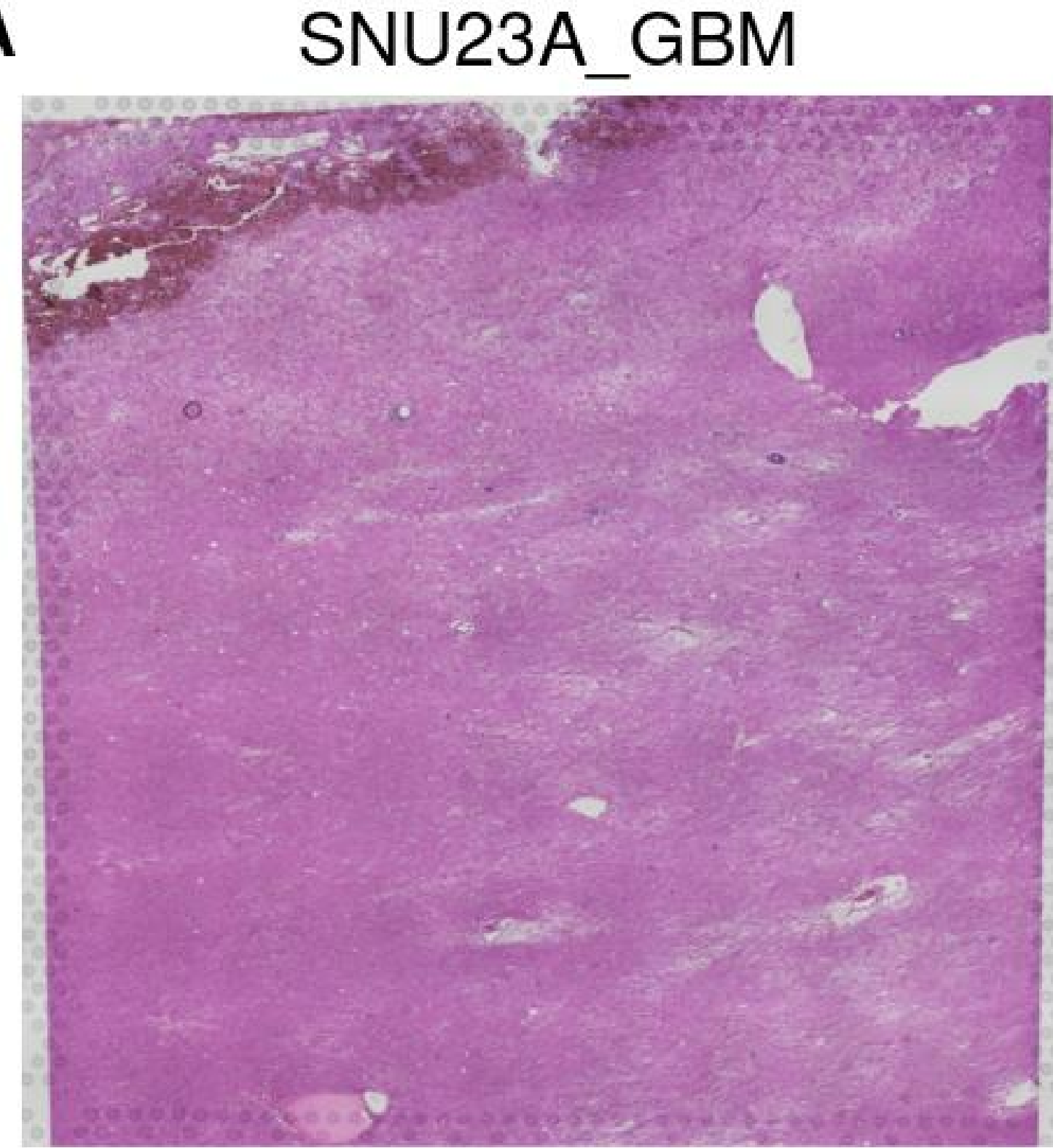


#spots 3836



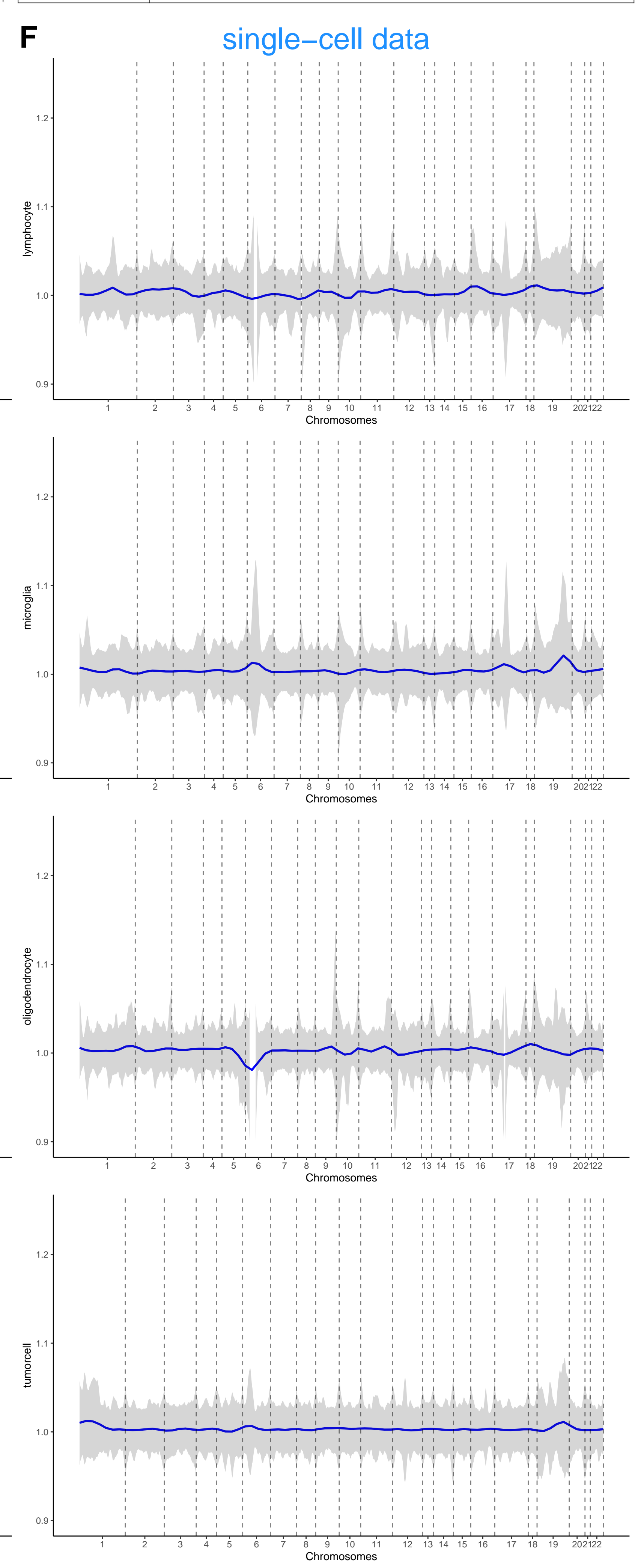
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	19q only deleted	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	hemizygous deletion
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

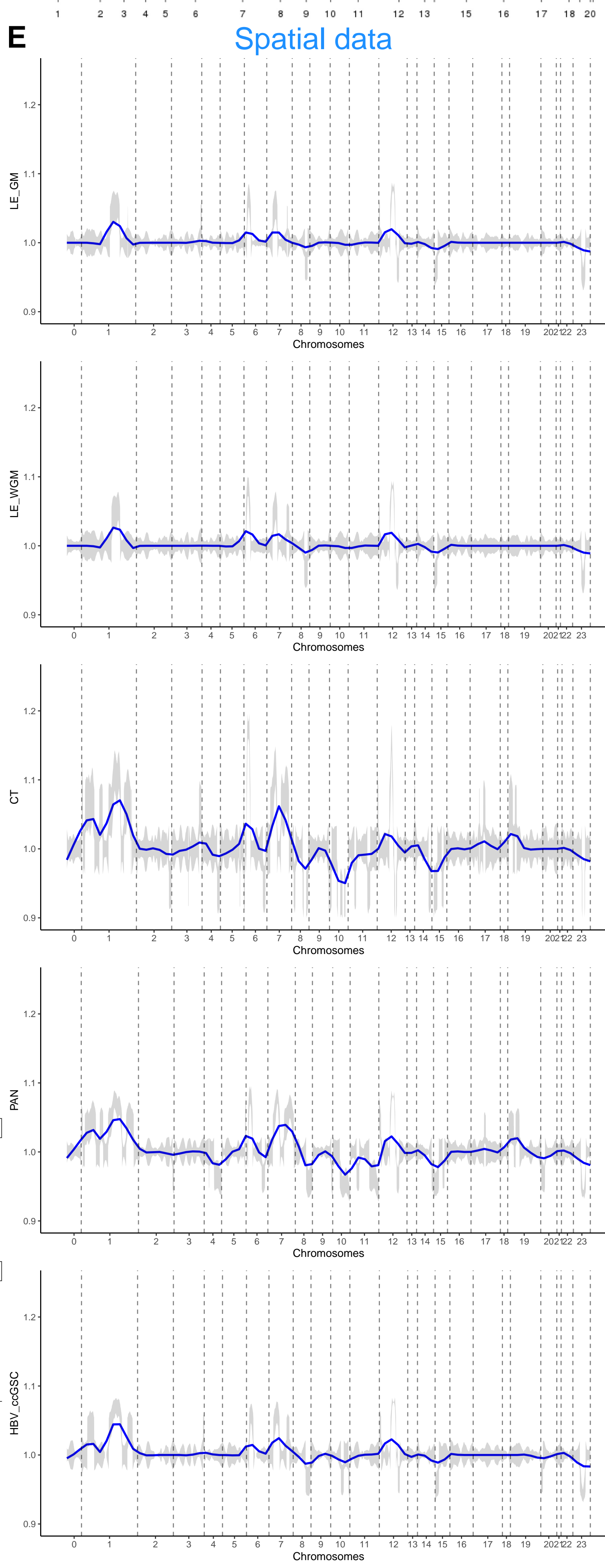
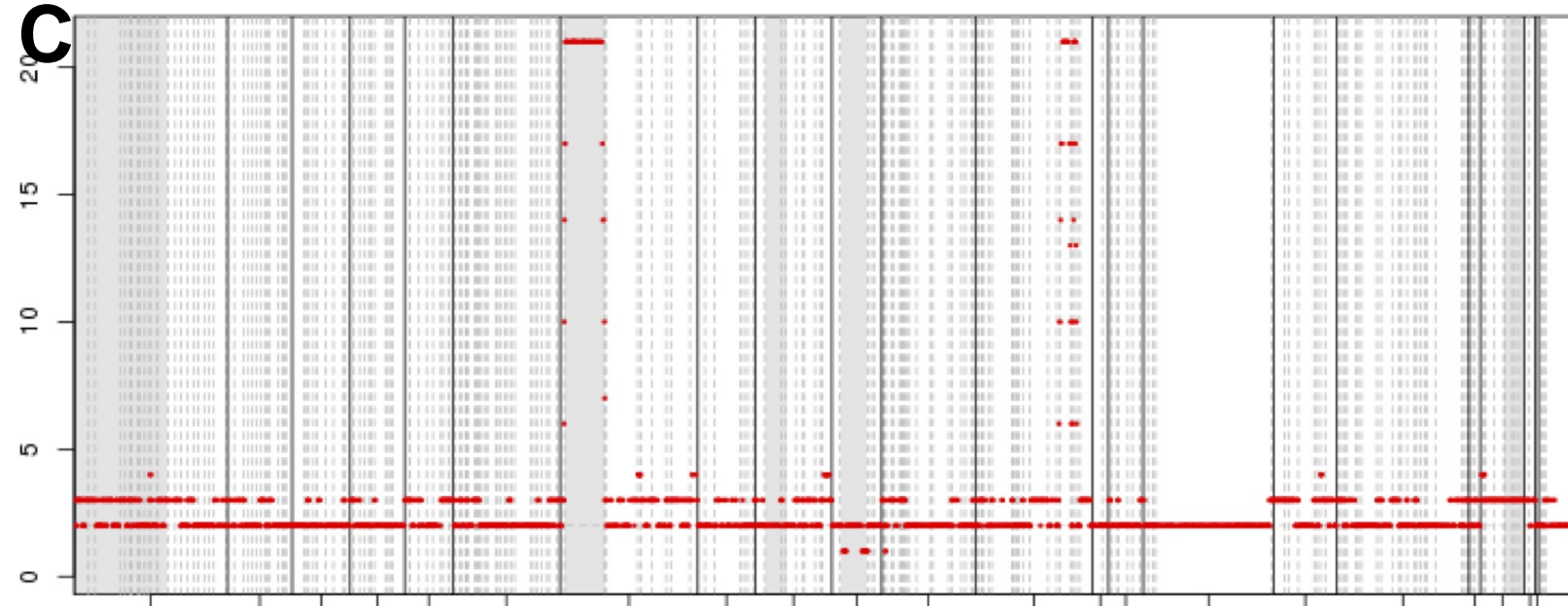
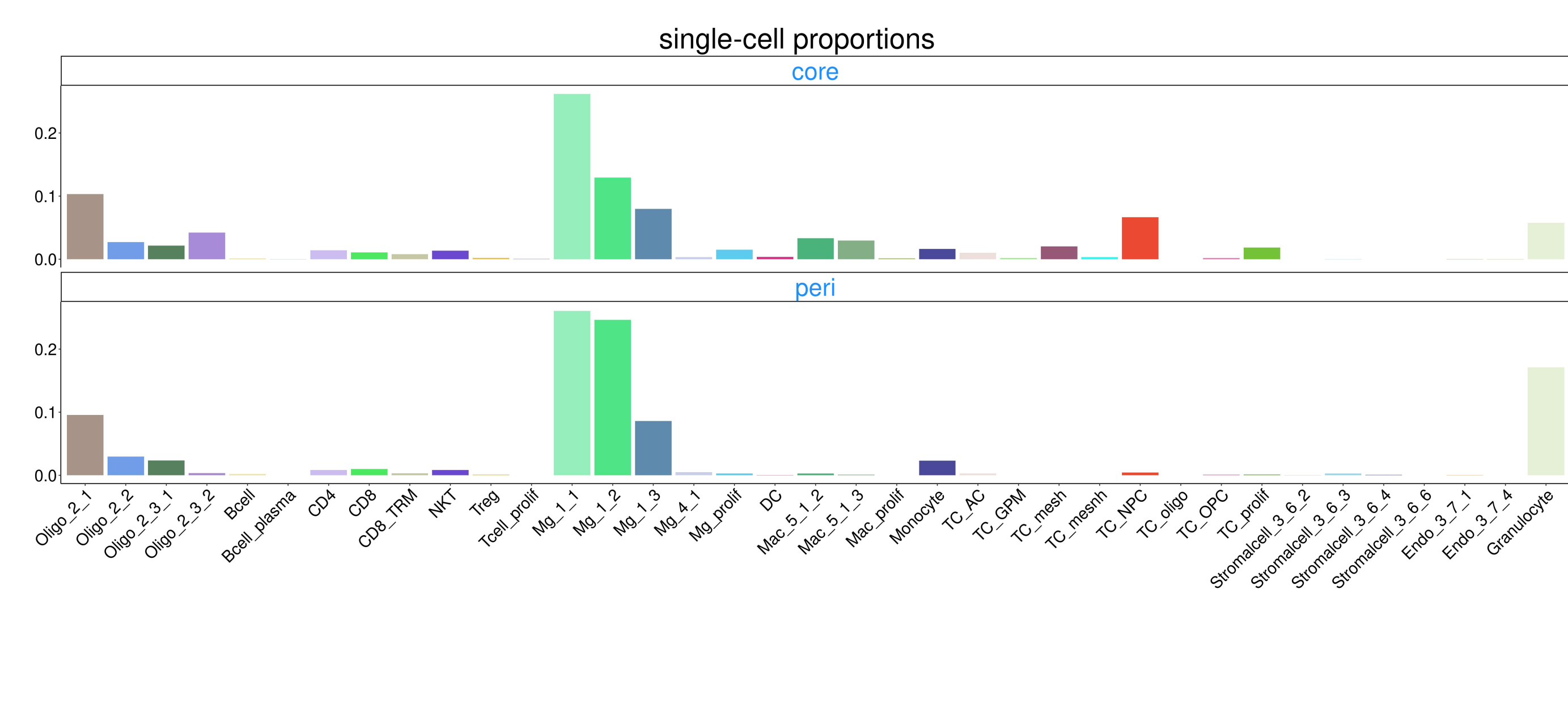
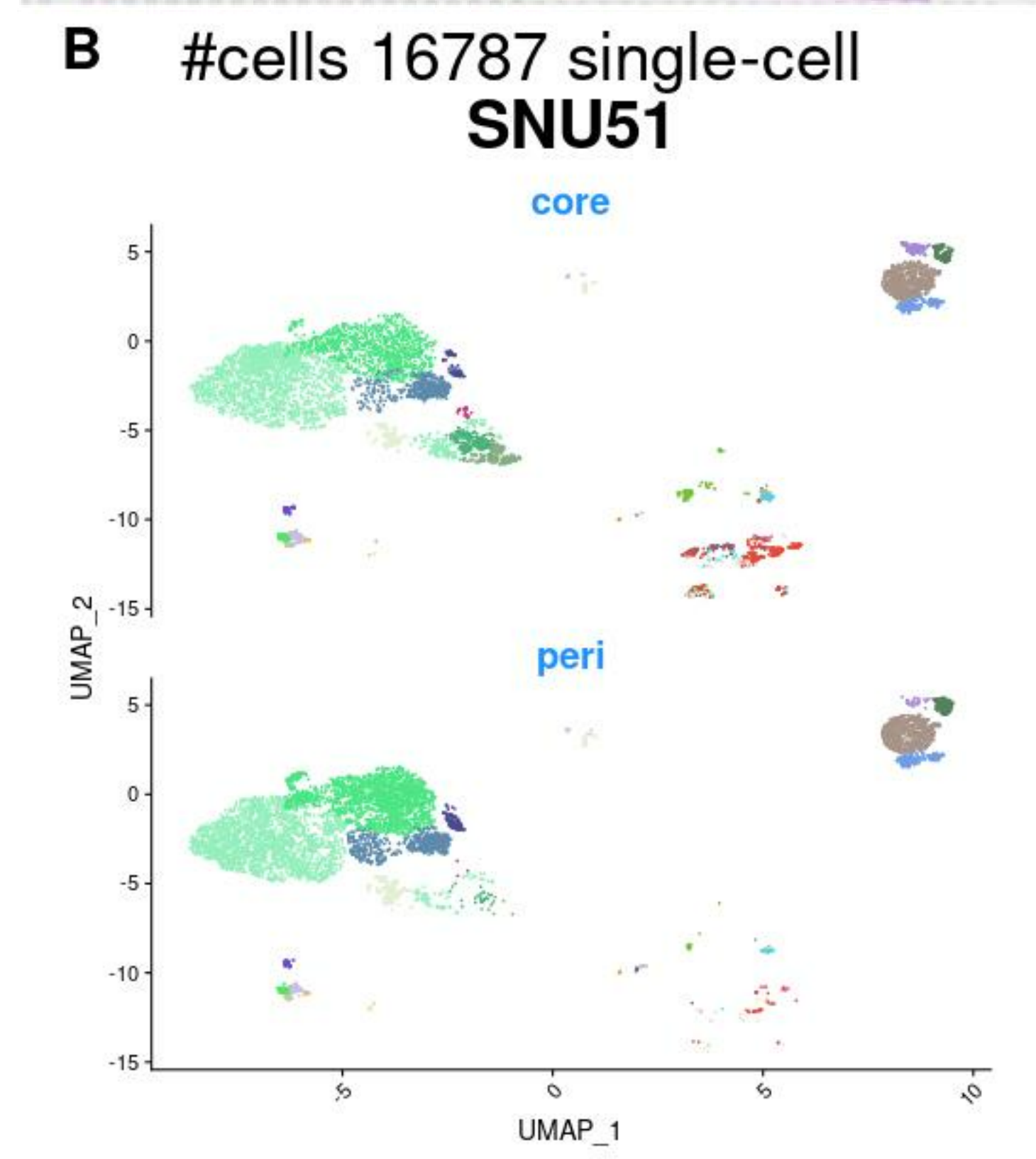
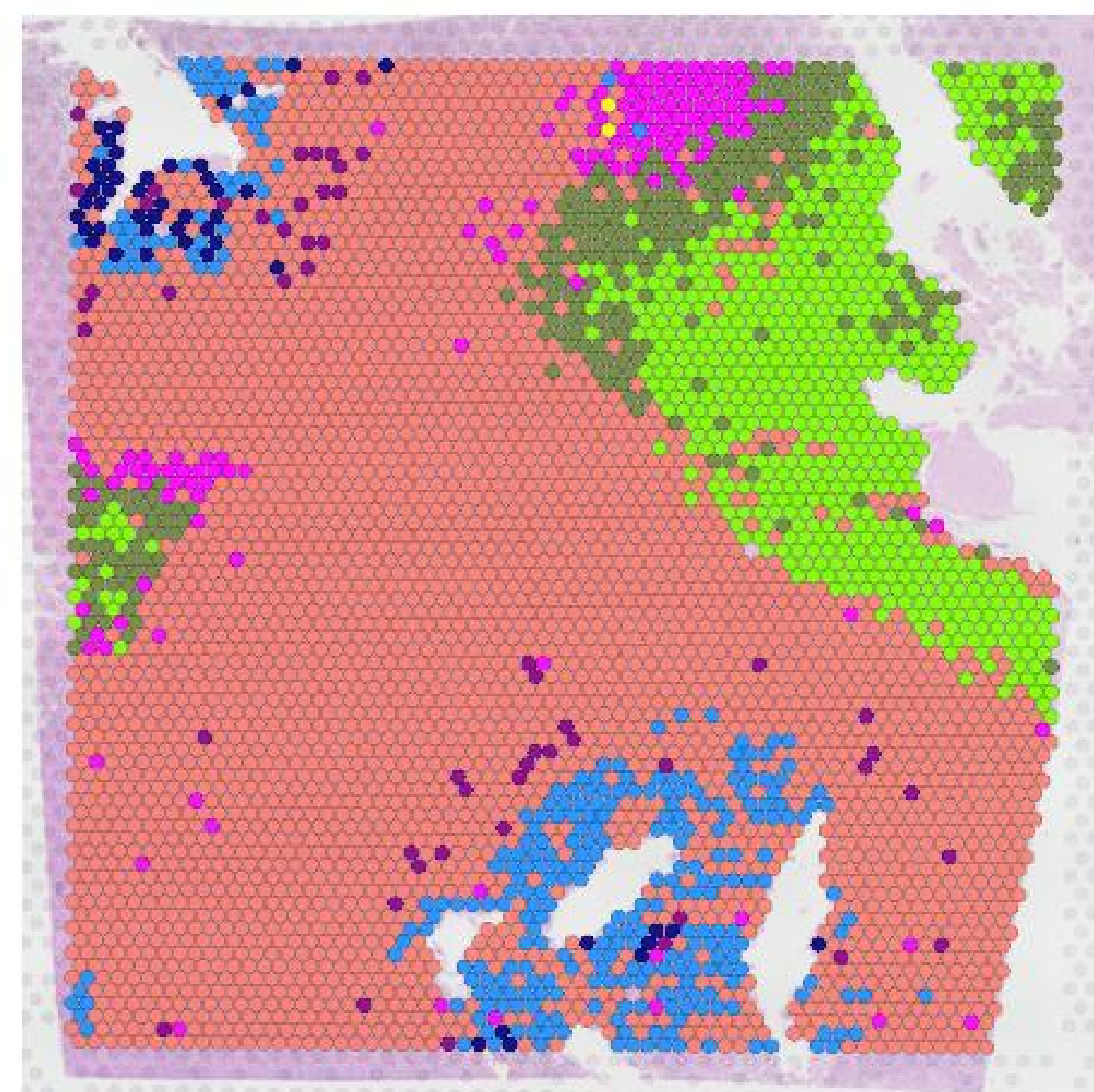
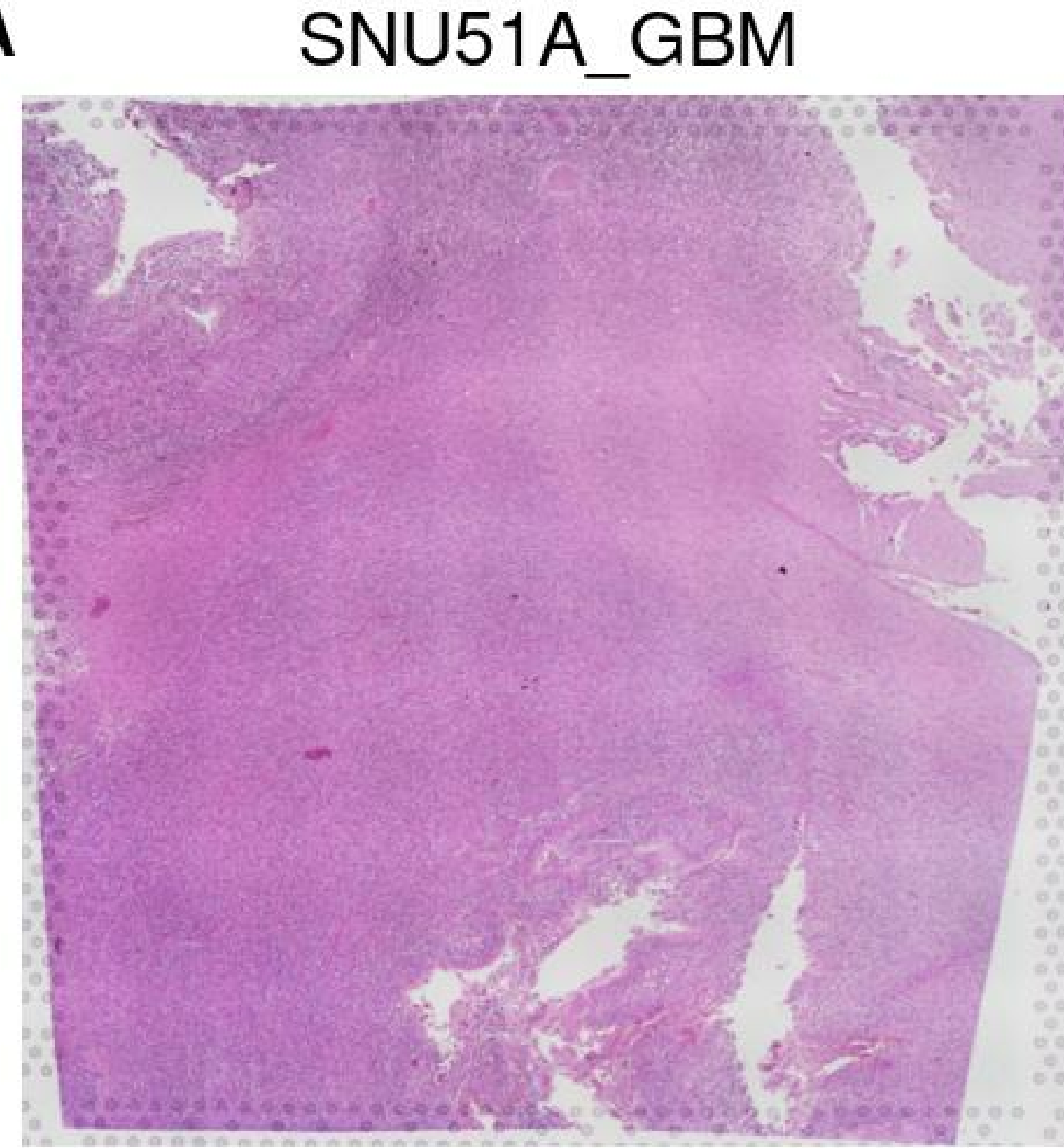




D

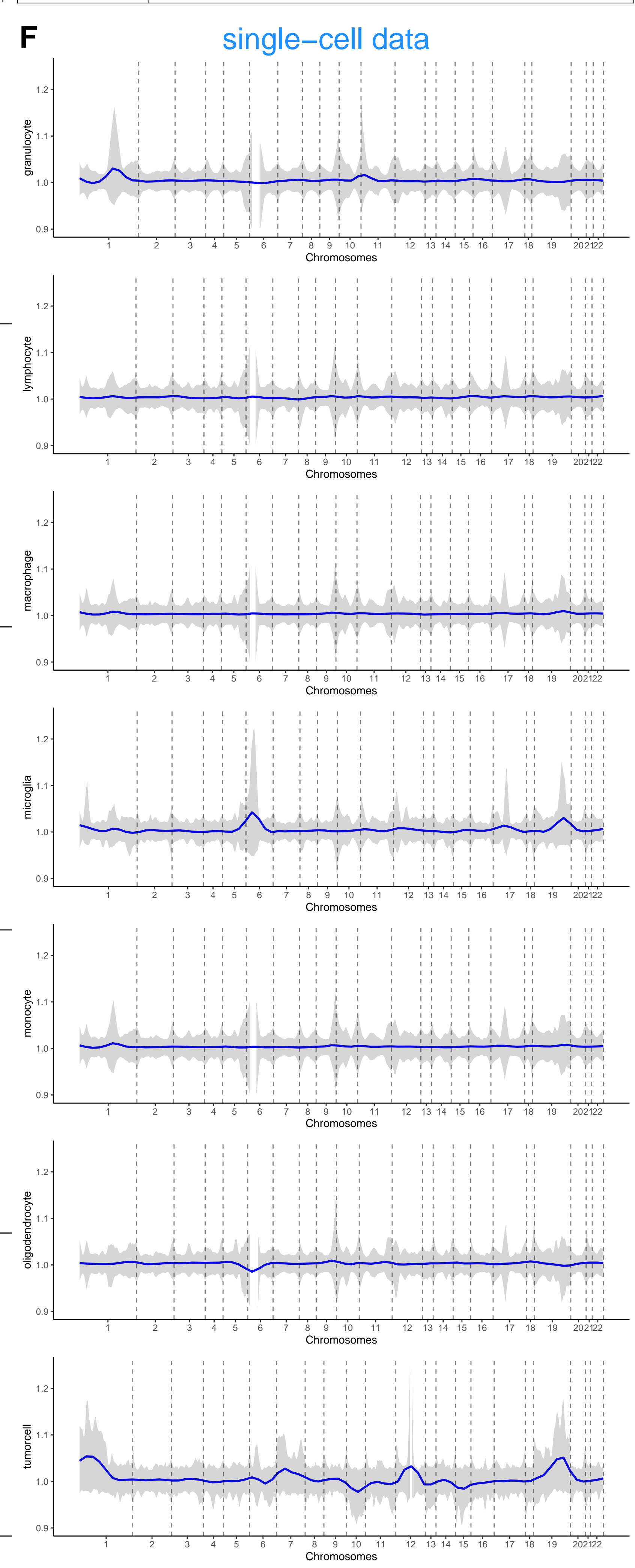
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TP53 mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
BRAF mutation	wildtype	NF2 mutation	wildtype
BRAF rearrangement	absent	NF2 deletion	absent
Others	absent	MYCN amplification	absent

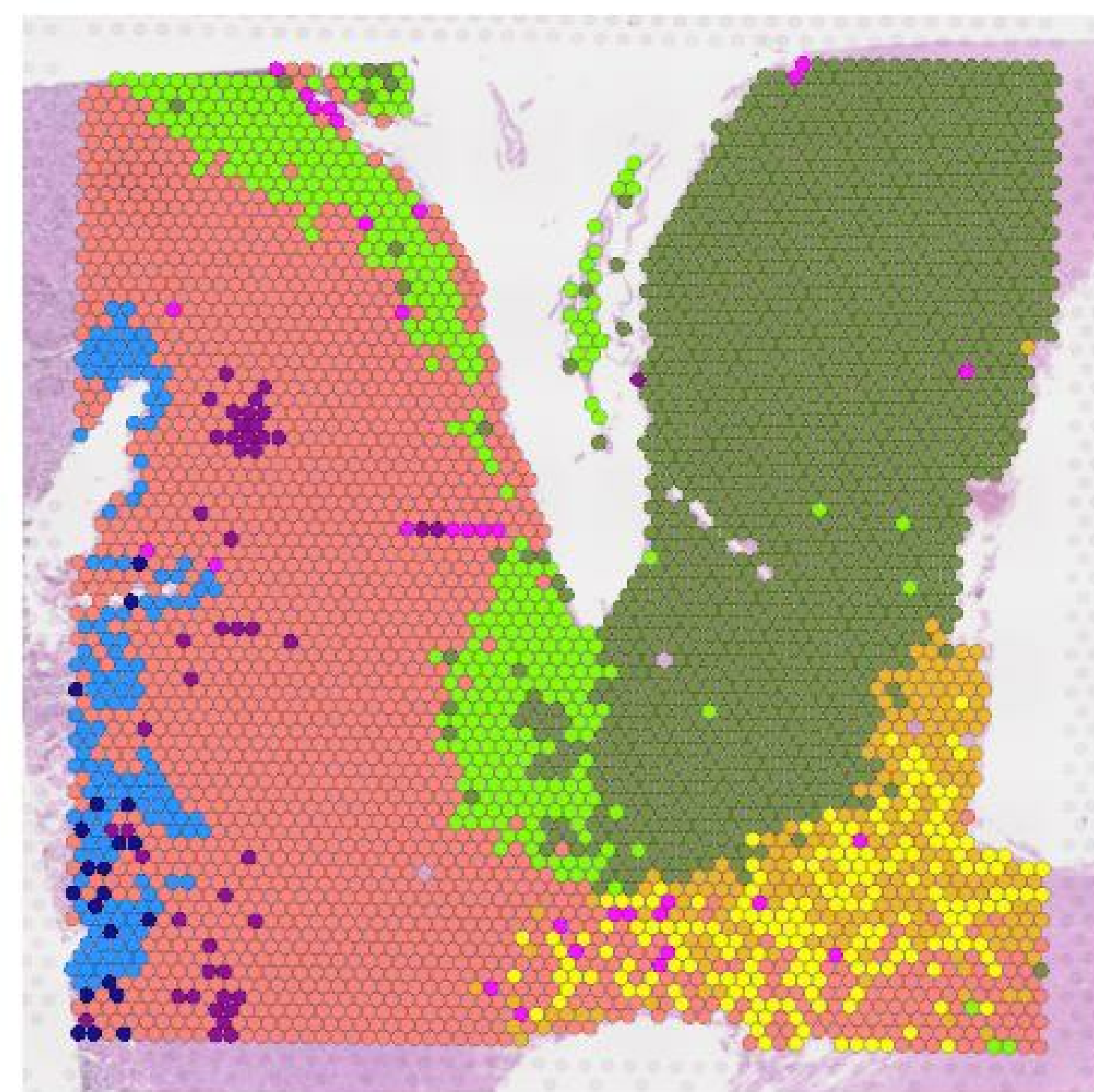
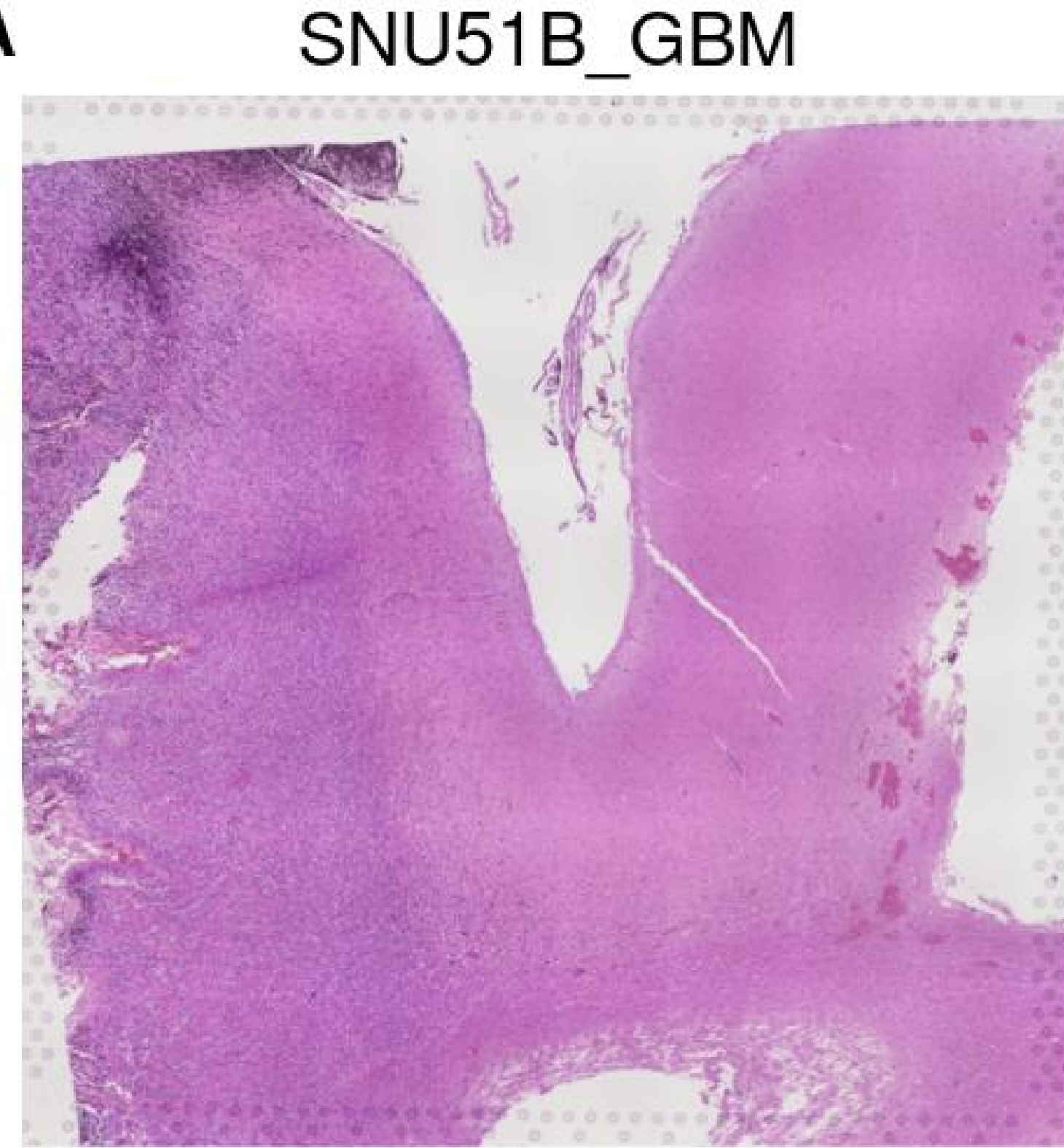




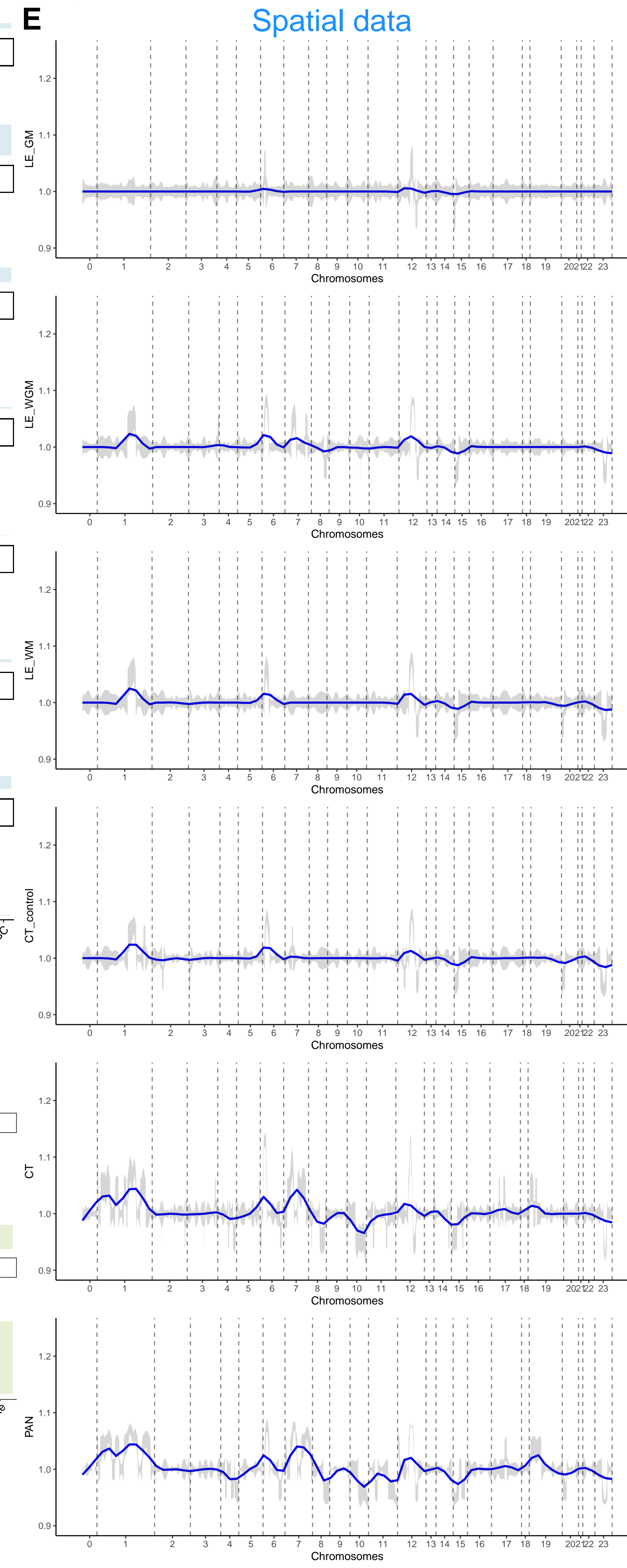
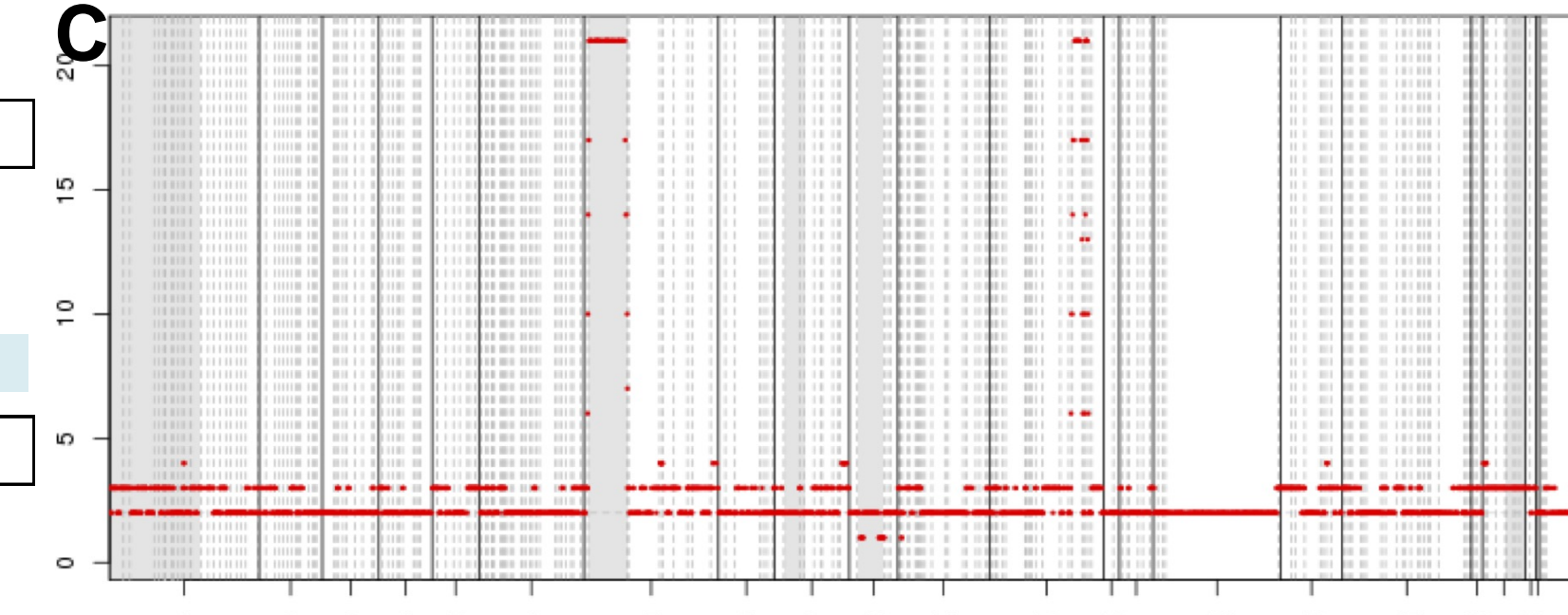
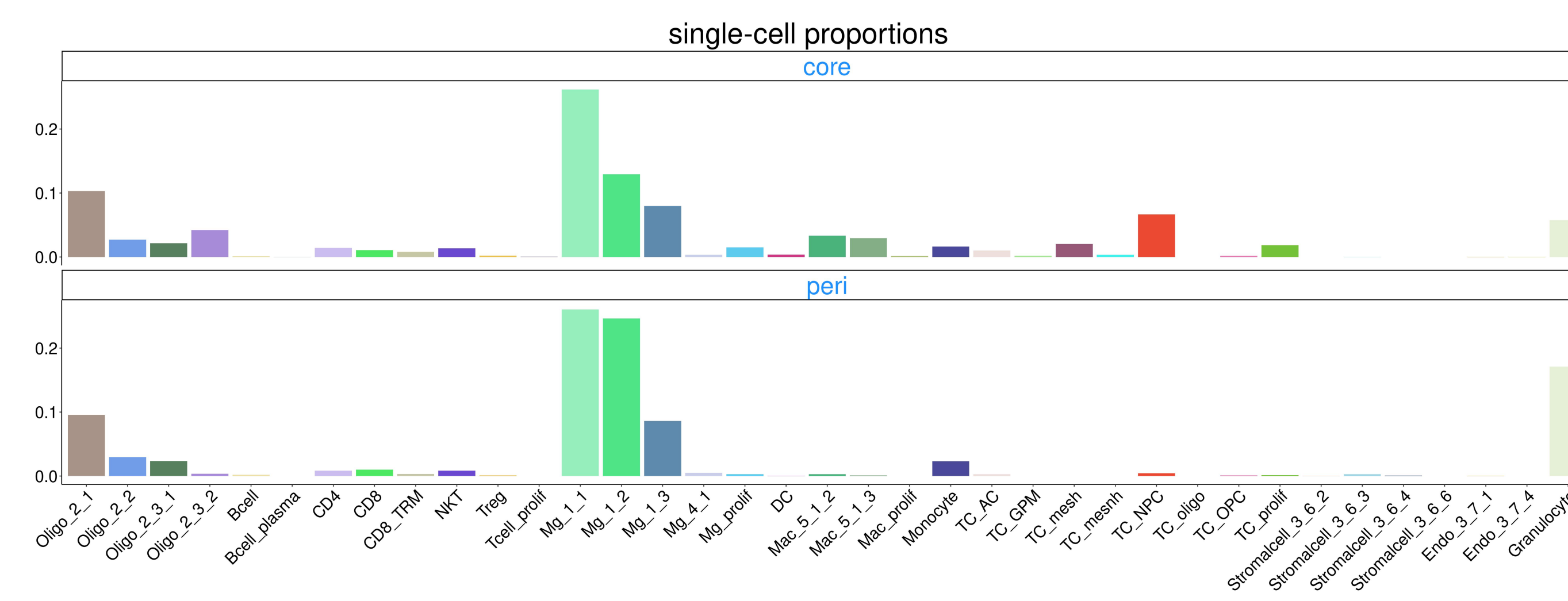
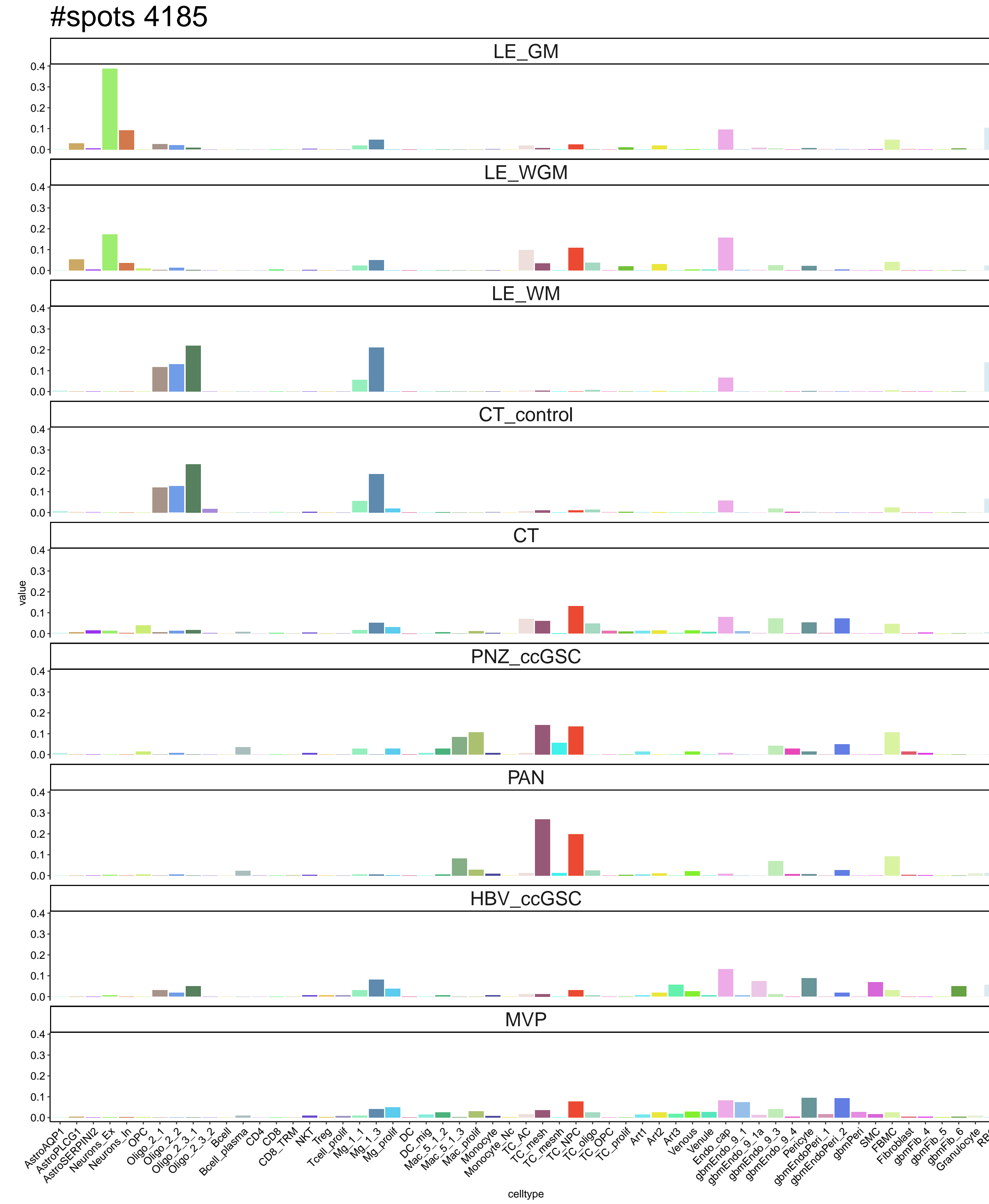
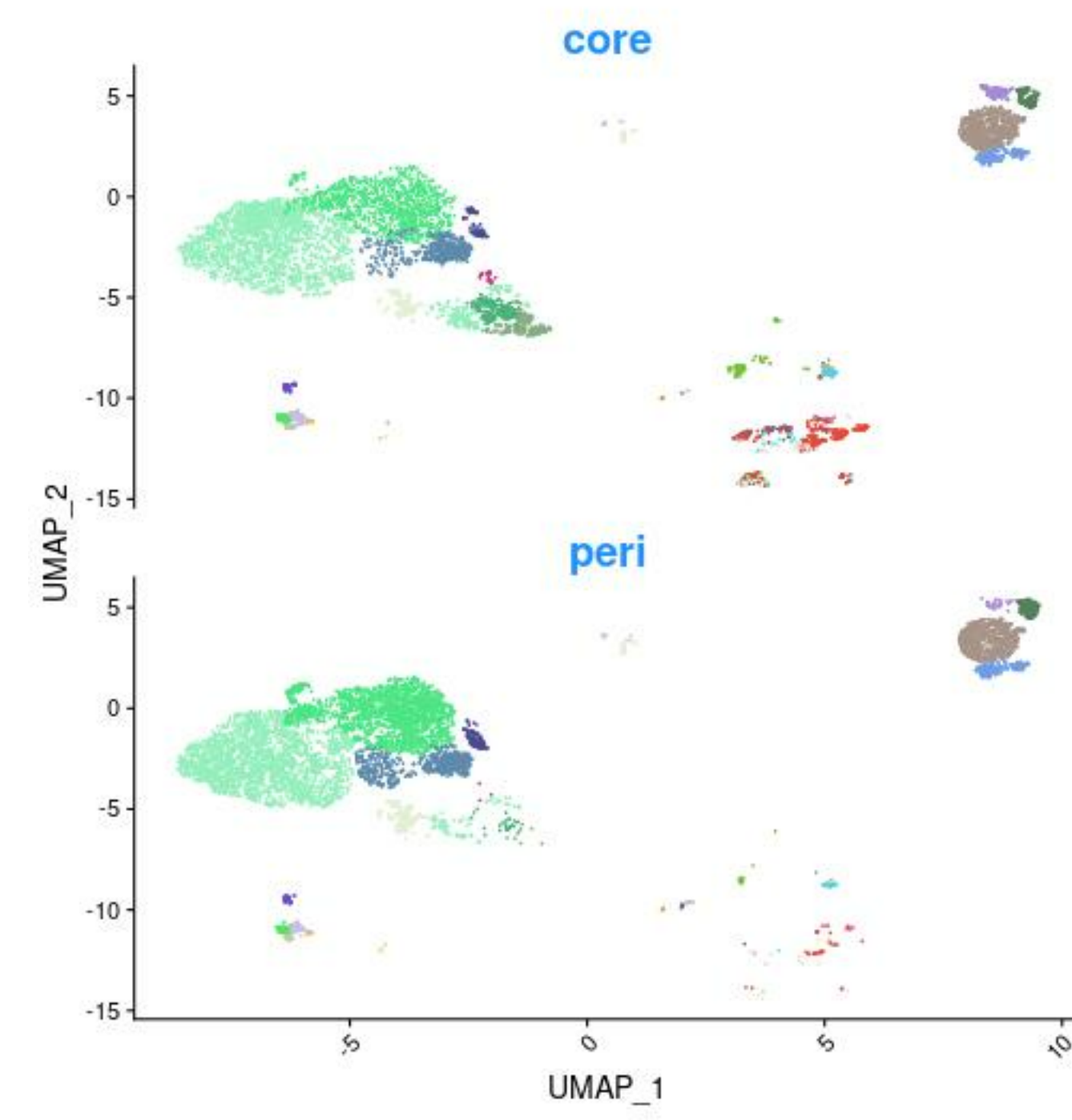
D

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	mutant (p.Pro492Leu, c.1475C>T)	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		



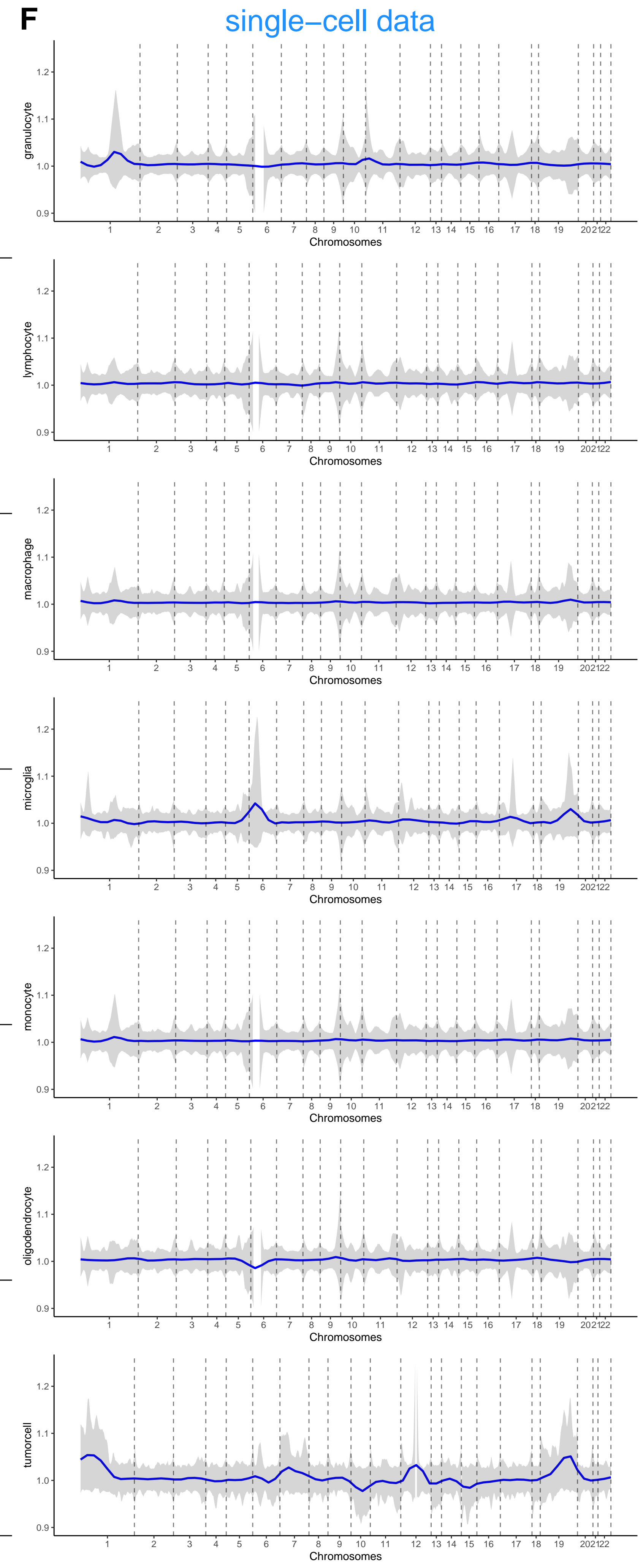


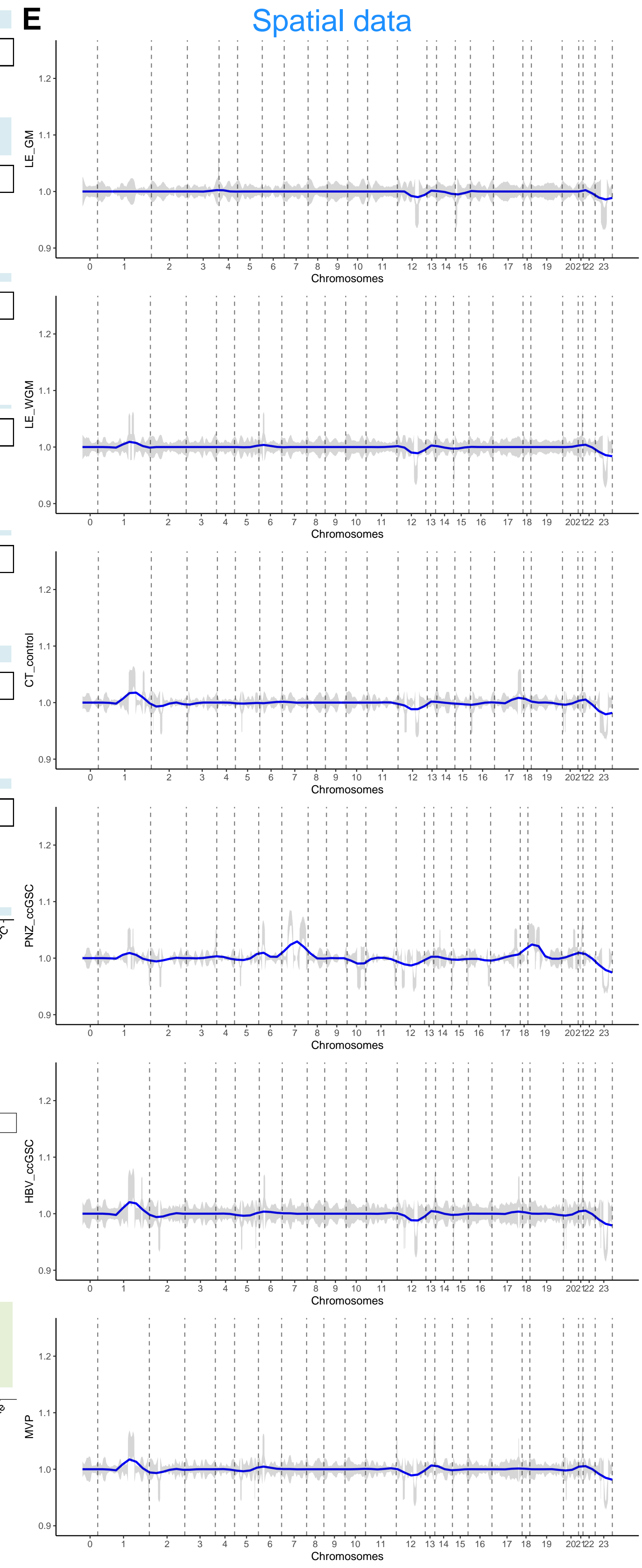
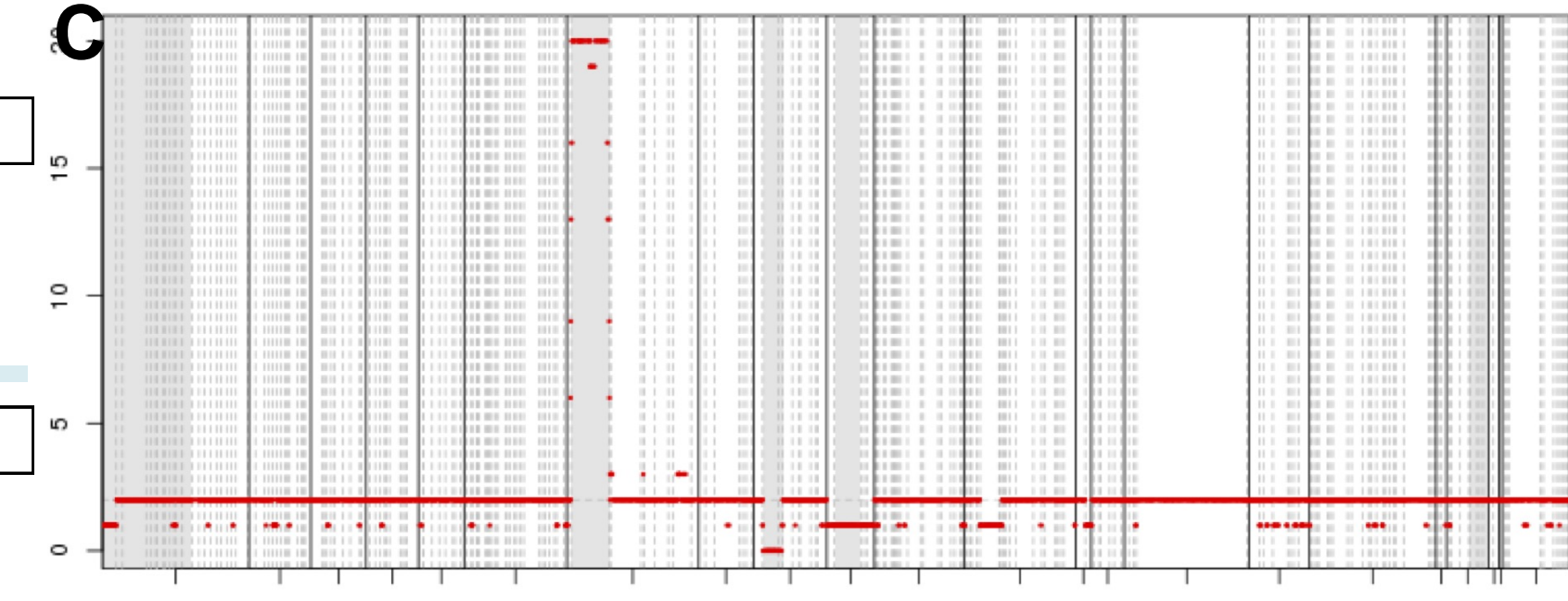
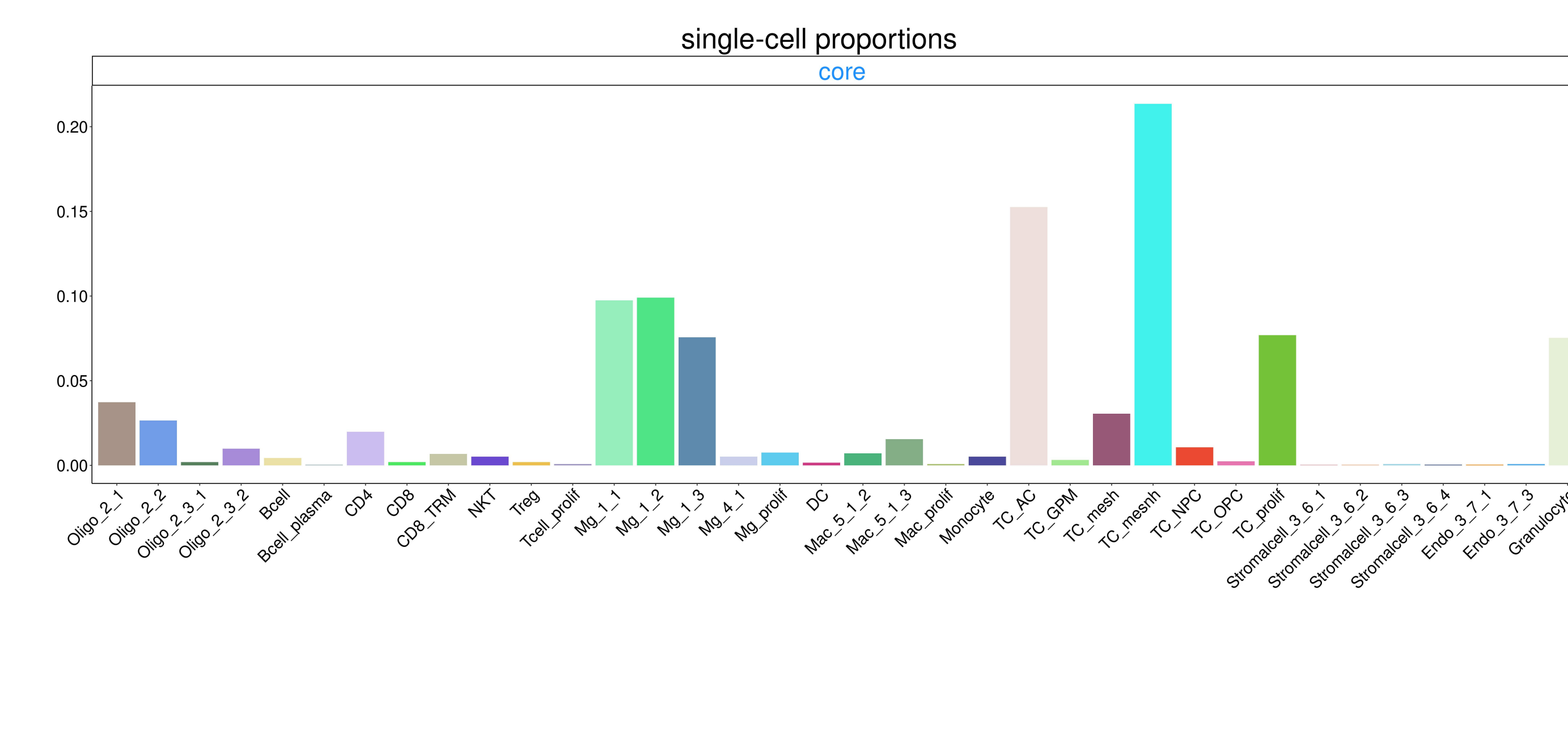
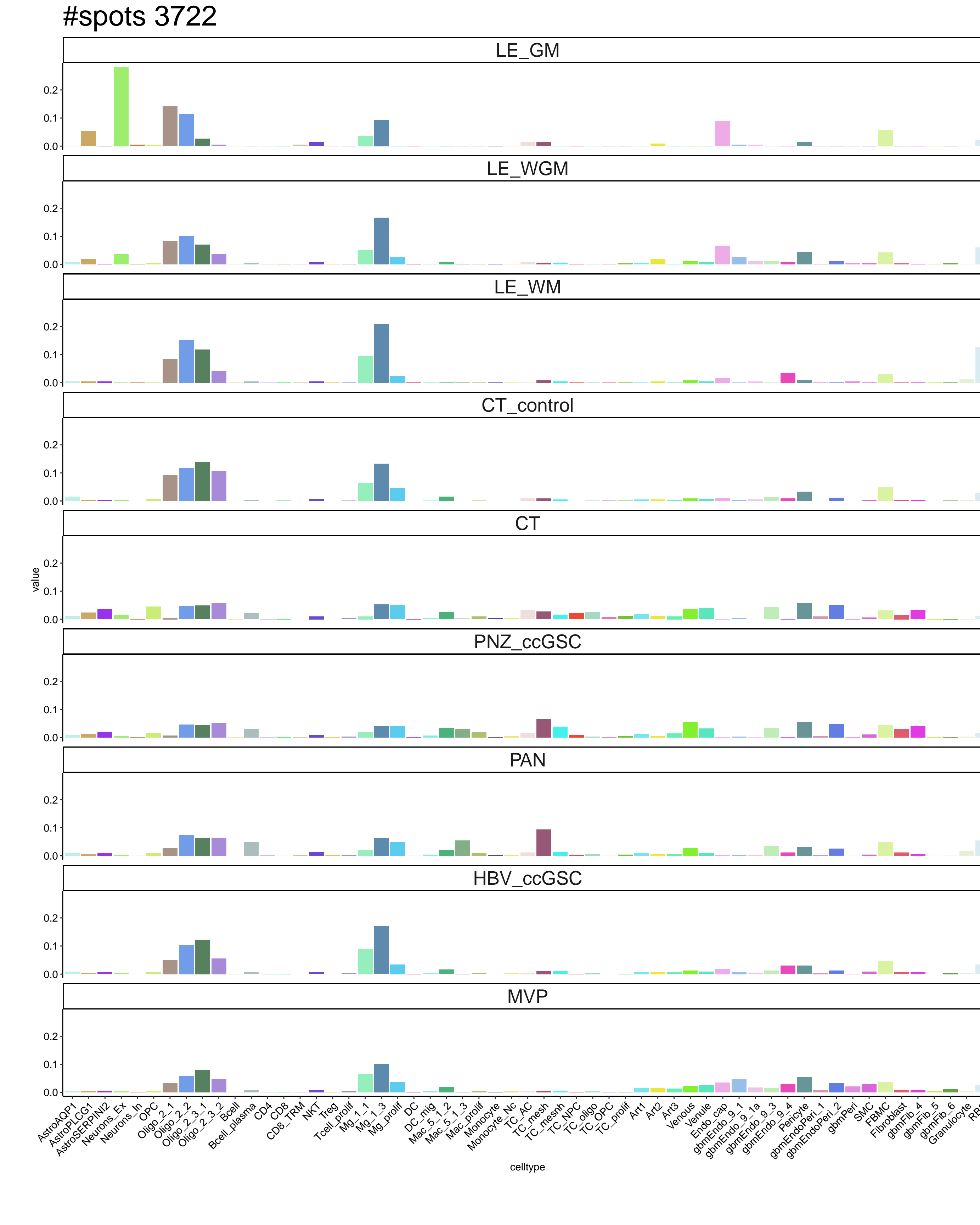
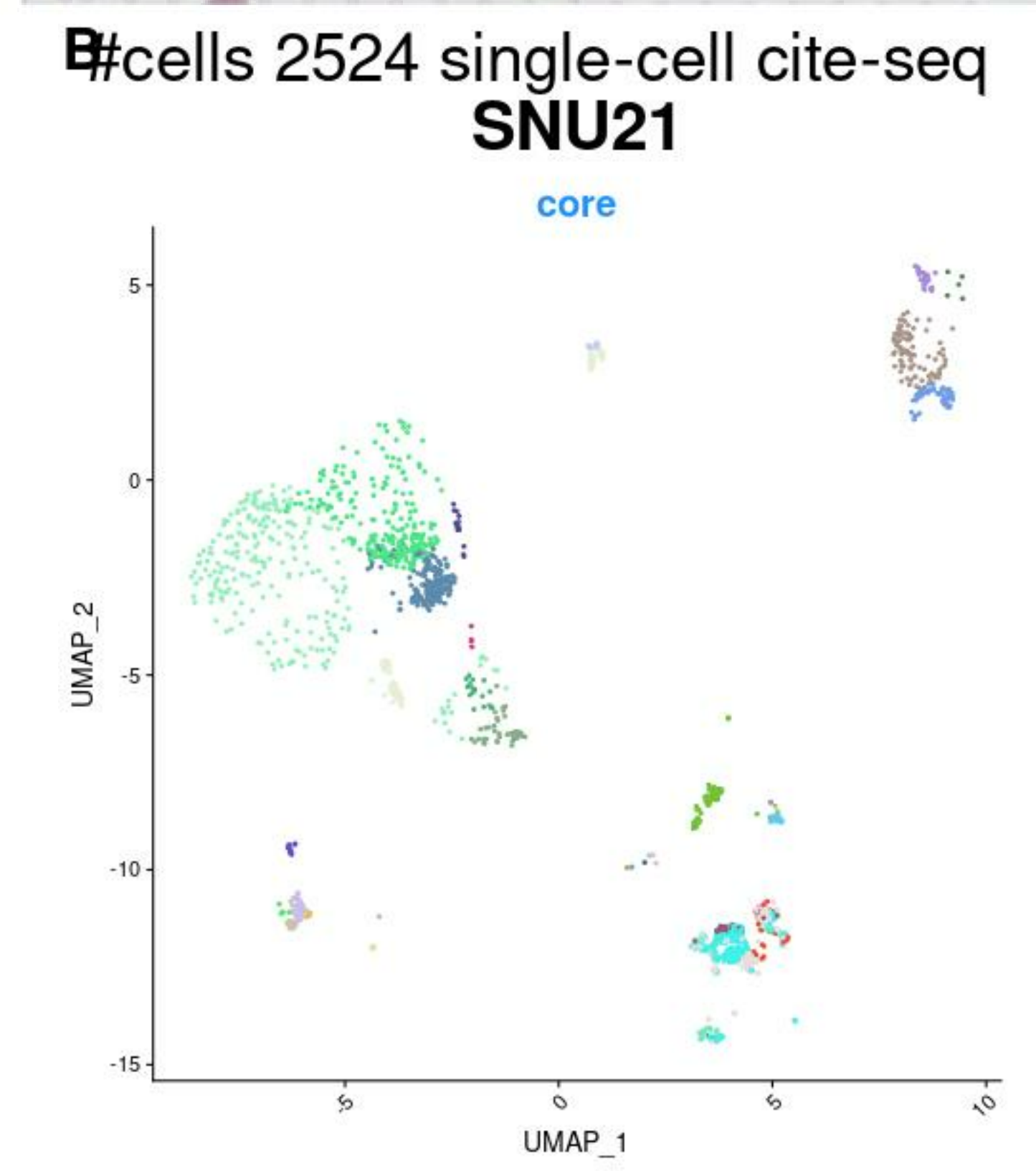
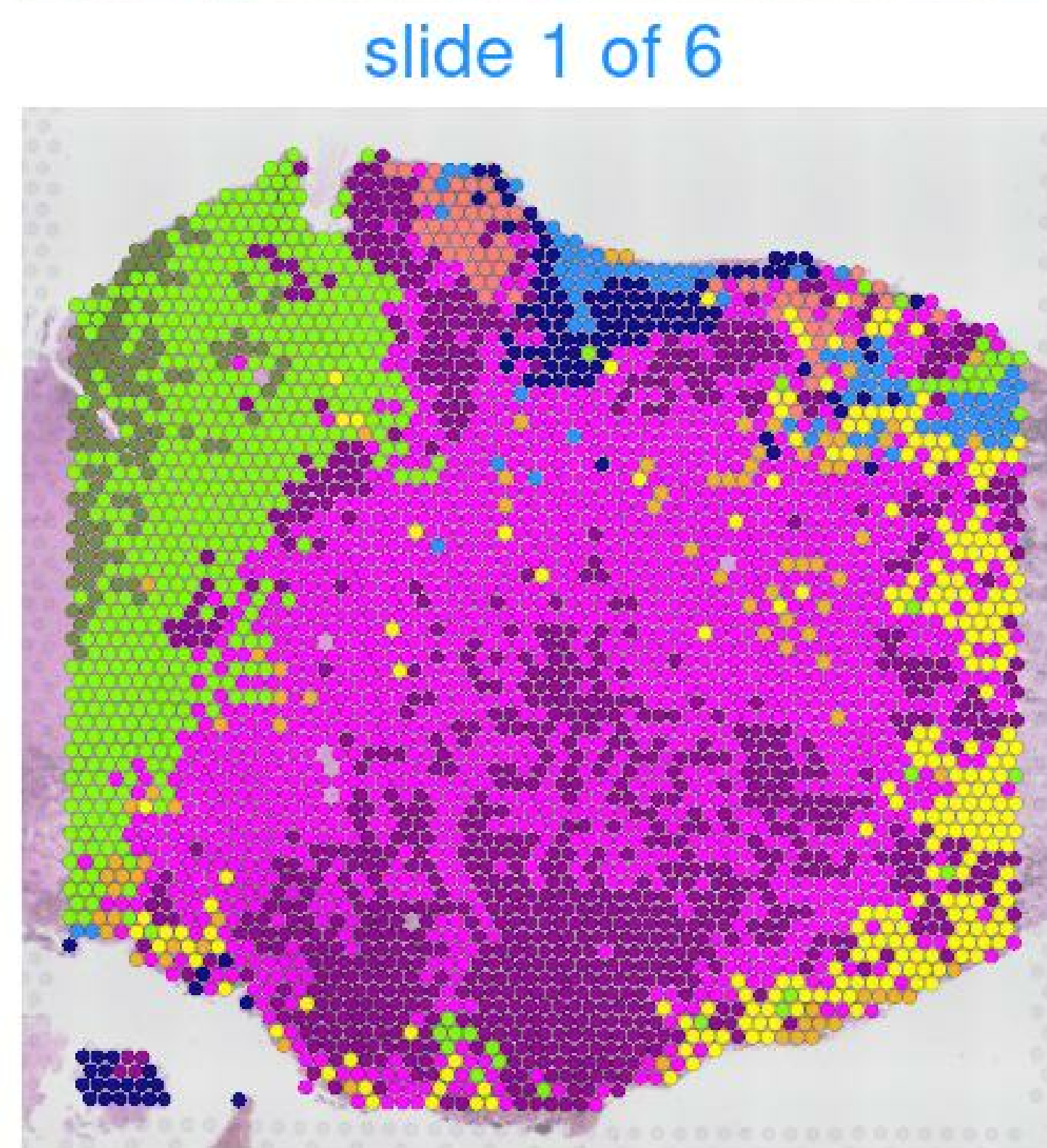
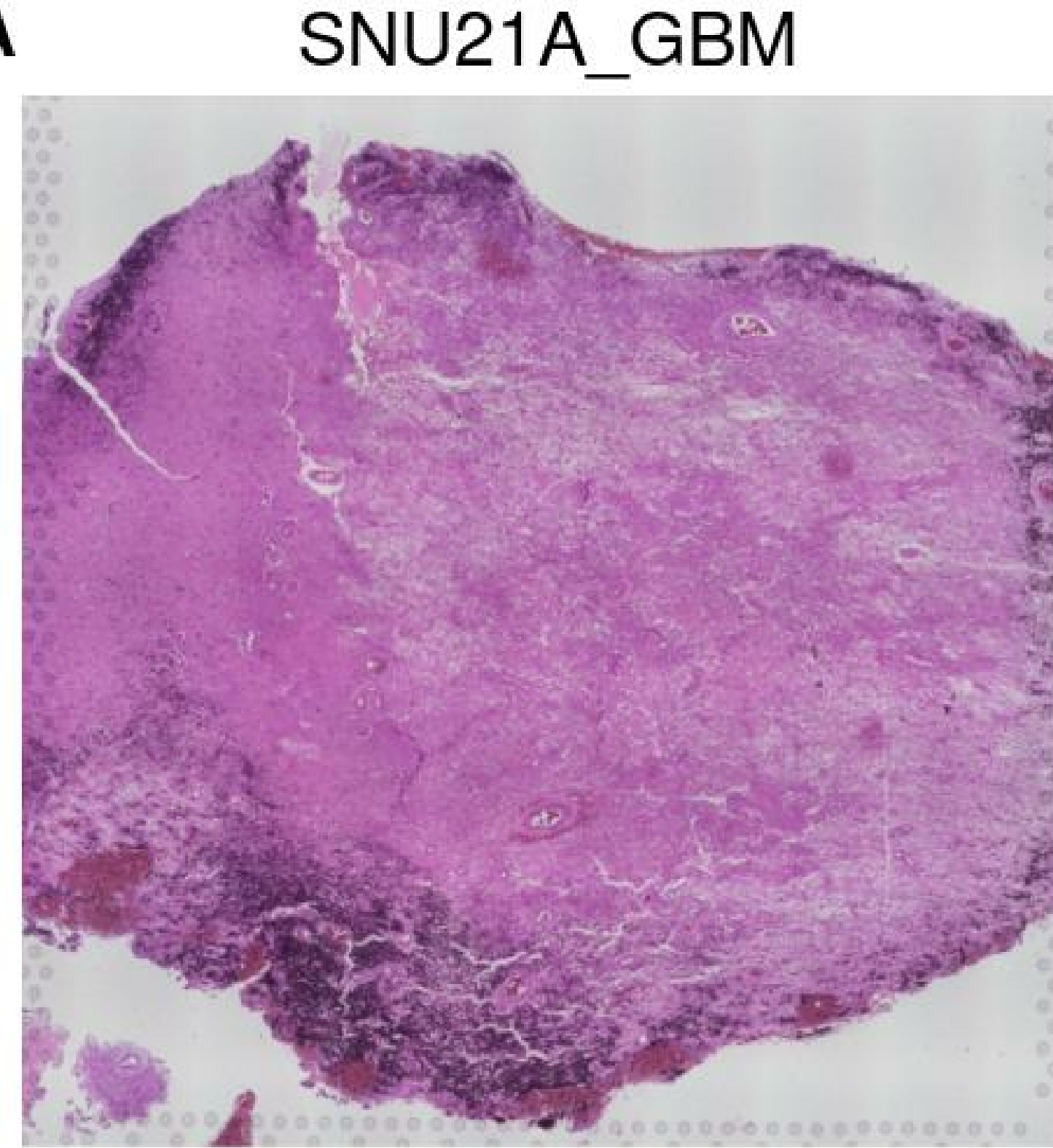
B #cells 16787 single-cell SNU51



D

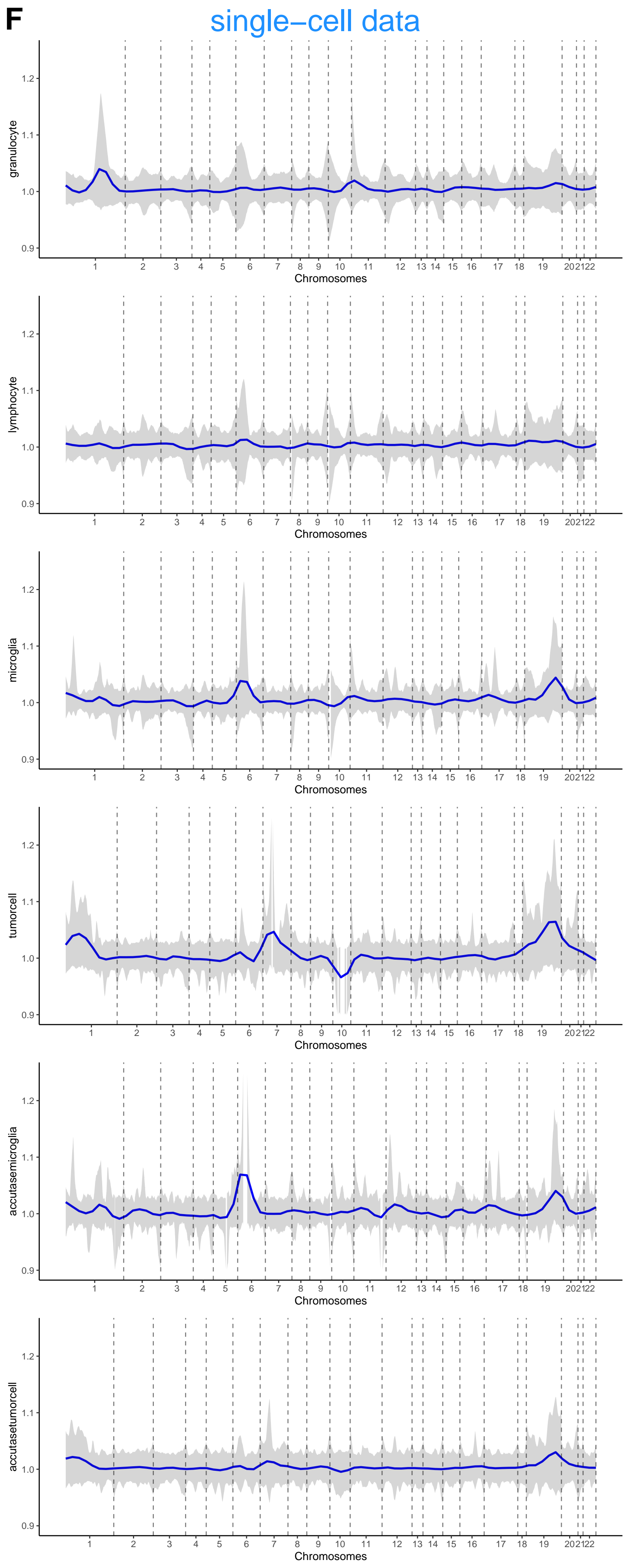
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TERF1p mutation	mutant (C250T, c.-146C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	mutant (p.Pro492Leu, c.1475C>T)	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		



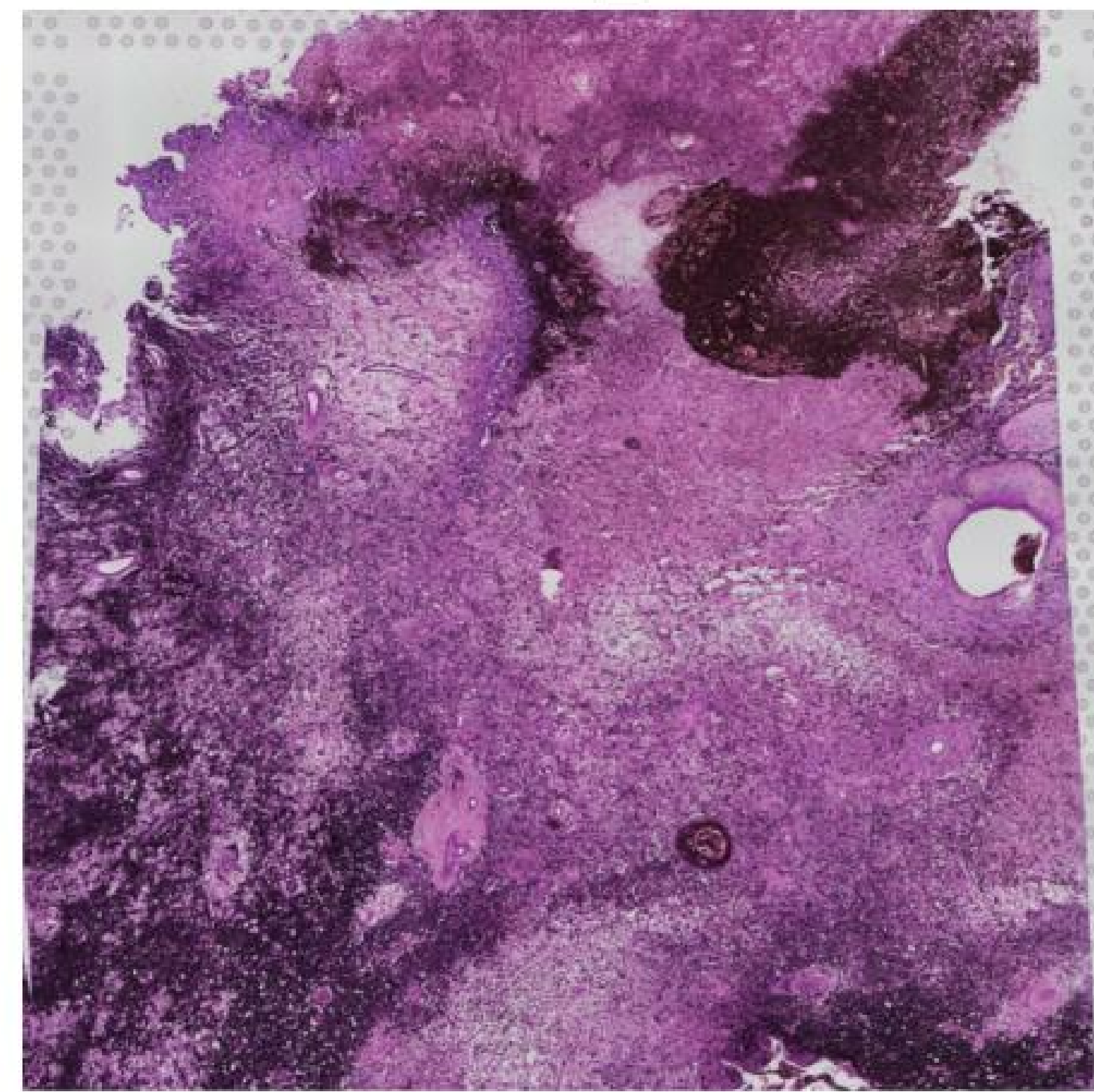


D

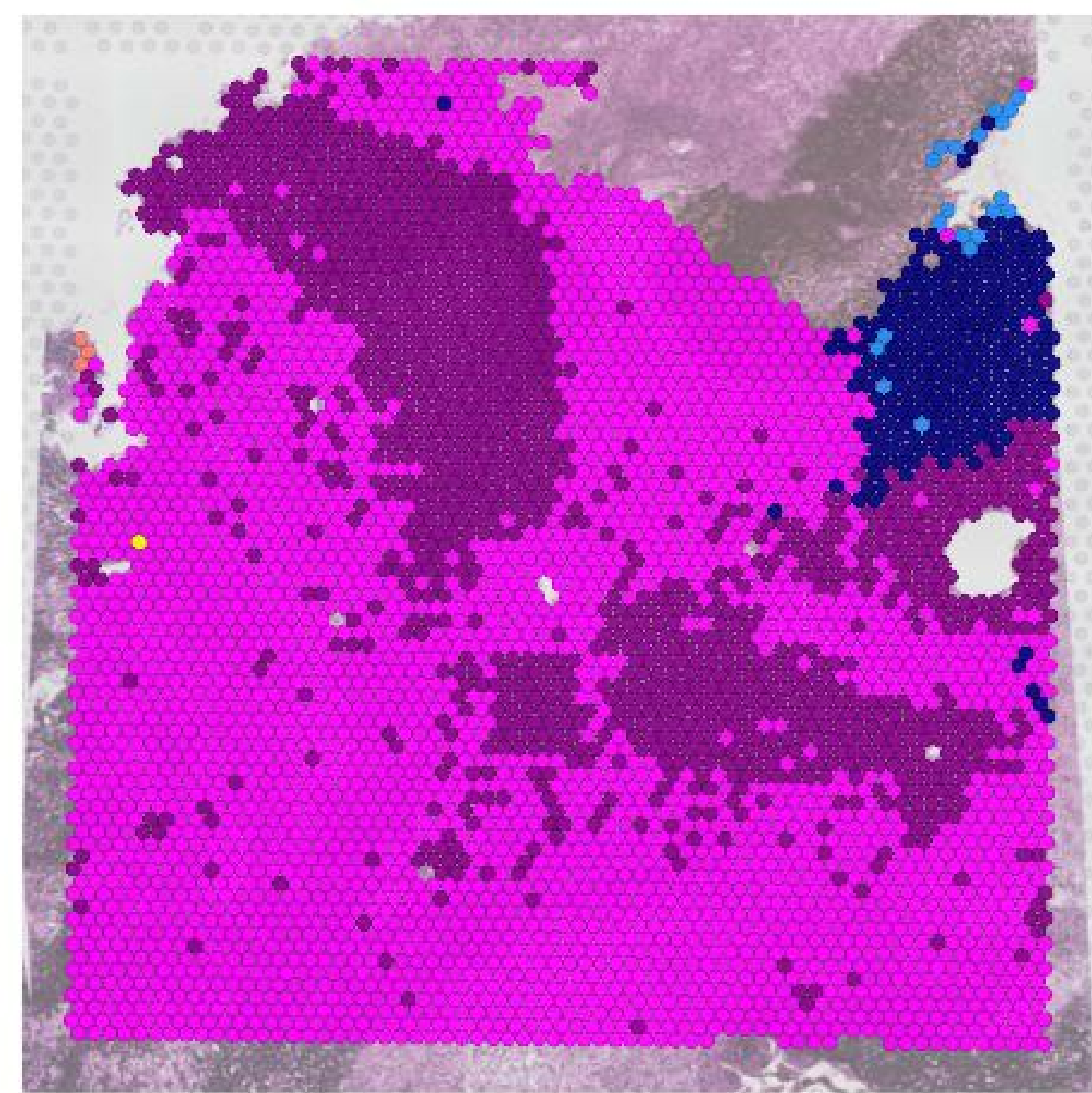
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	PDGFRA amplification	absent
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI mutation	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		



SNU21B_GBM

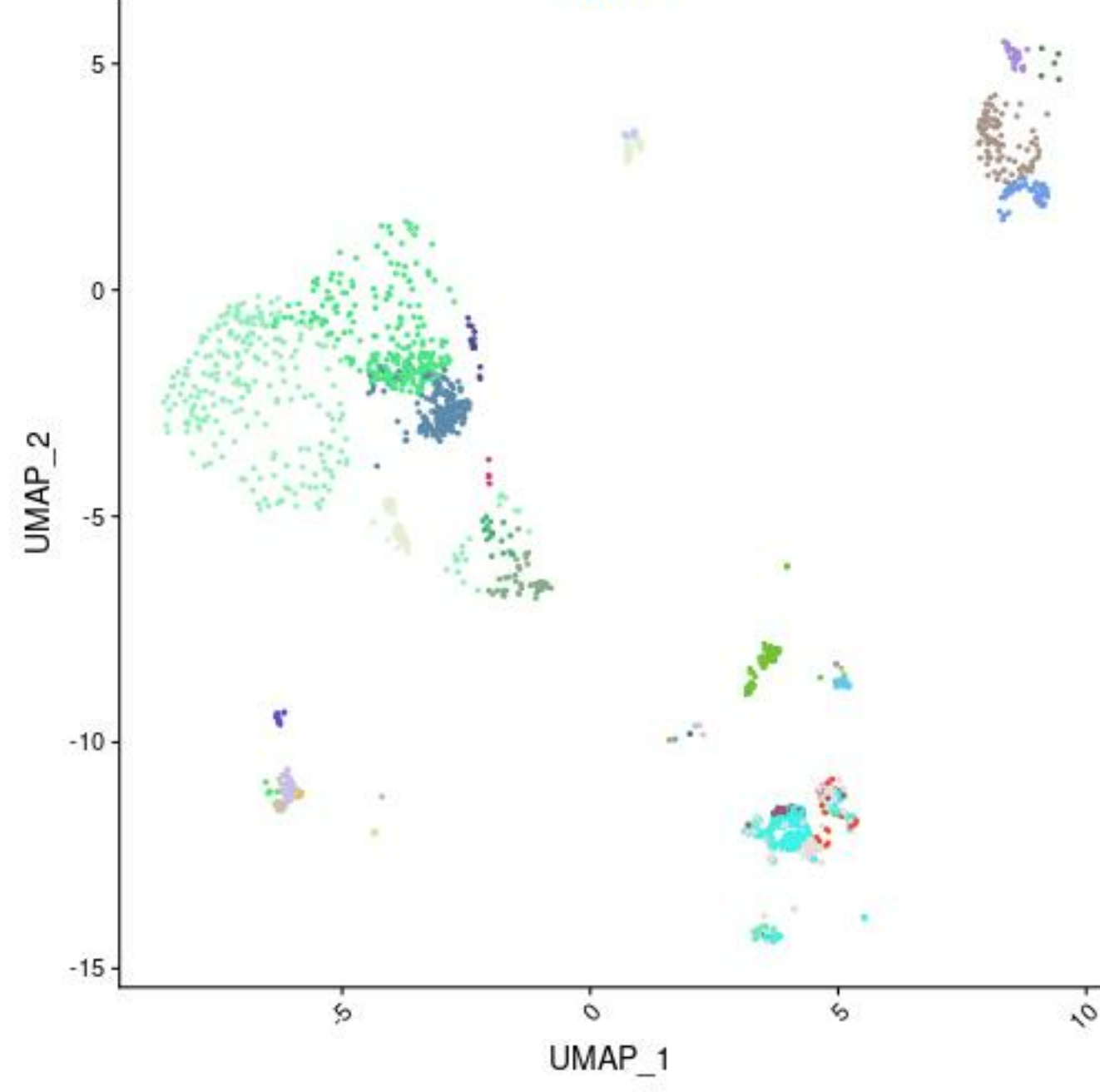


slide 2 of 6

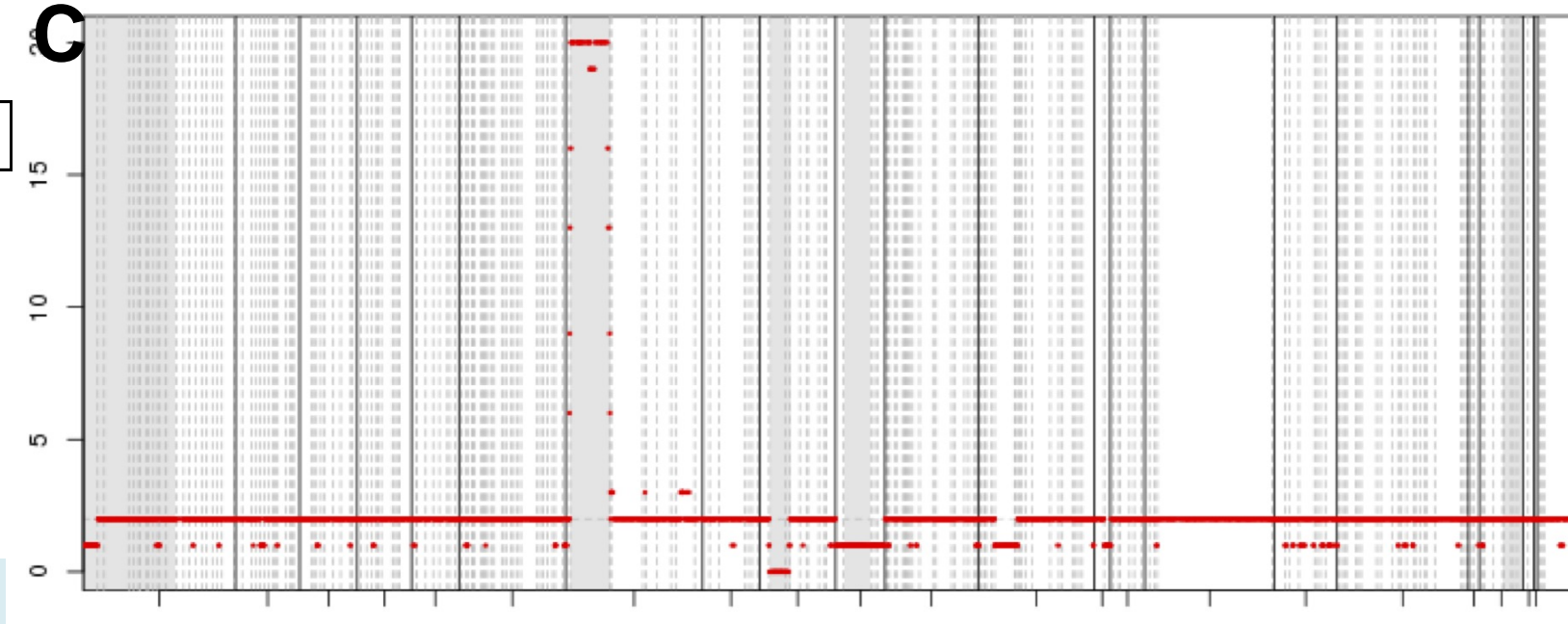
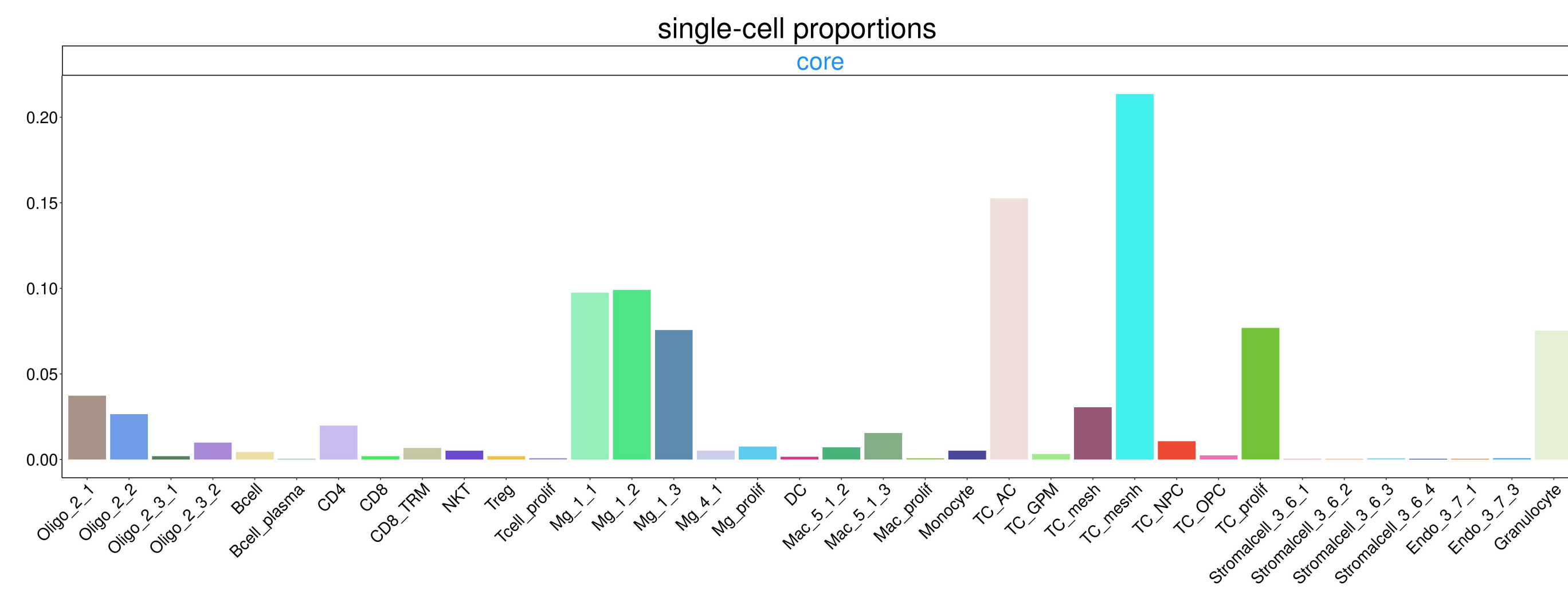
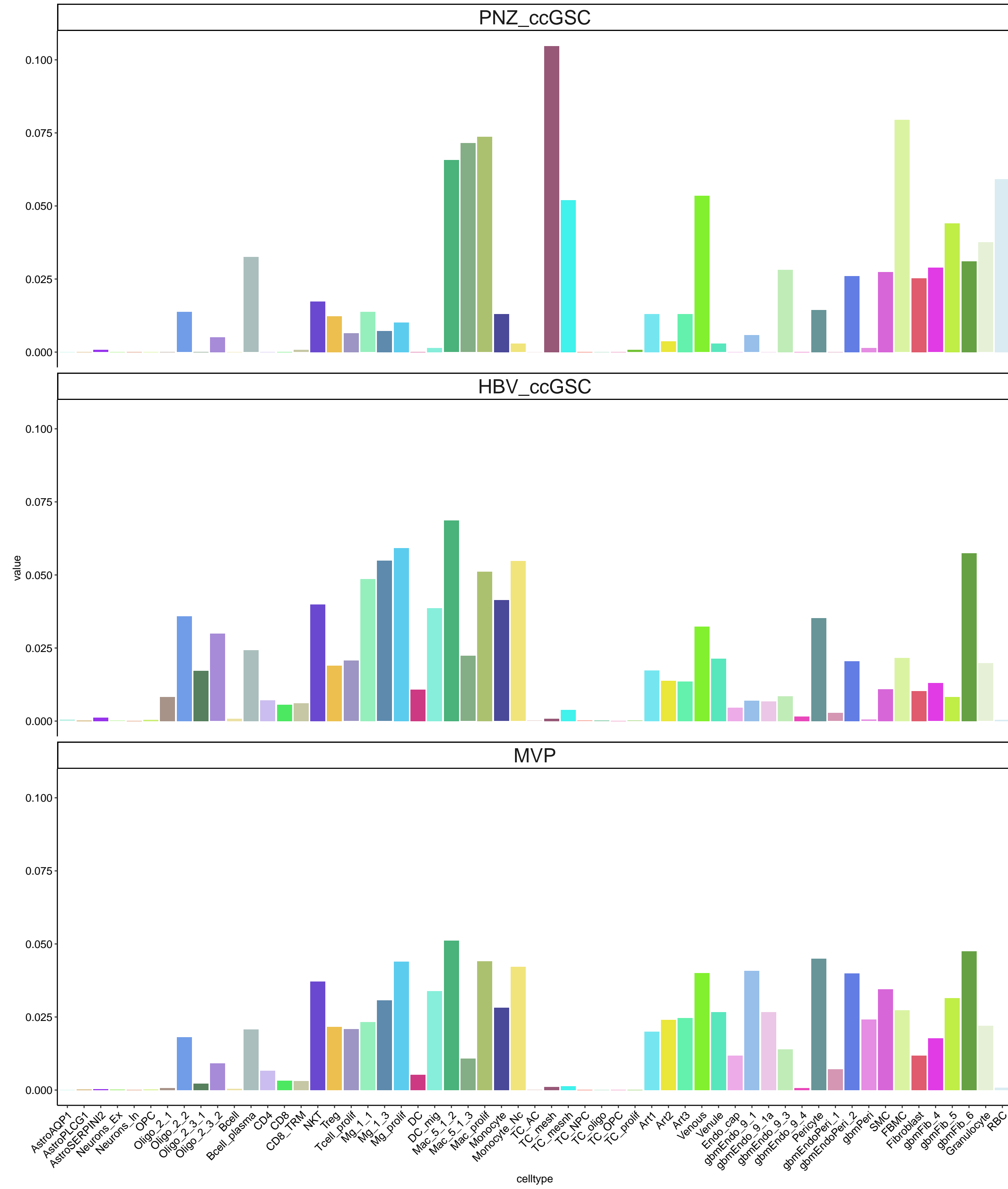


#cells 2524 single-cell cite-seq
SNU21

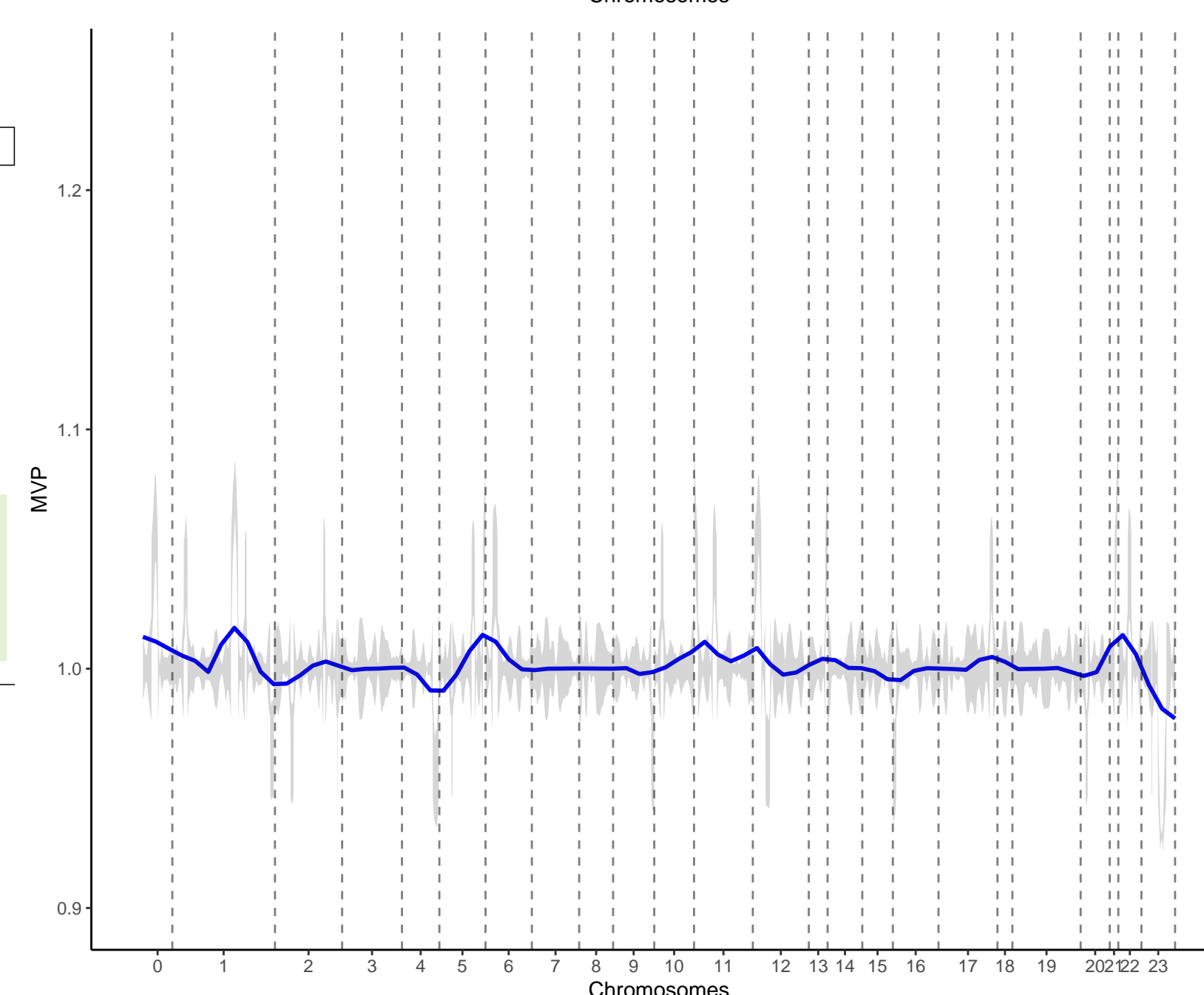
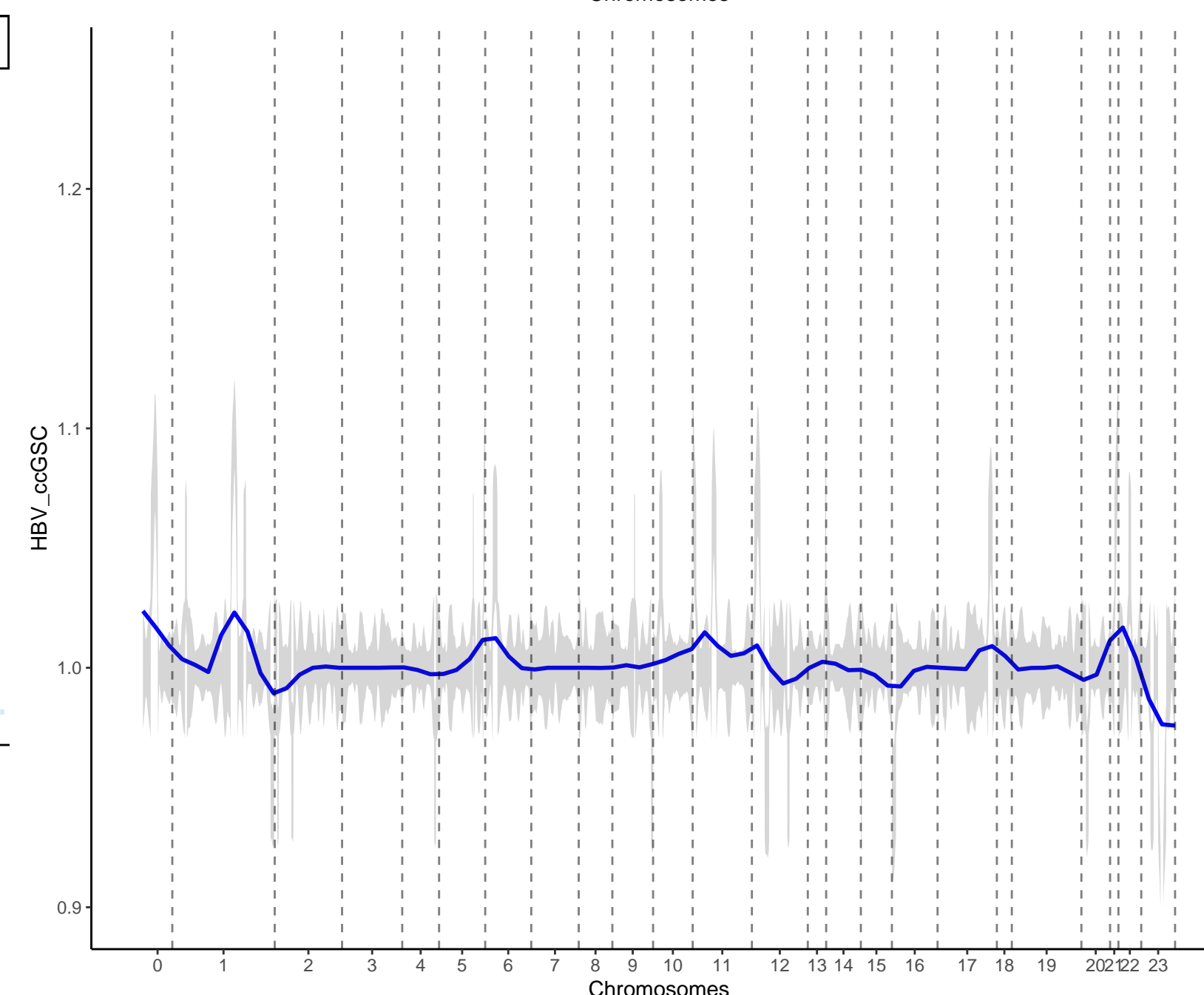
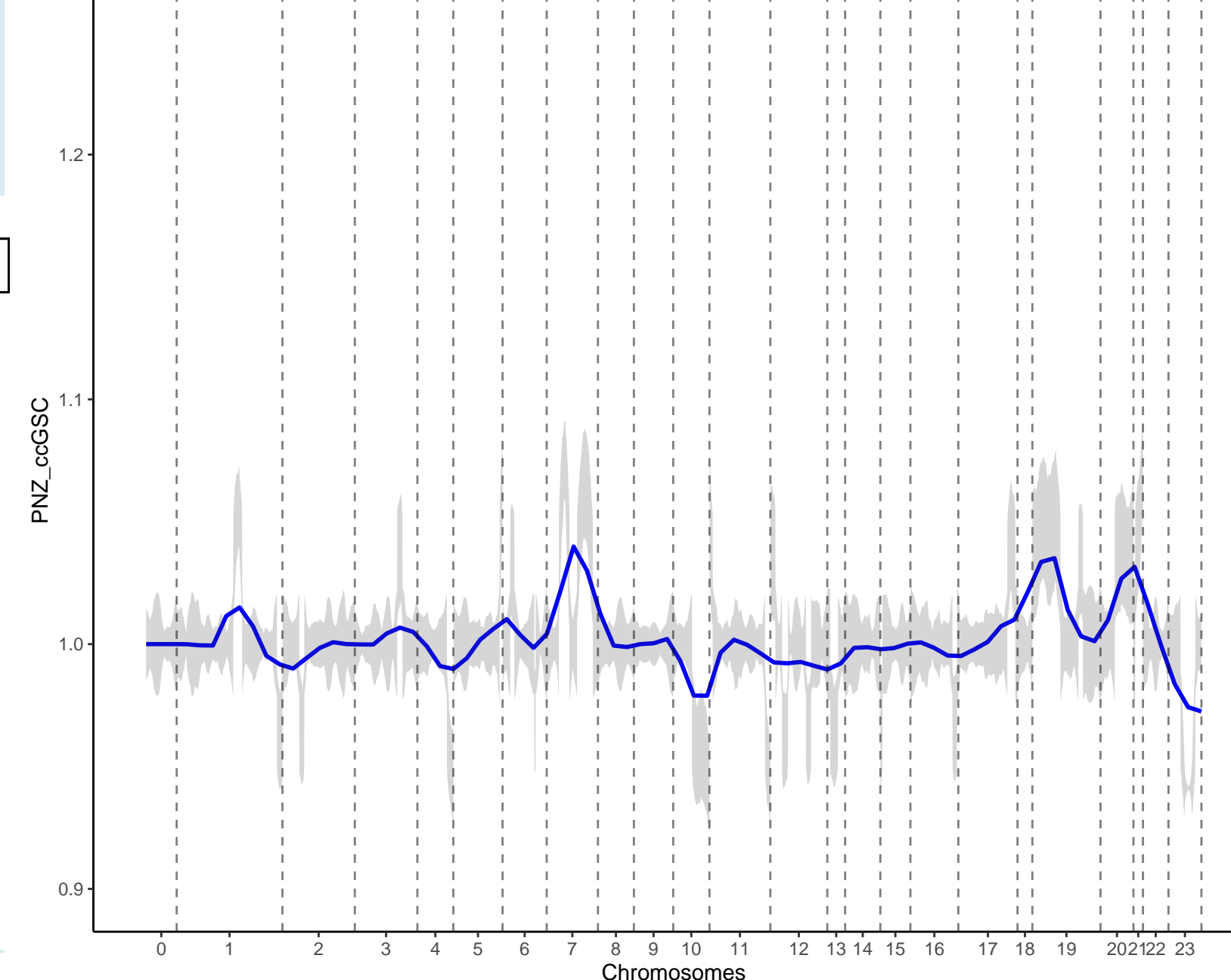
core



#spots 4302

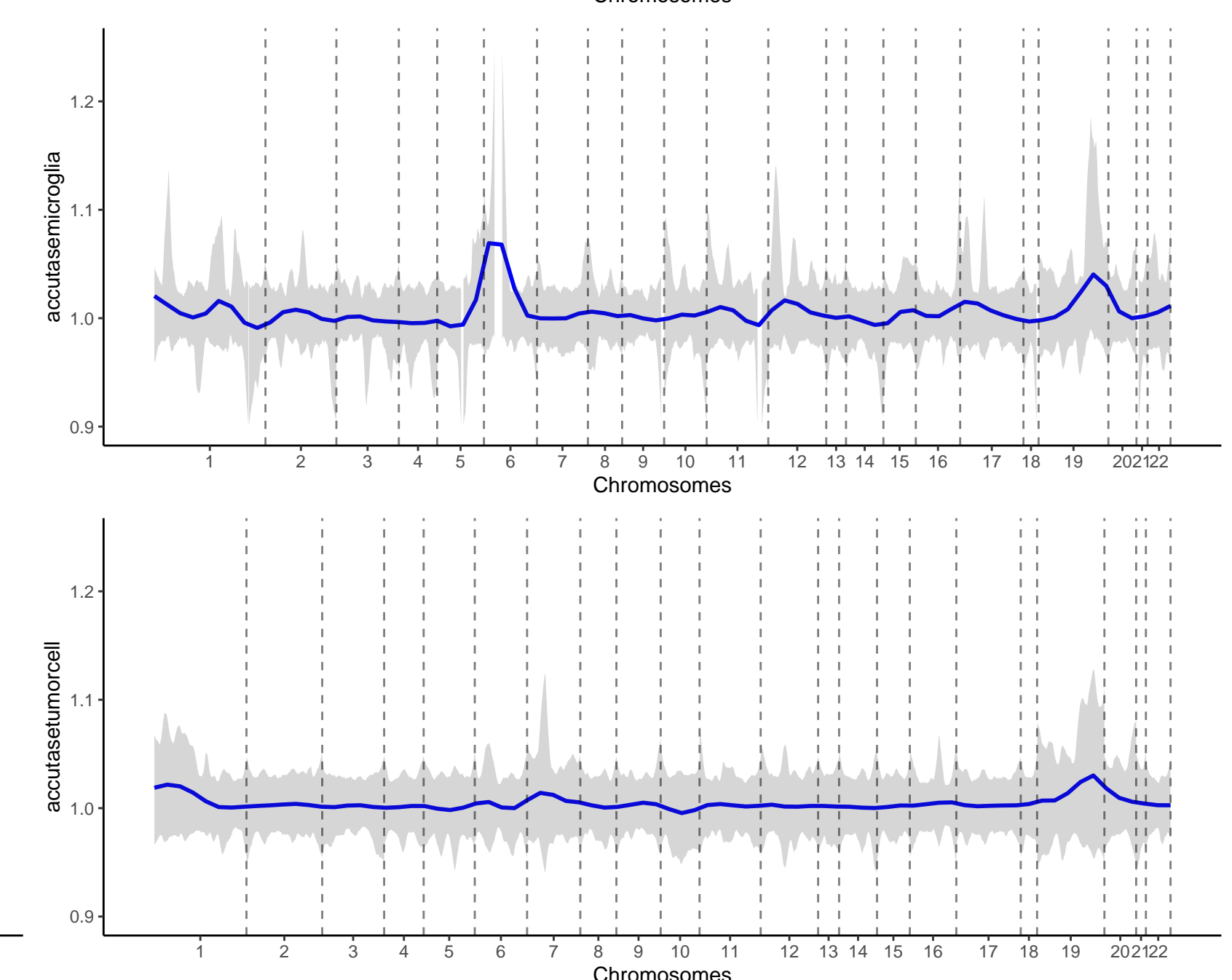
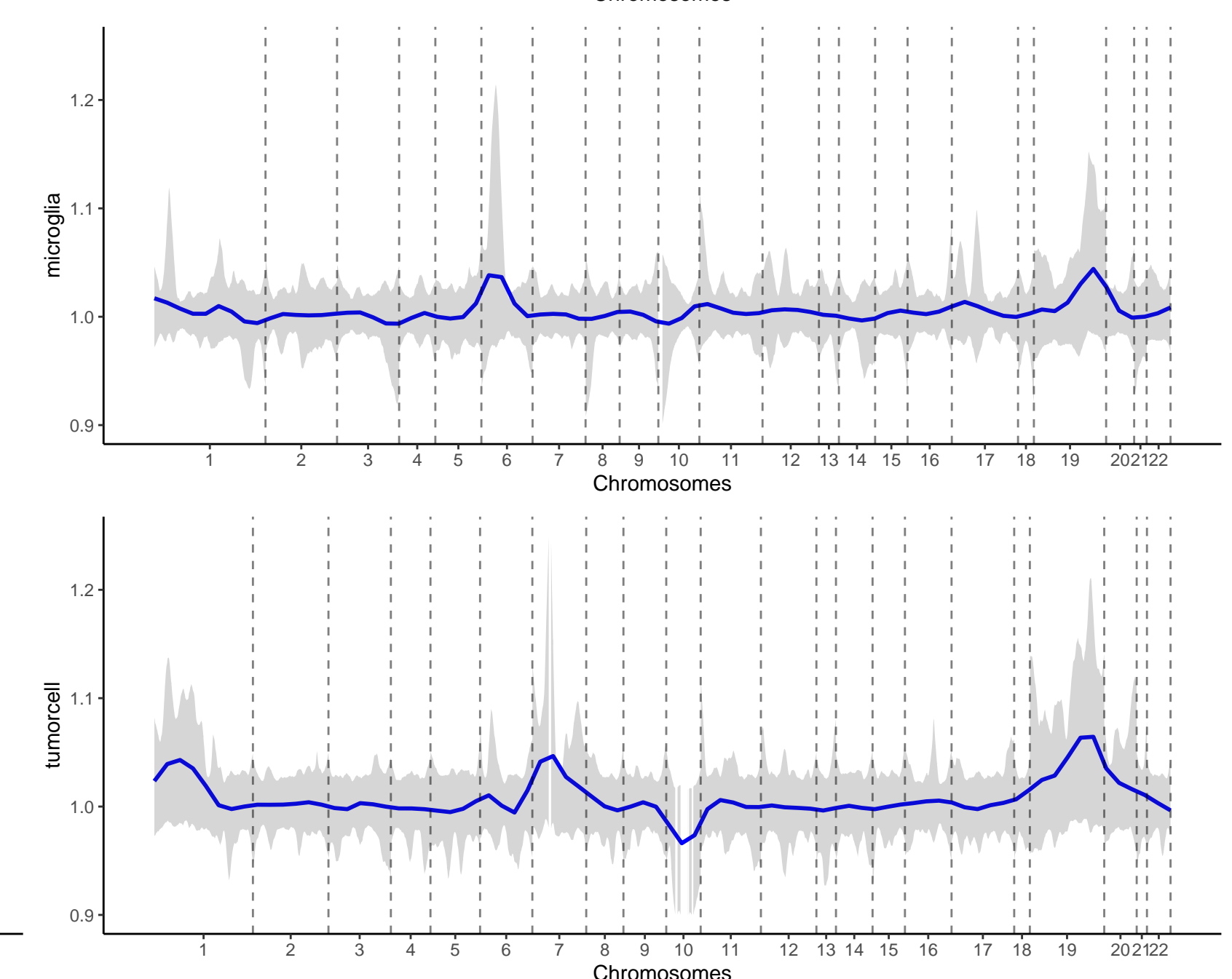
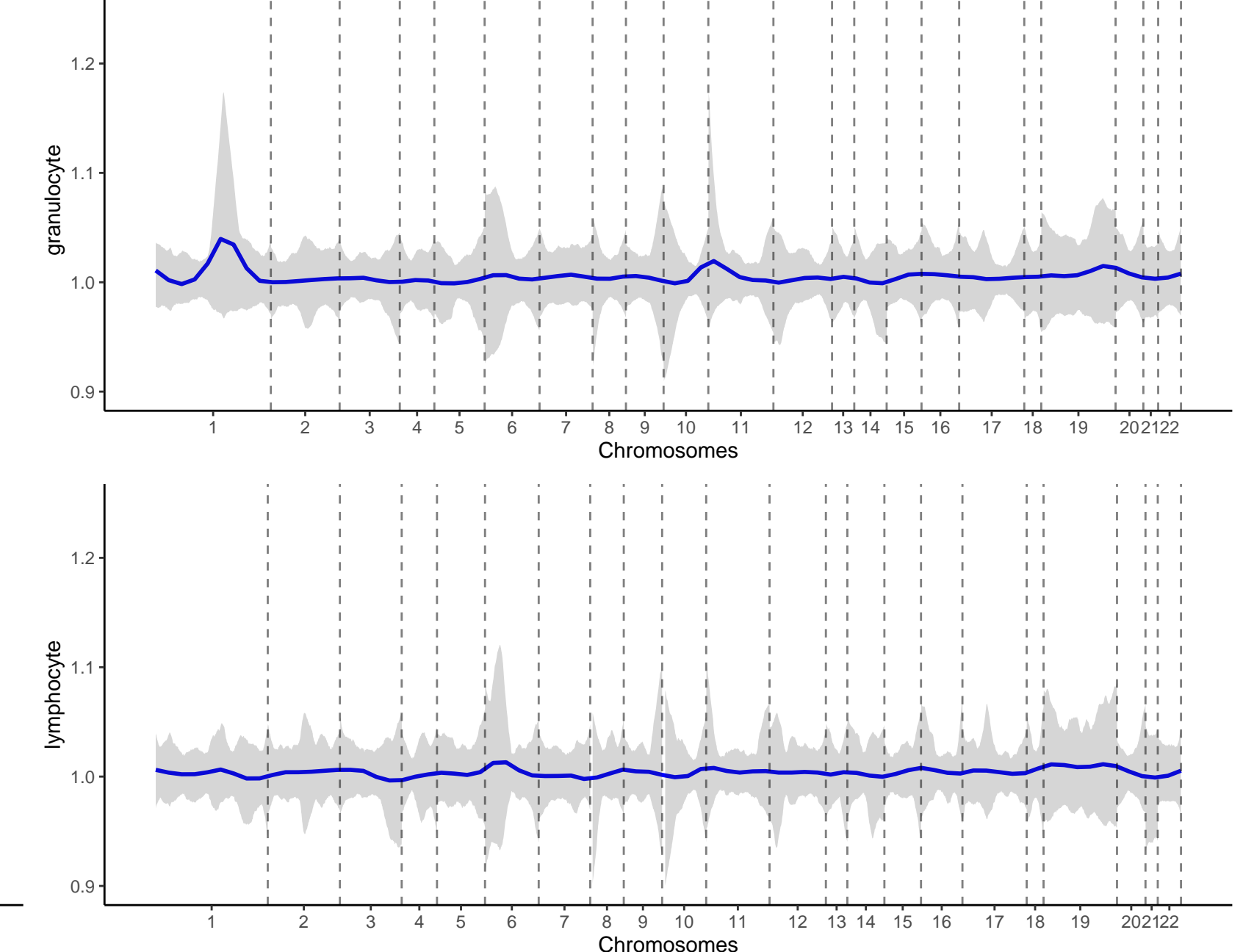


E Spatial data

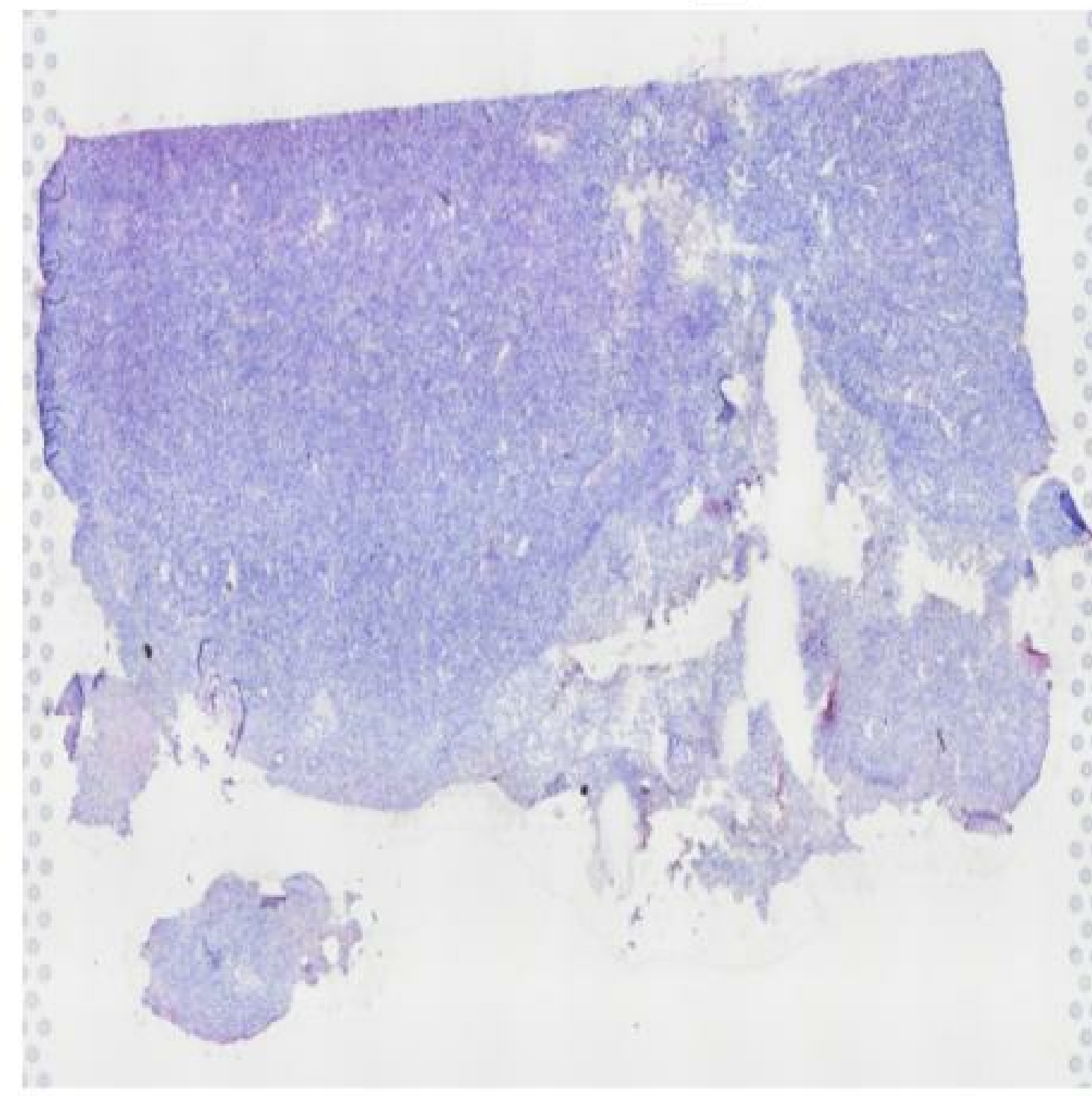


Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI deletion	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

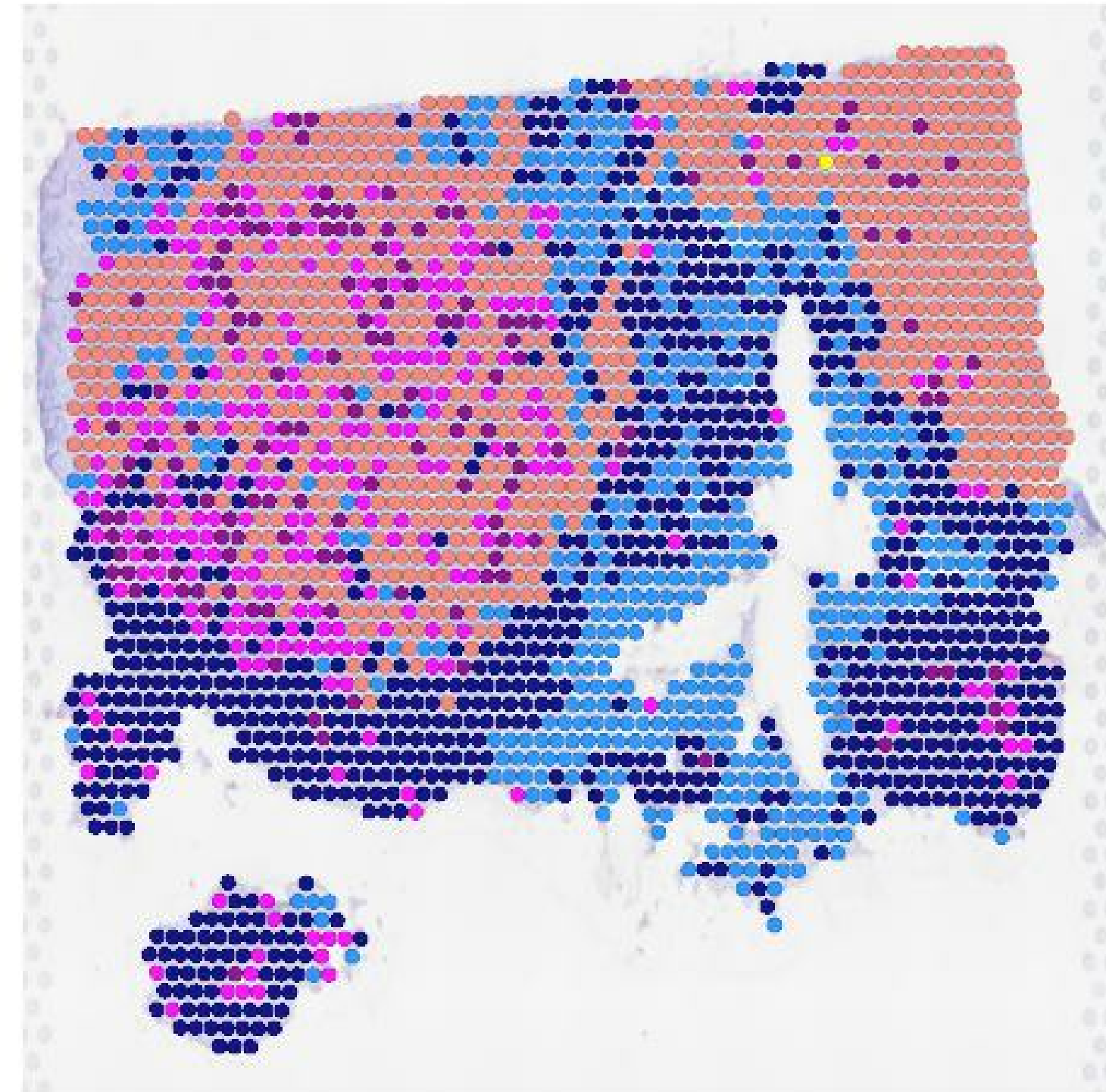
F single-cell data



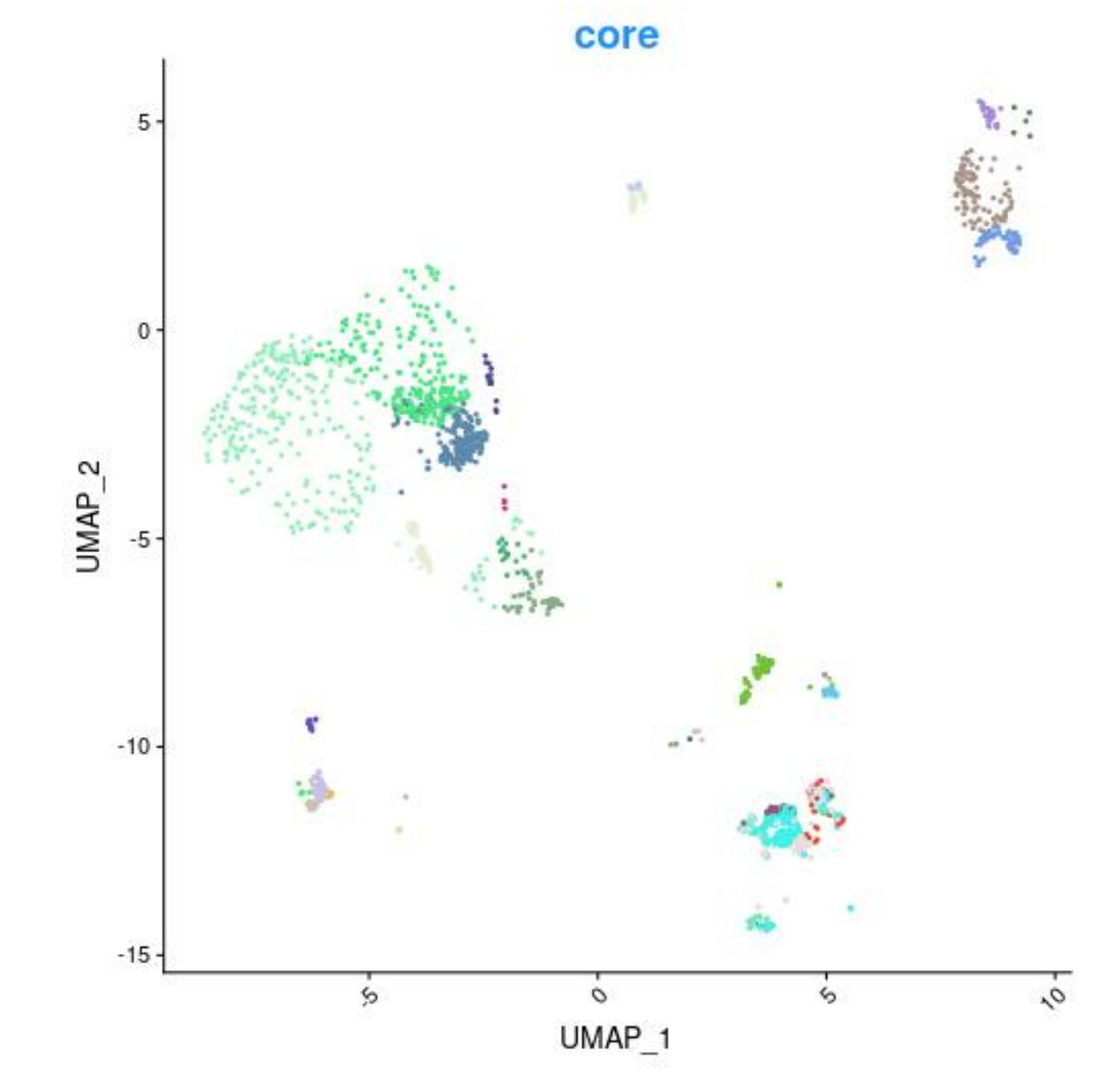
A SNU21Afrozen_GBM



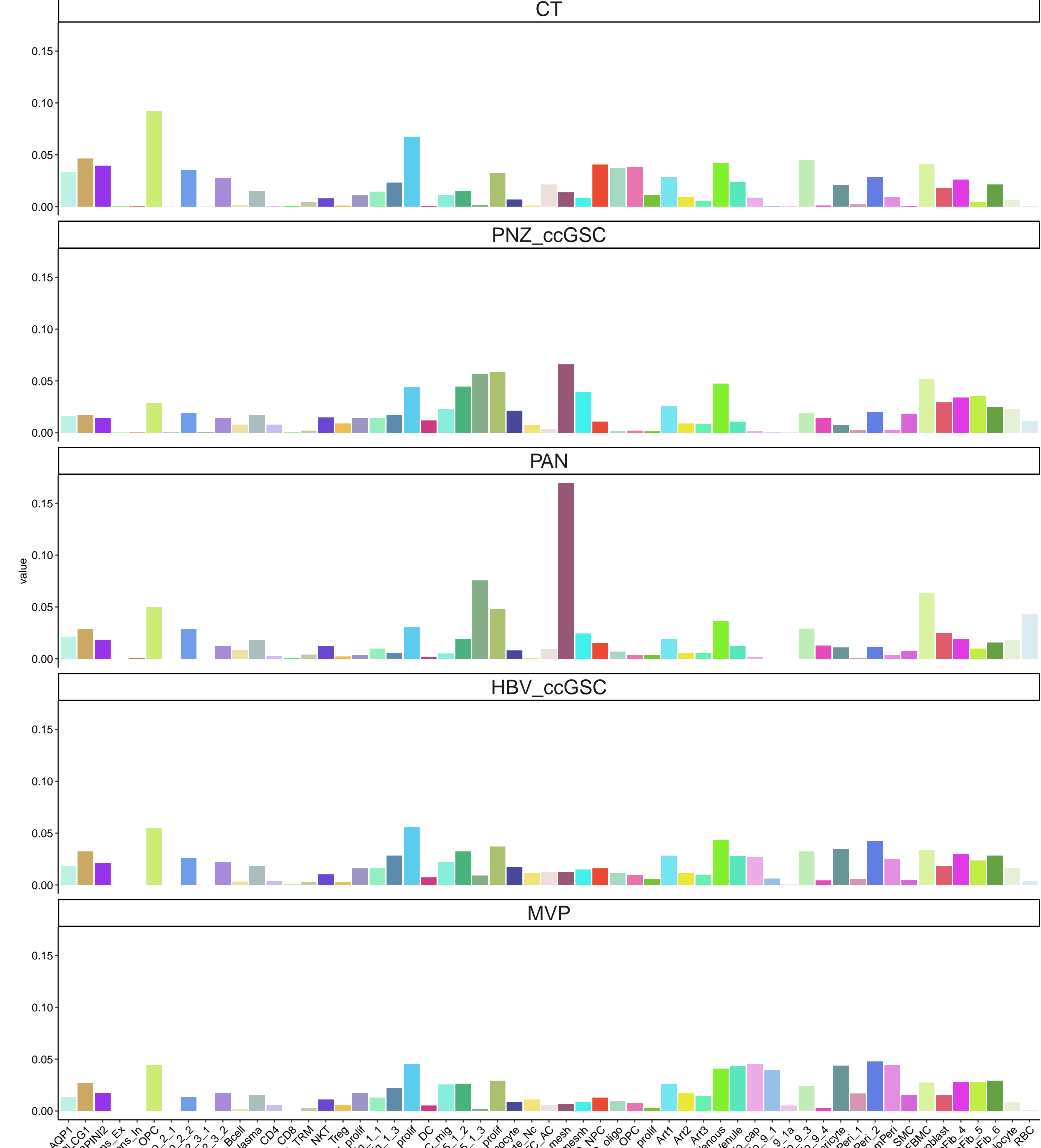
slide 3 of 6



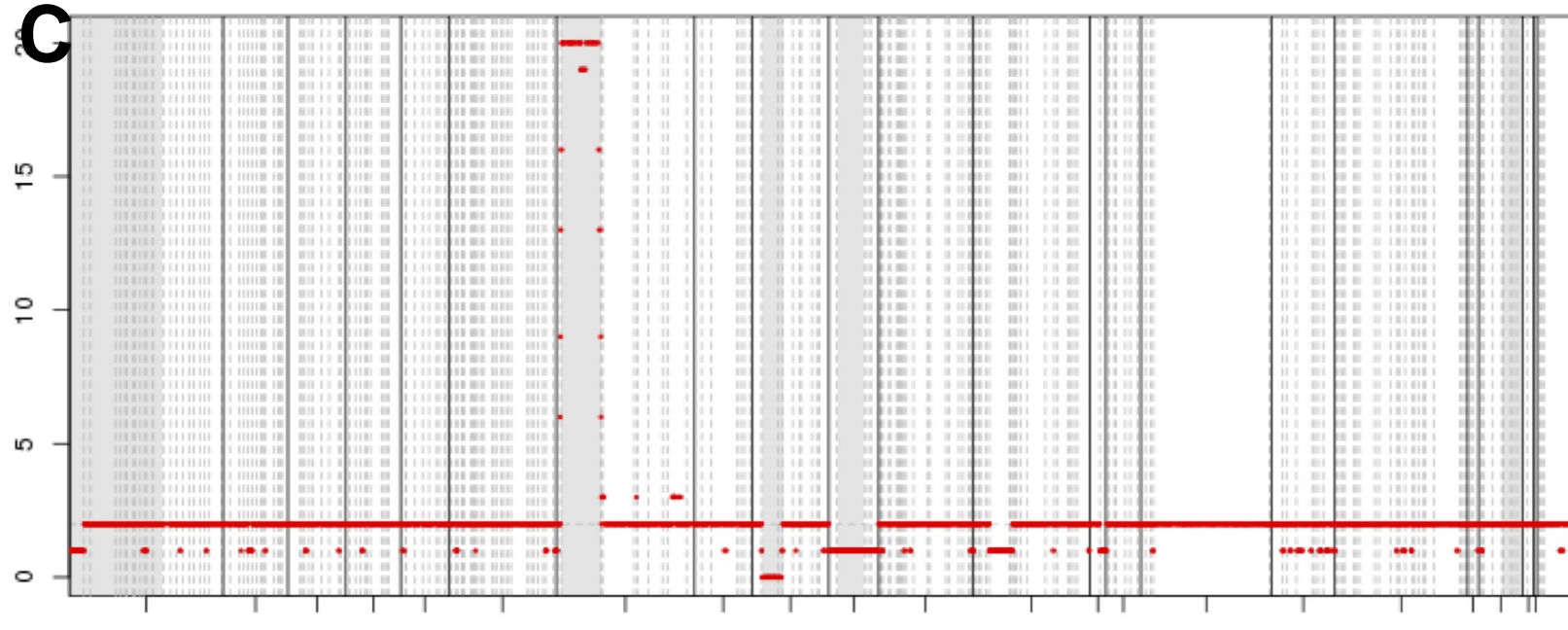
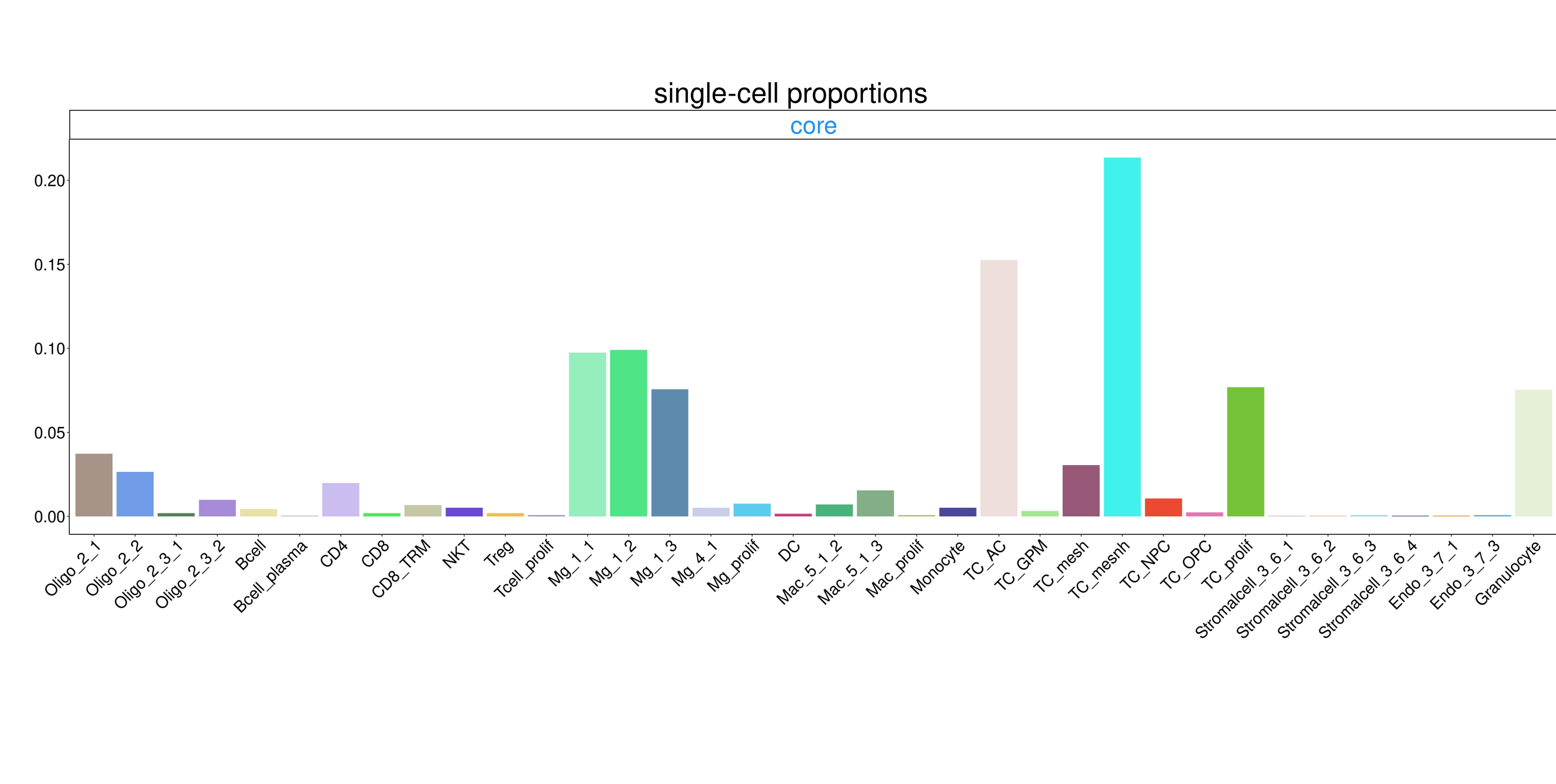
B #cells 2524 single-cell cite-seq SNU21



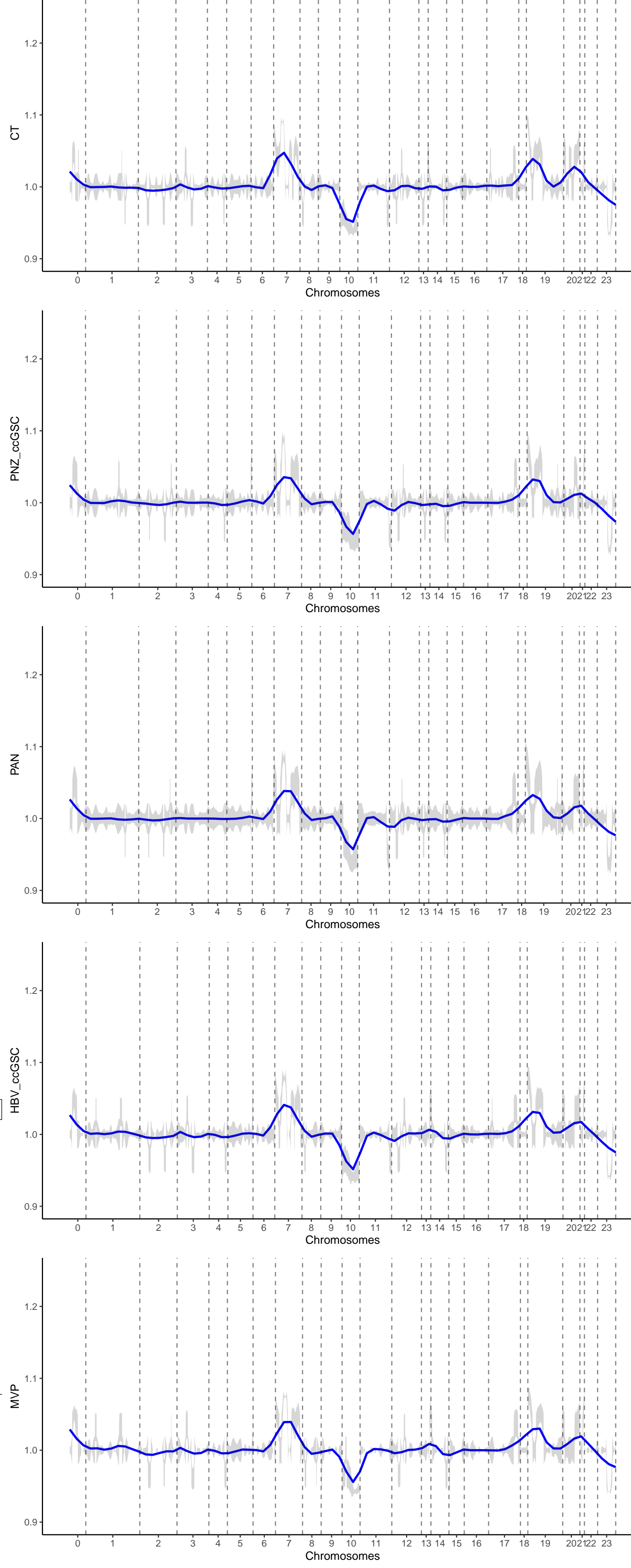
C #spots 2408



D single-cell proportions

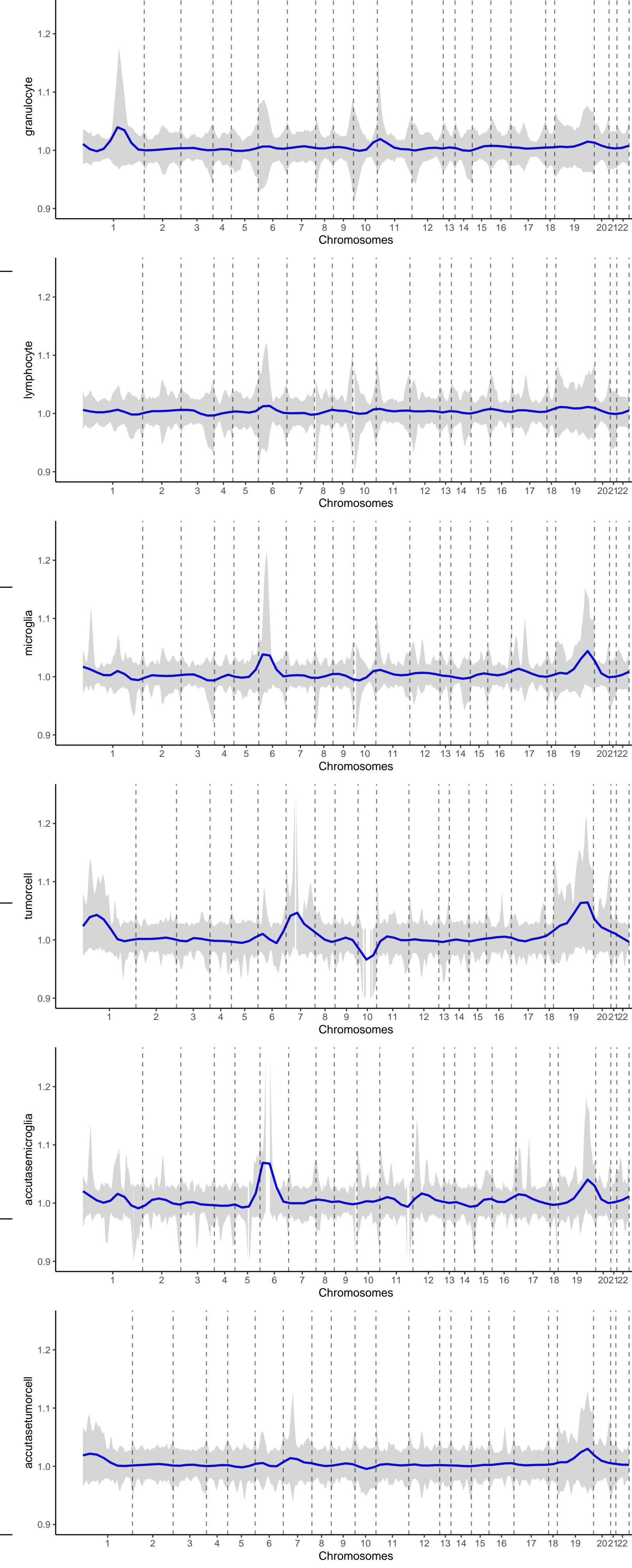


E Spatial data

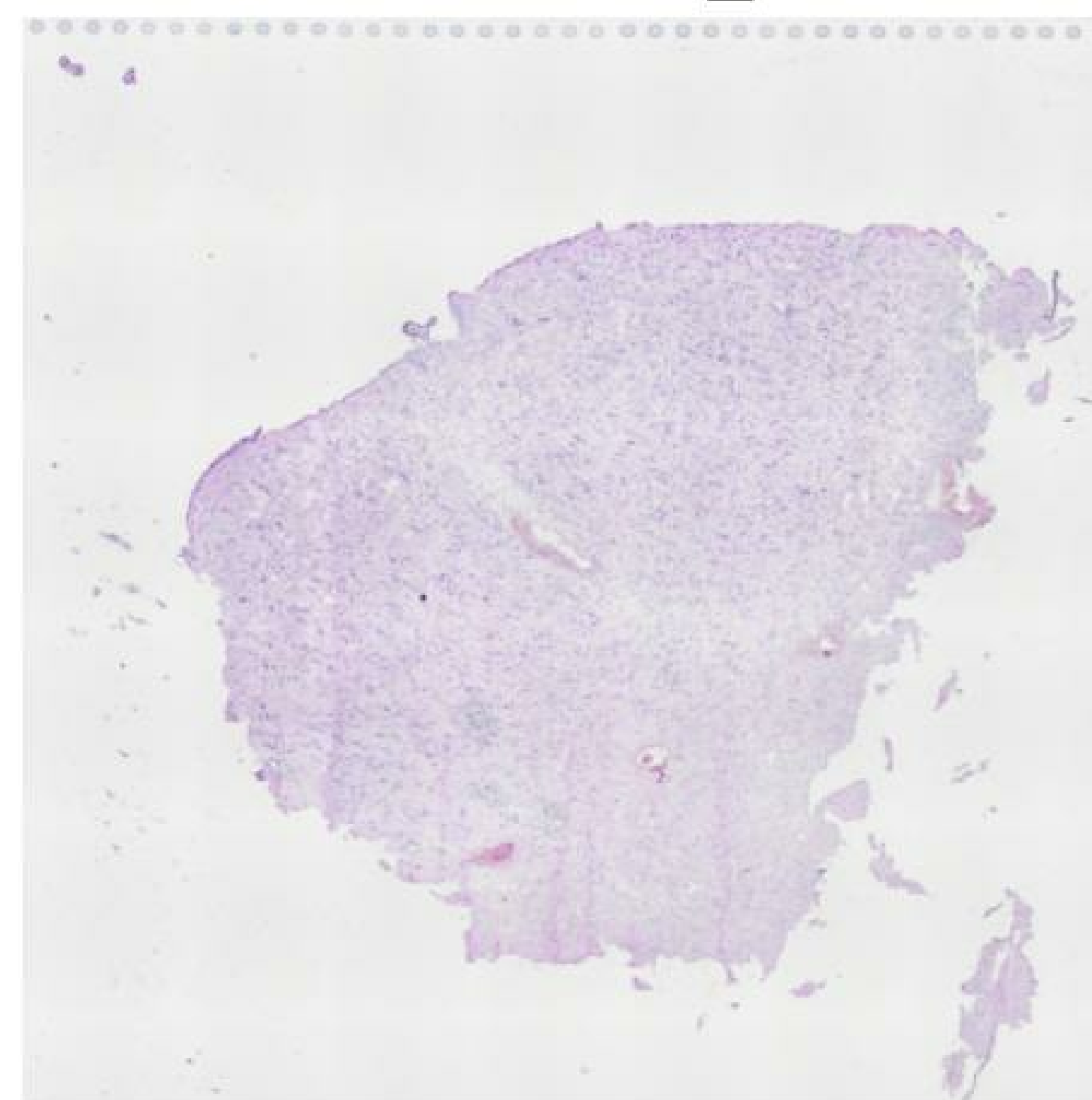


Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

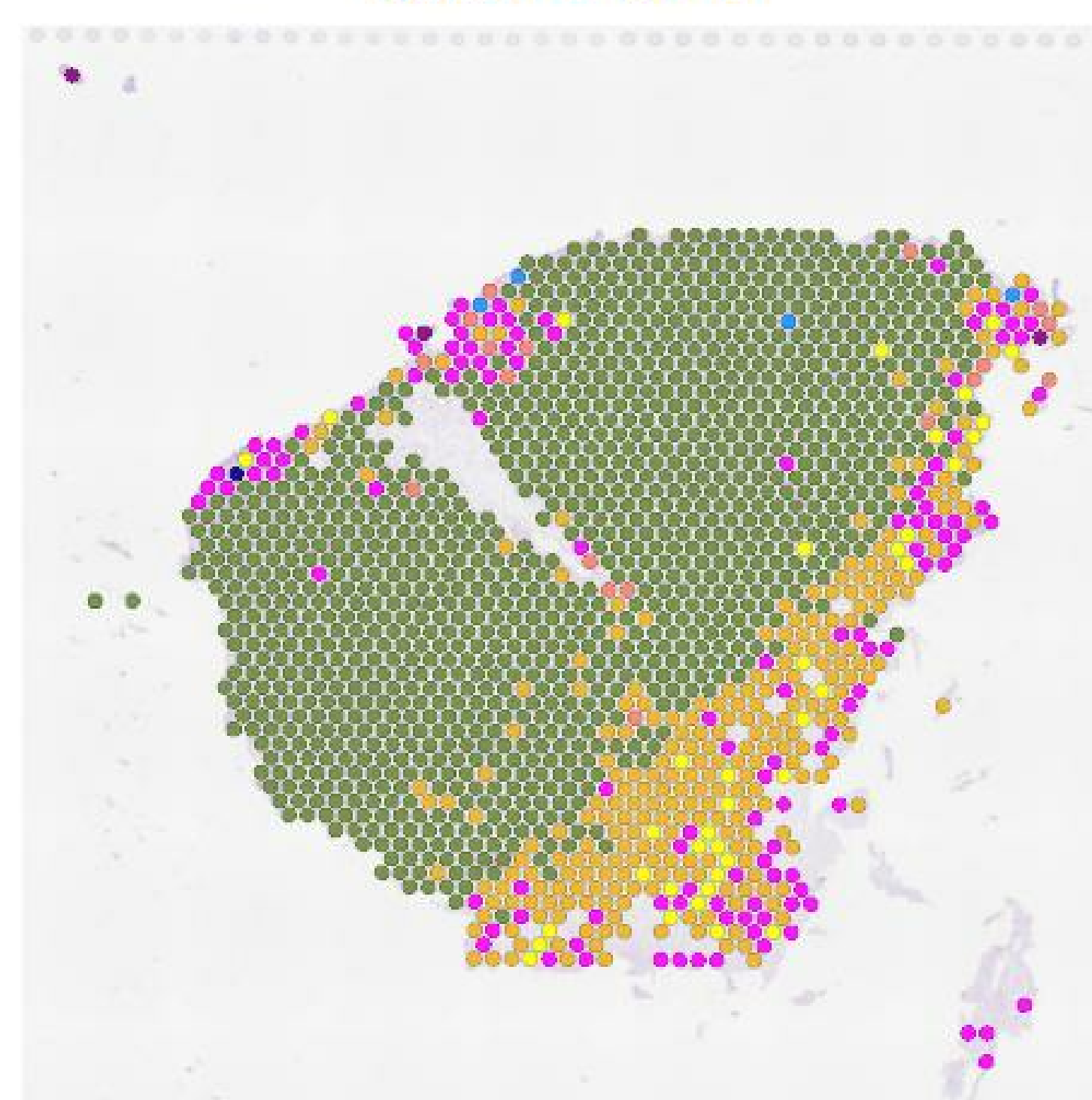
F single-cell data



A SNU21Bfrozen_GBM

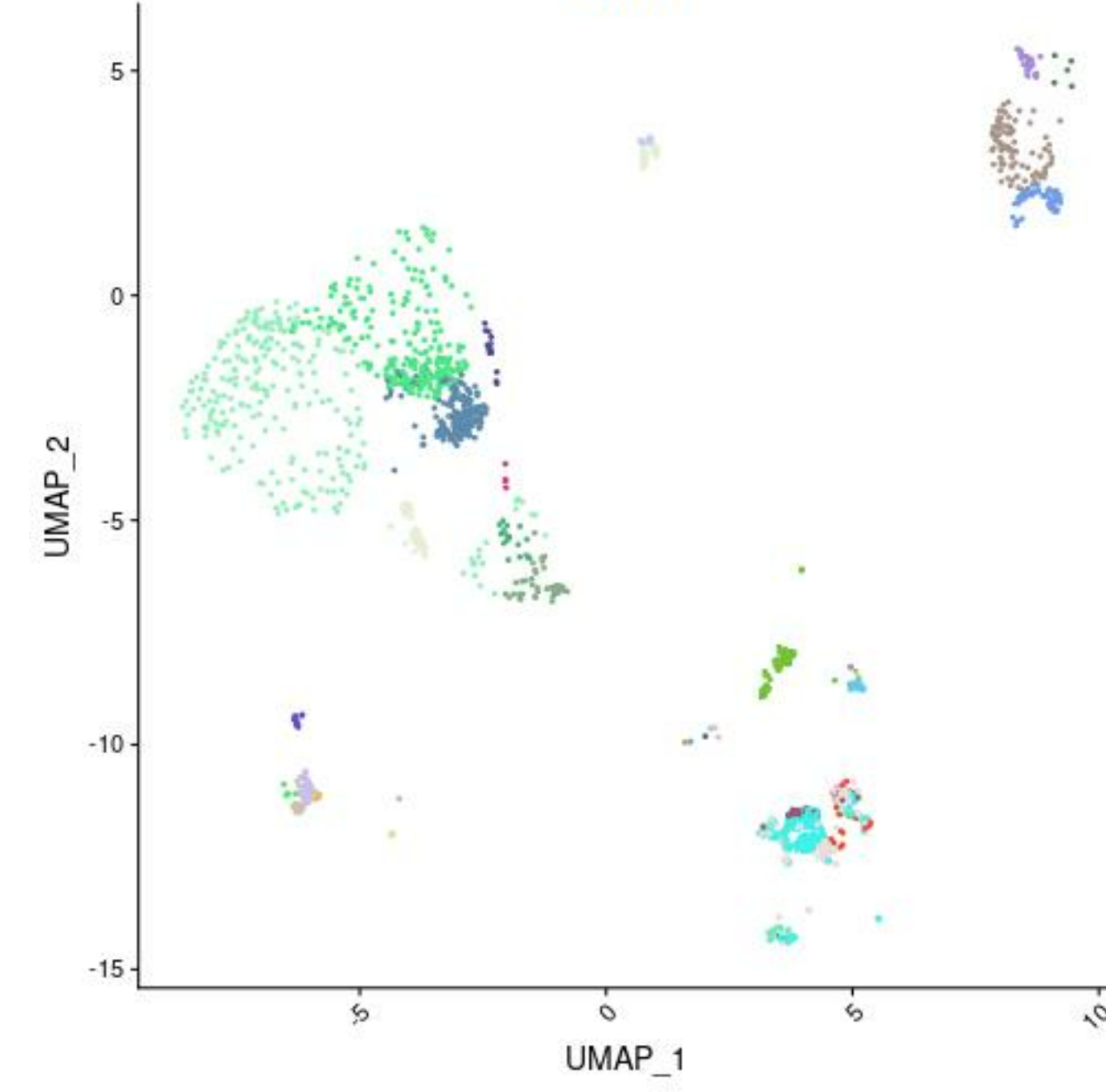


slide 4 of 6

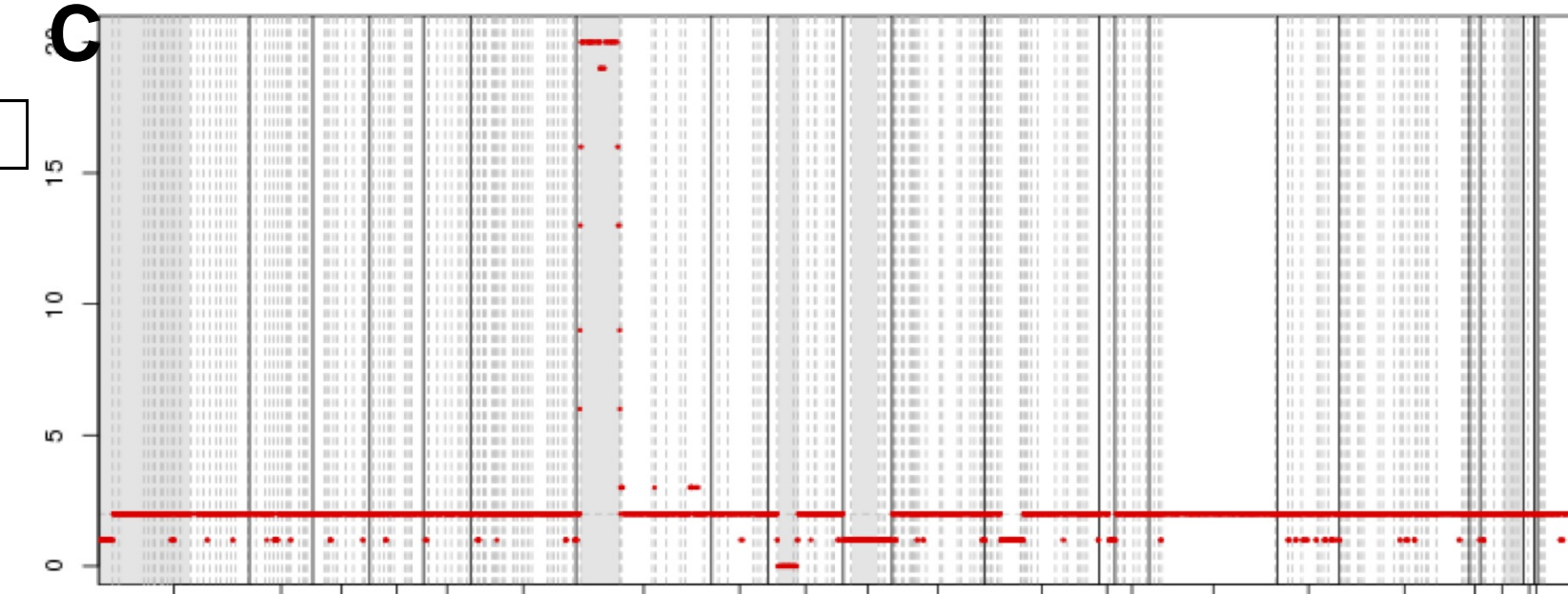
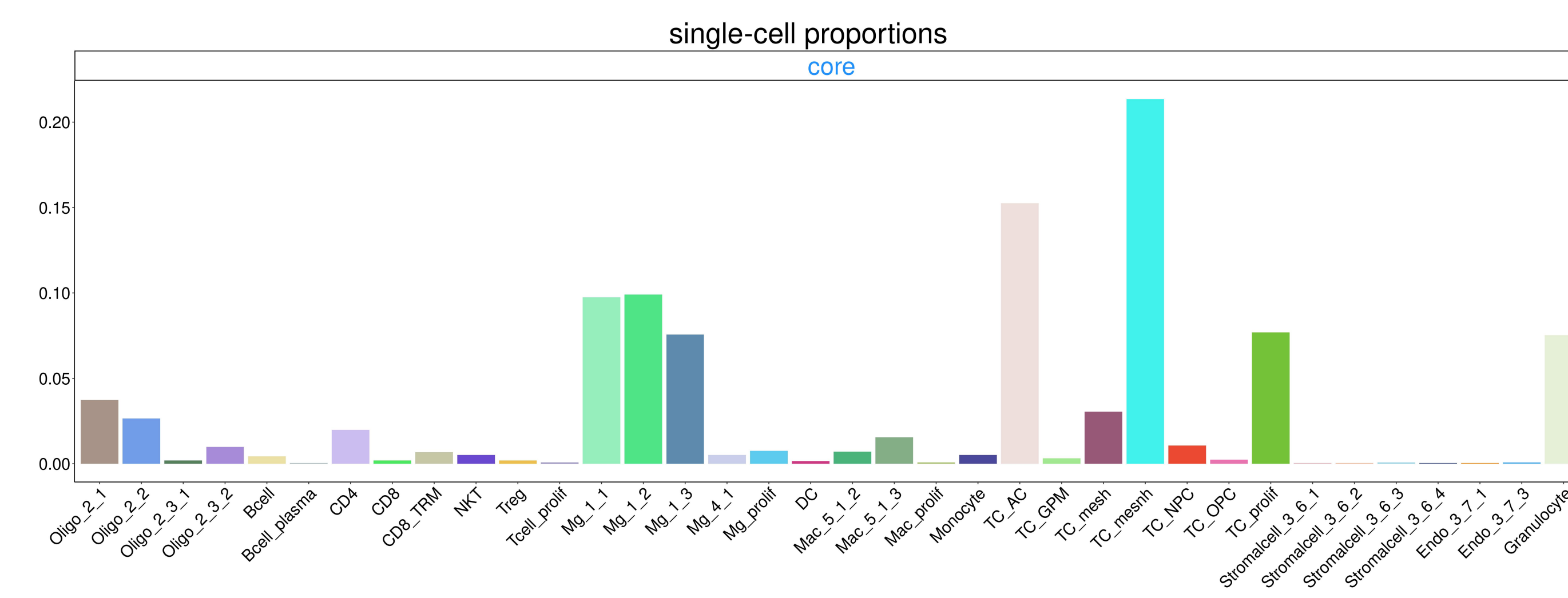
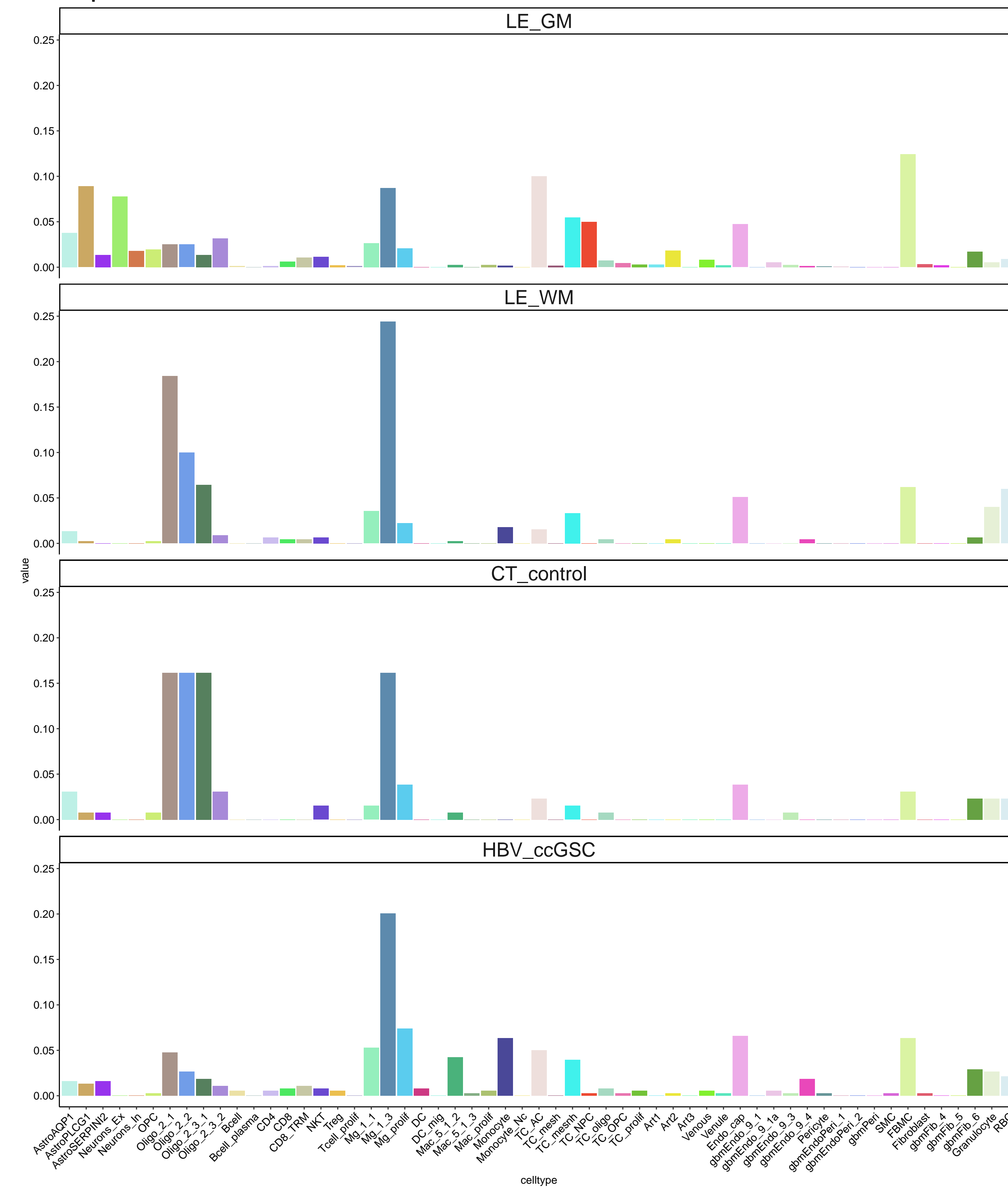


B #cells 2524 single-cell cite-seq SNU21

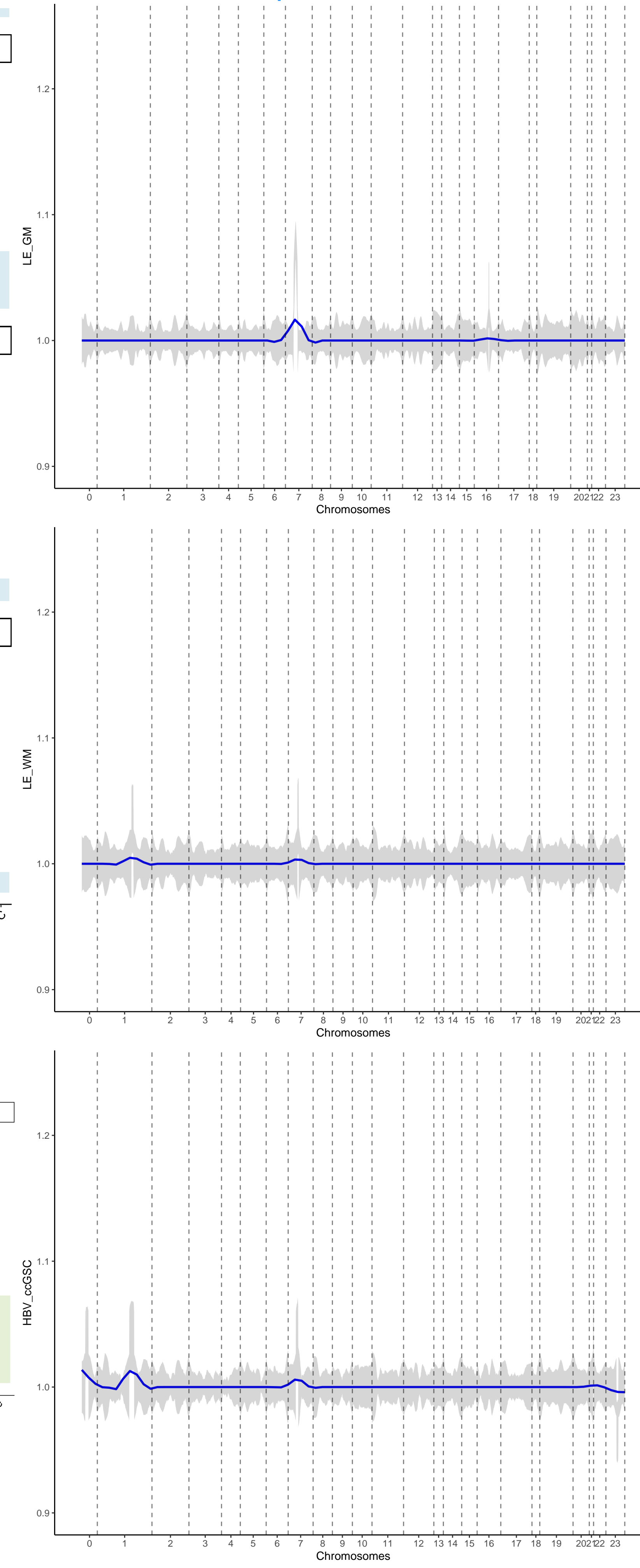
core



#spots 1572

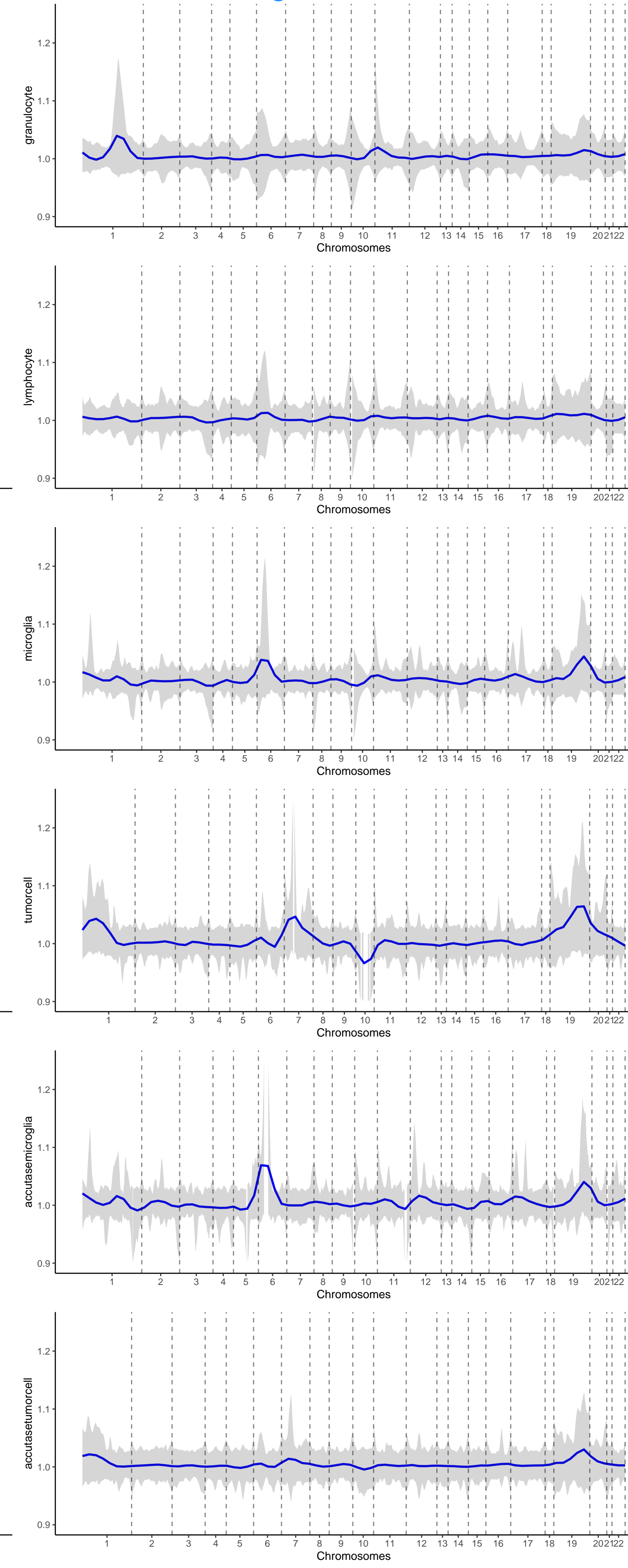


E Spatial data

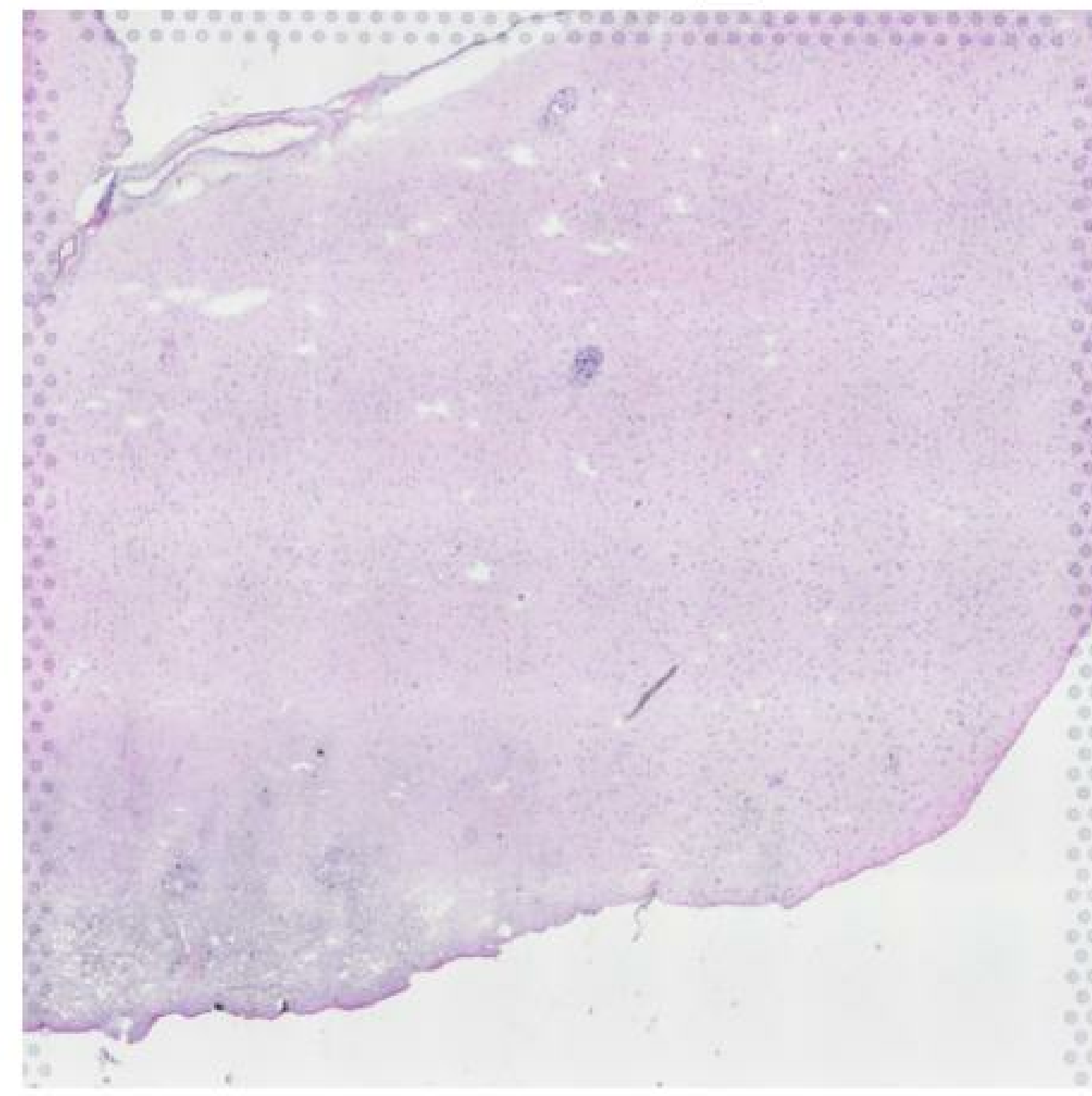


Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI deletion	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C28T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

F single-cell data



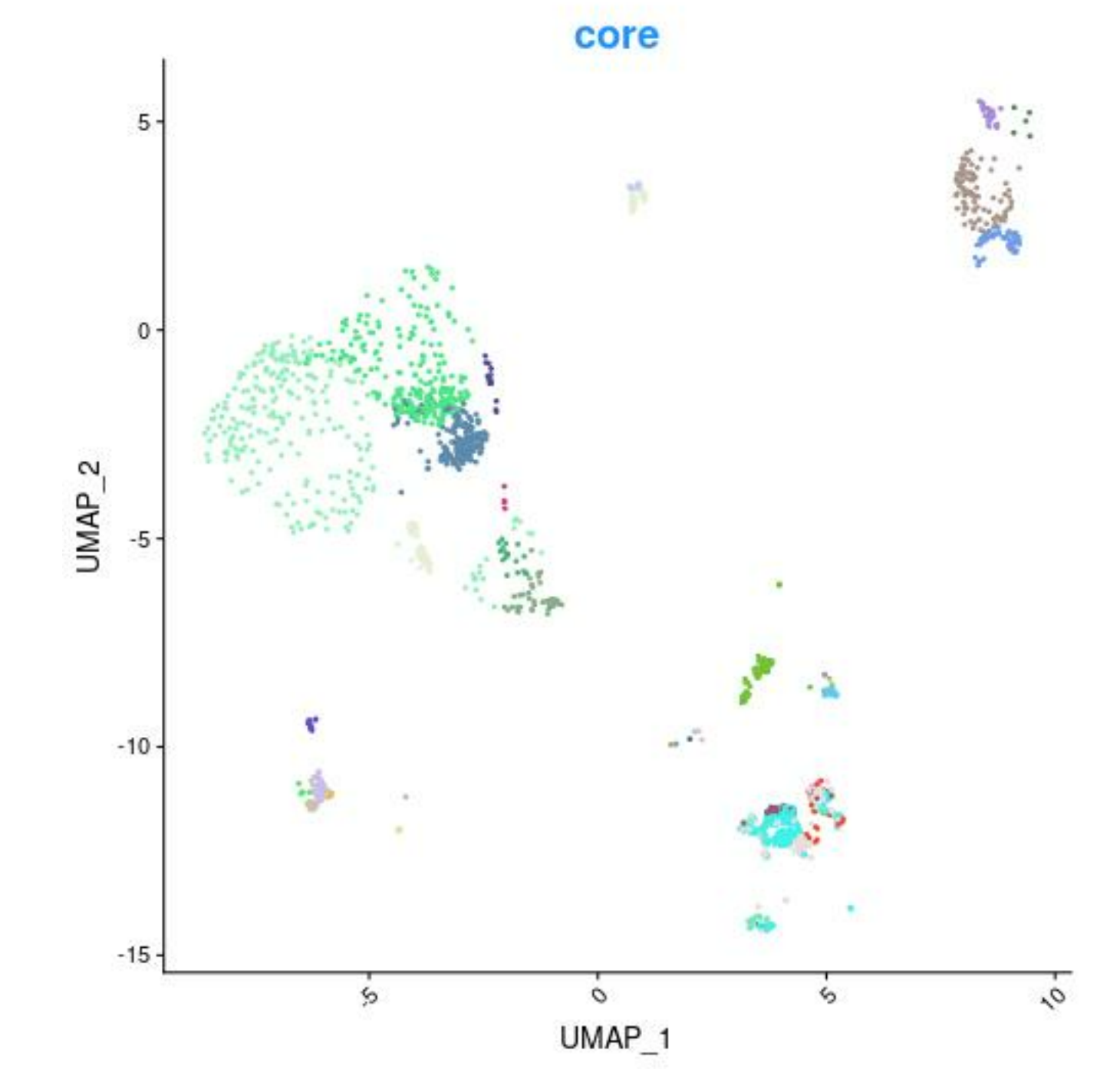
A SNU21Cfrozen_GBM



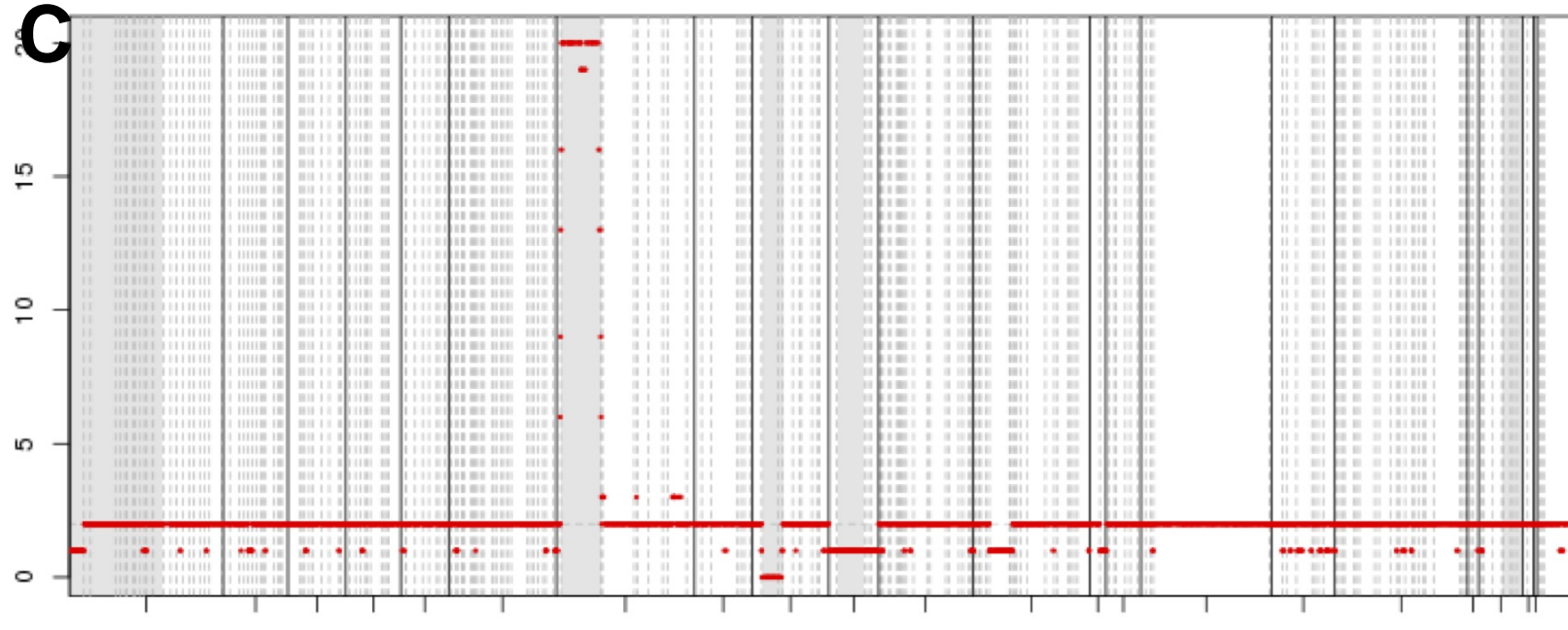
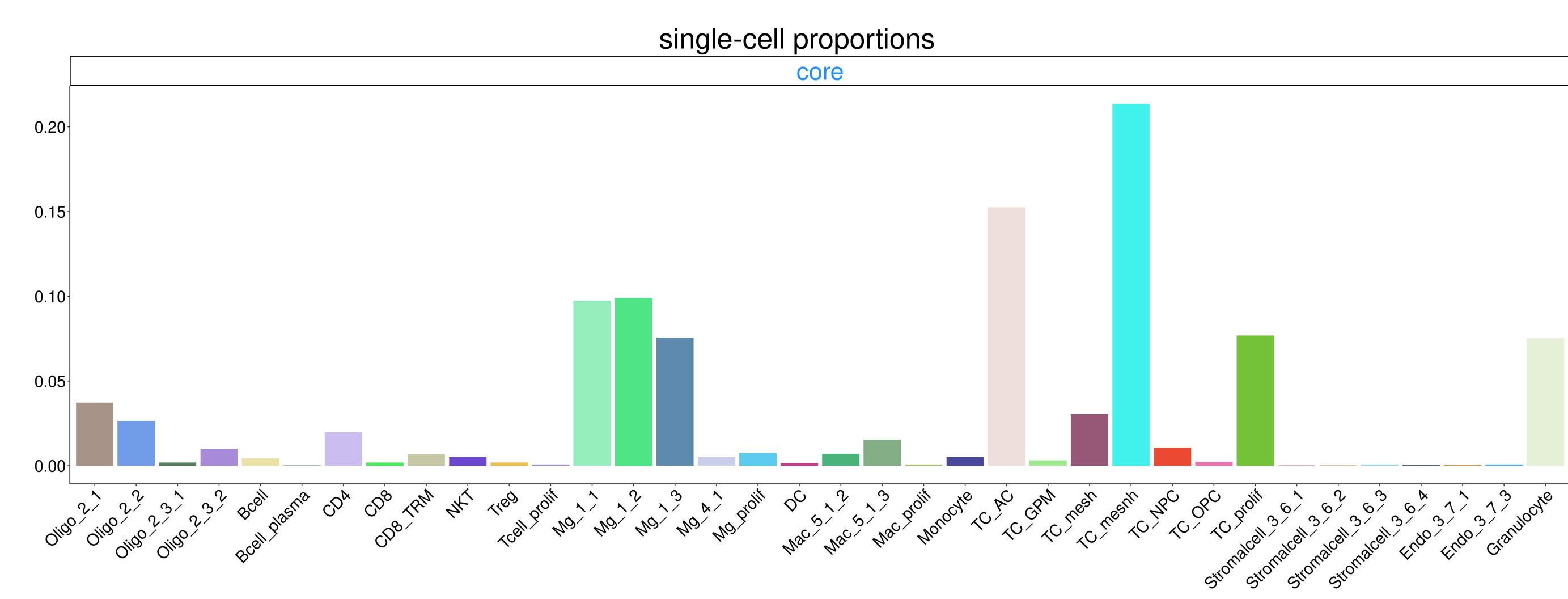
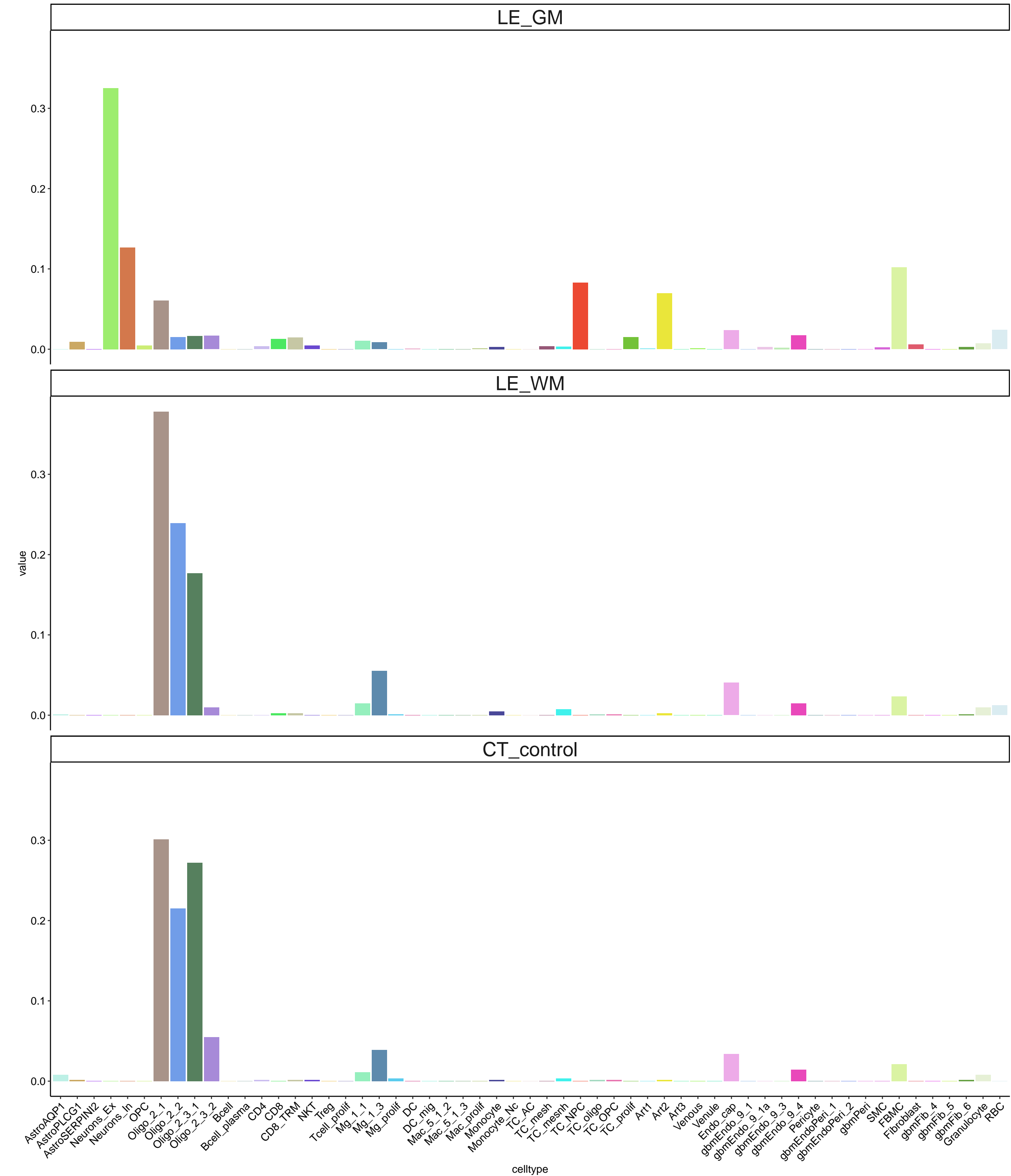
slide 5 of 6



B #cells 2524 single-cell cite-seq SNU21

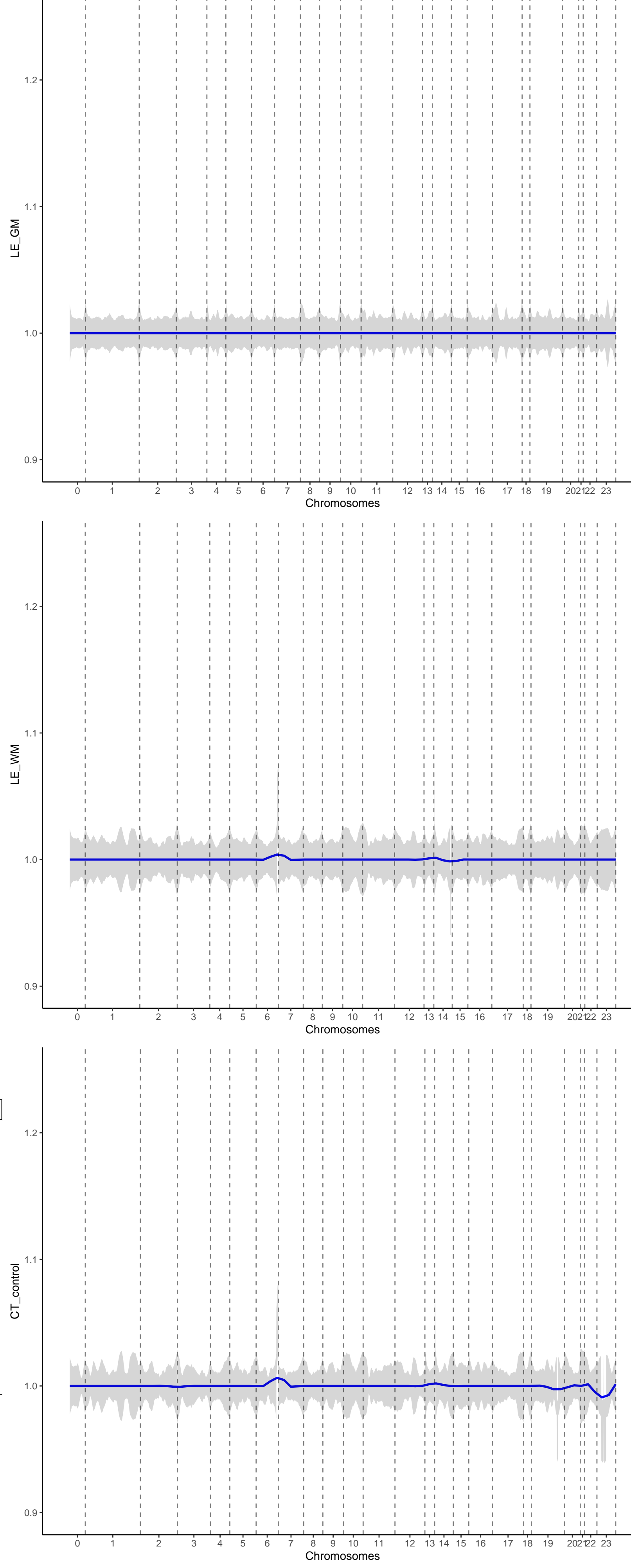


#spots 3804

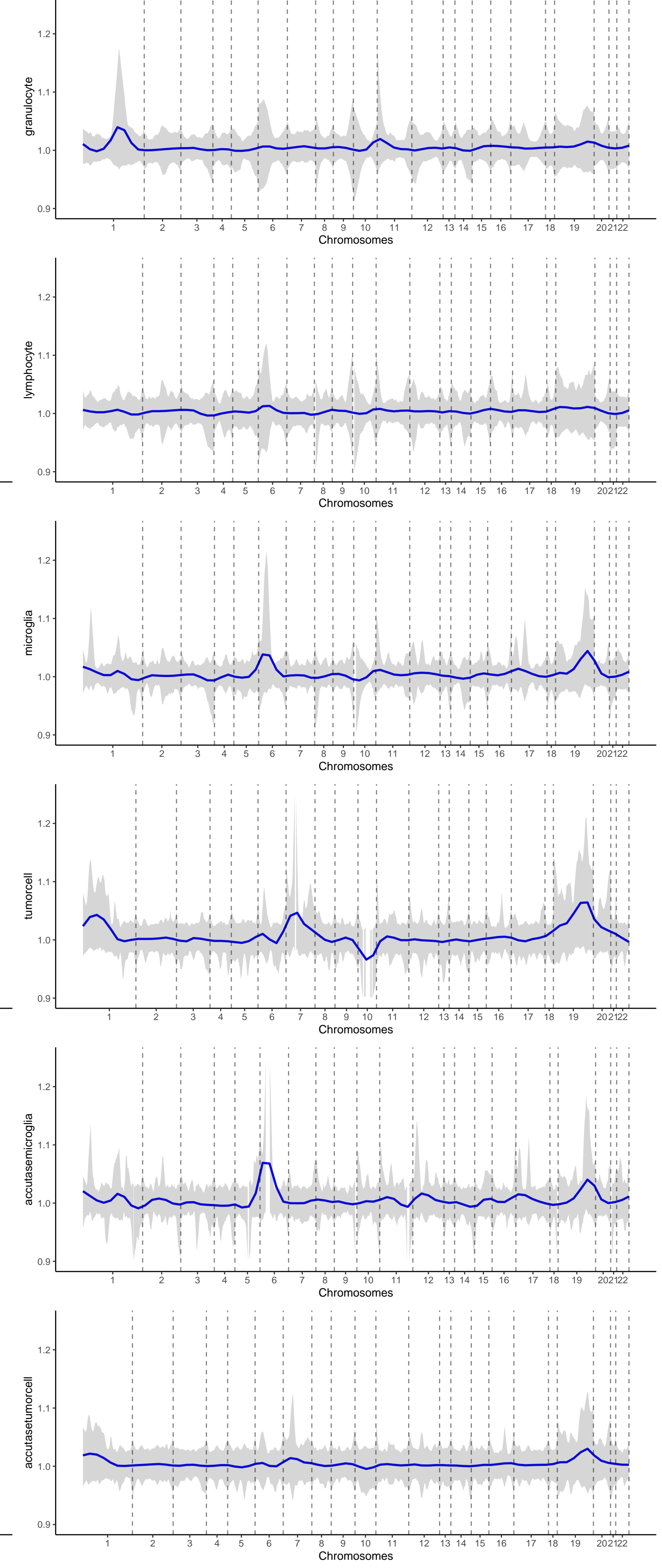


Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

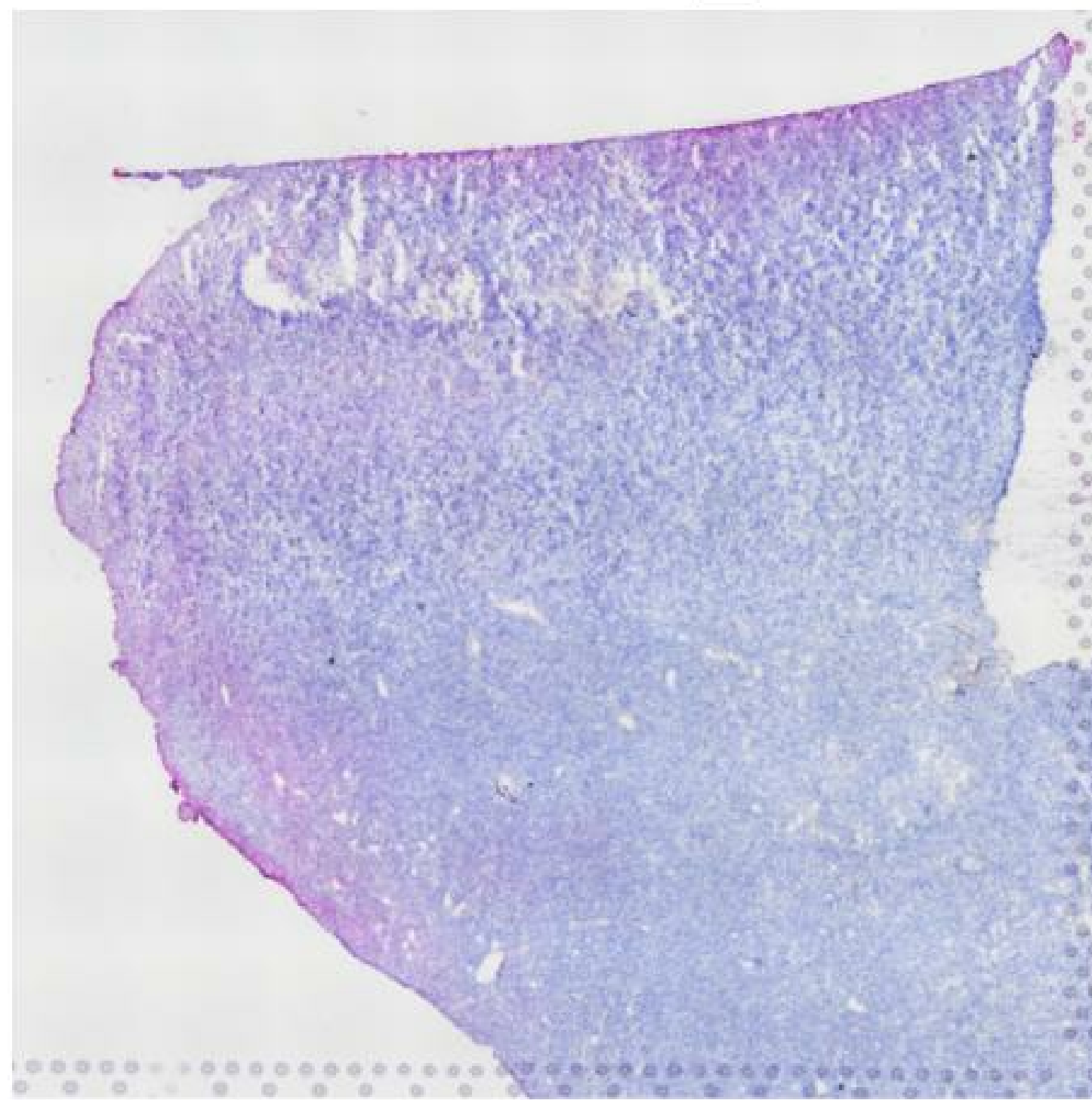
E Spatial data



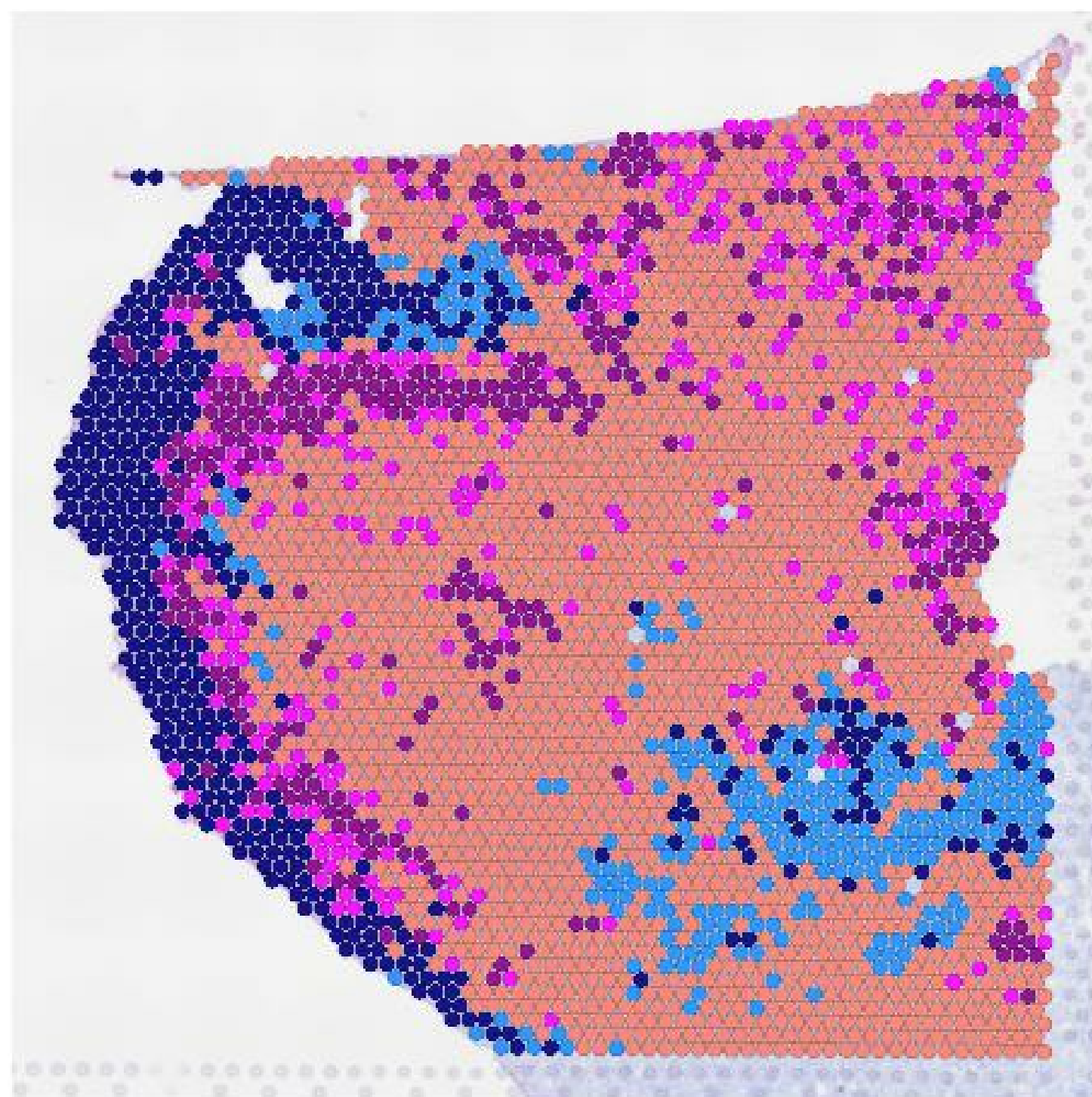
F single-cell data



SNU21Dfrozen_GBM

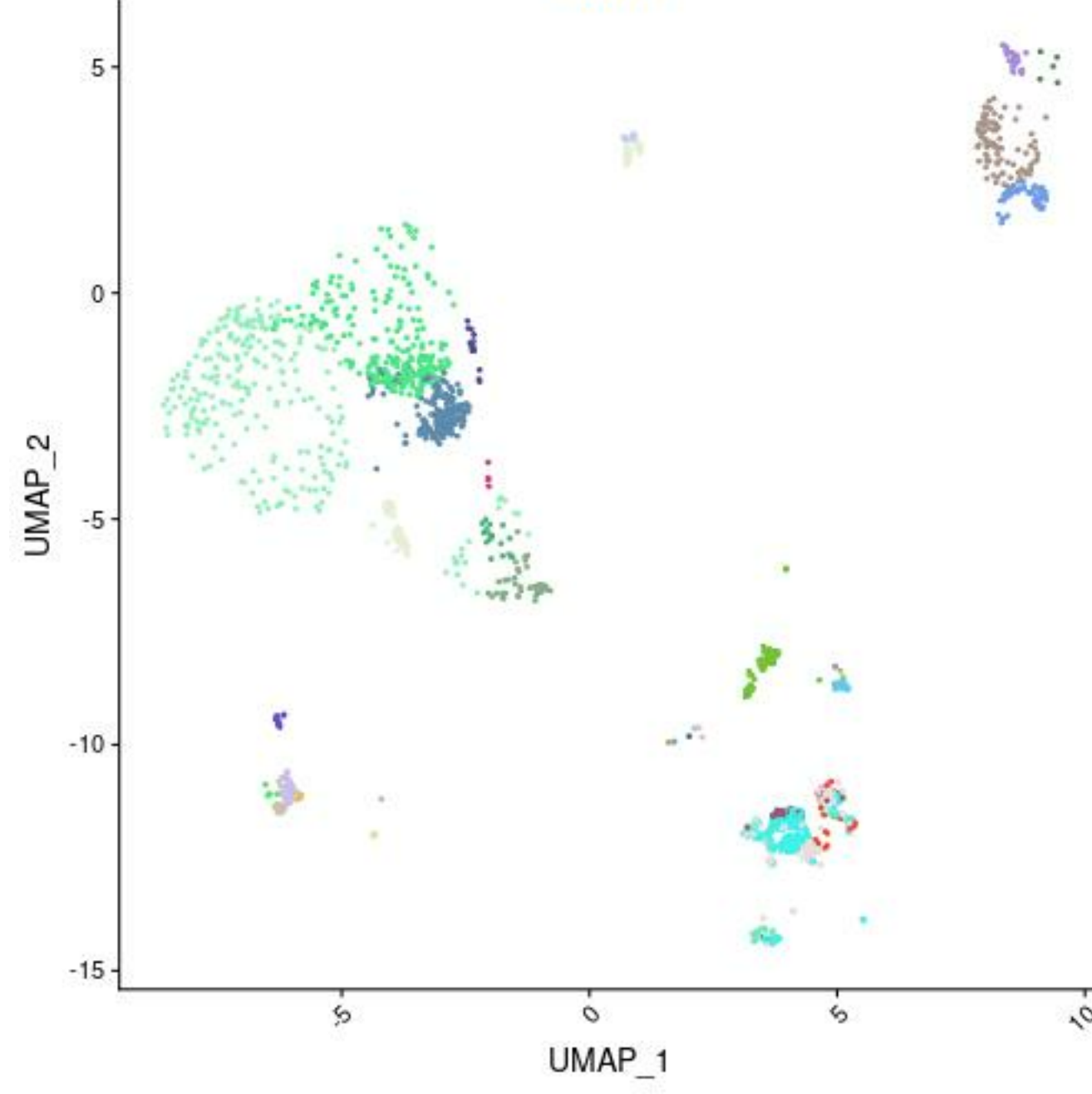


slide 6 of 6

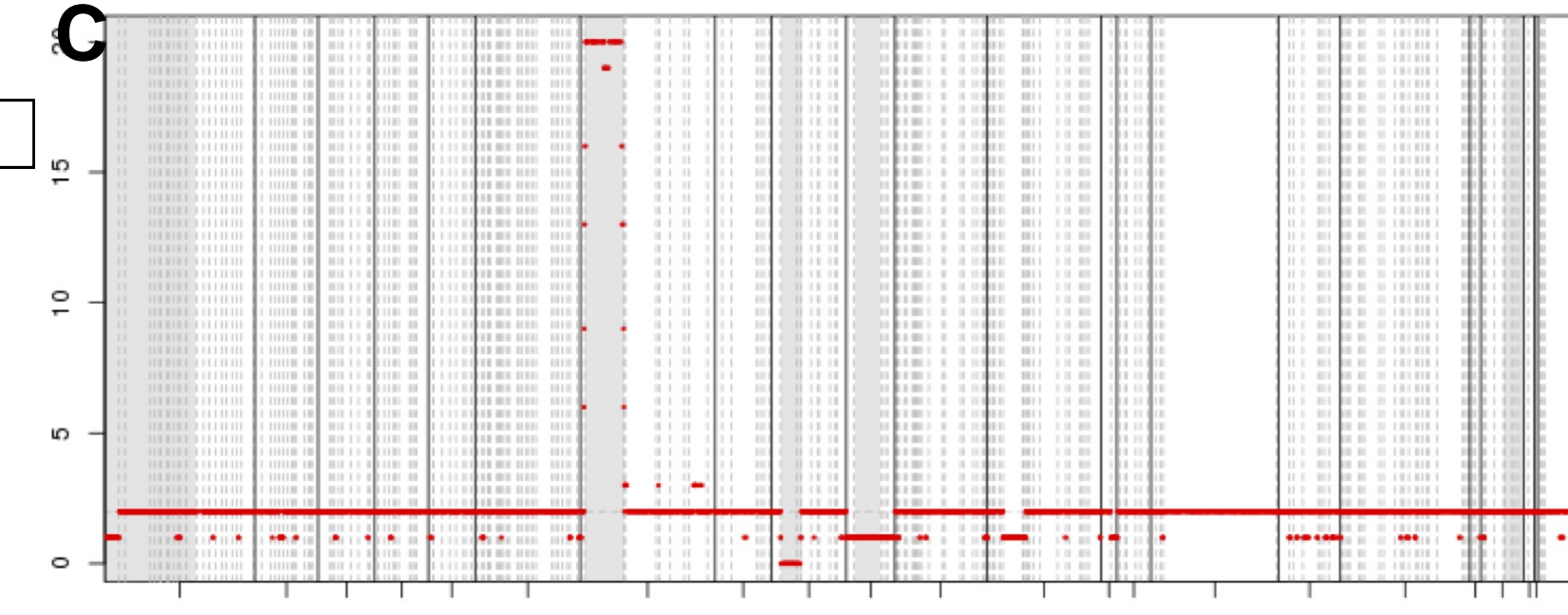
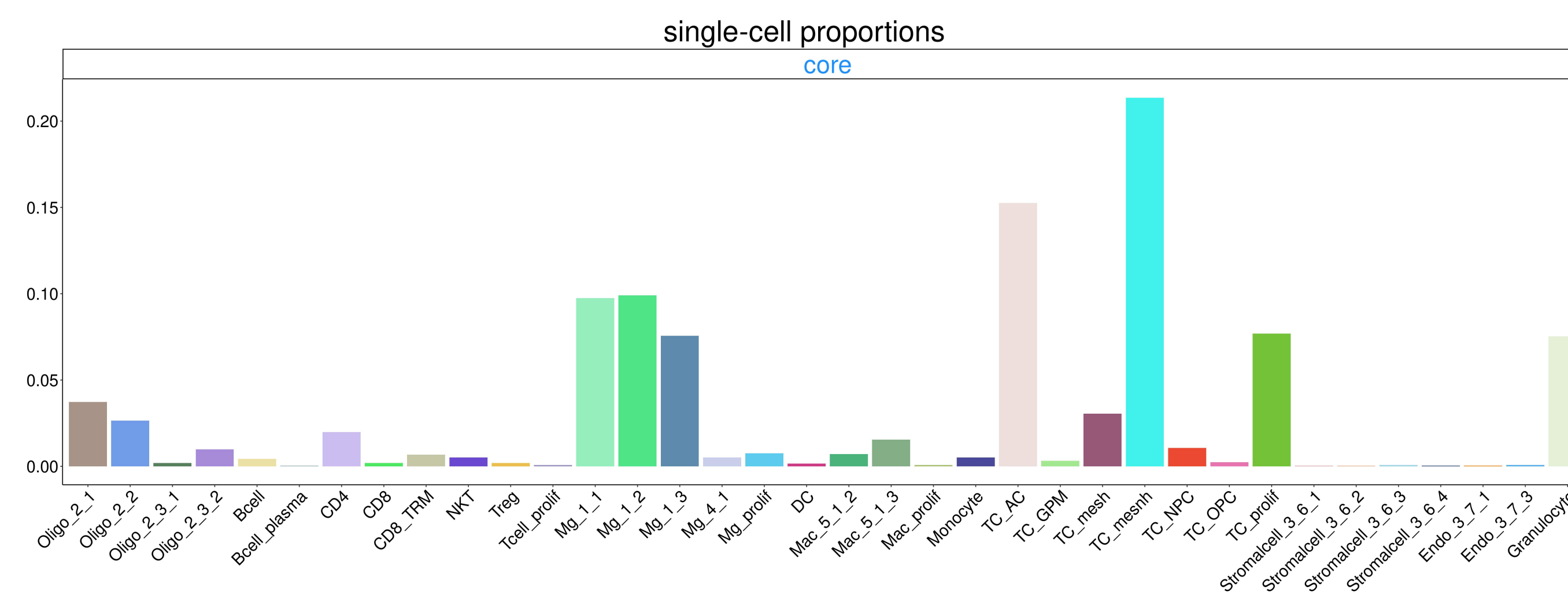
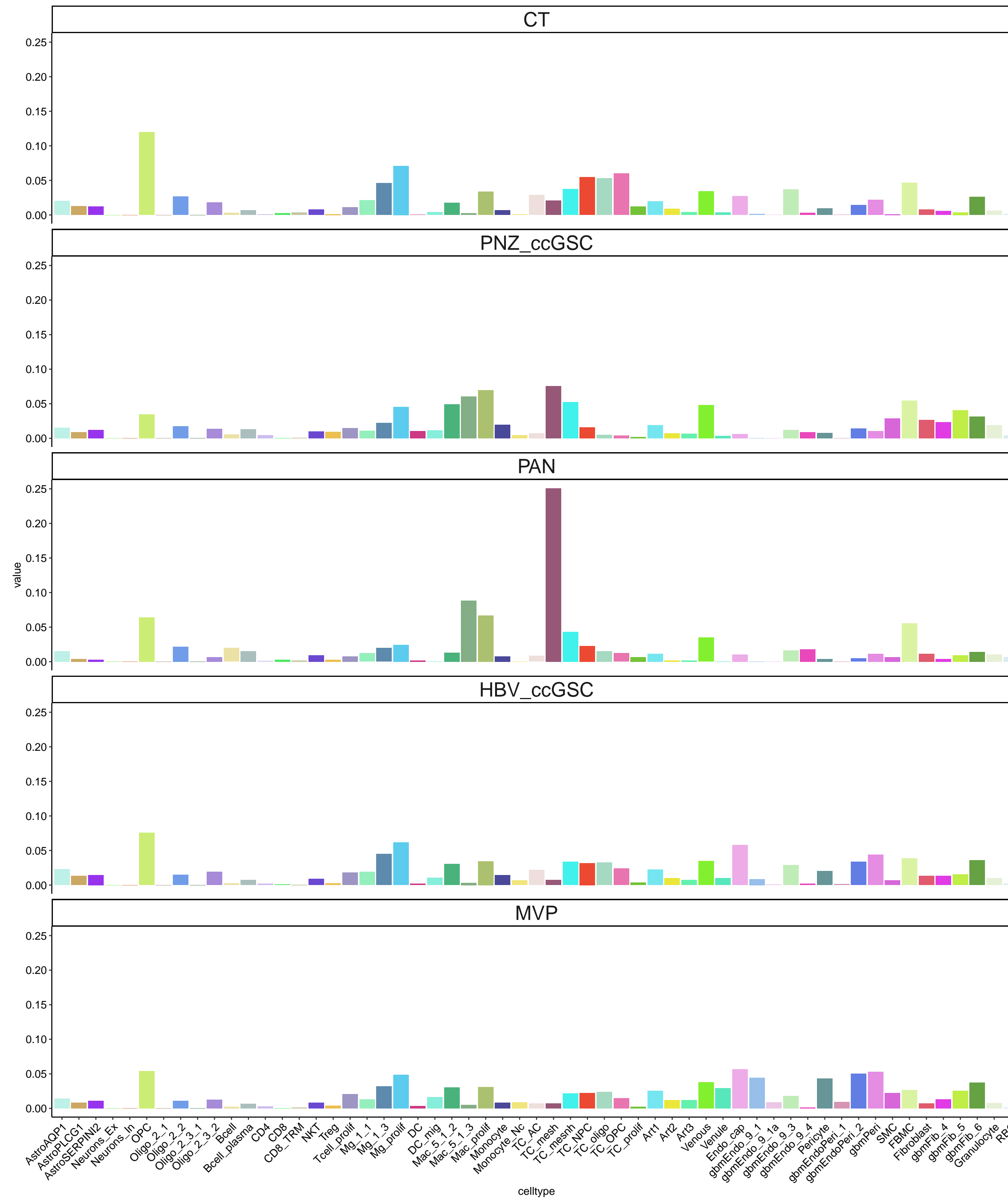


#cells 2524 single-cell cite-seq
SNU21

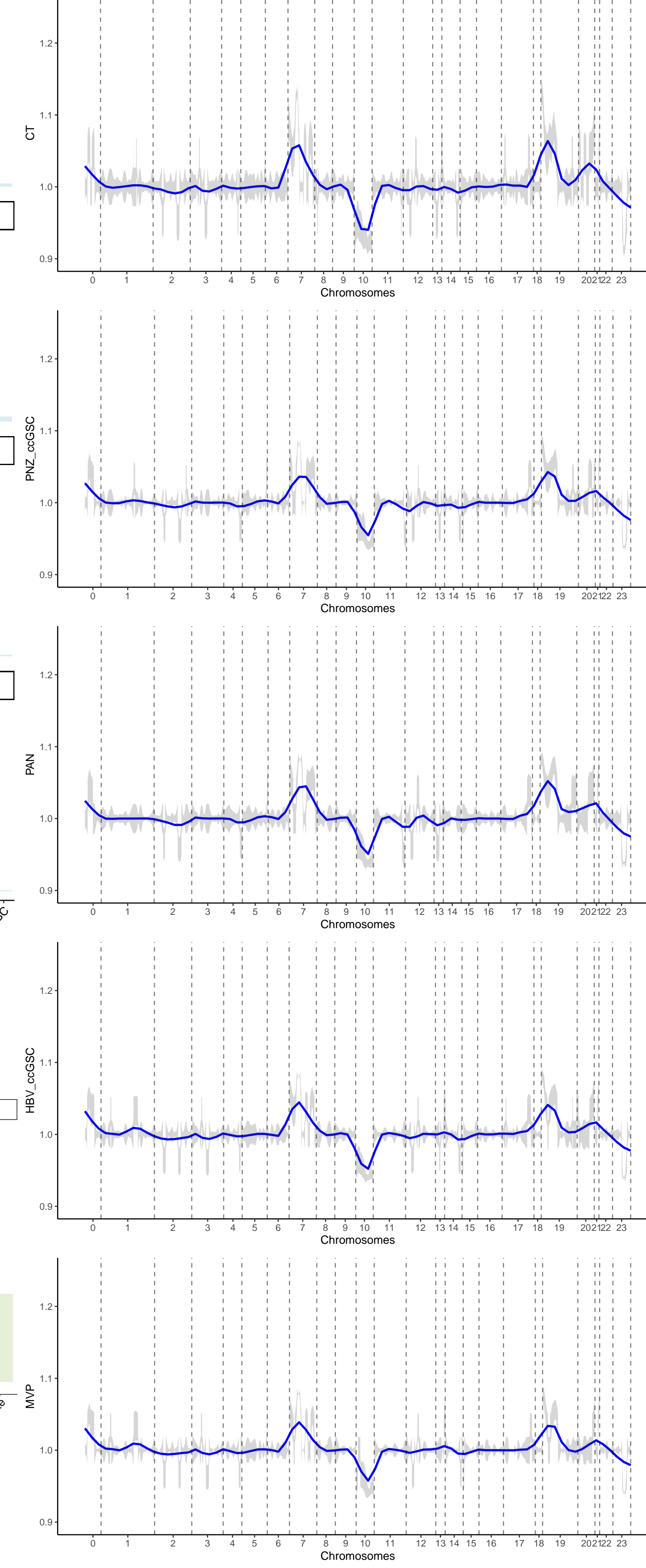
core



#spots 3467

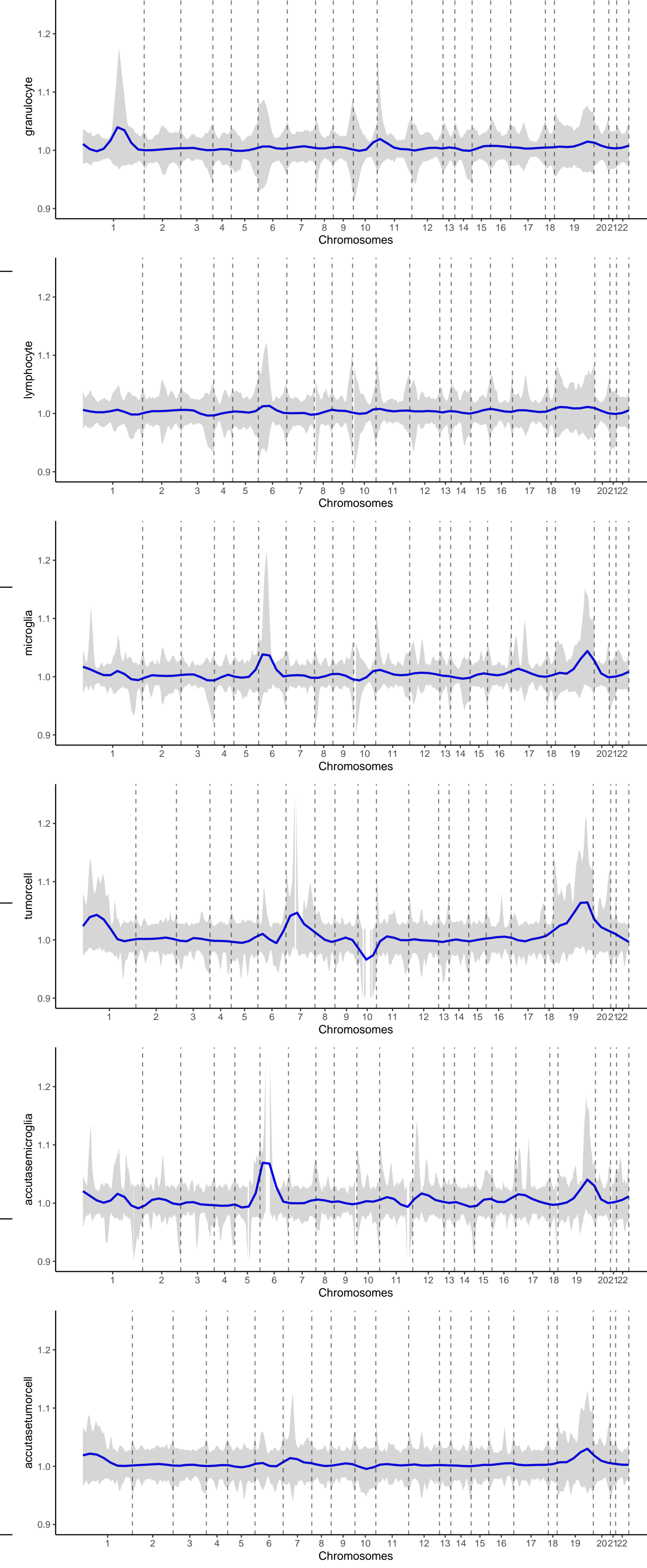


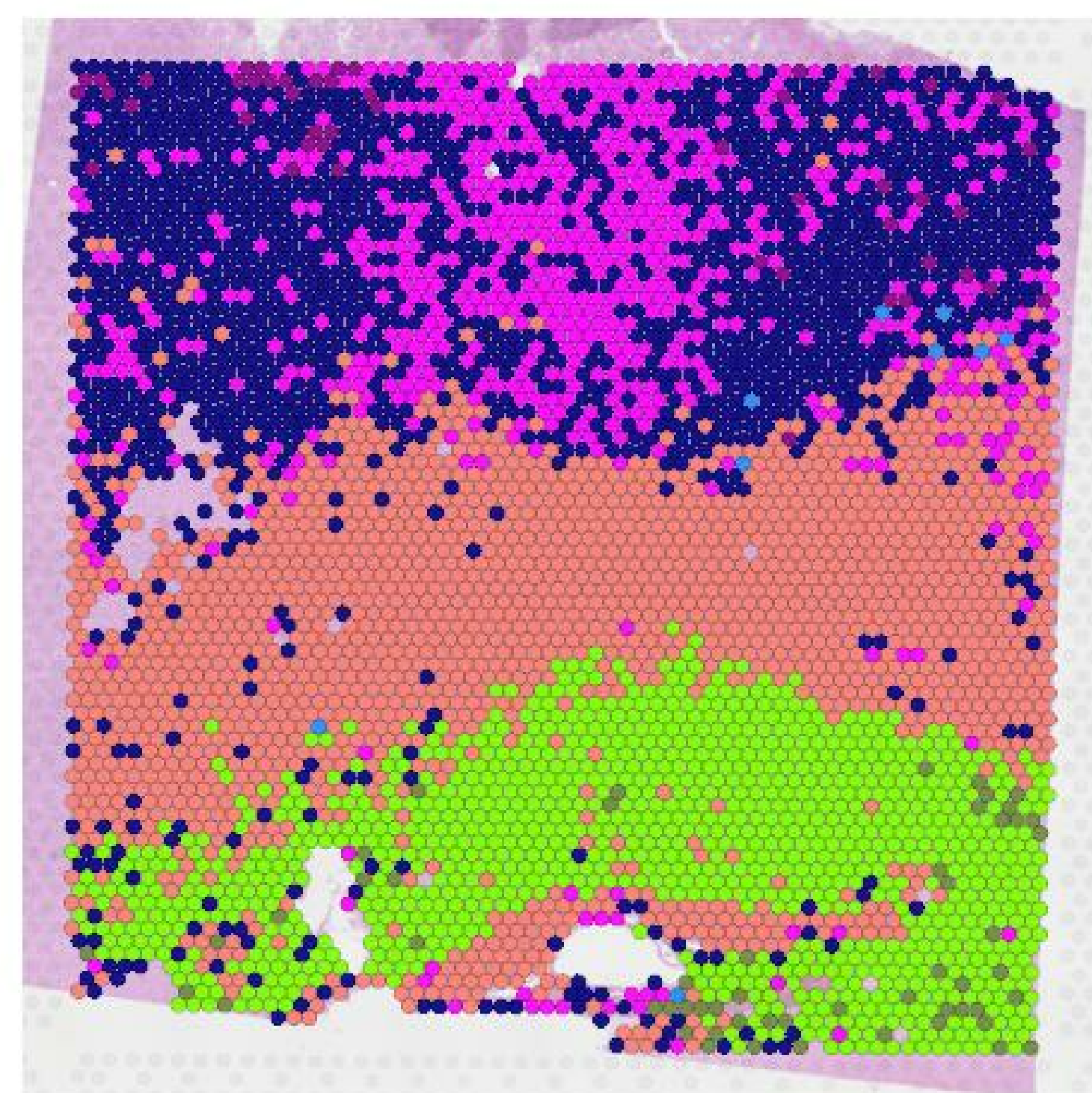
Spatial data



Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI deletion	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

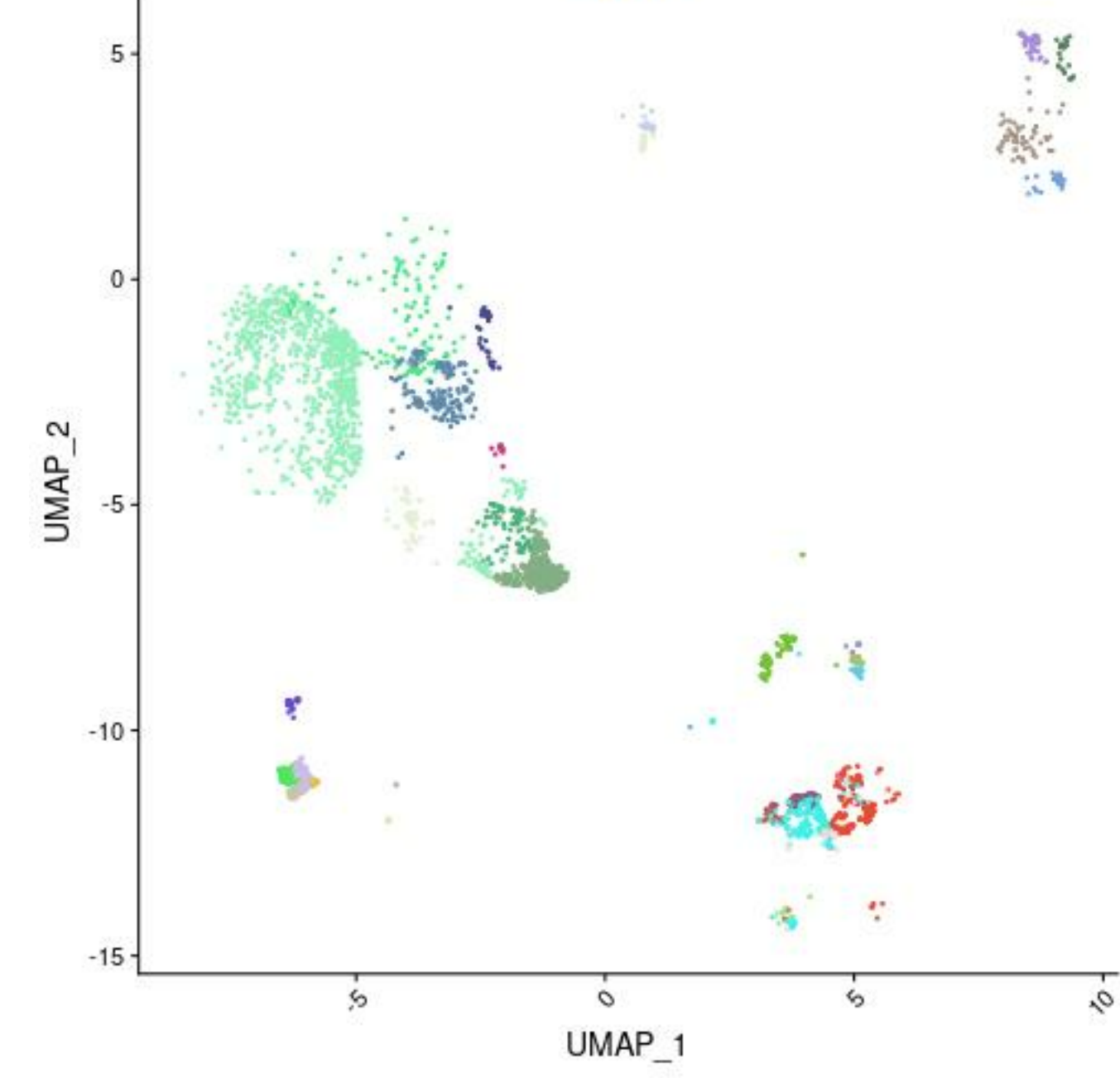
single-cell data



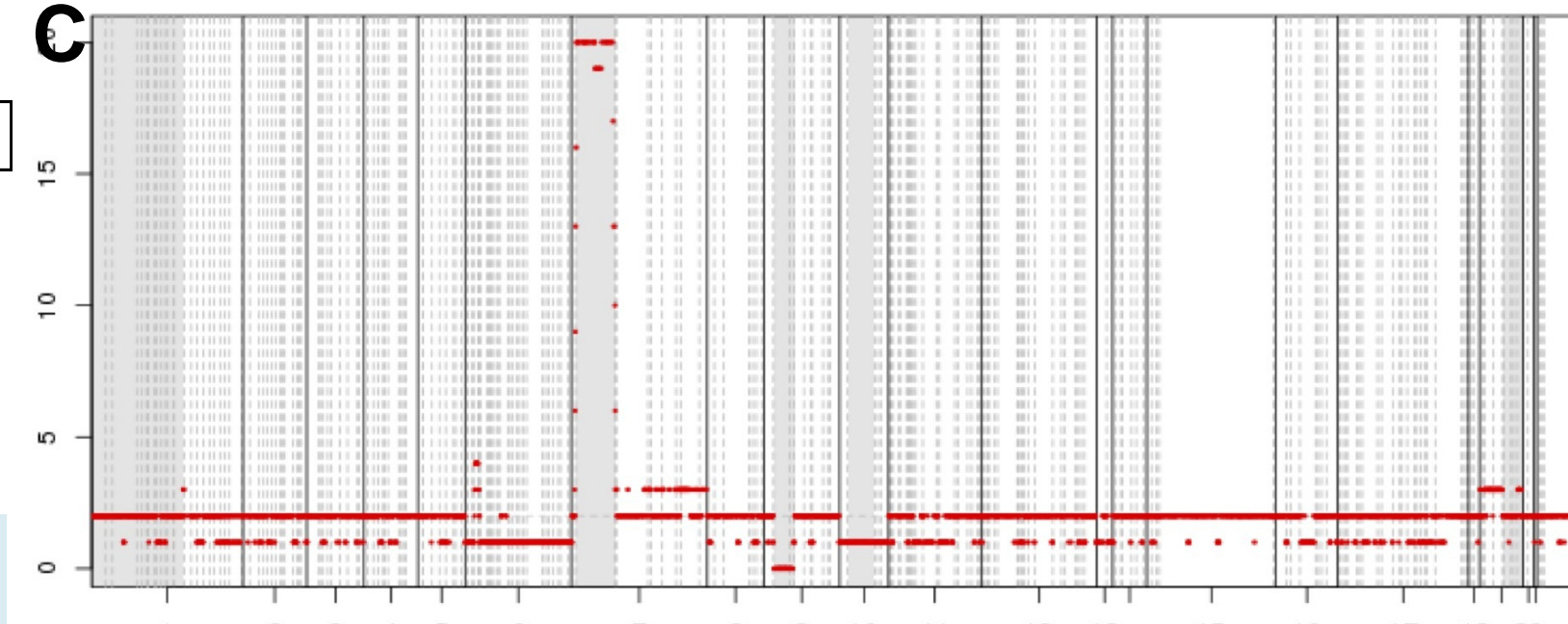
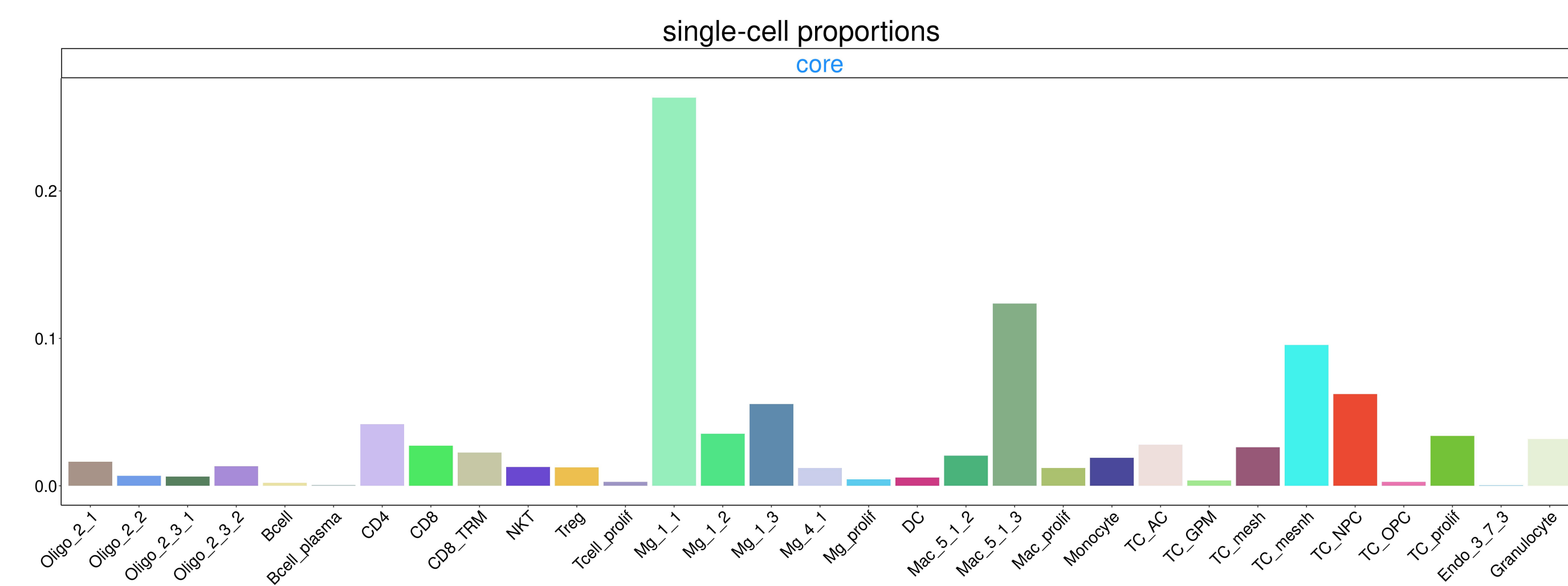
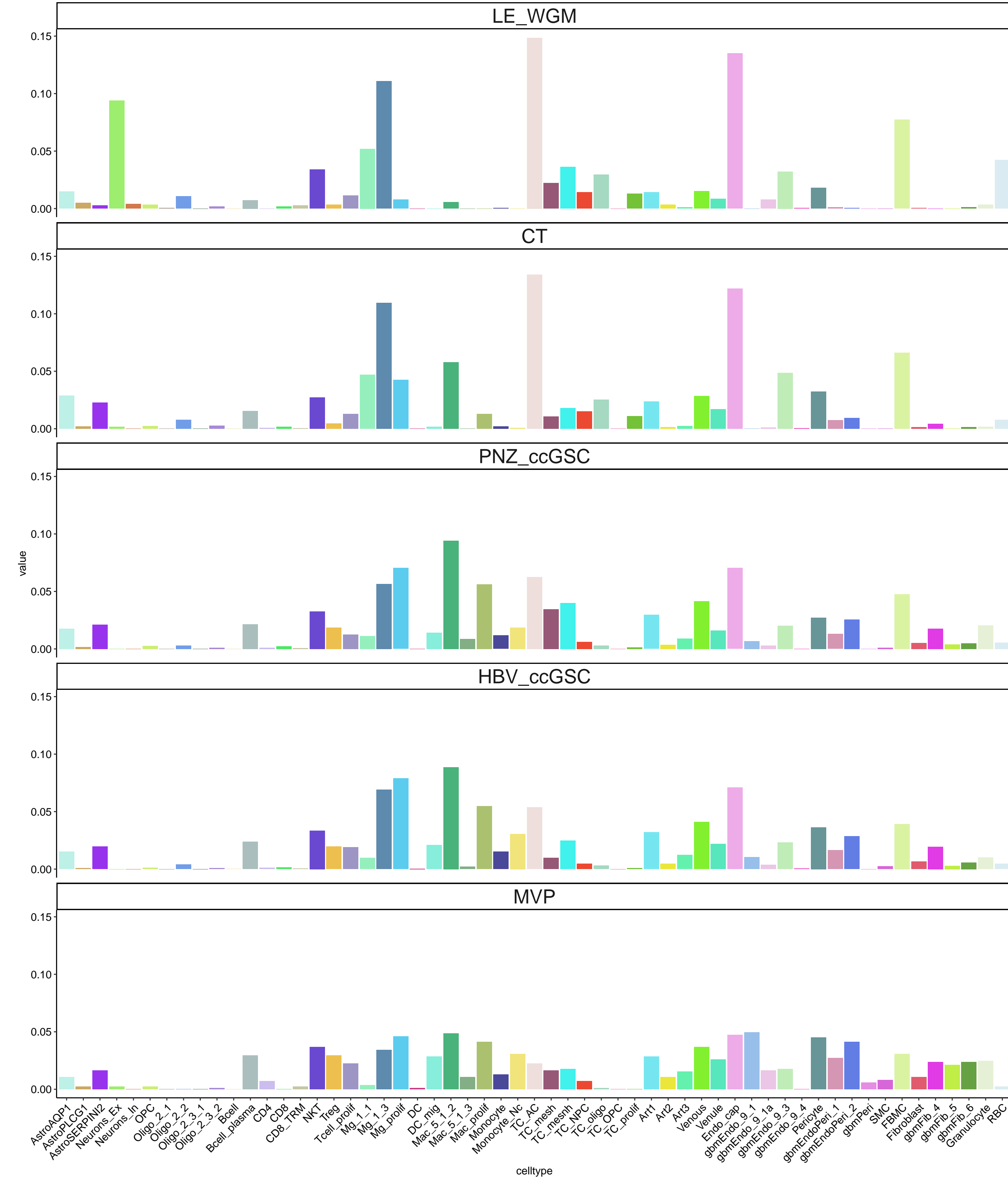


B #cells 3373 single-cell SNU43

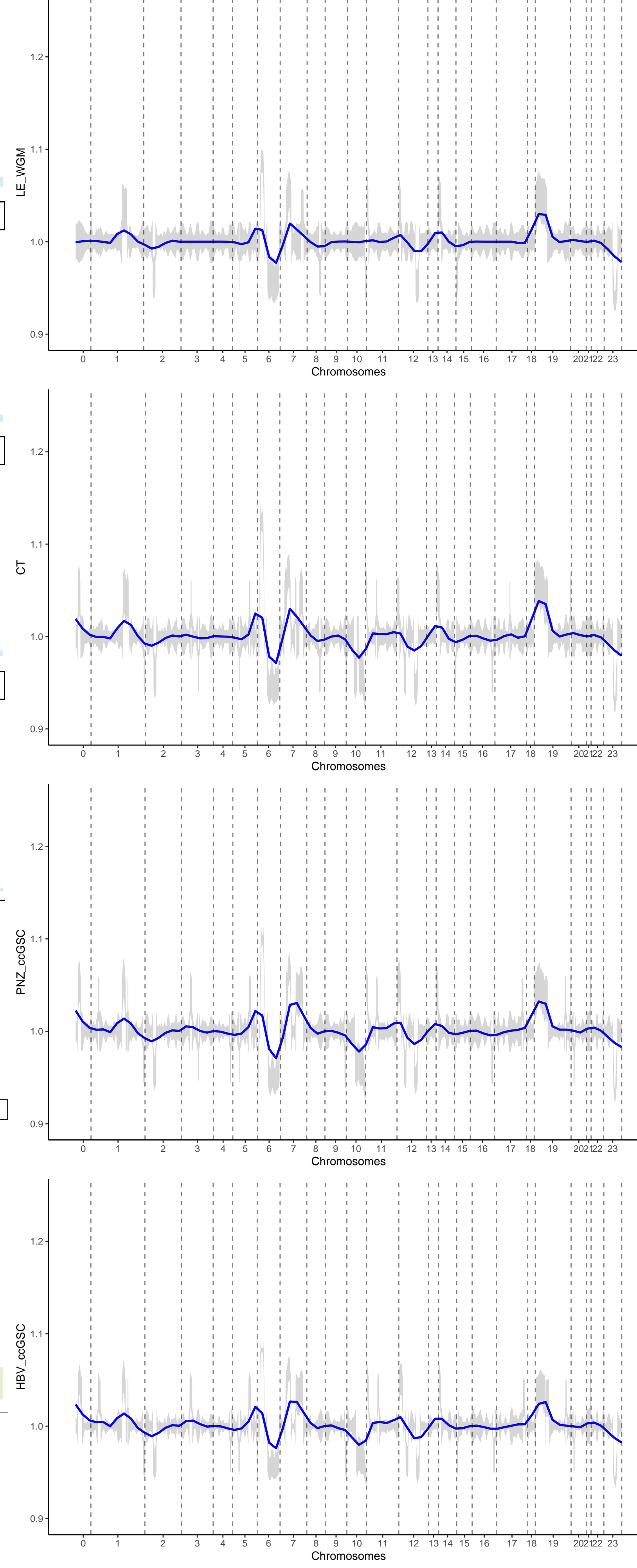
core



#spots 4701



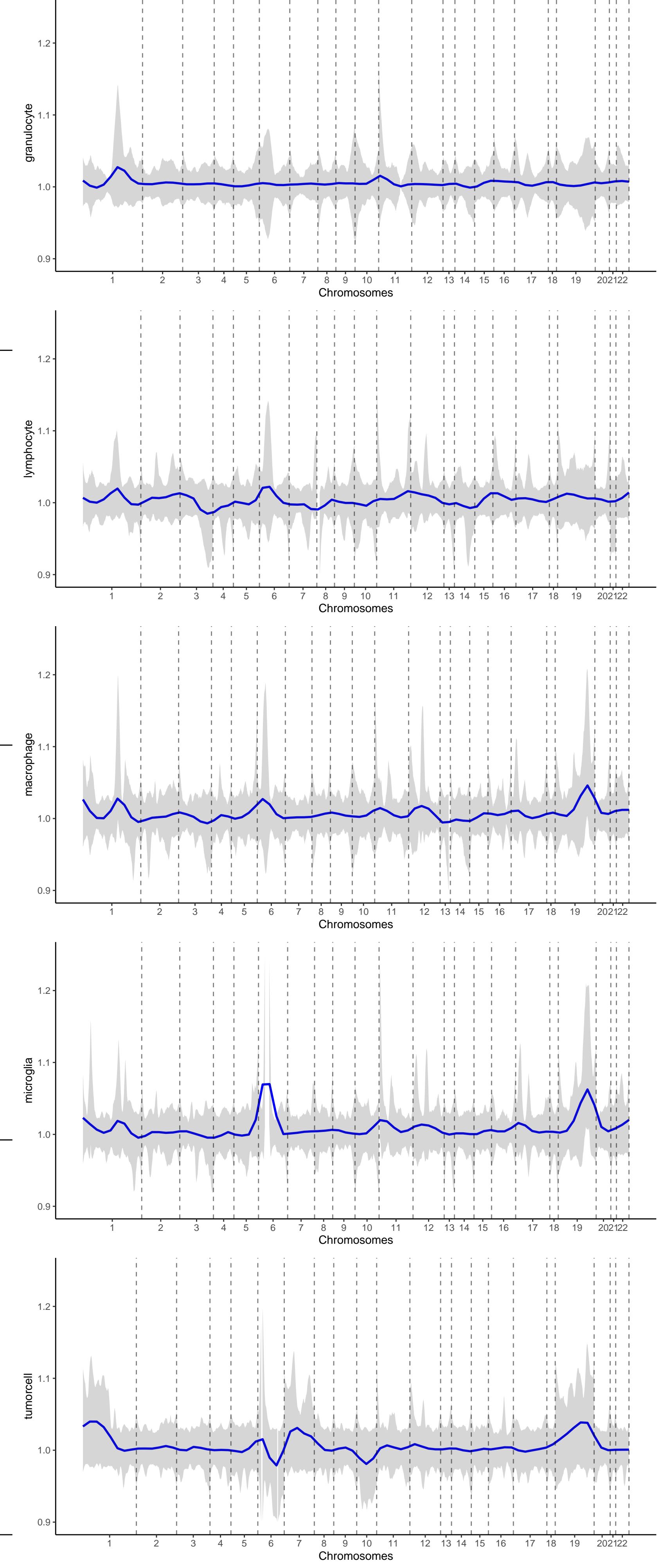
E Spatial data



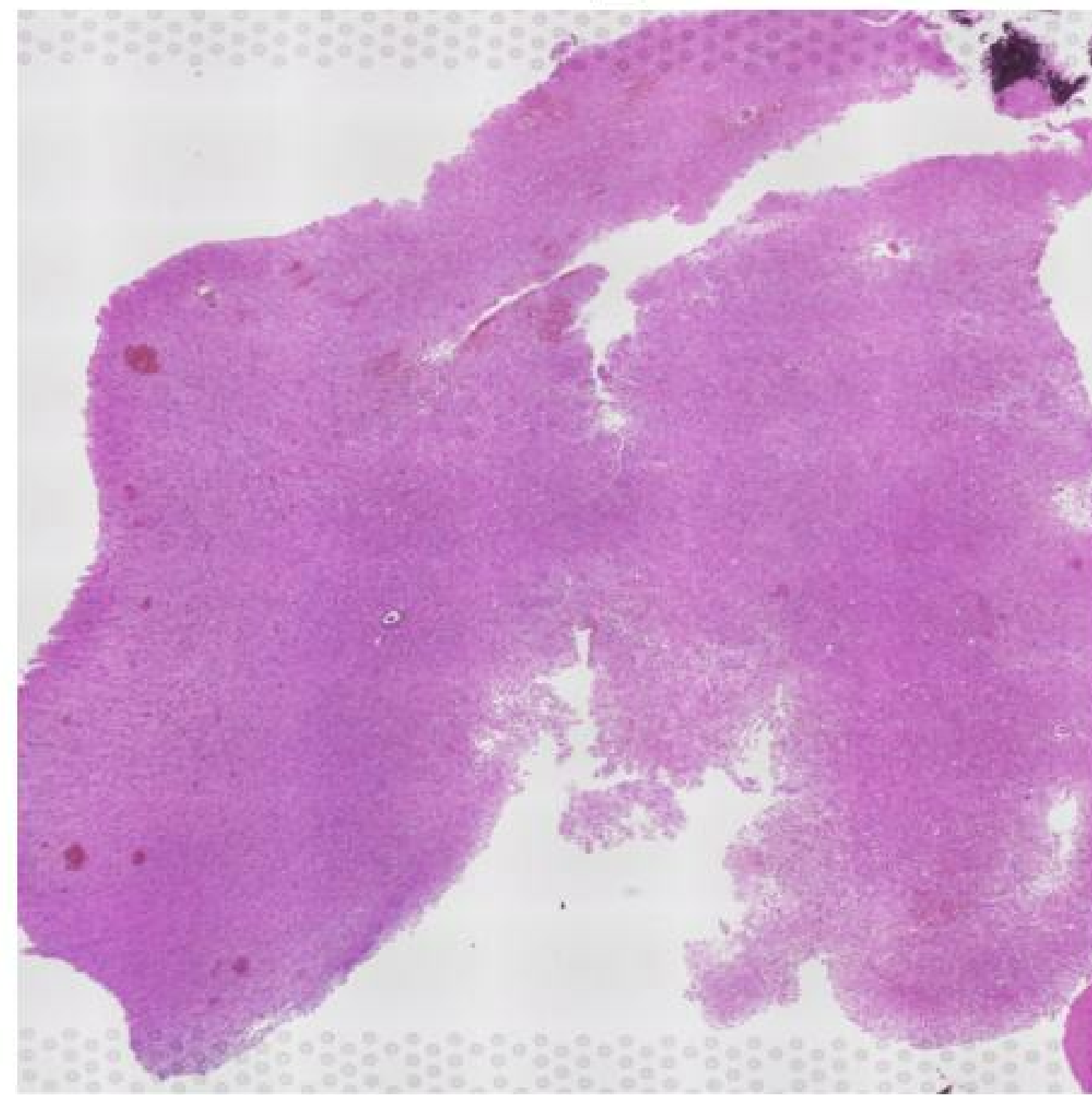
D

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	amplification	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TERP mutation	mutant (C28T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others			

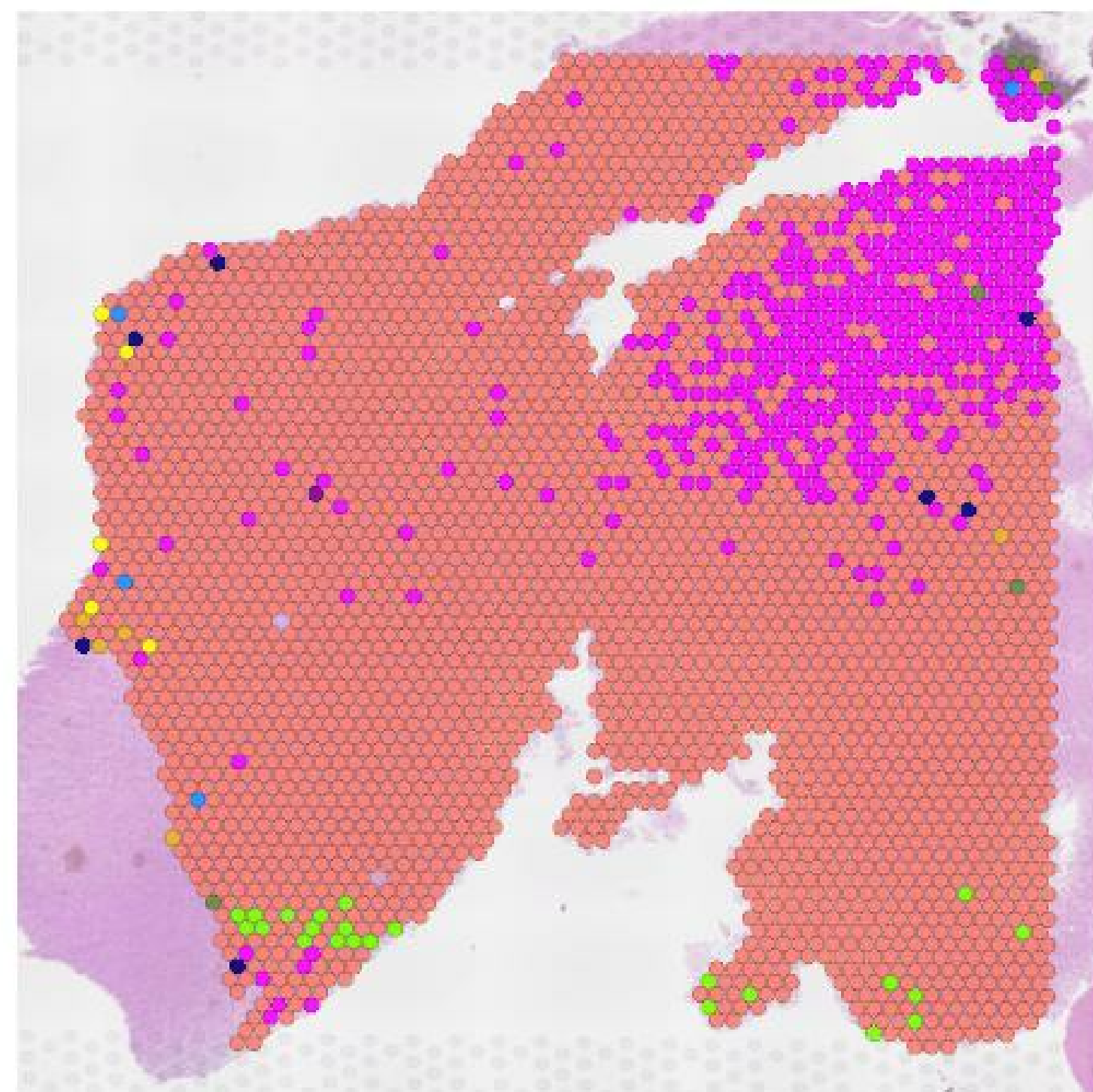
F single-cell data



SNU24A_GBM

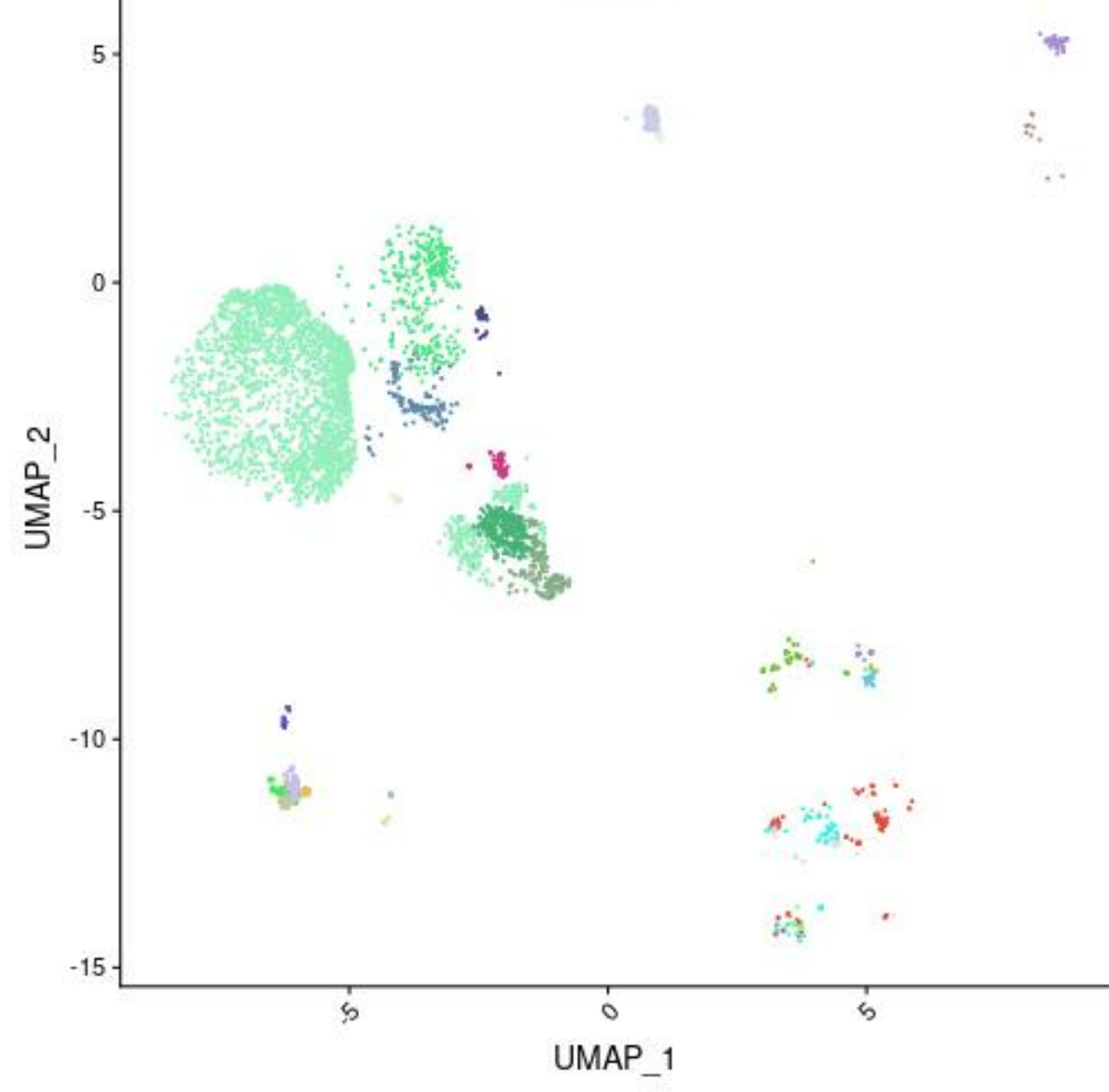


slide 1 of 2

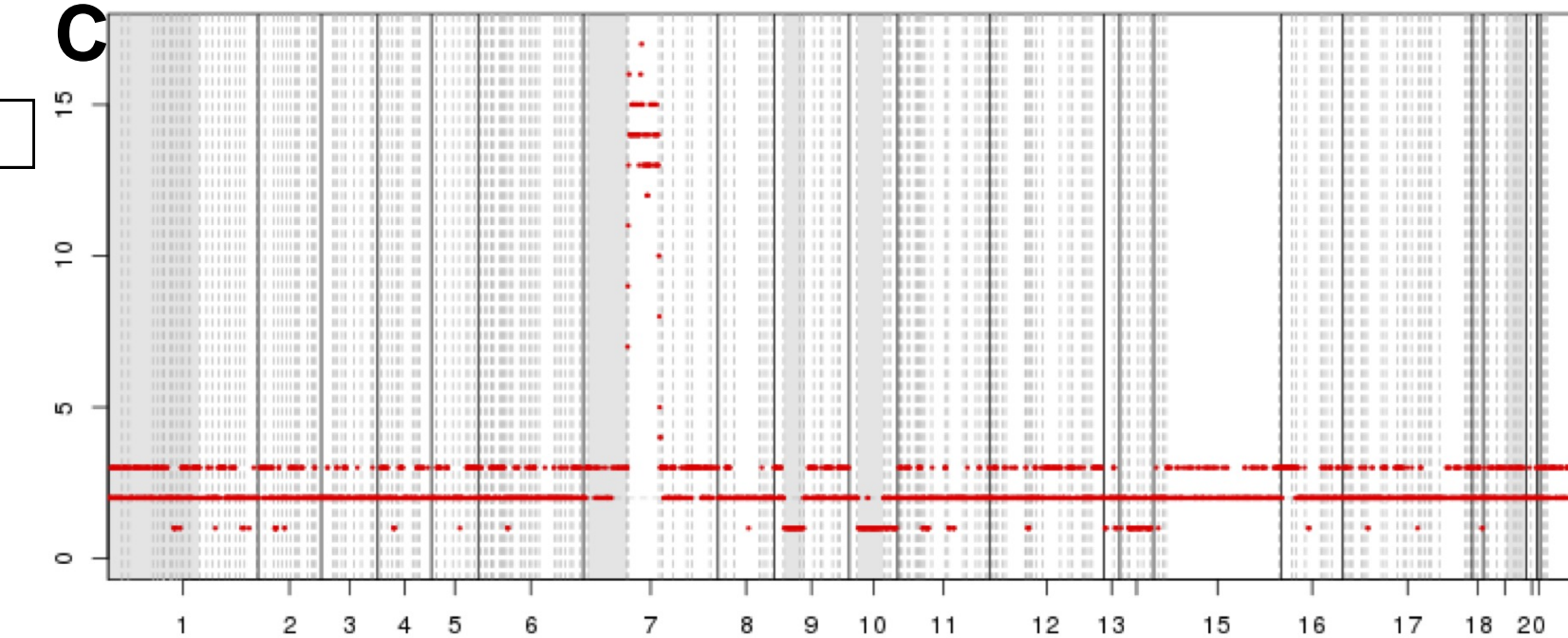
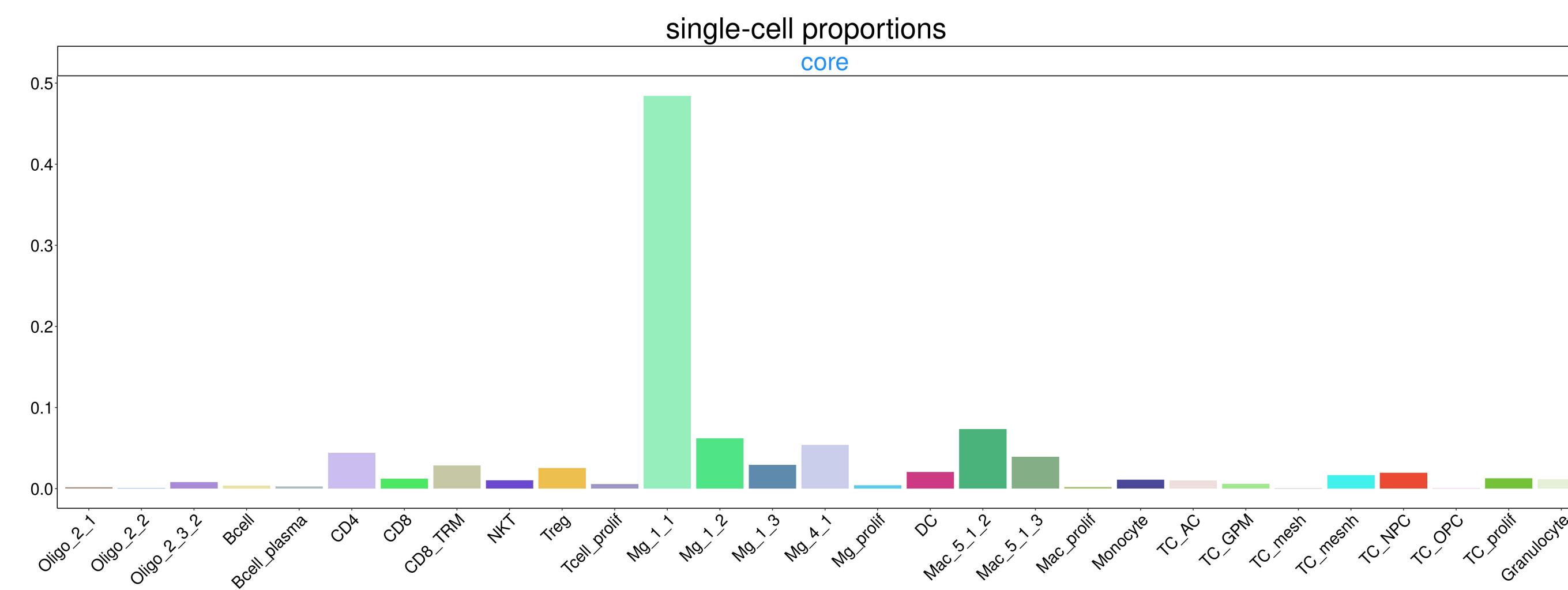
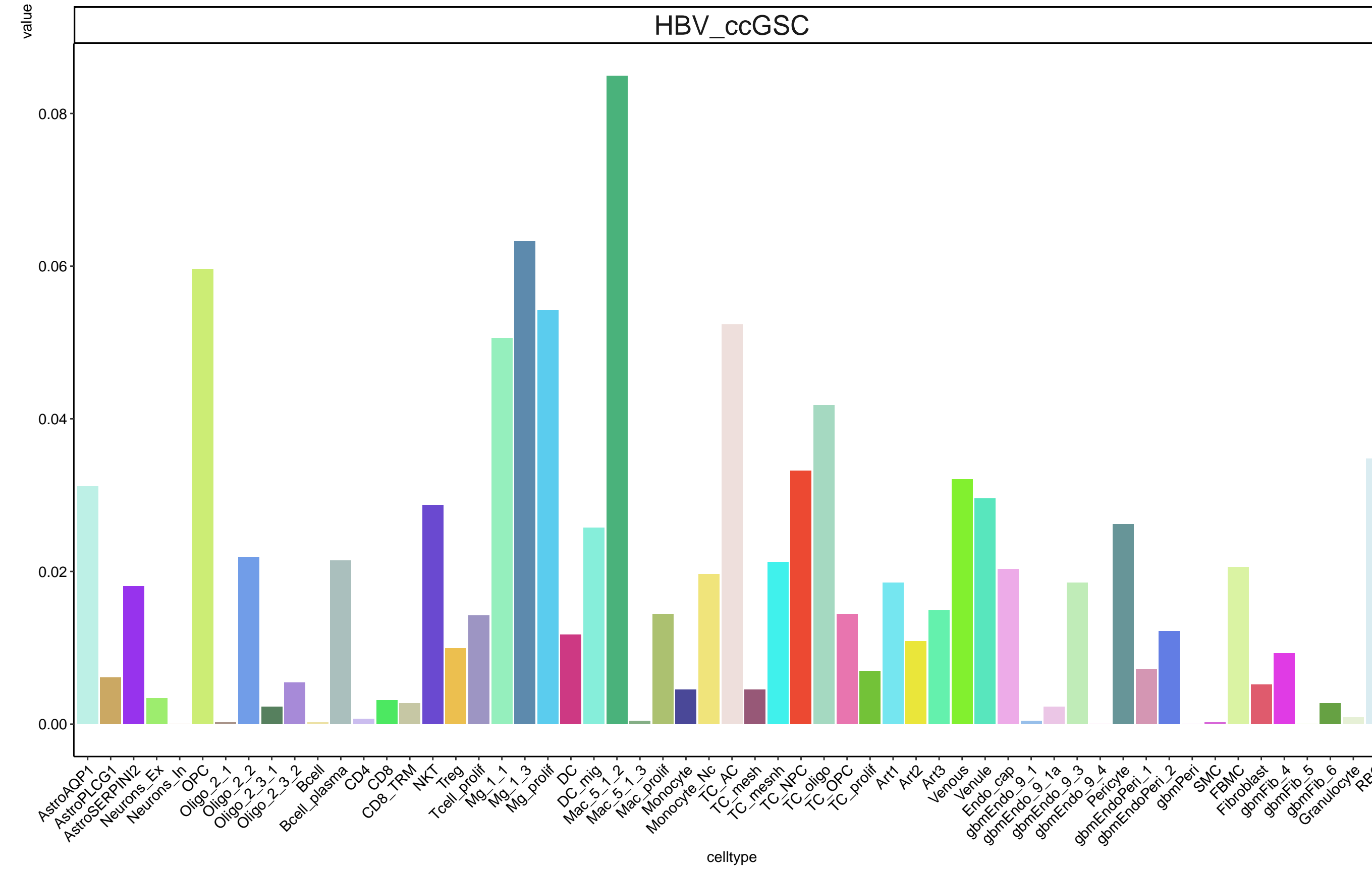
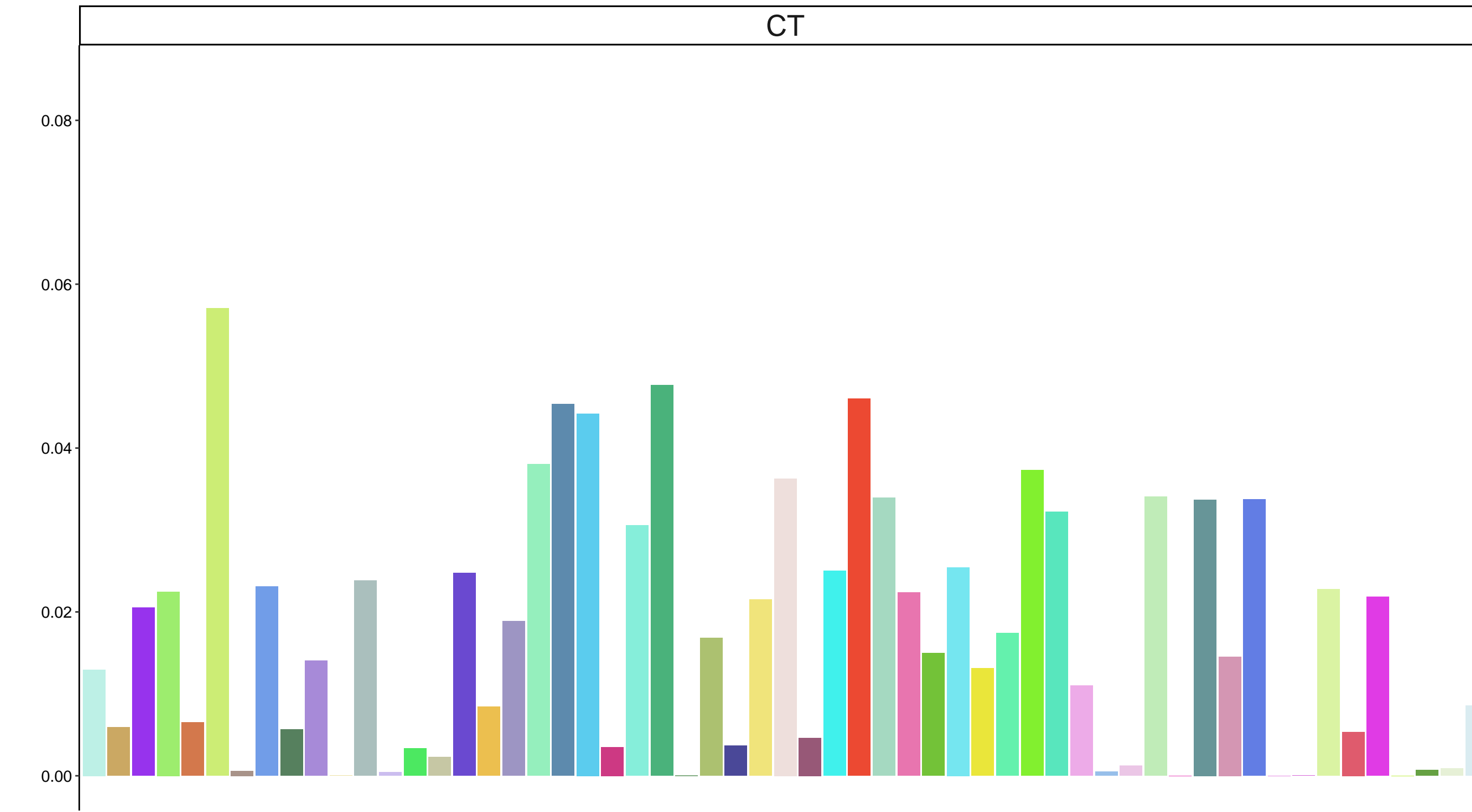


#cells 4717 single-cell cite-seq
SNU24

core

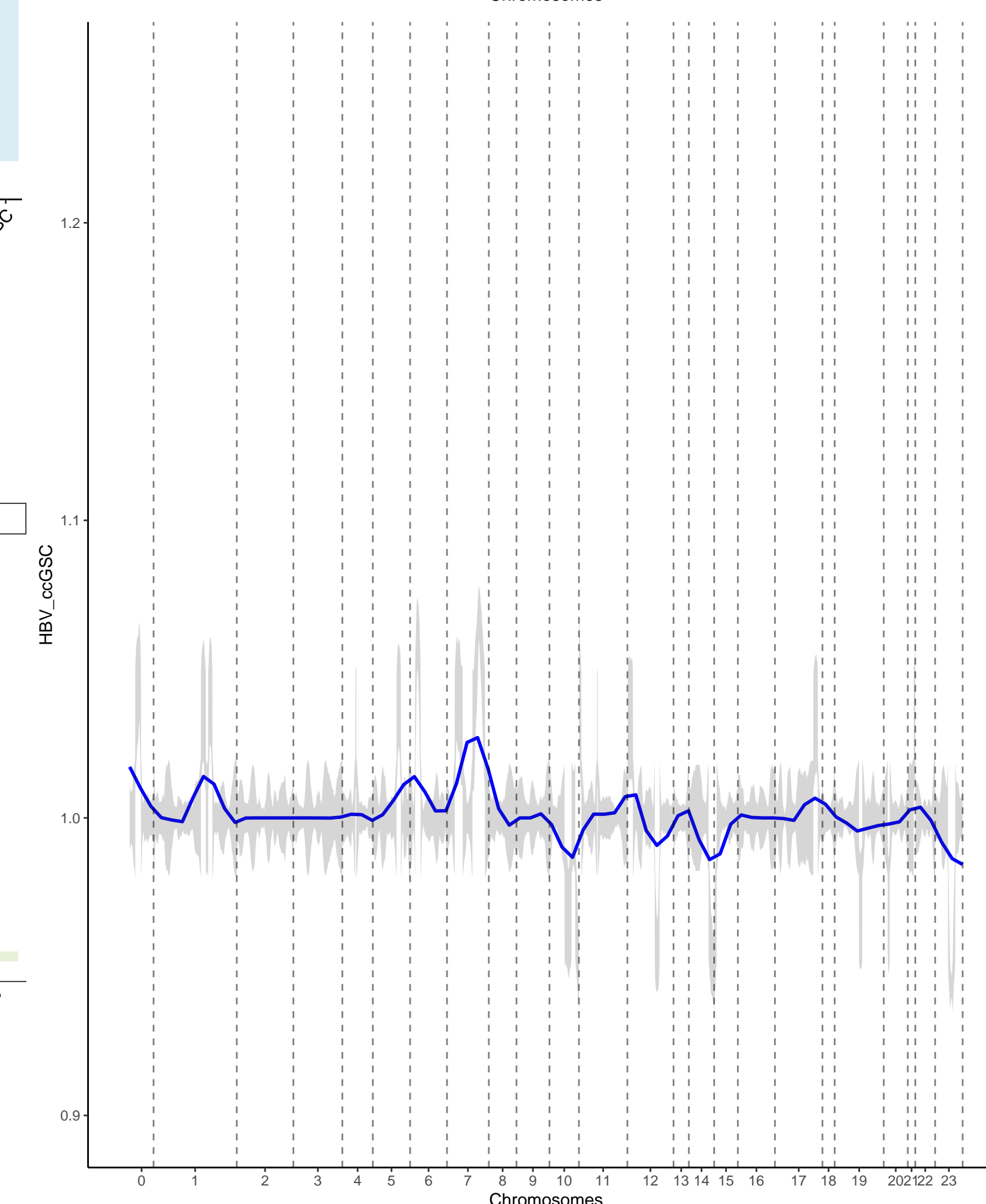
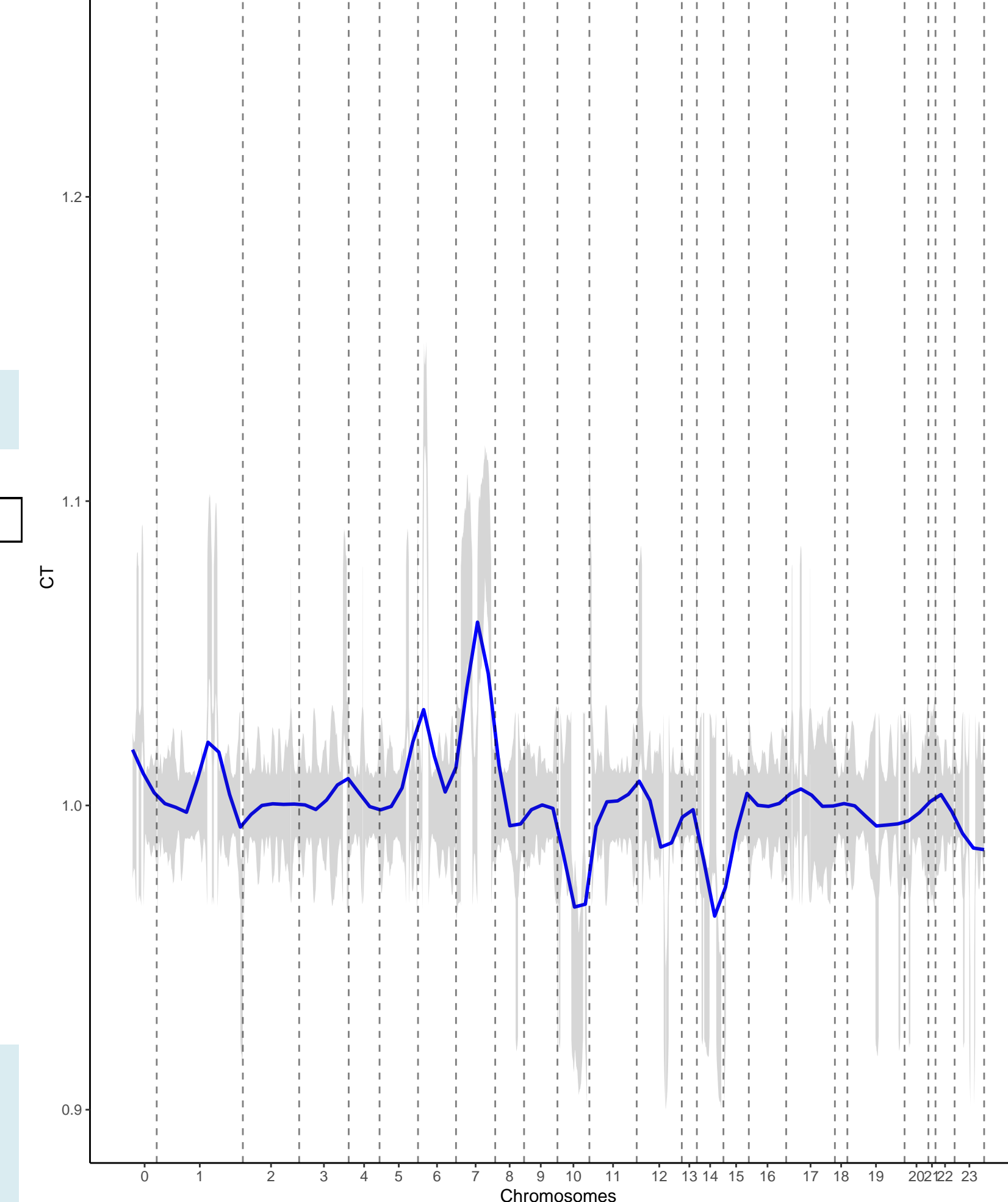


#spots 3391

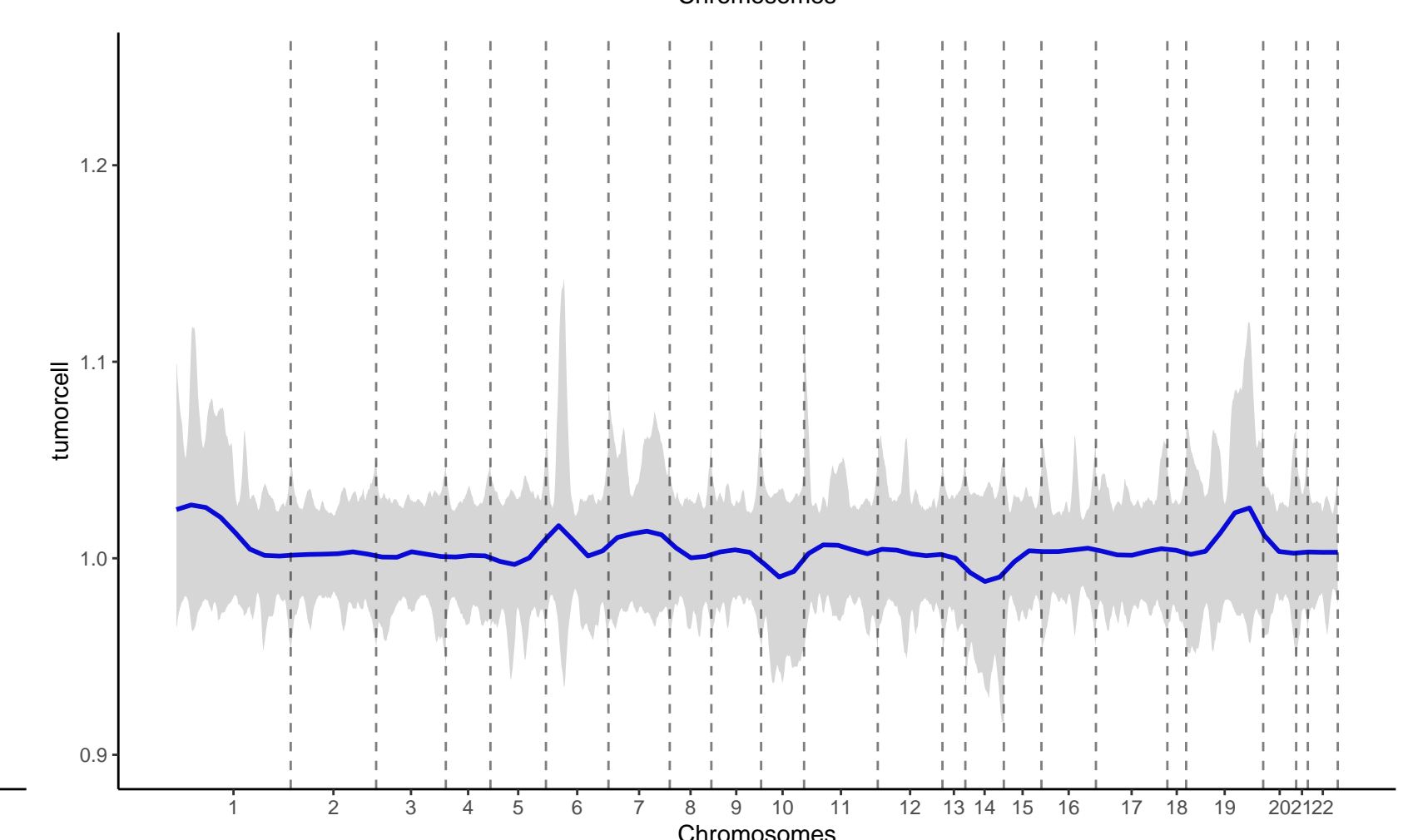
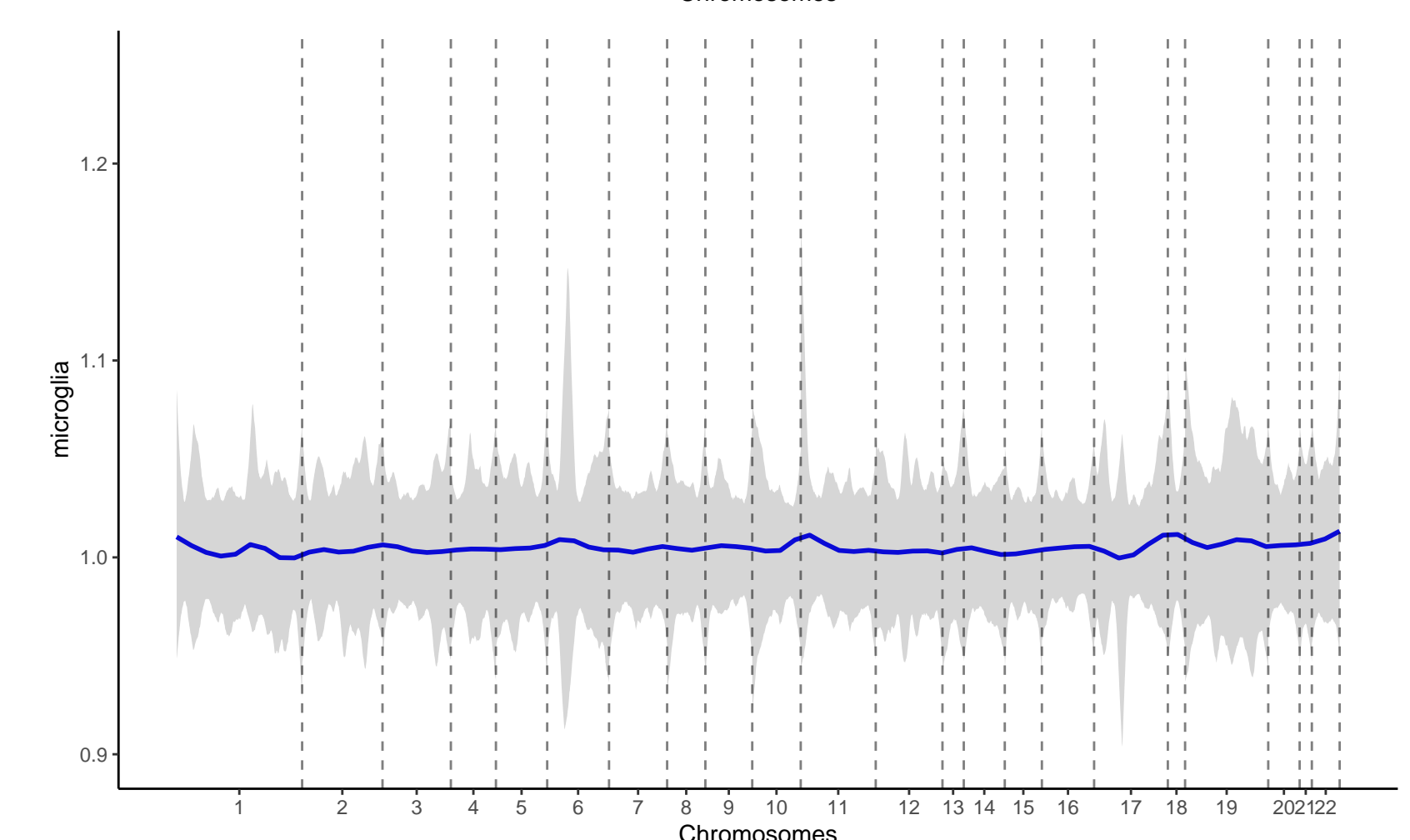
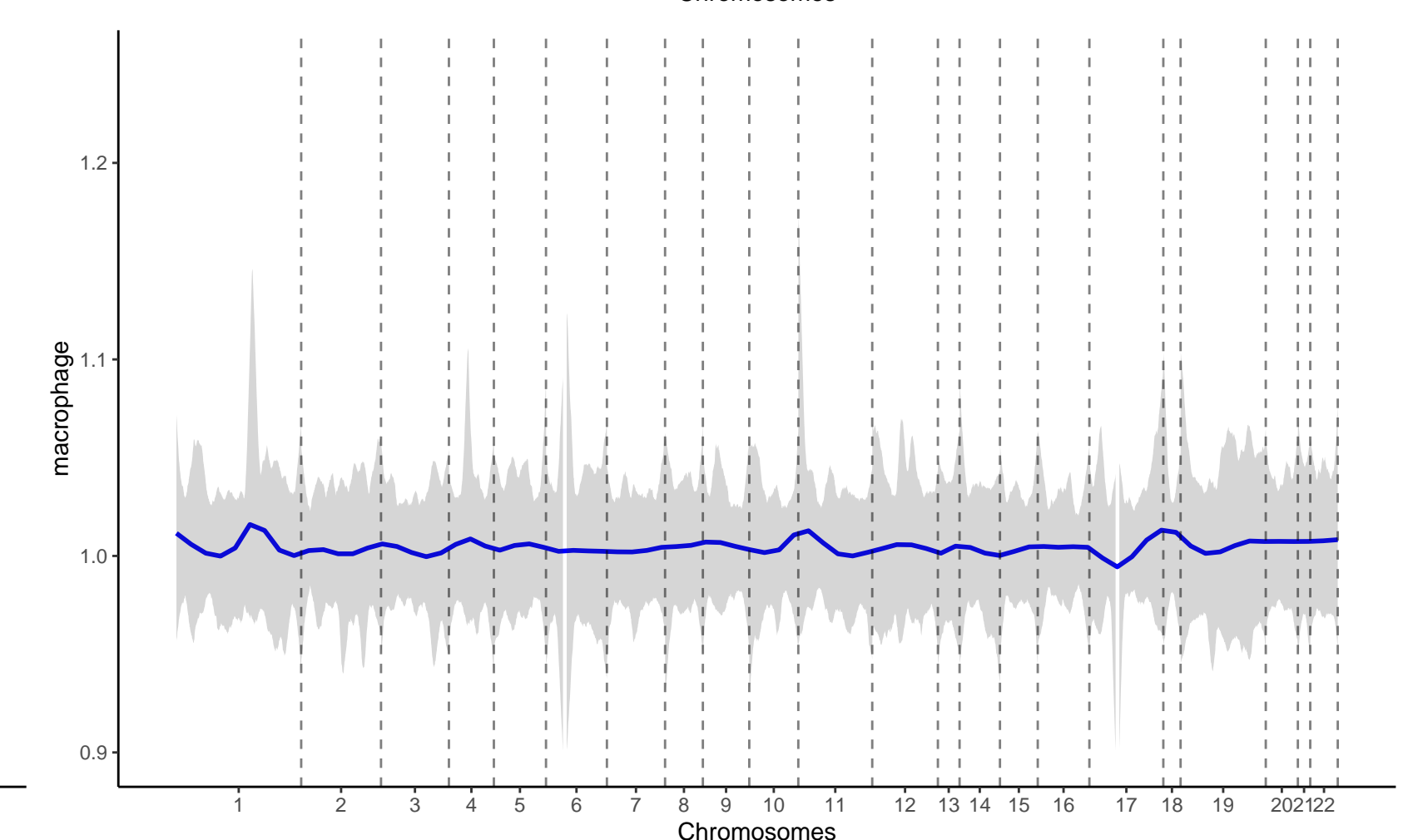
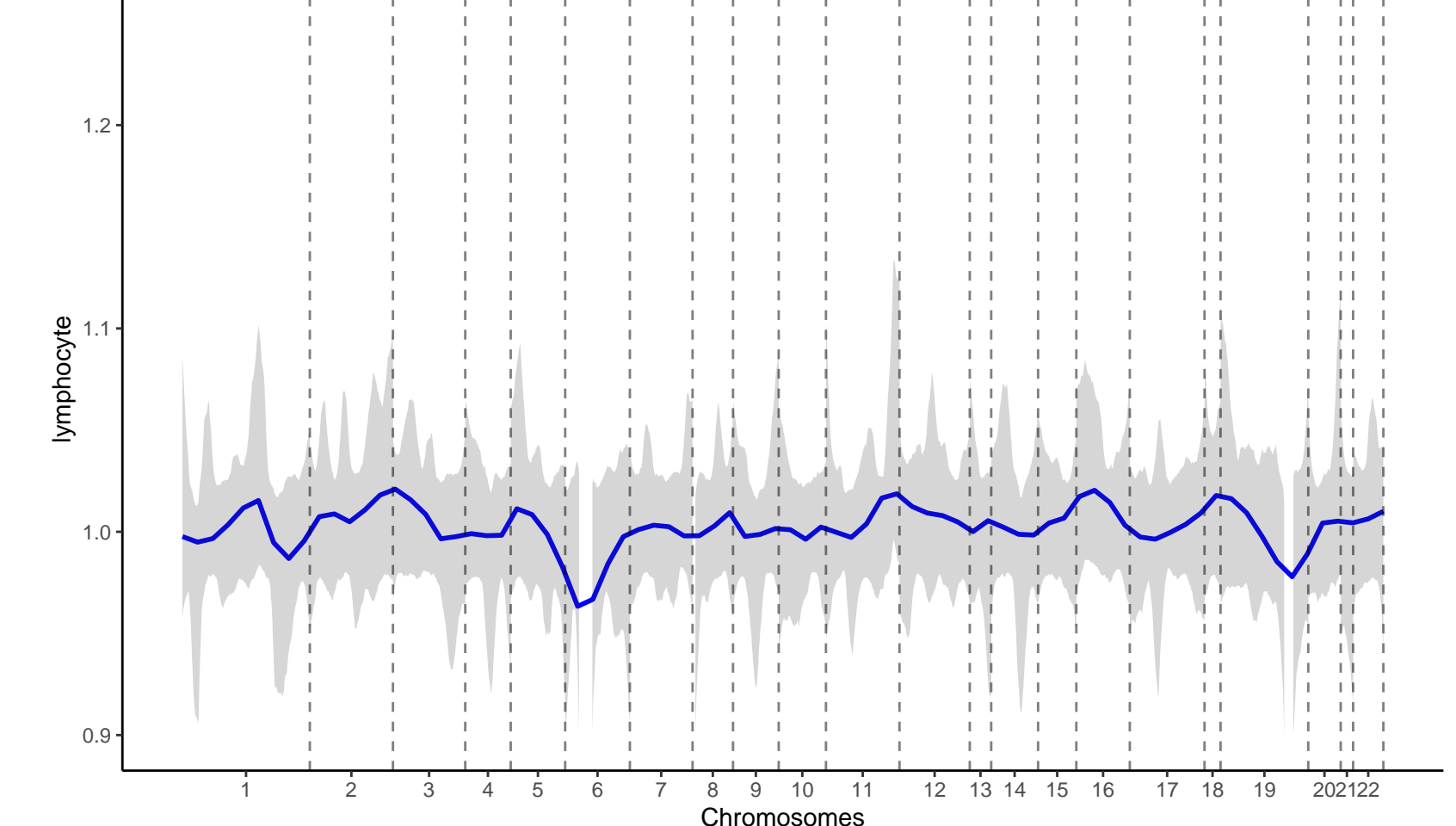


Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

E Spatial data



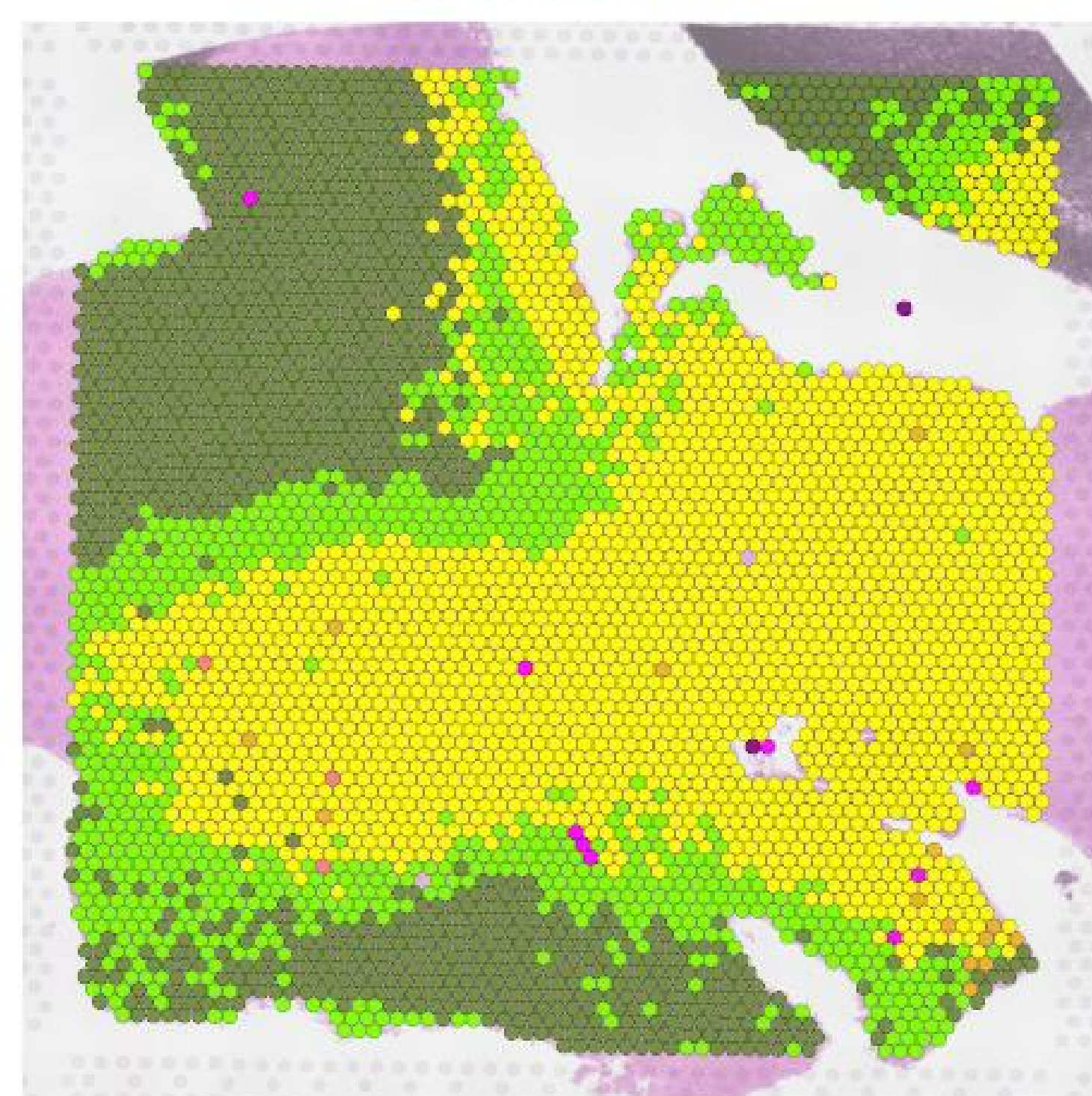
F single-cell data



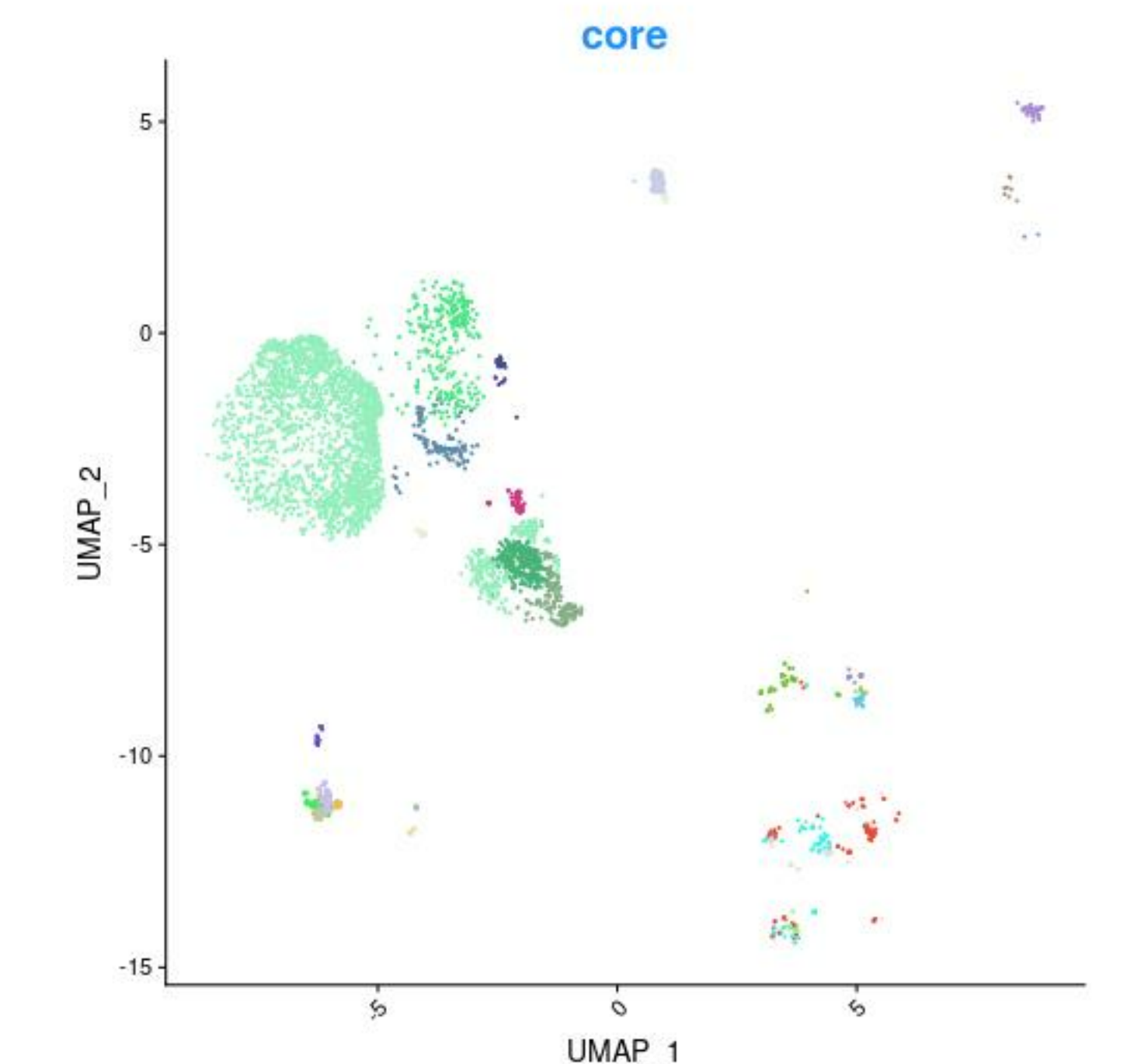
A SNU24B_GBM



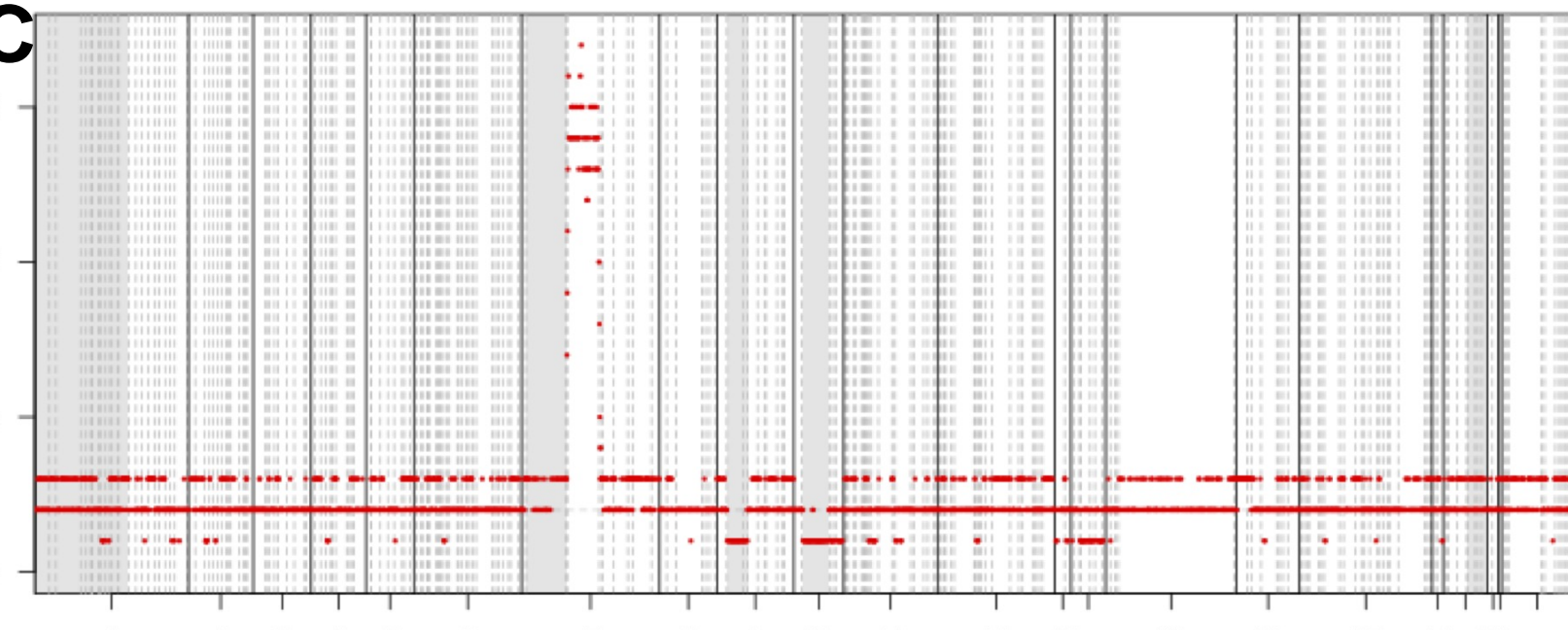
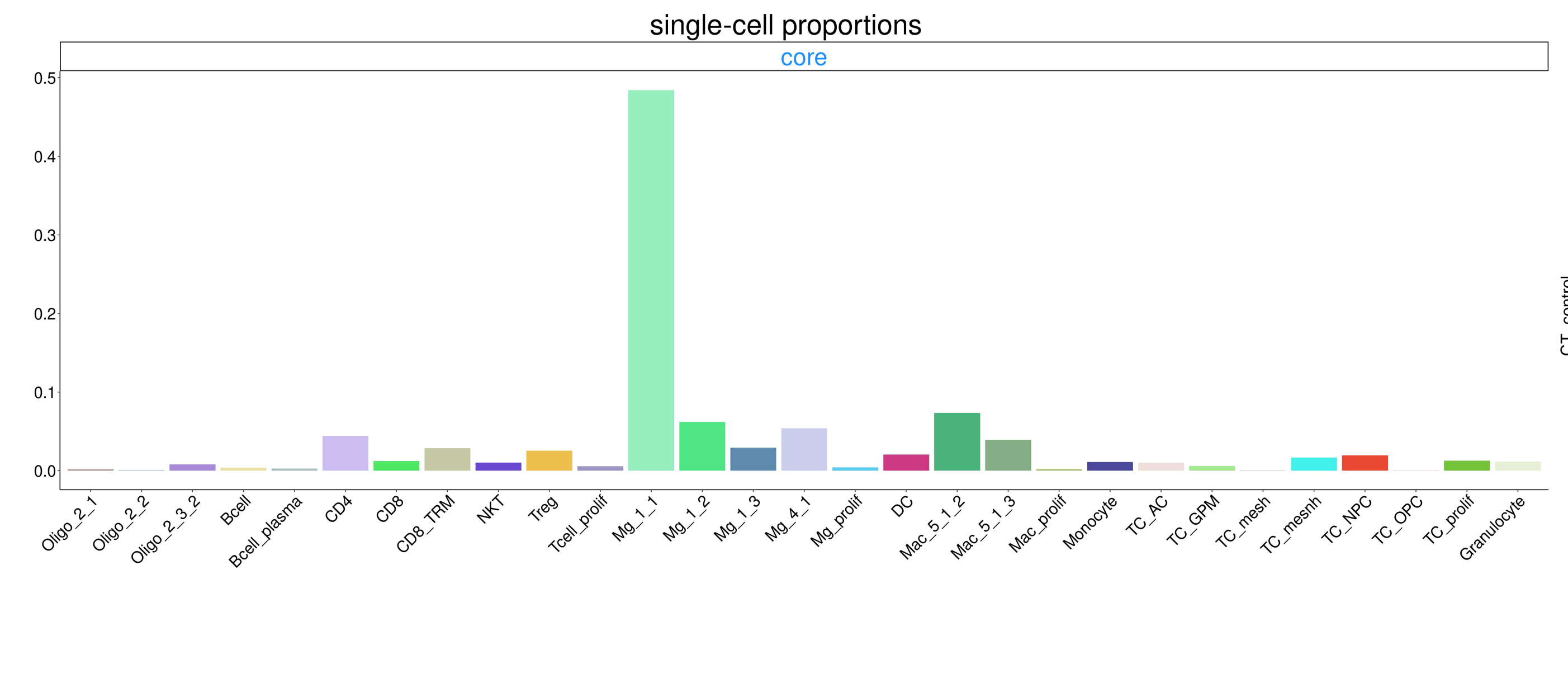
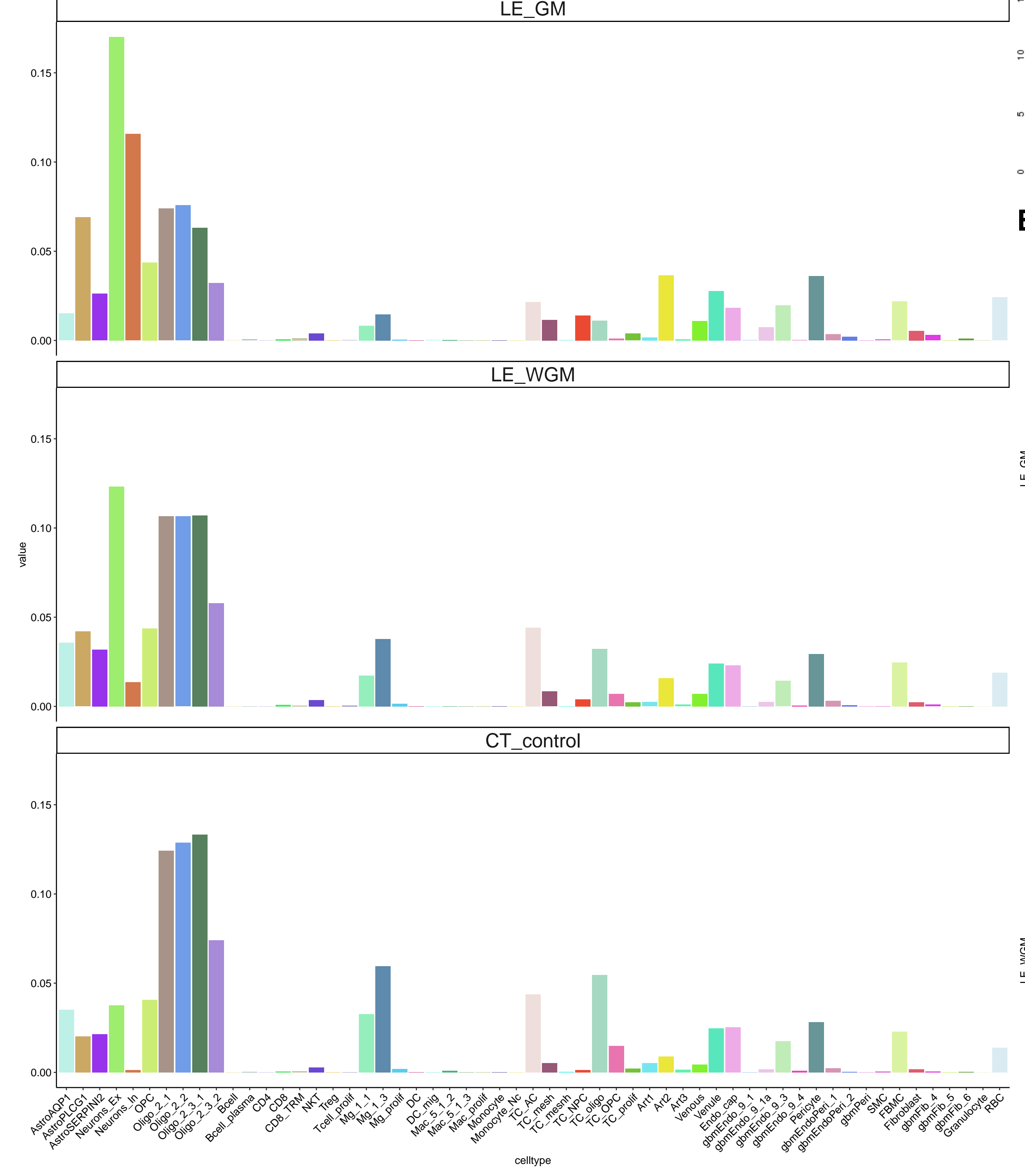
slide 2 of 2



B #cells 4717 single-cell cite-seq SNU24

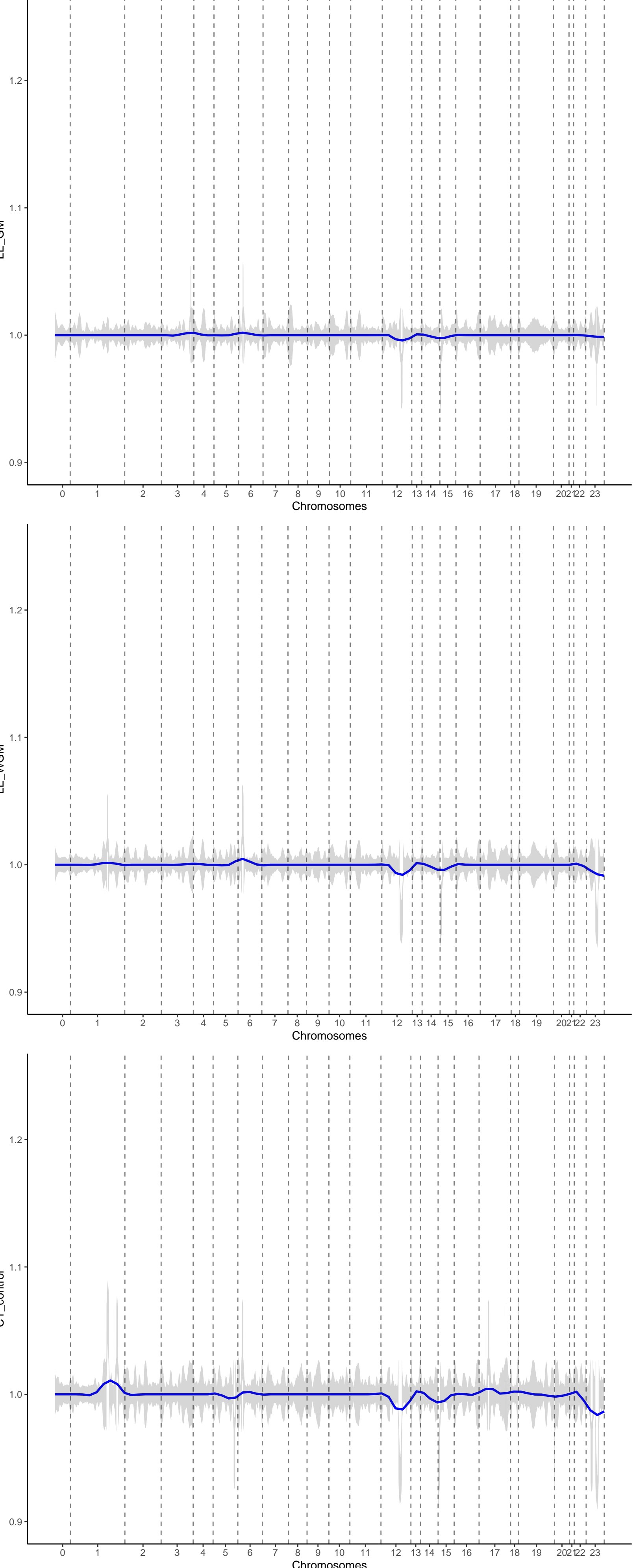


C #spots 4208

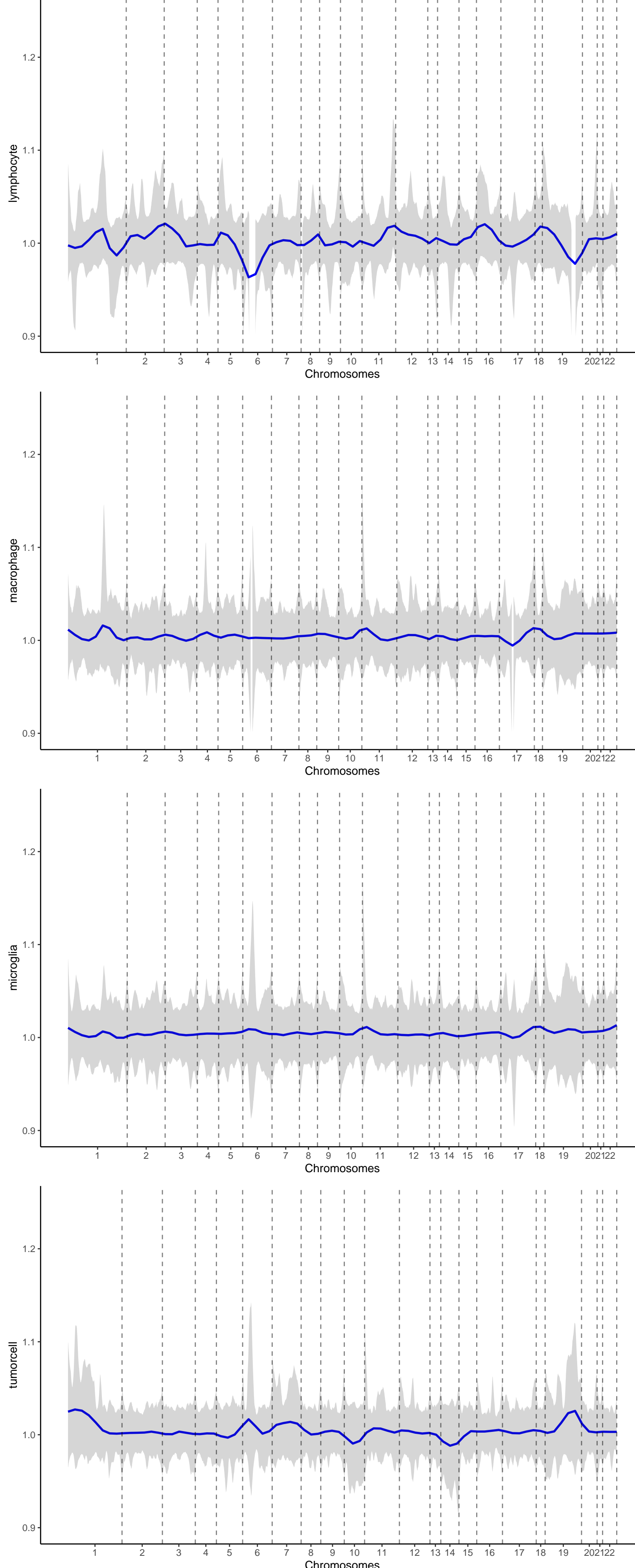


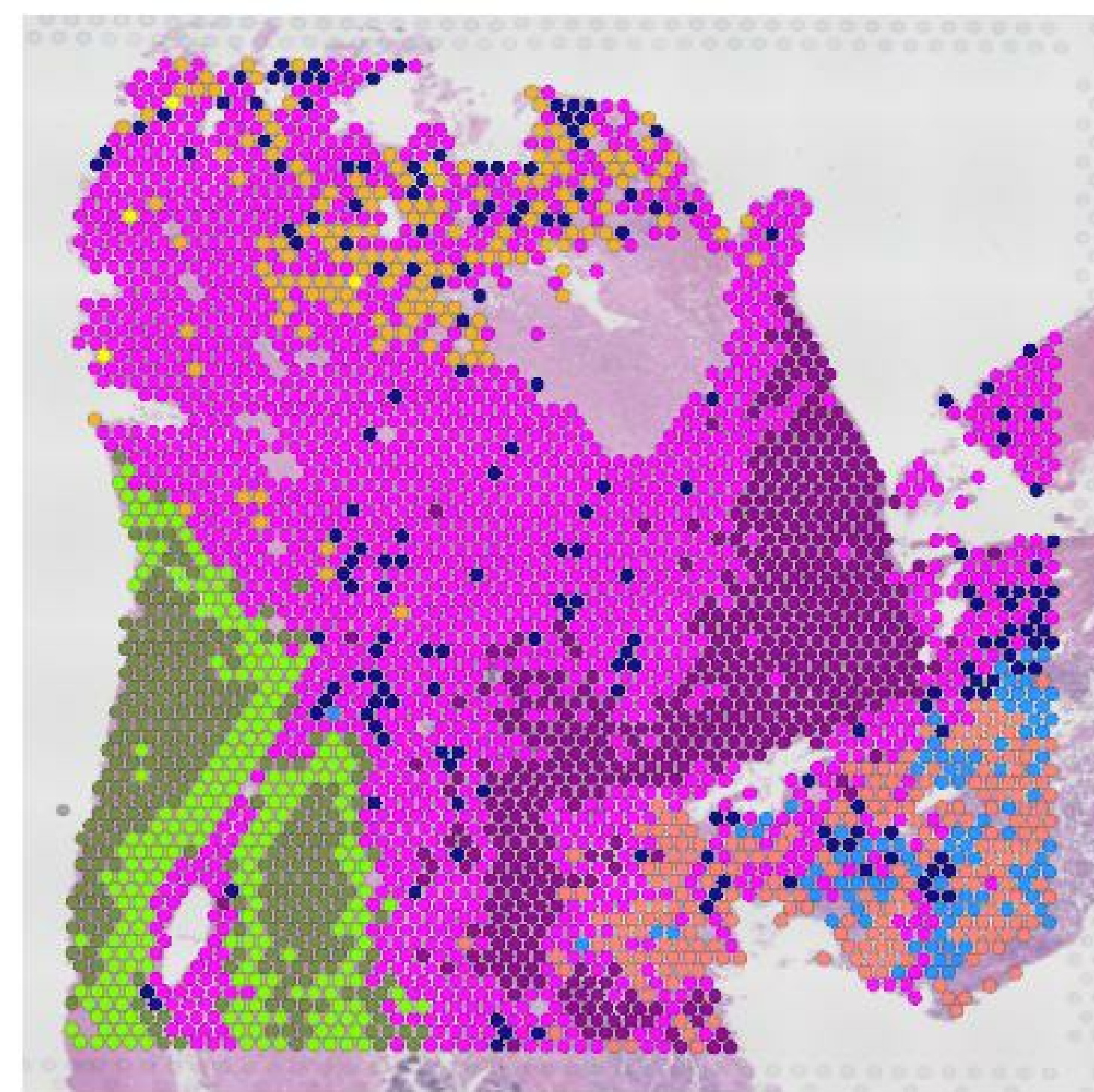
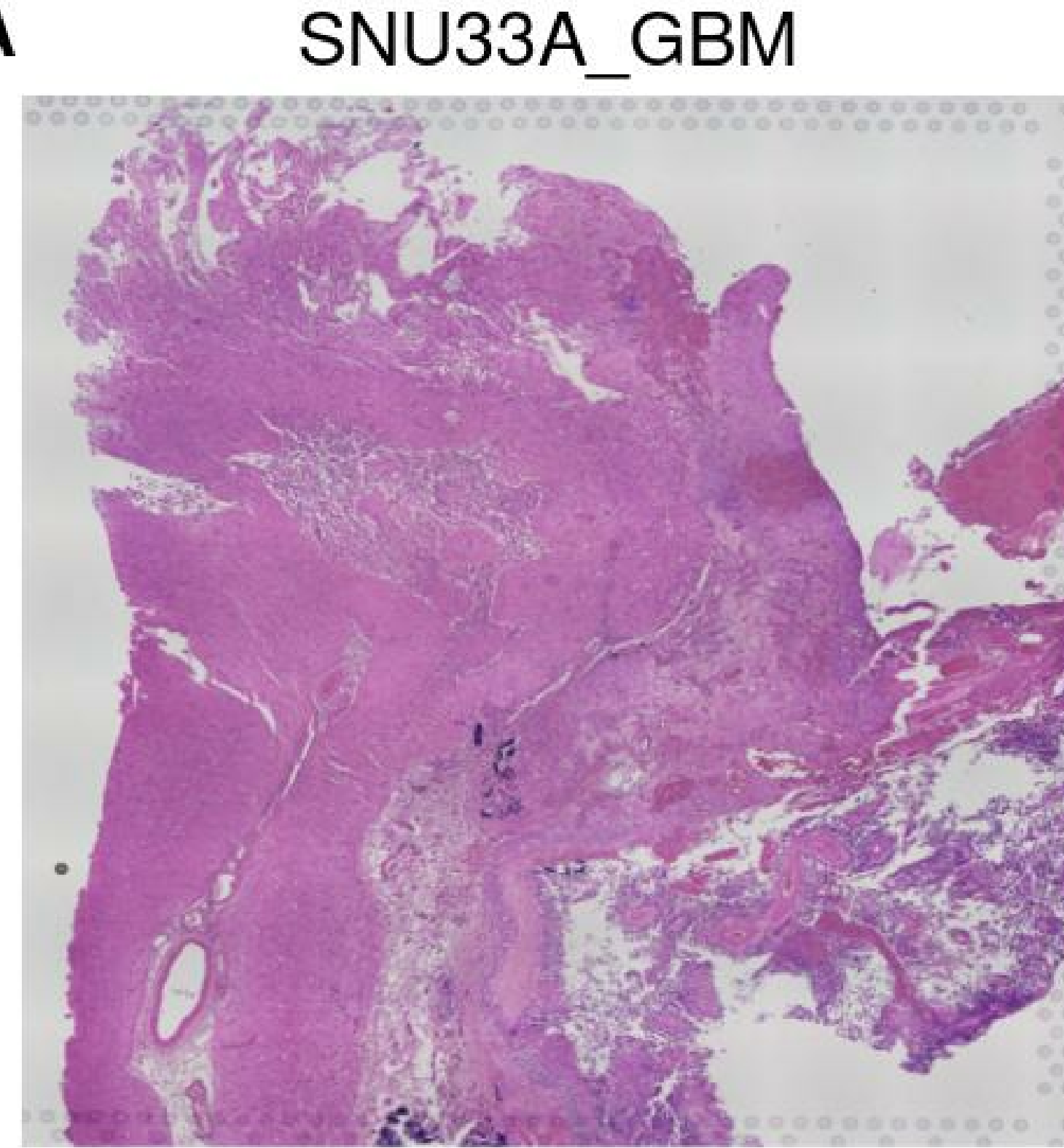
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C28T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others			

E Spatial data

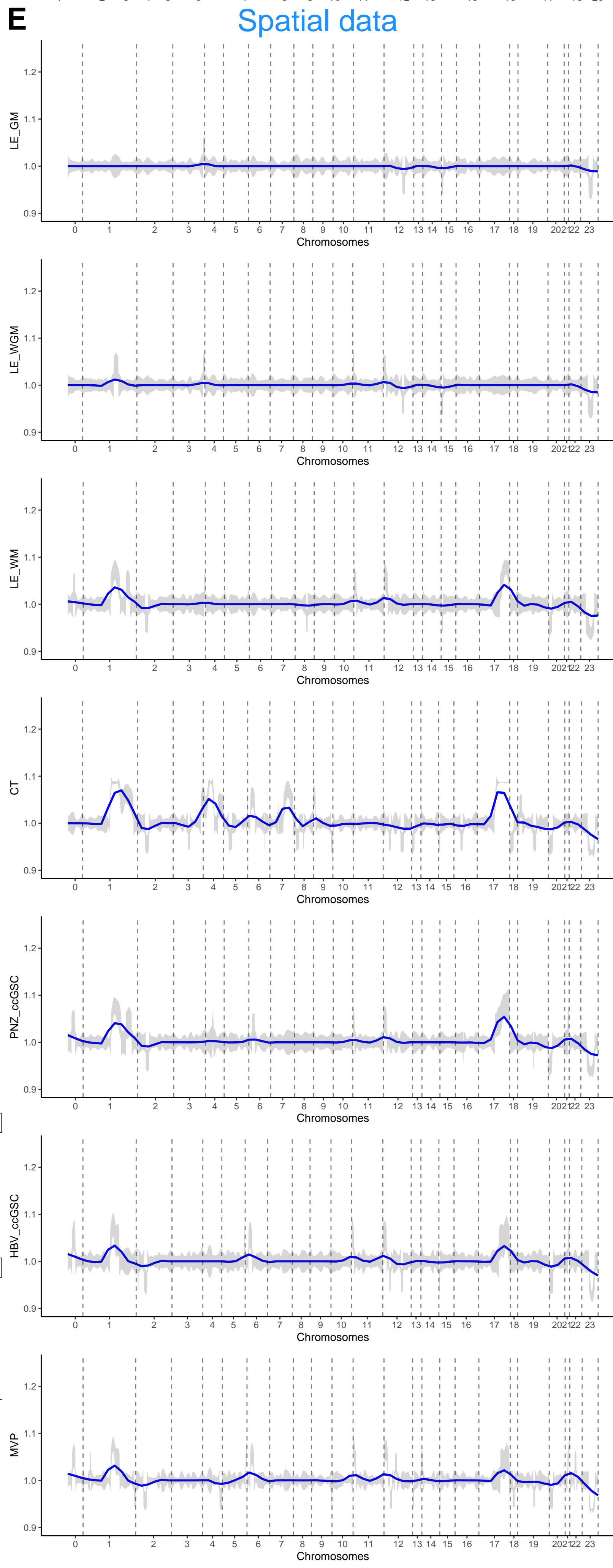
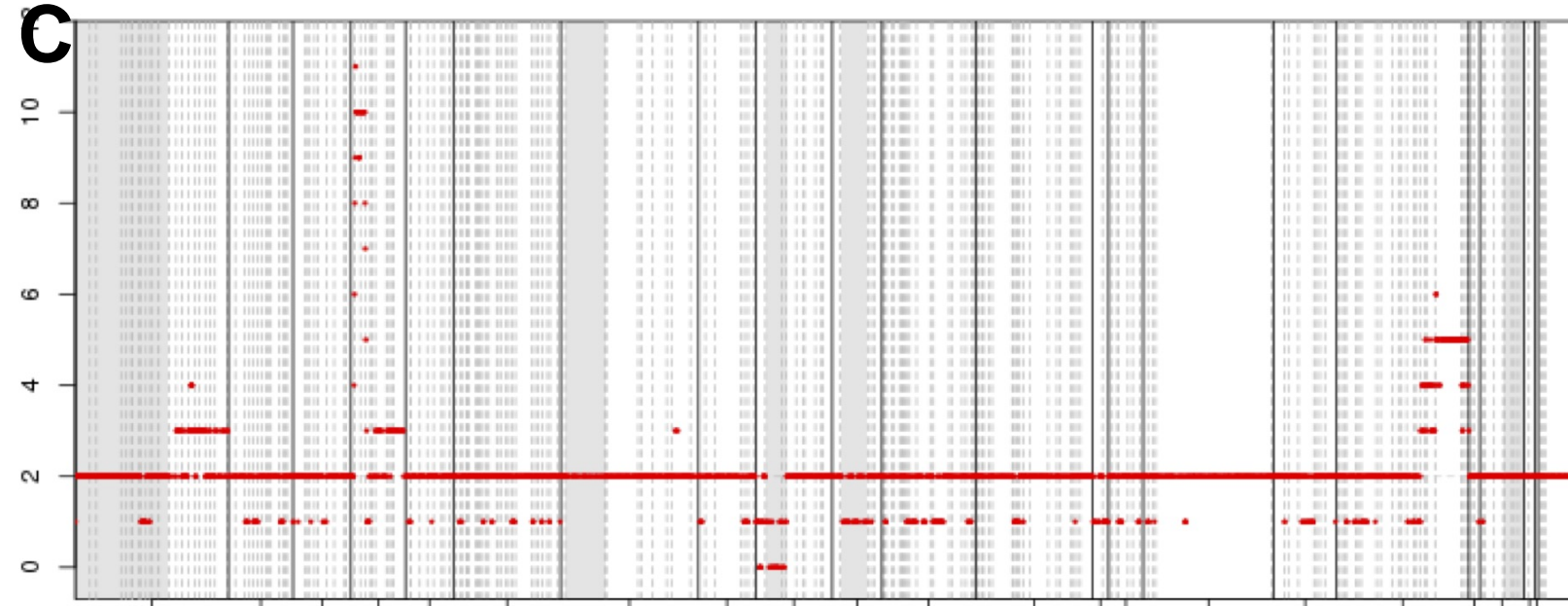
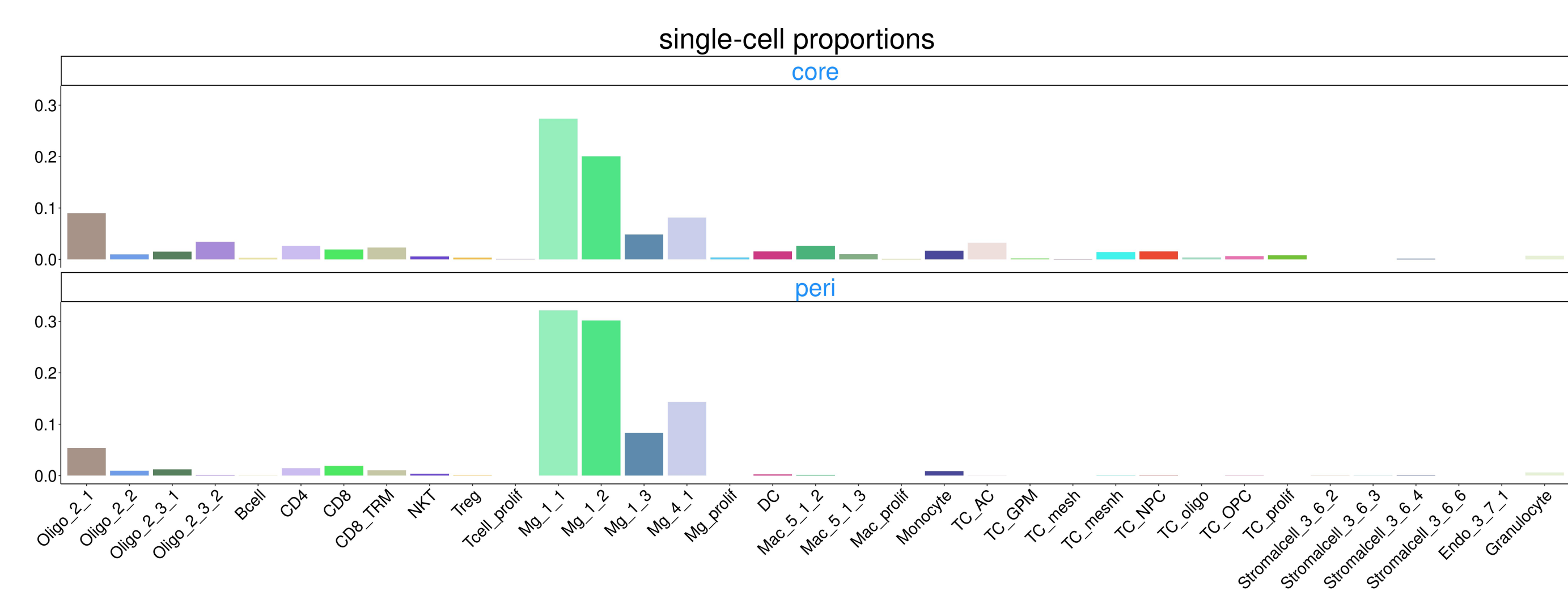
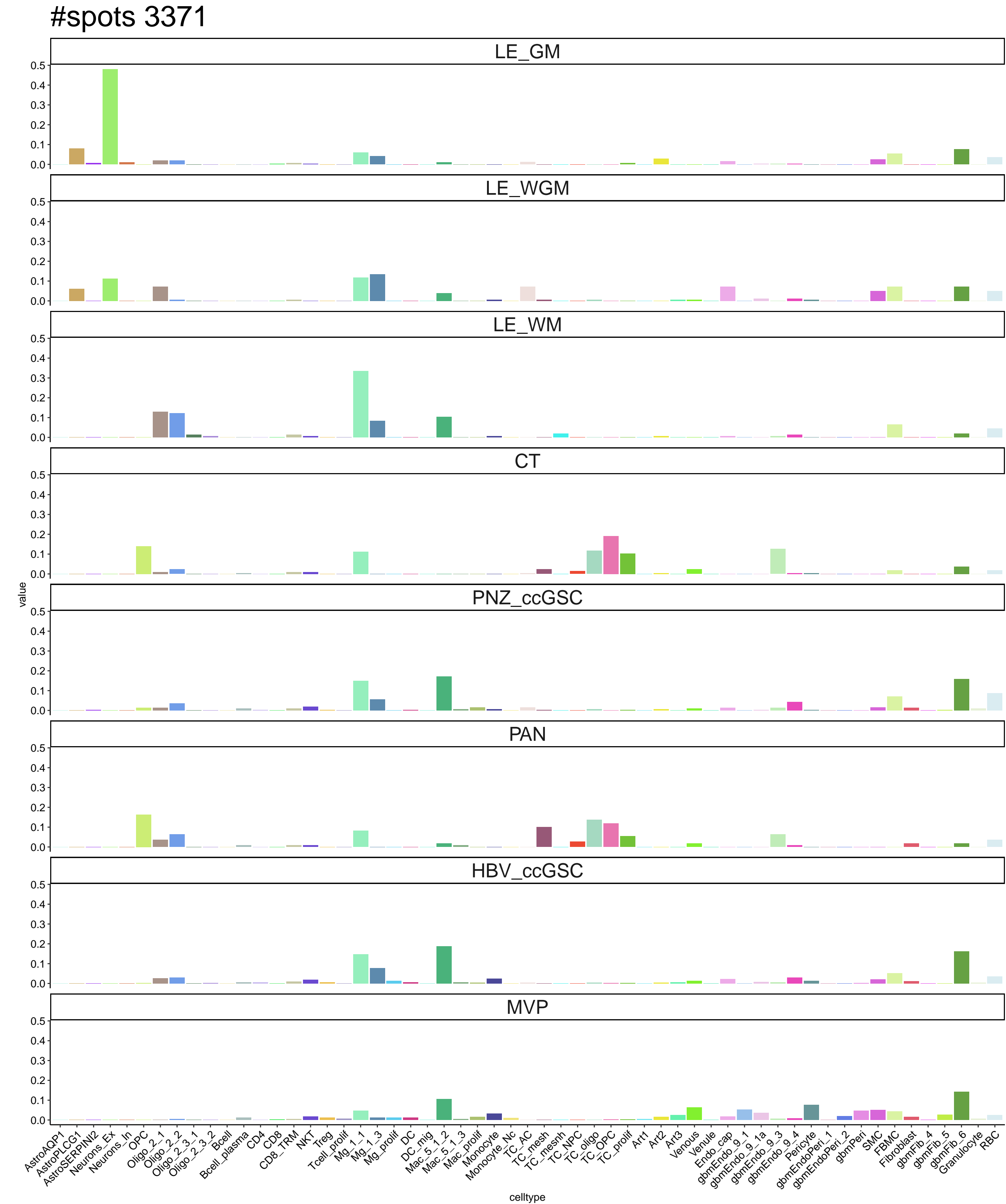
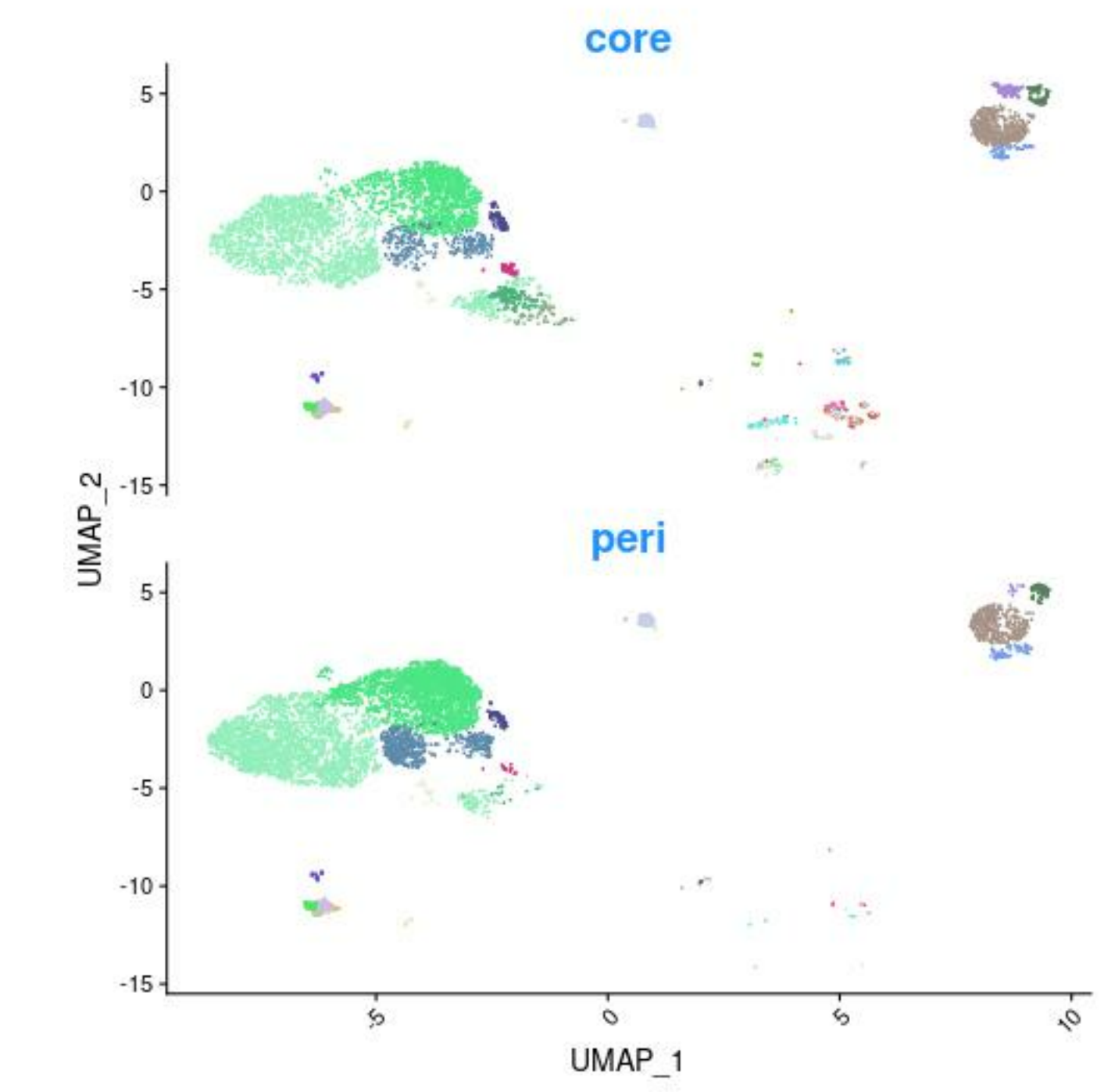


F single-cell data



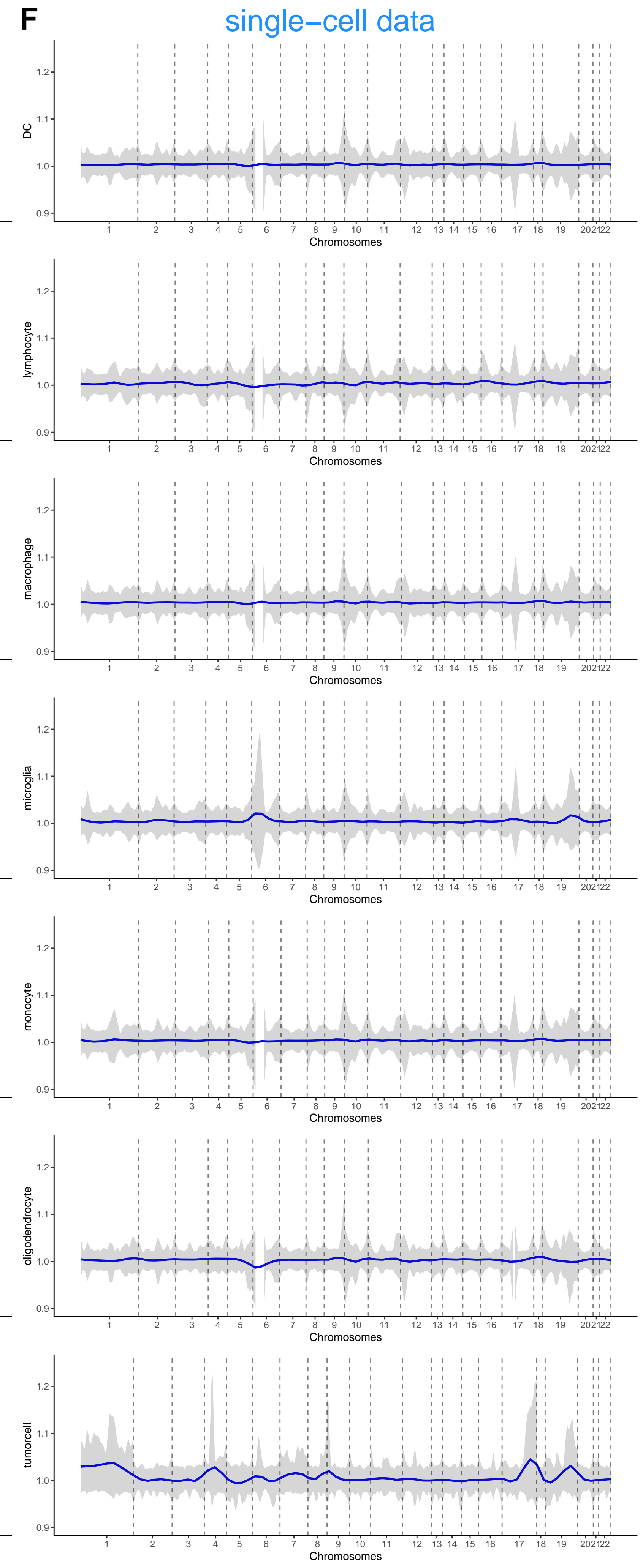


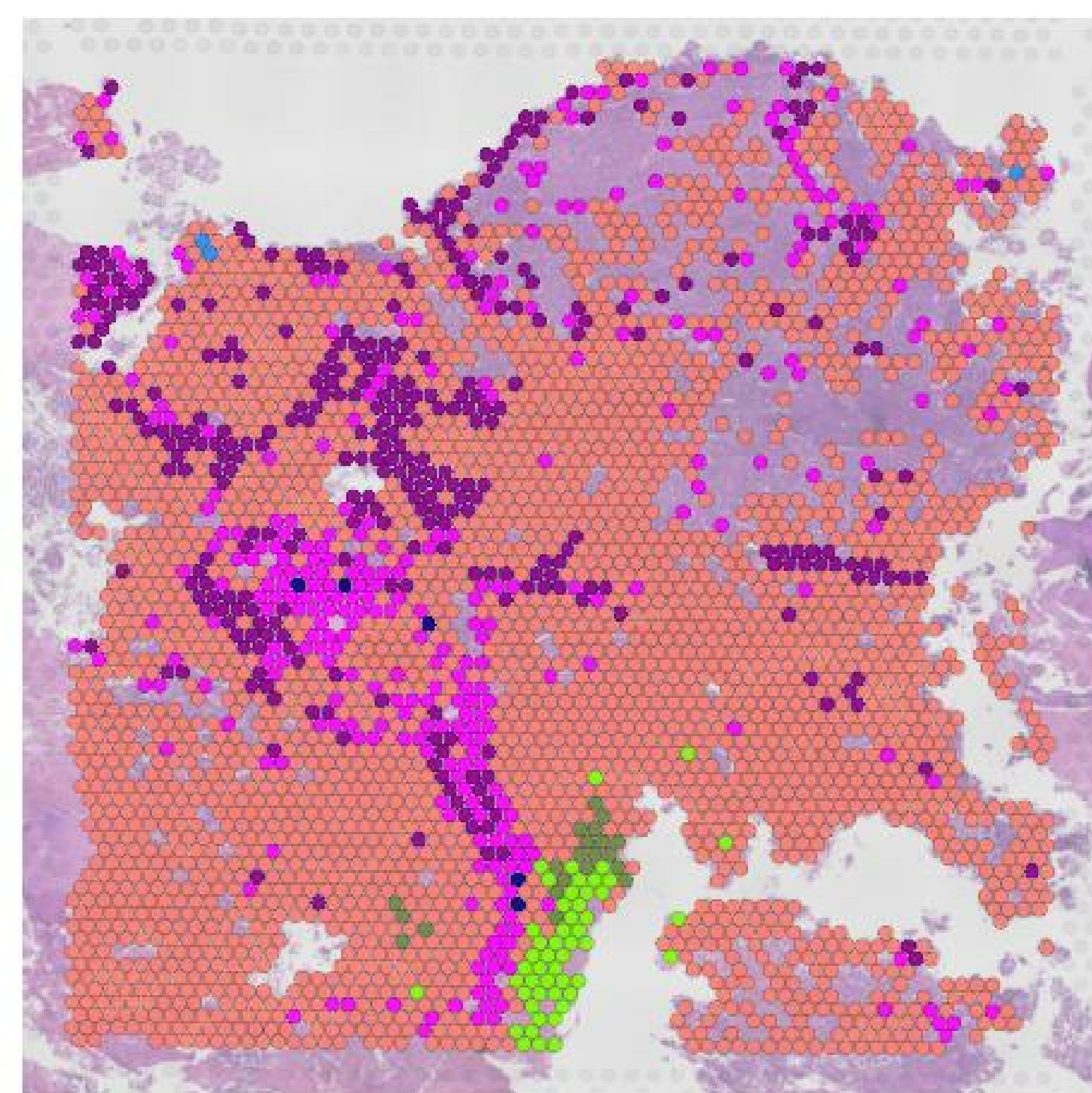
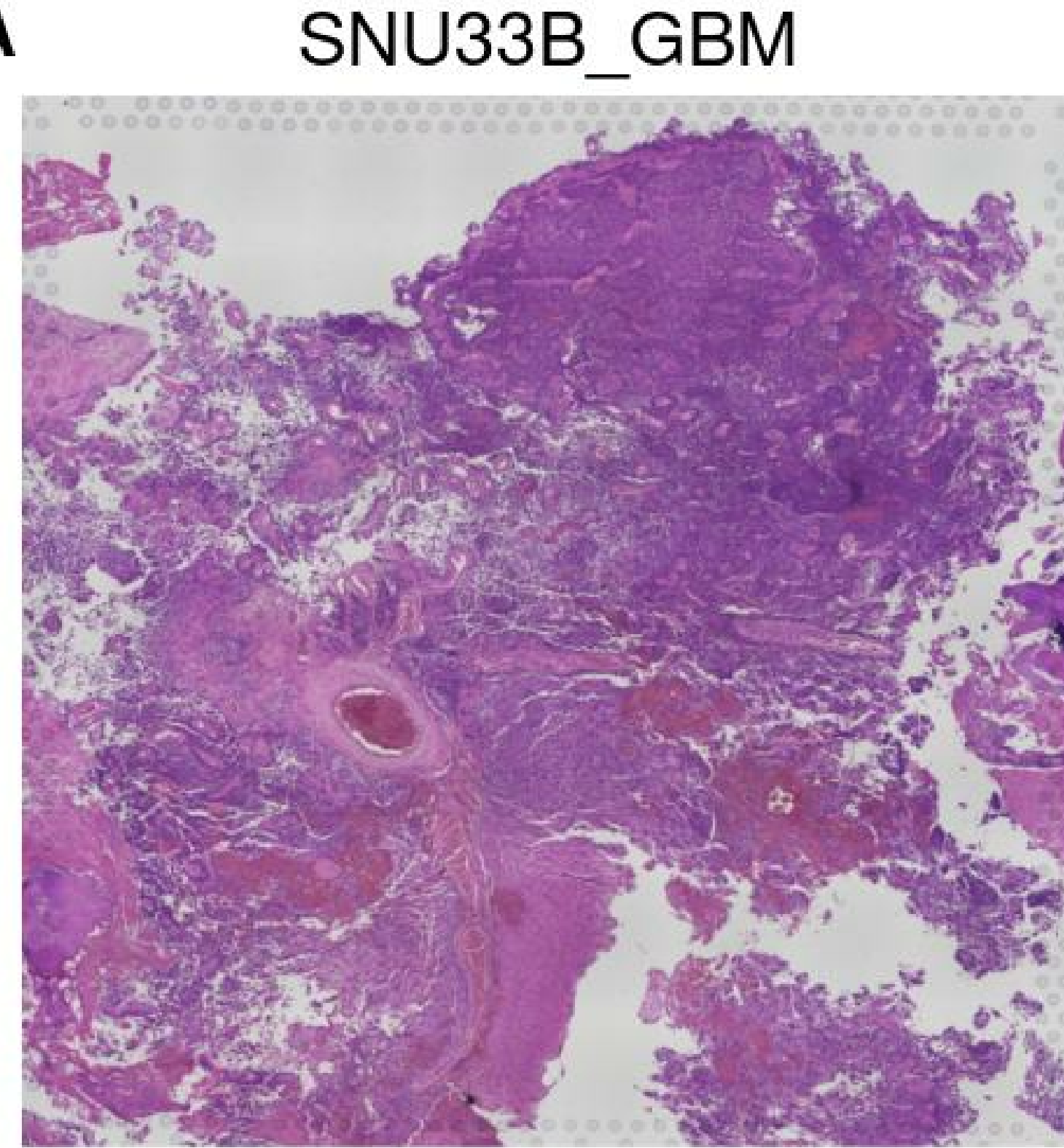
#cells 13729 single-cell cite-seq
SNU33



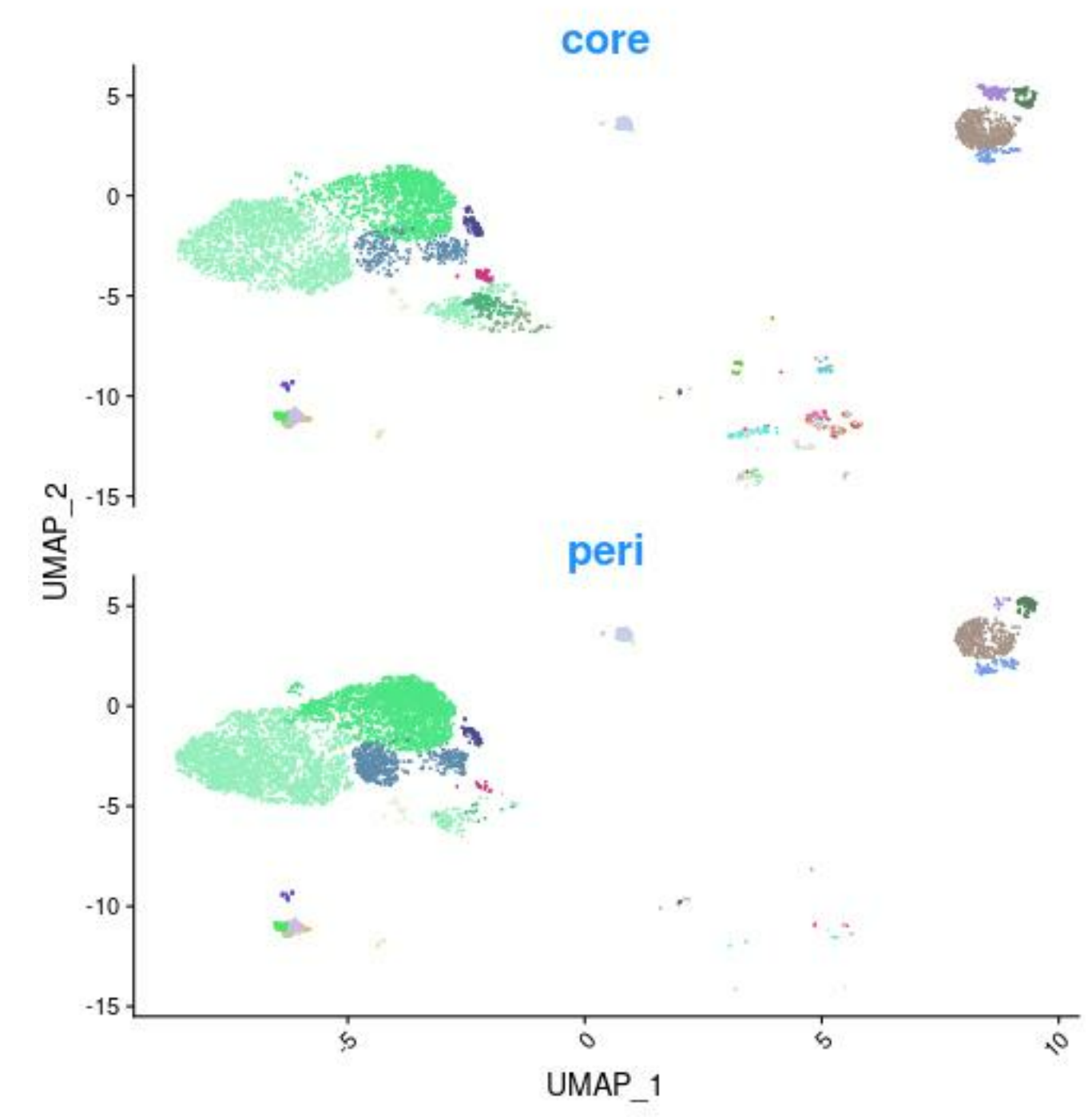
D

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p/19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	amplification
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TP53 mutation	wildtype	NF1 deletion	absent
BRAF mutation	wildtype	NF2 mutation	wildtype
BRAF rearrangement	absent	NF2 deletion	absent
Others	absent	MYCN amplification	absent

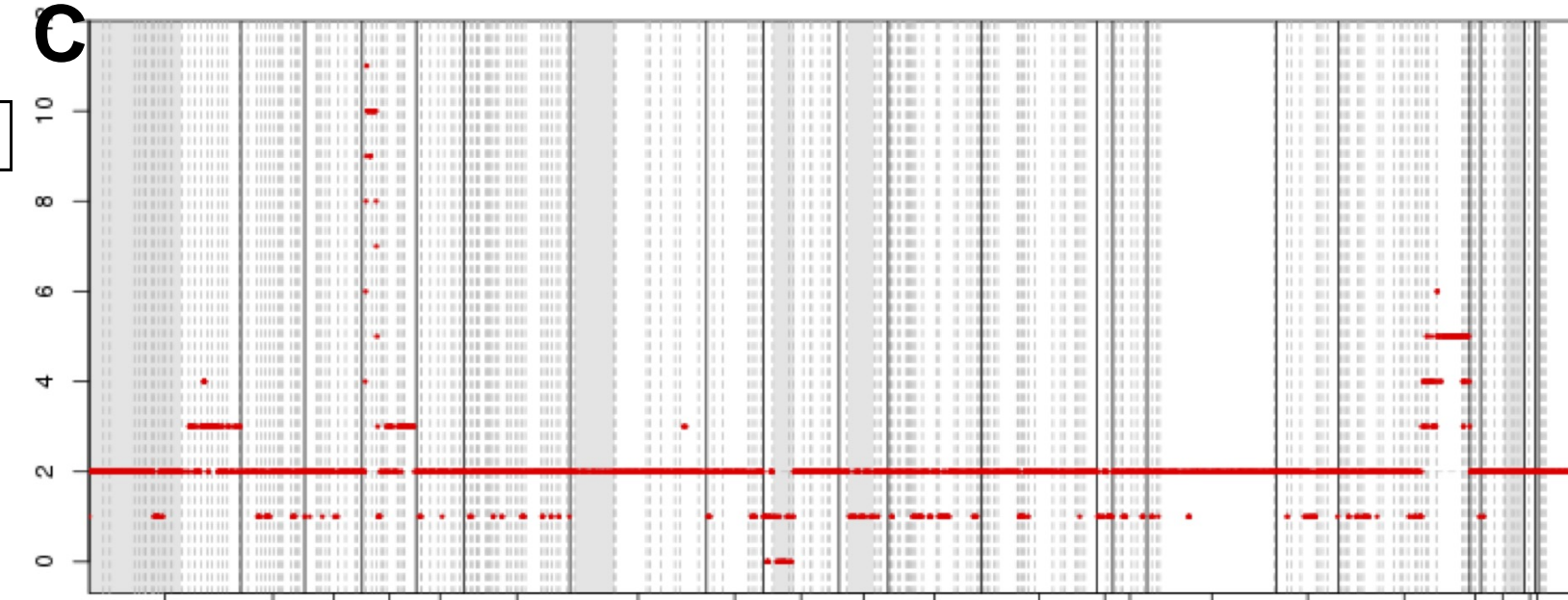
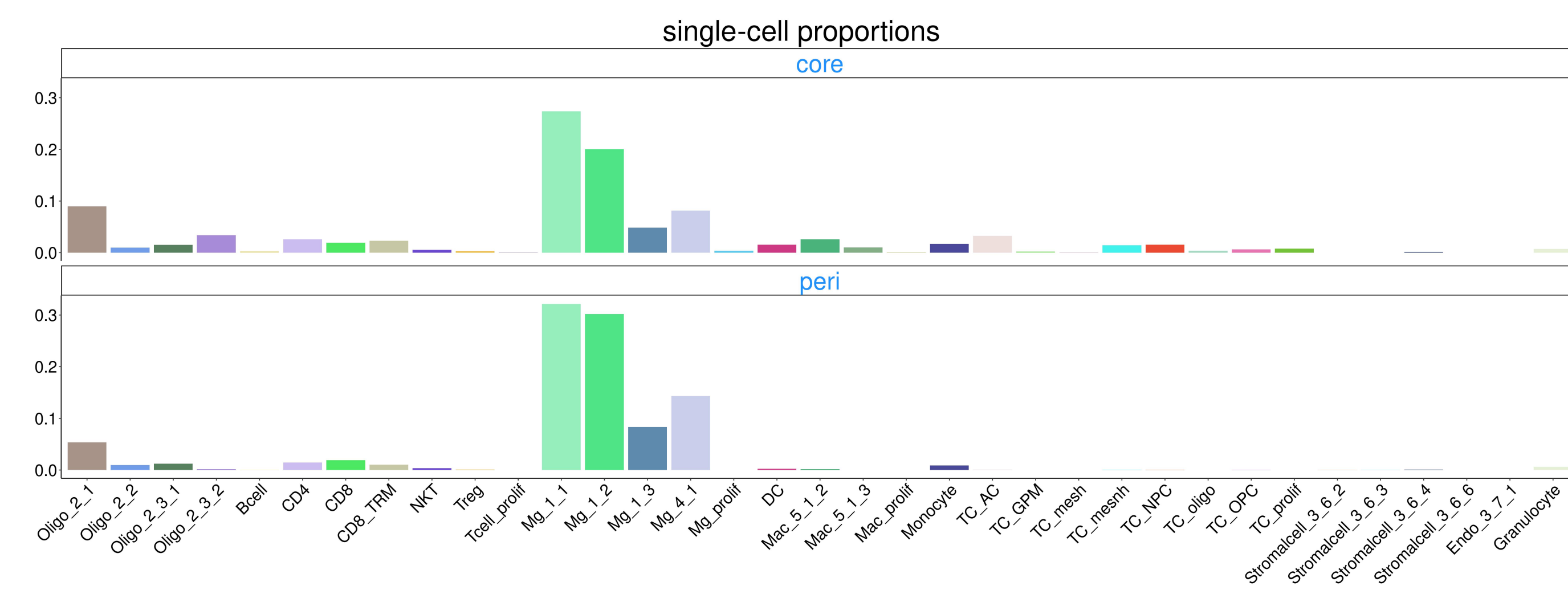
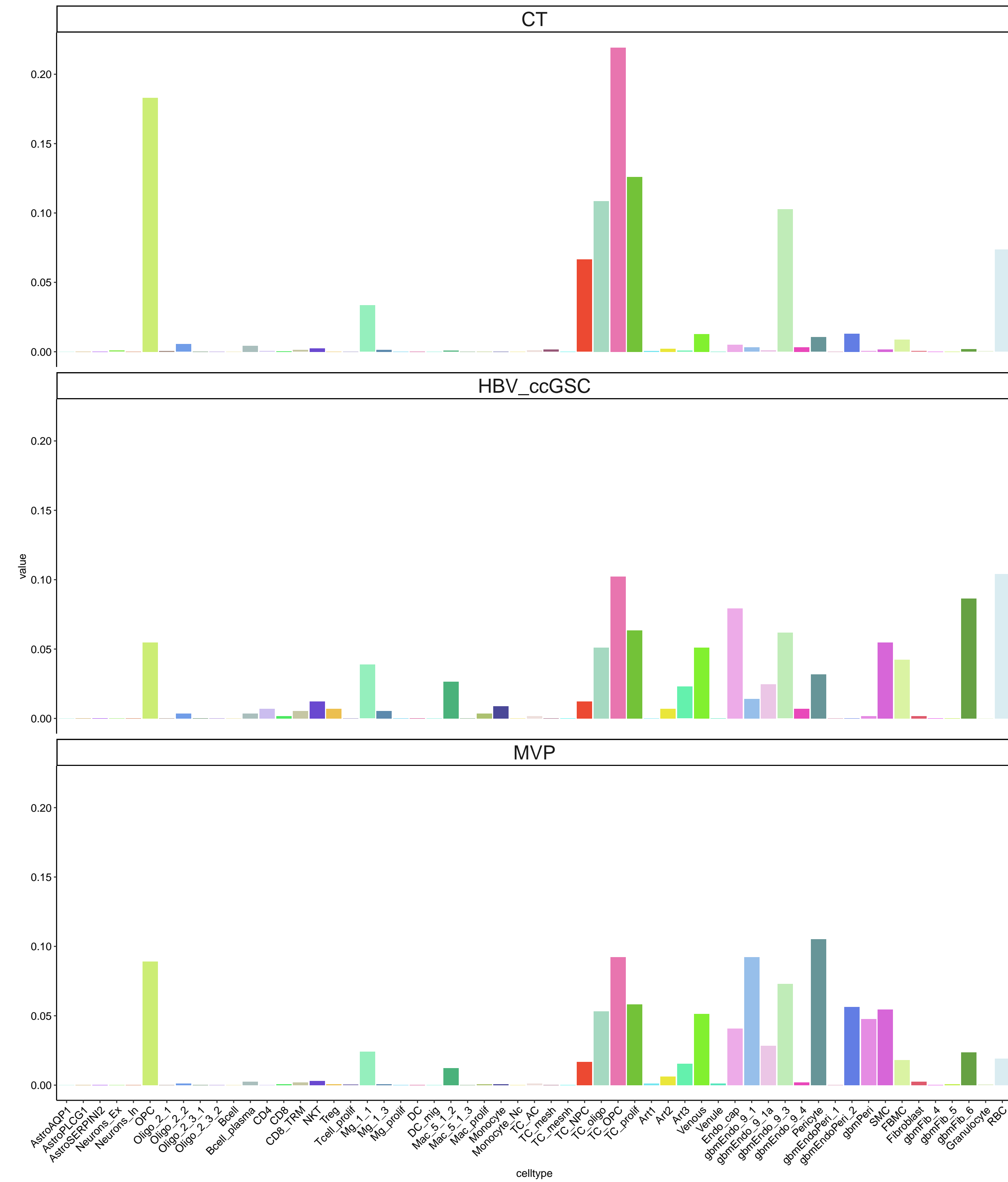




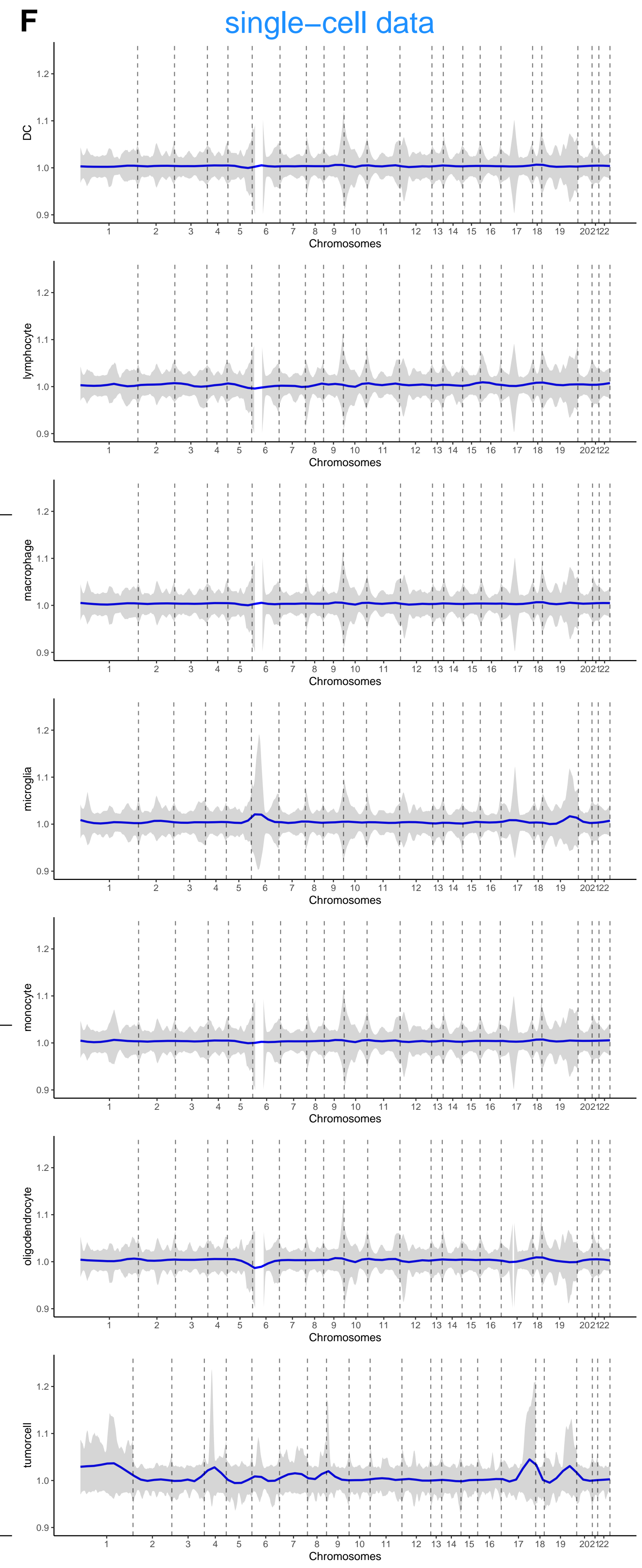
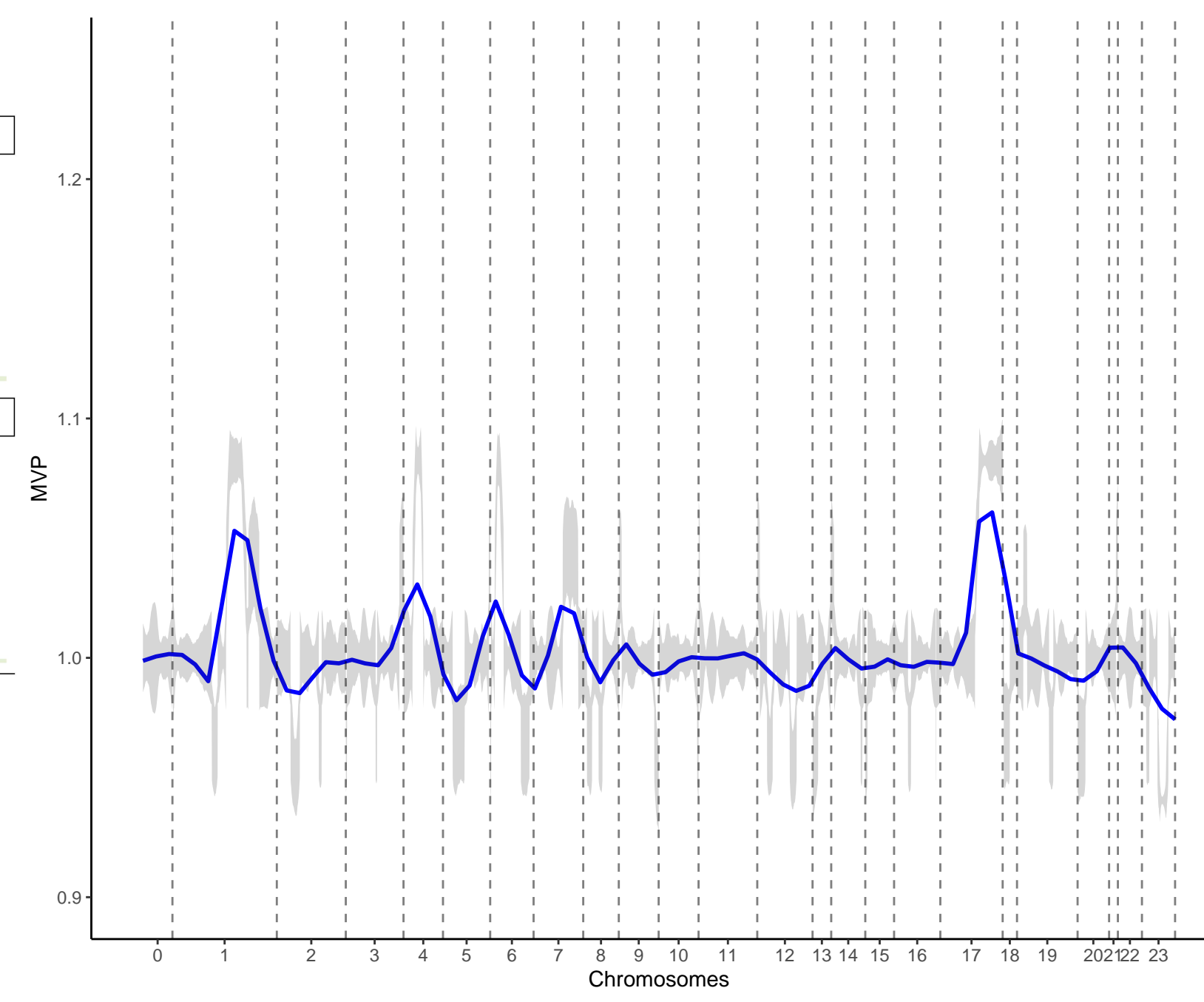
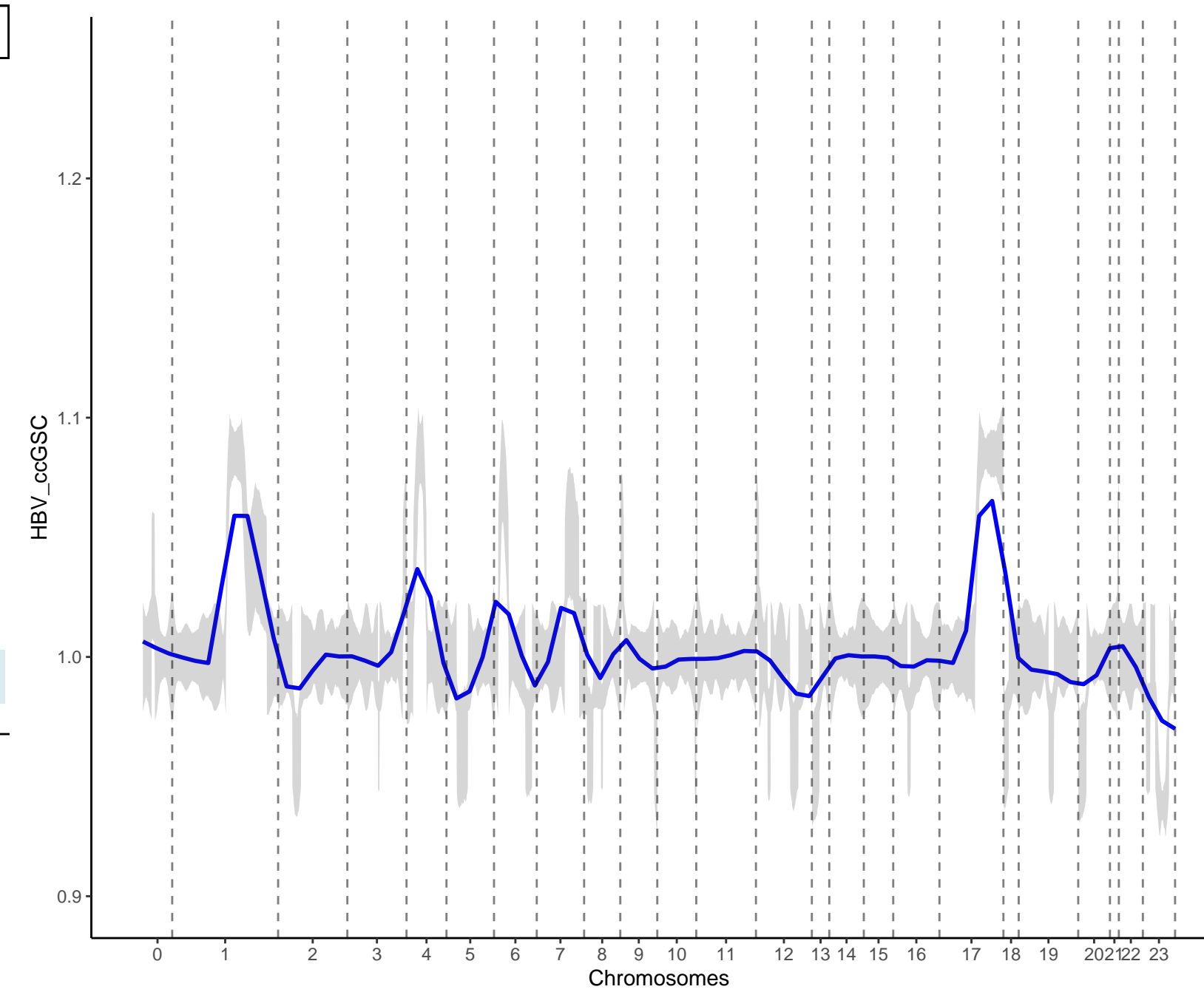
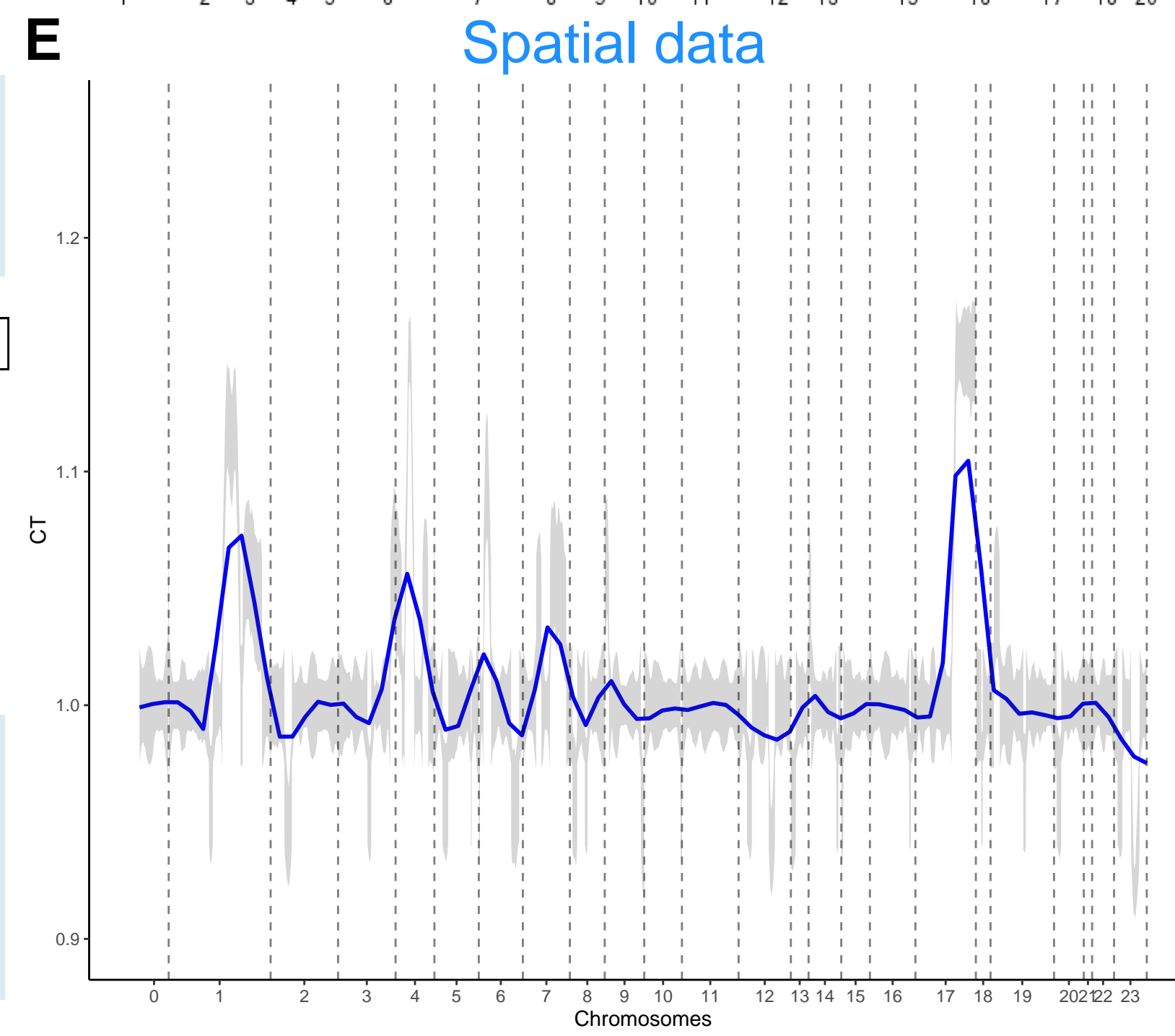
#cells 13729 single-cell cite-seq
SNU33



#spots 3303



Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	amplification
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI1 mutation	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1P mutation	wildtype	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		



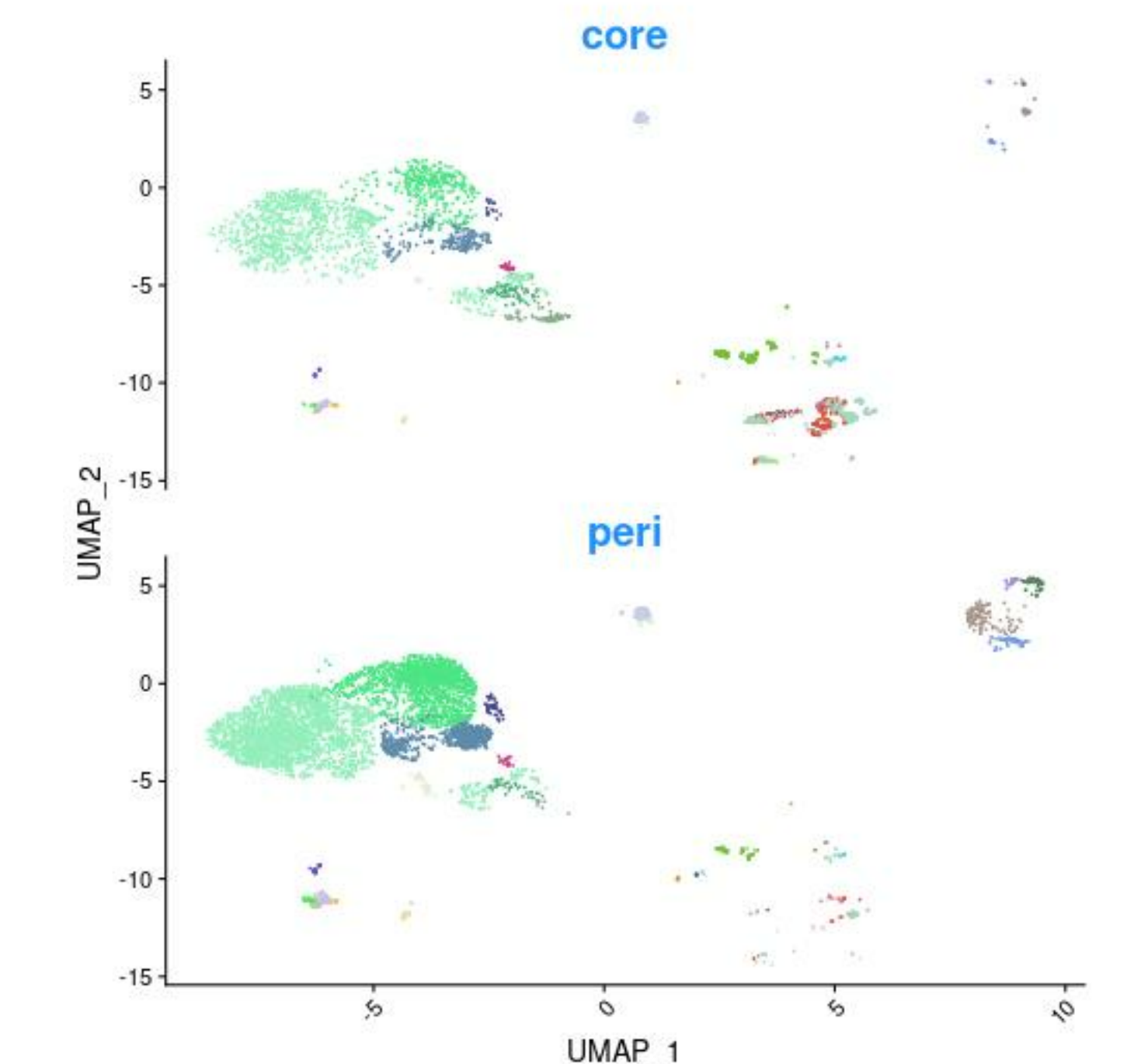
A SNU34A_GBM



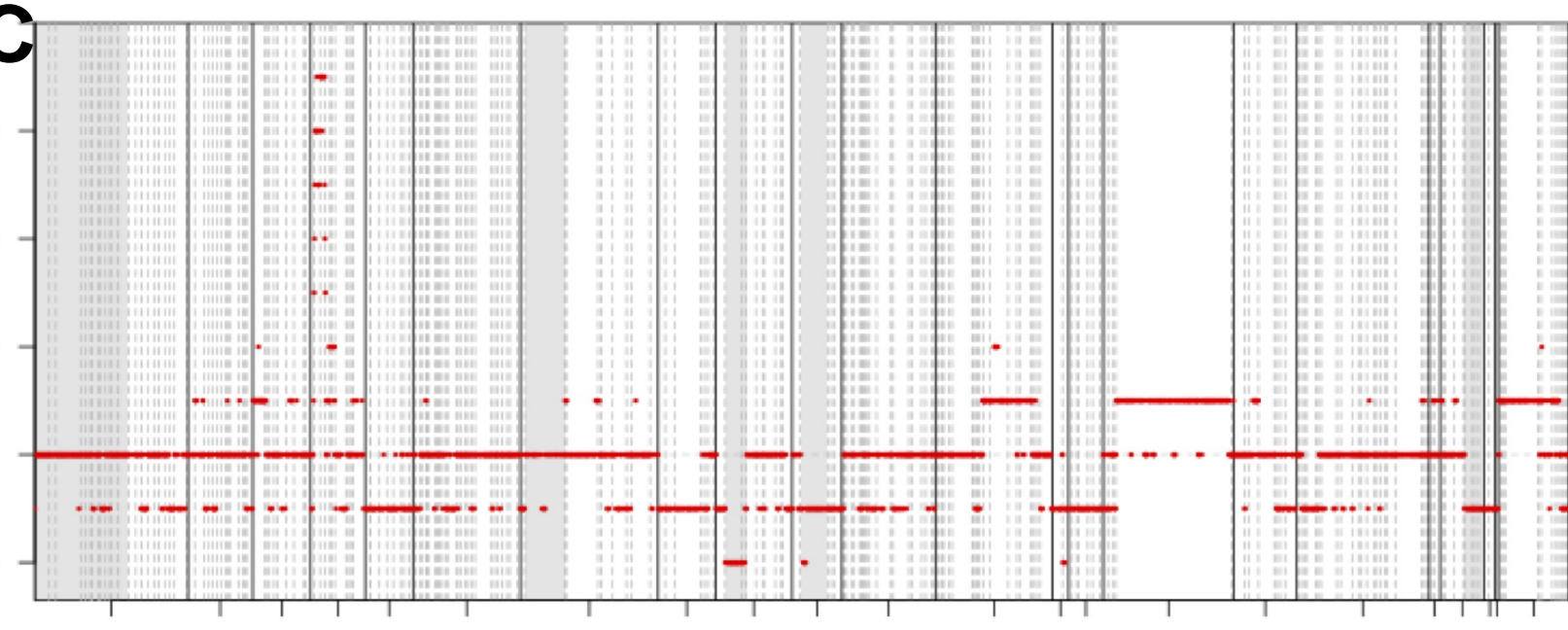
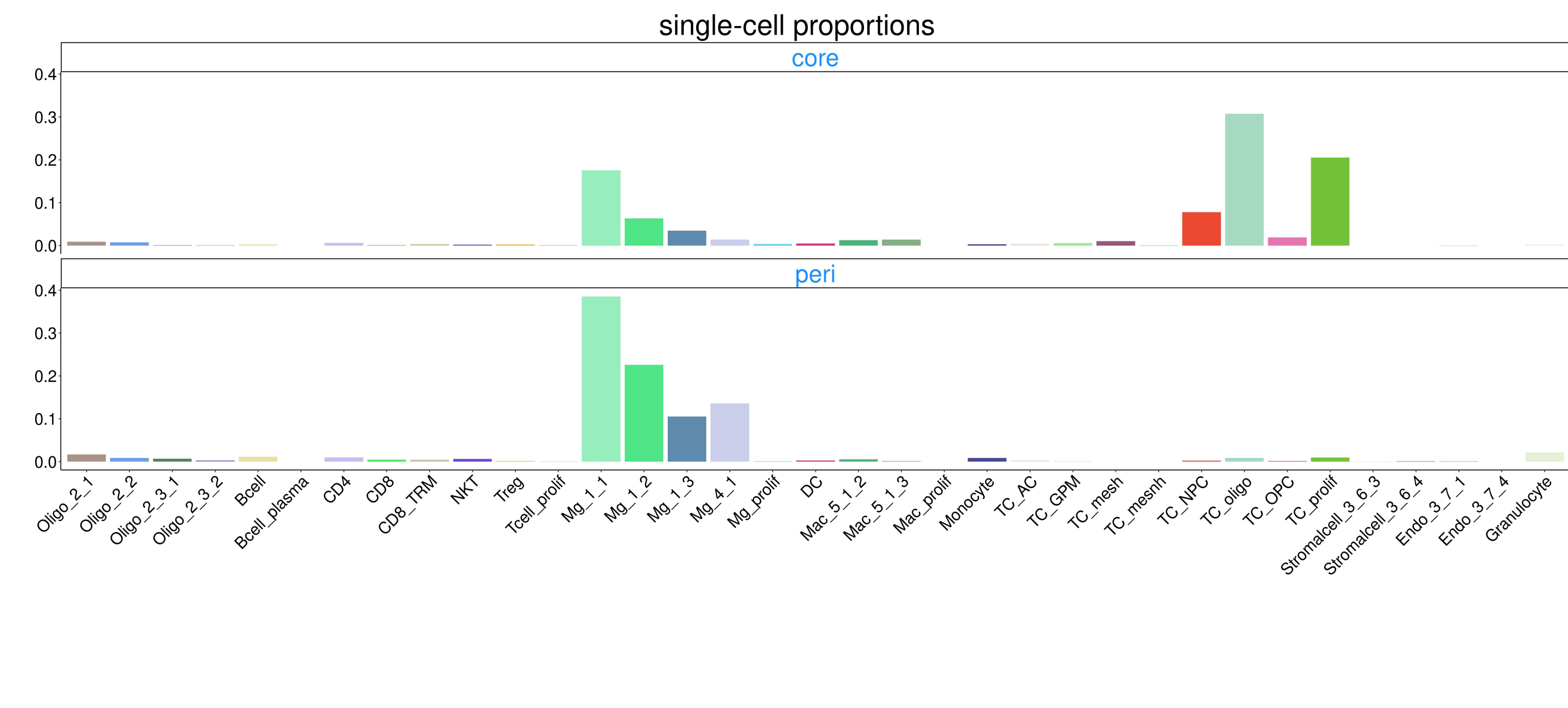
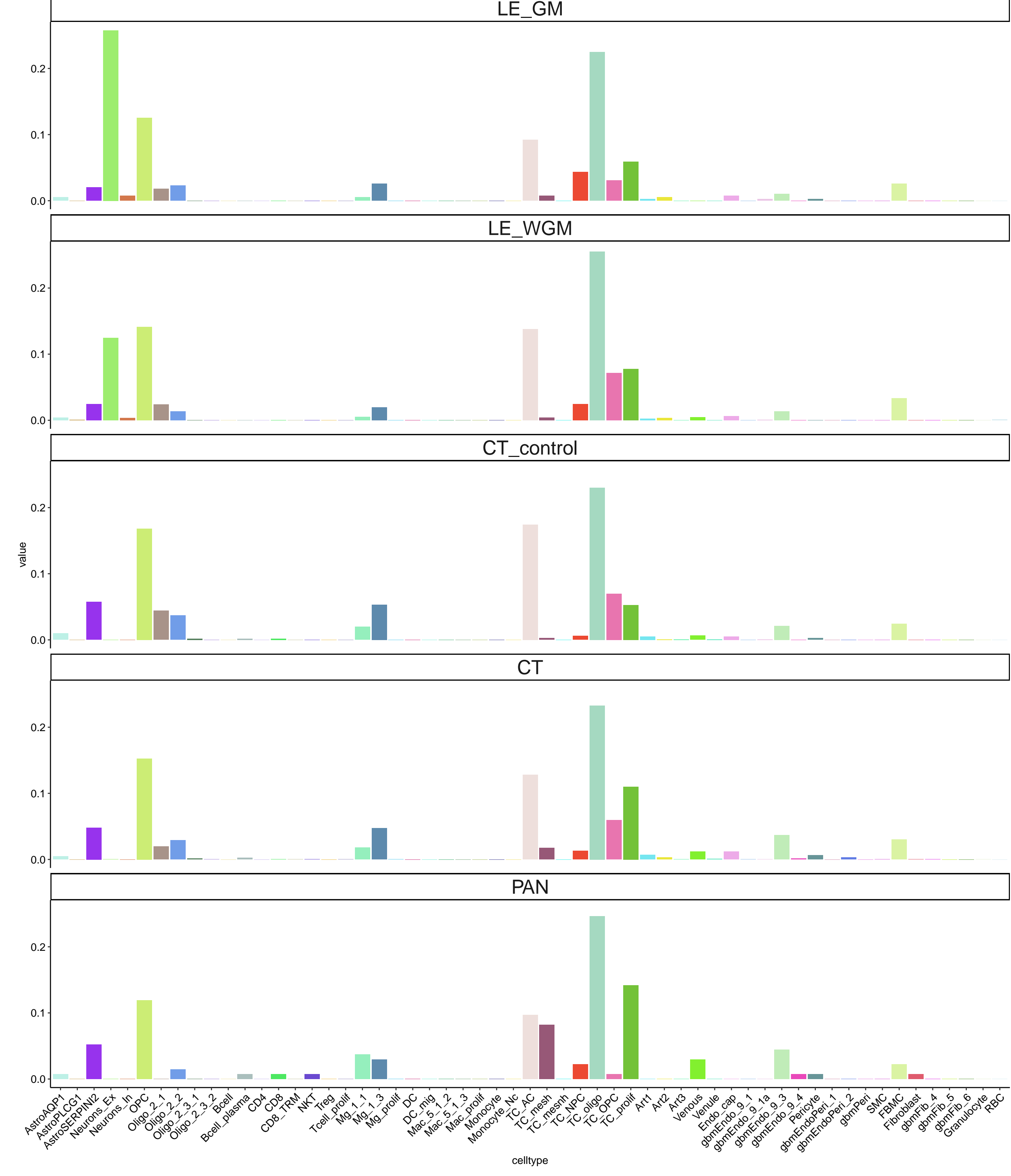
slide 1 of 1



B #cells 12182 single-cell cite-seq SNU34

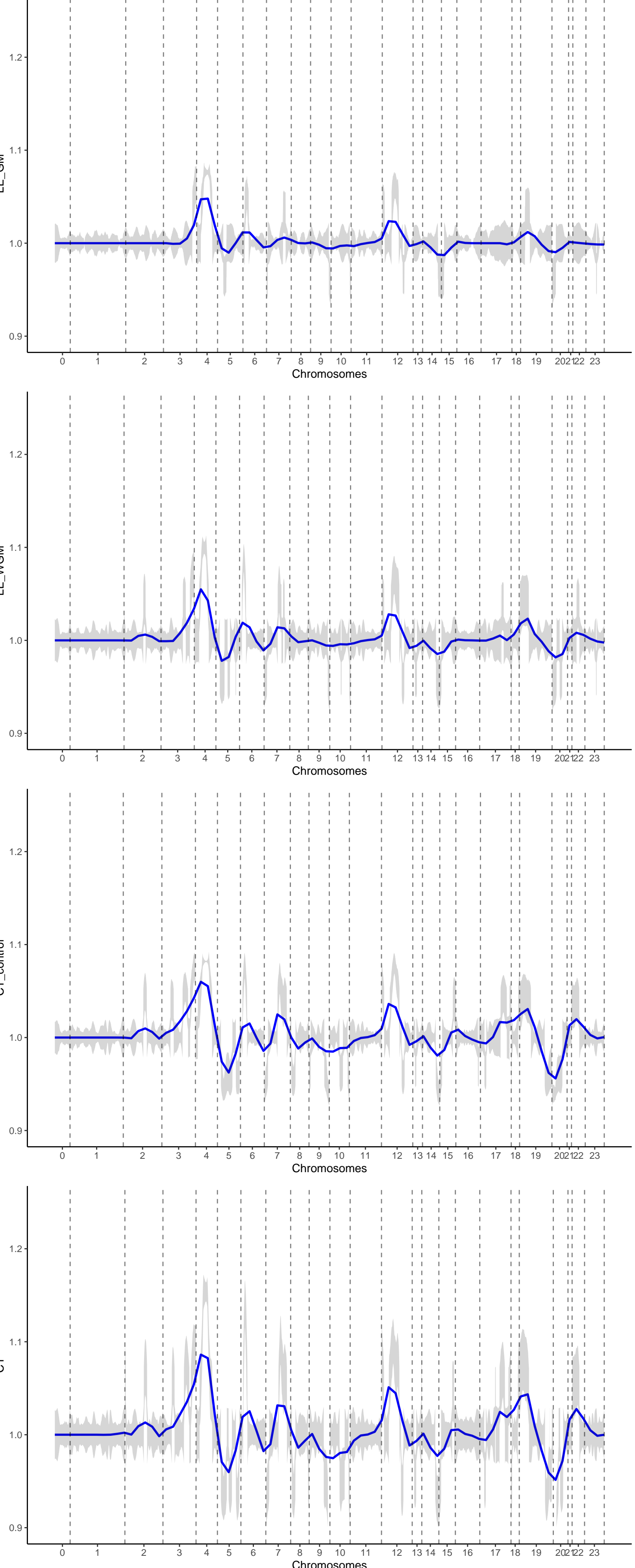


#spots 4794

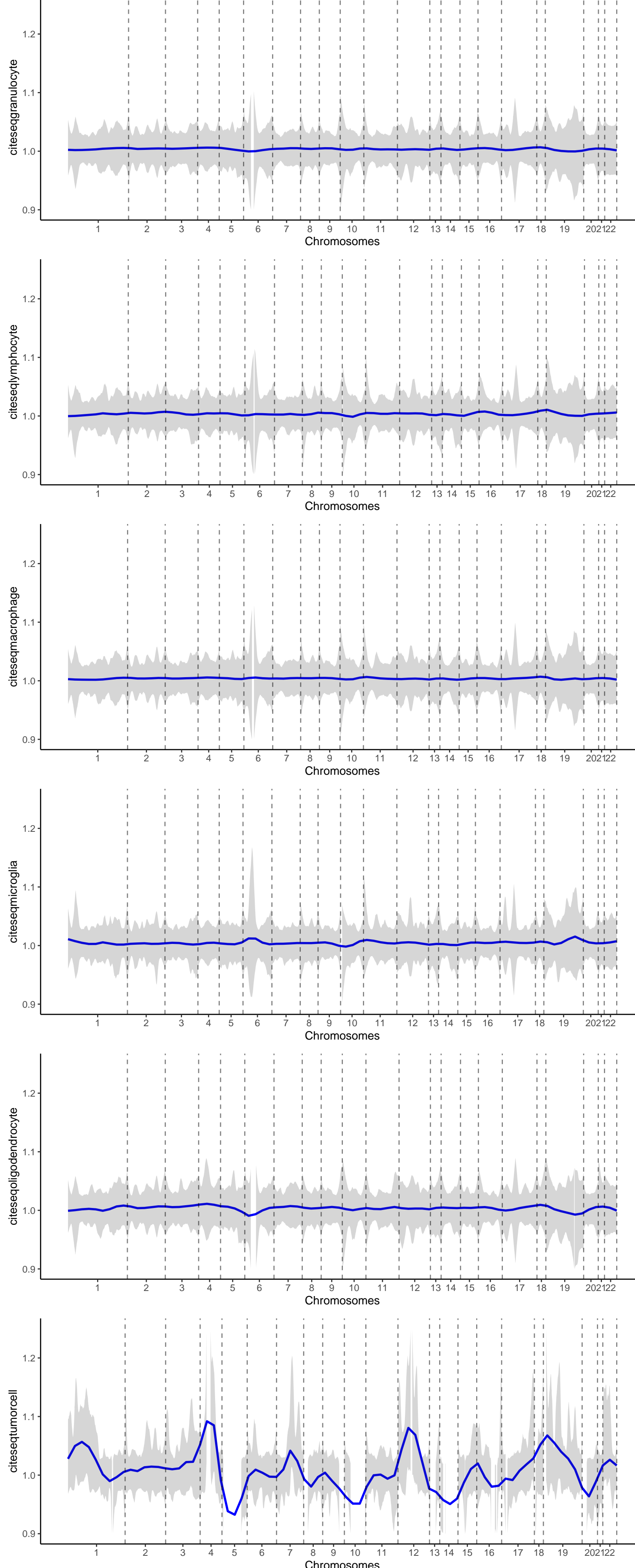


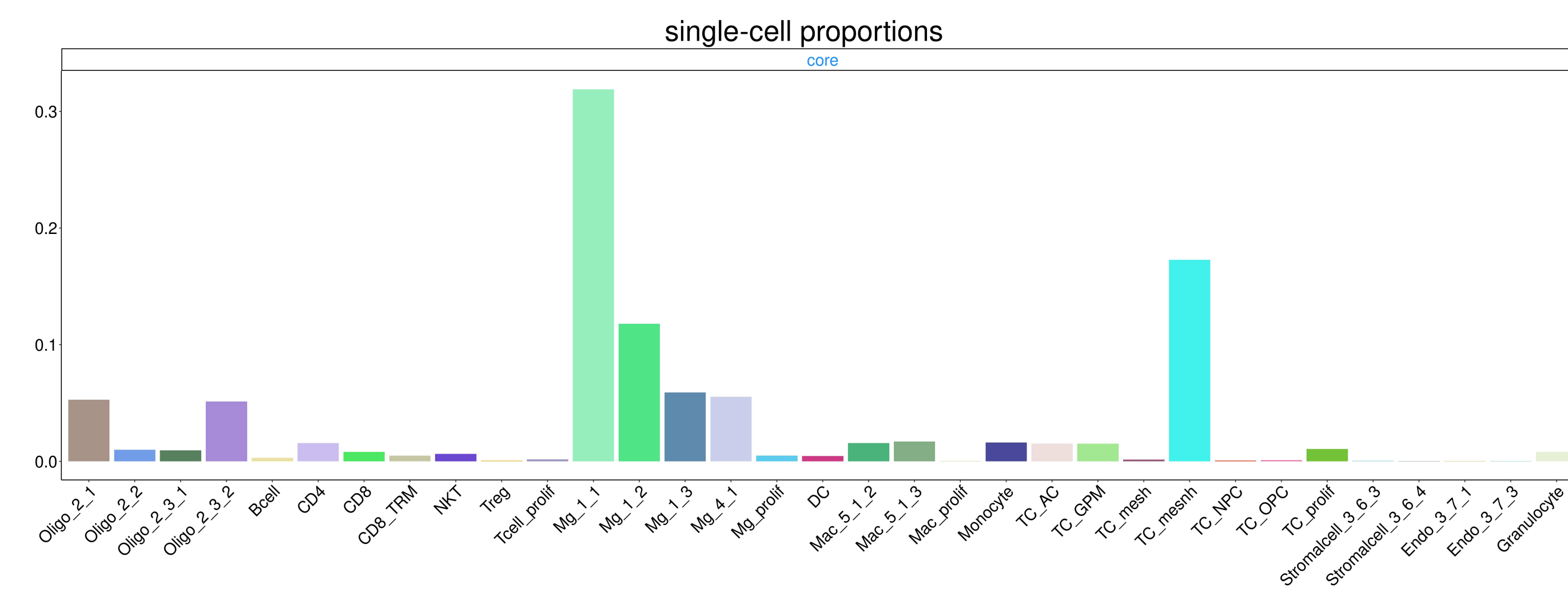
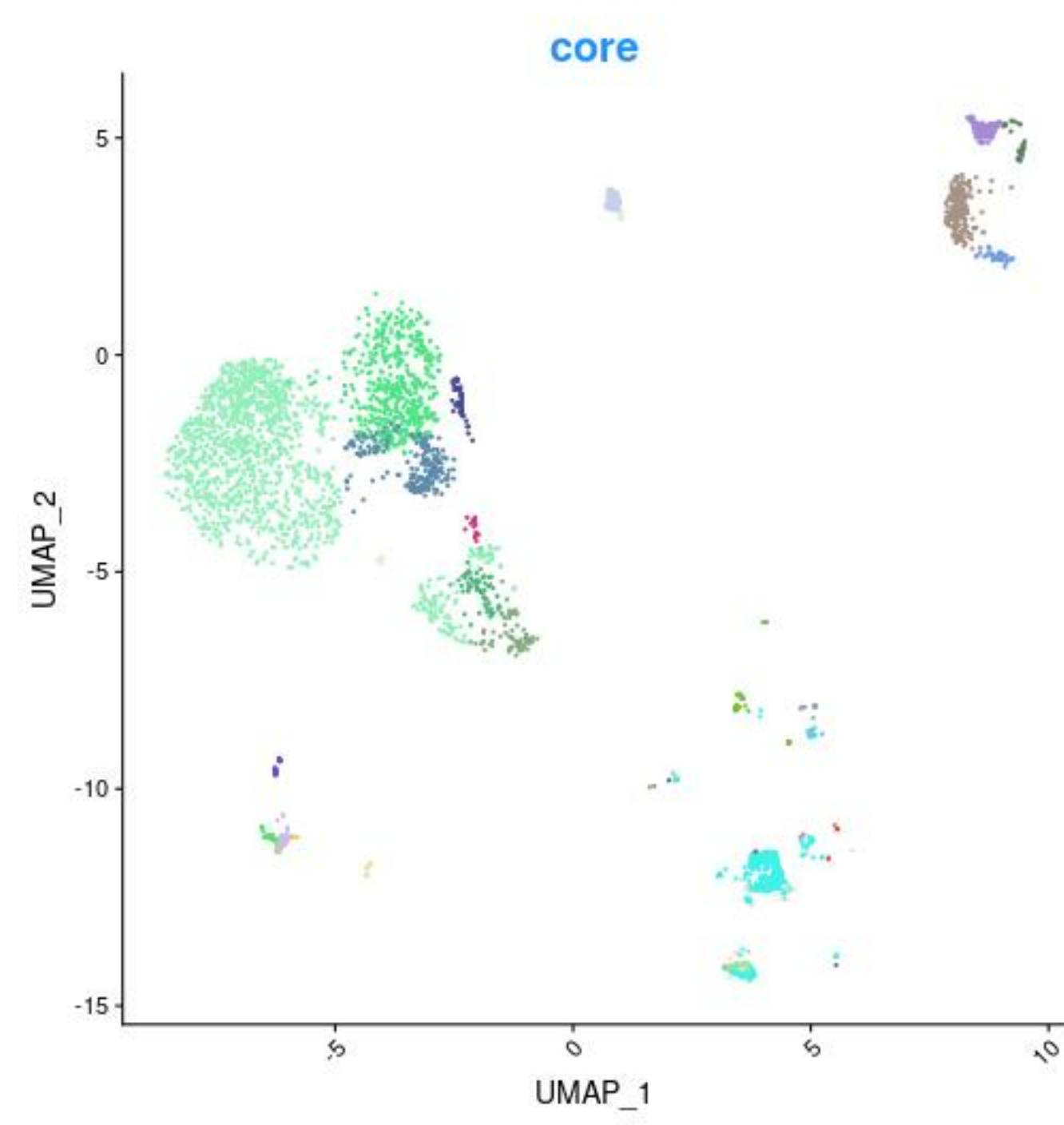
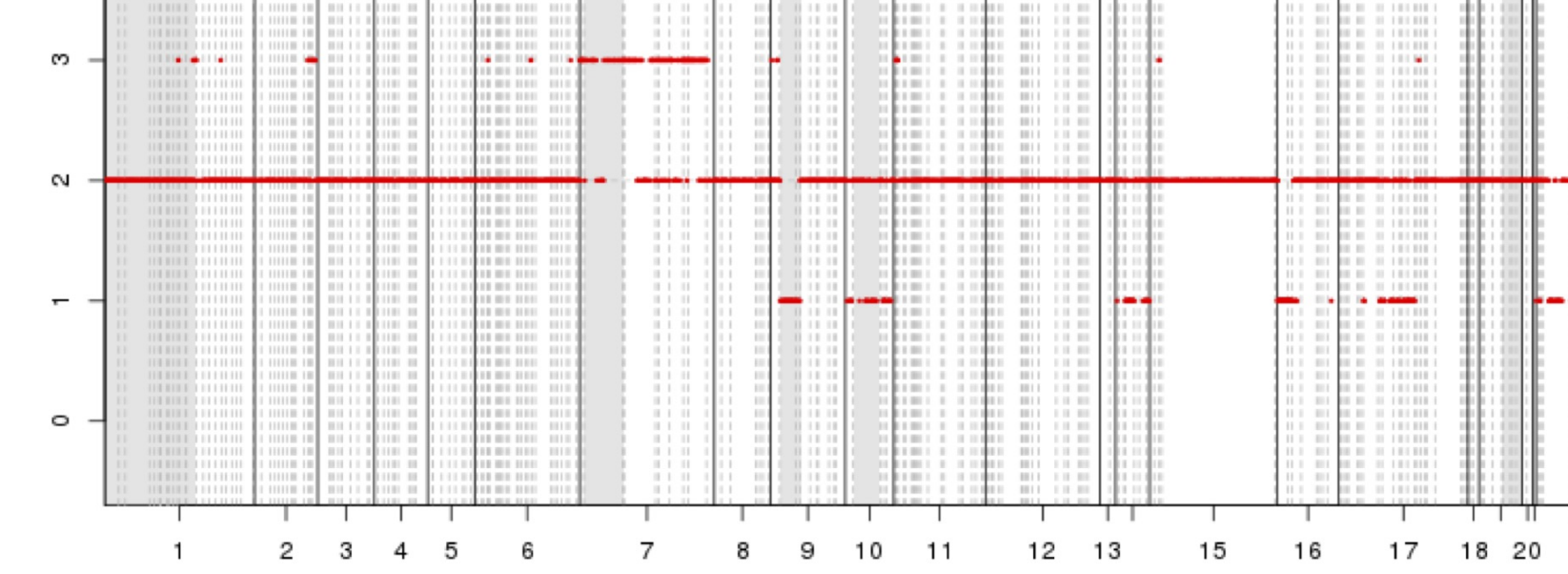
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p/19q	19q only deleted	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	amplification
5p21 (CDKN2A, CDKN2B) deletion	homozygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	NF1 mutation	hemizygous deletion
ATRX mutation	wildtype	NF1 mutation	wildtype
TP53 mutation	mutant (p.Val272Met, c.814G>A)	NF1 deletion	absent
BRAF mutation	wildtype	NF2 mutation	wildtype
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

E Spatial data

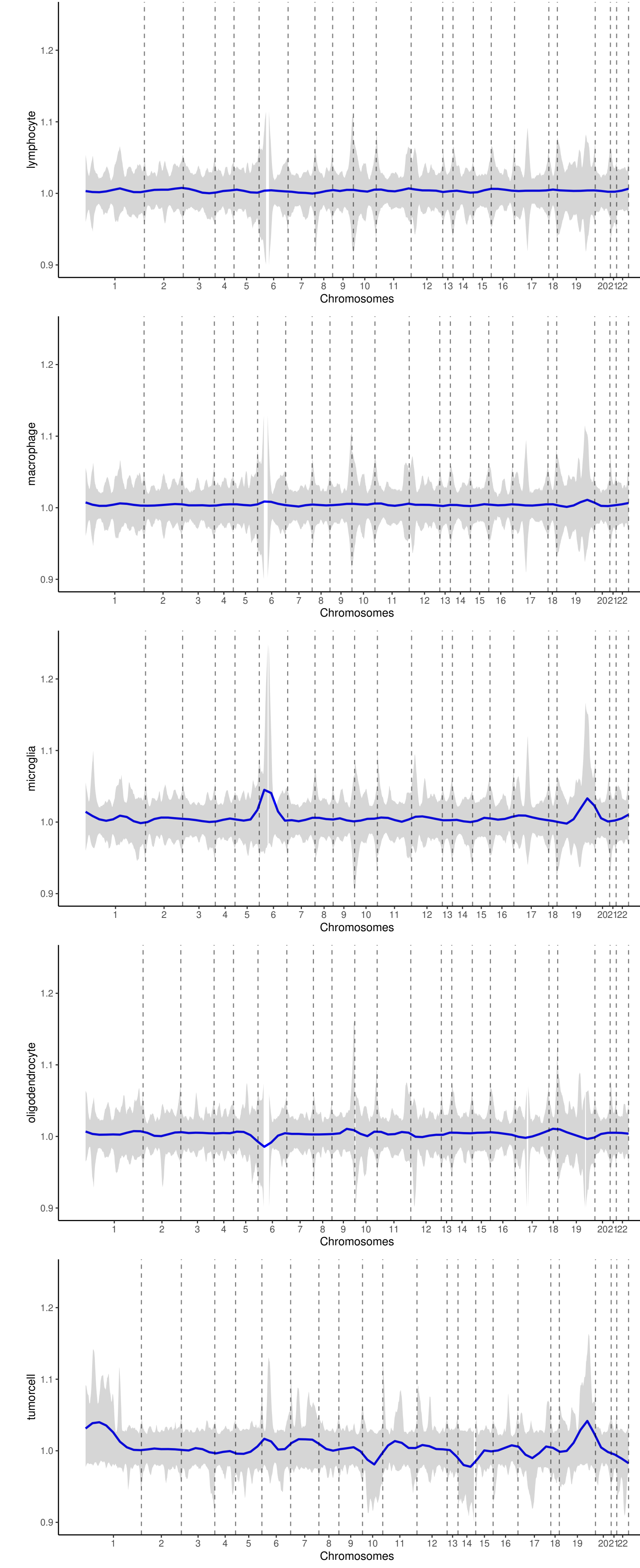


F single-cell data



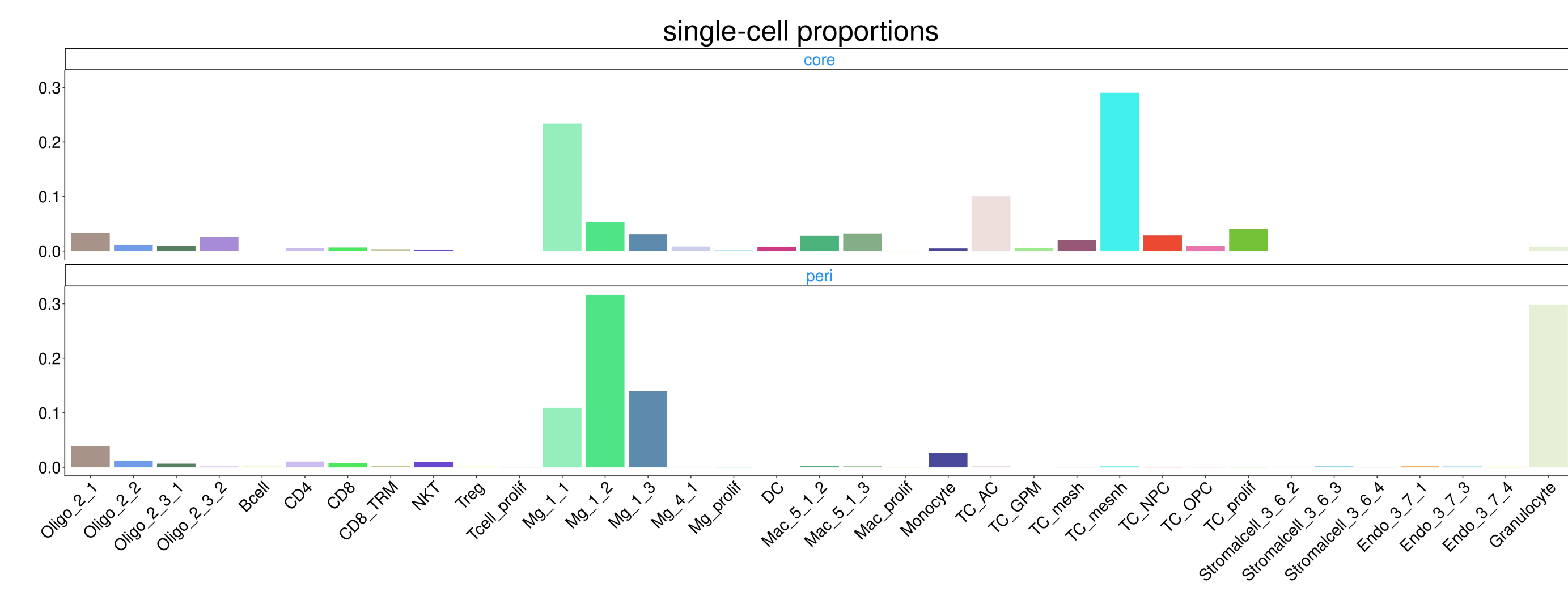
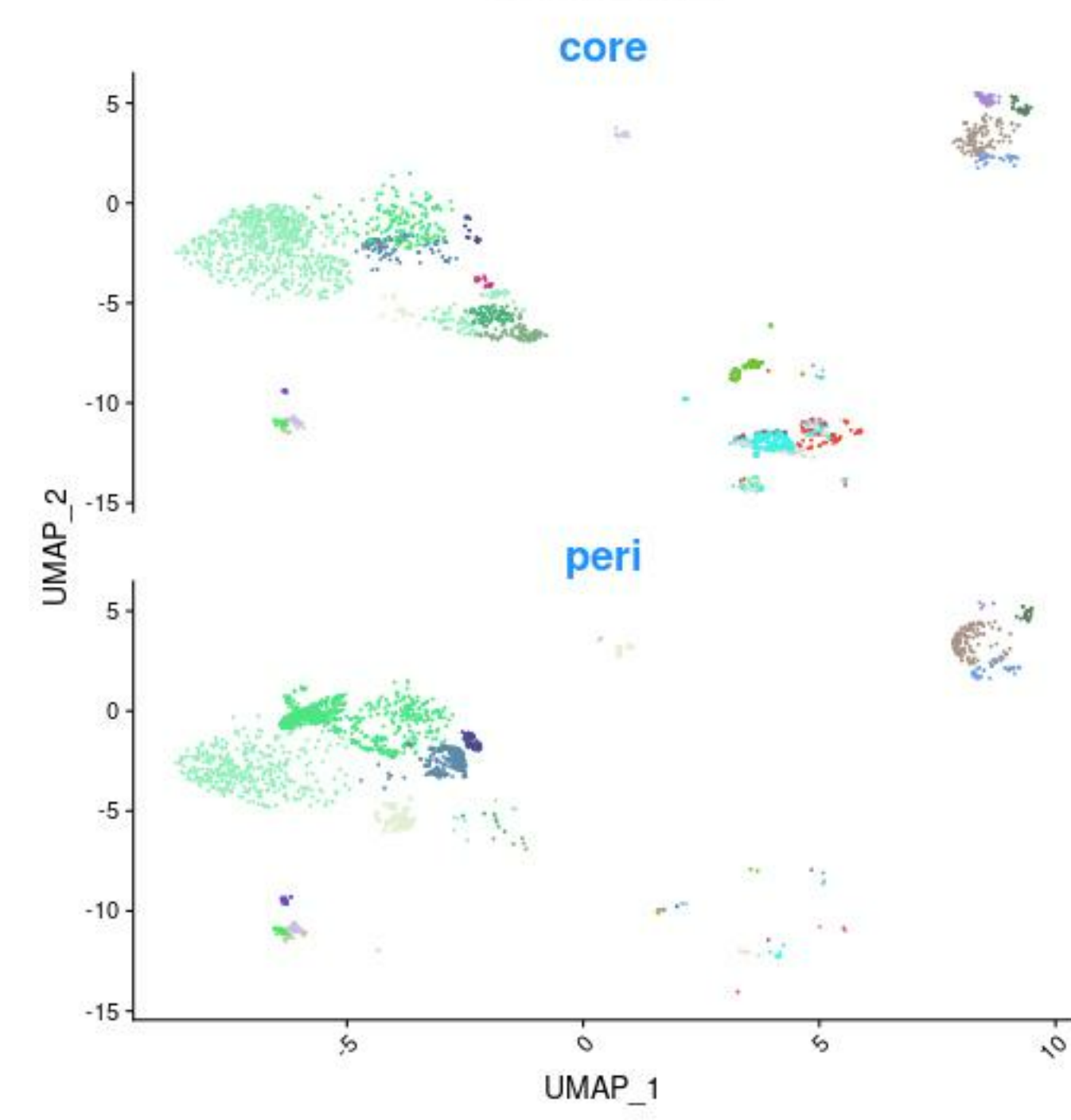
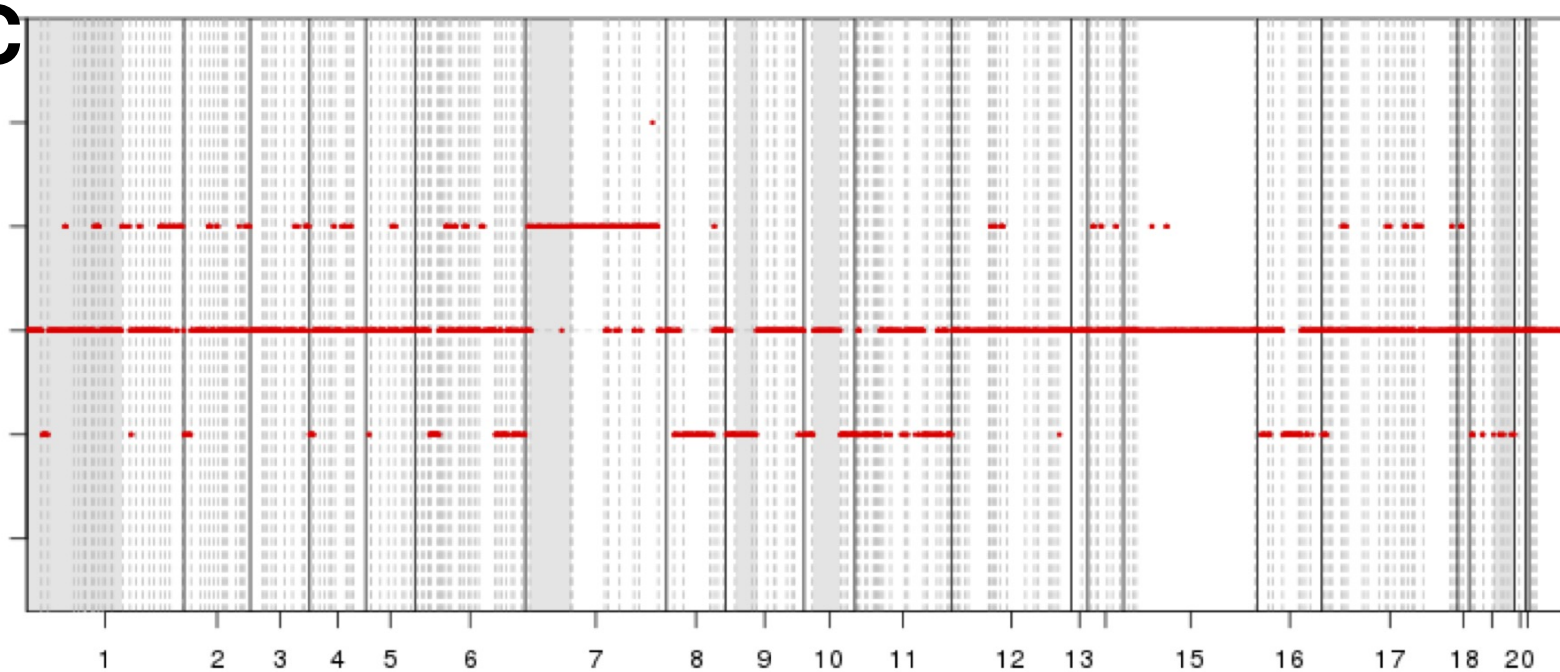
A**B** #cells 3943 single-cell umap**C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	mutant (p.Lys1299fs, c.3896_3897delAAinsT)
TERP mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

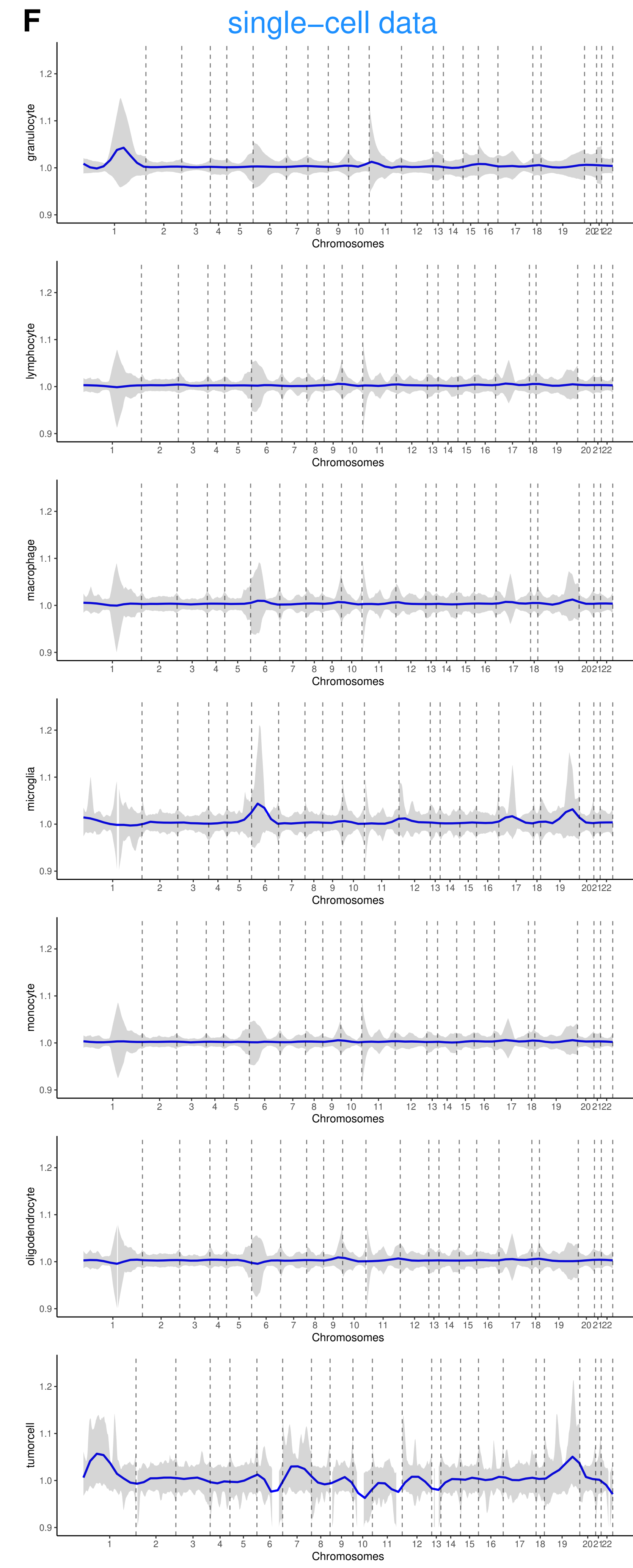
F

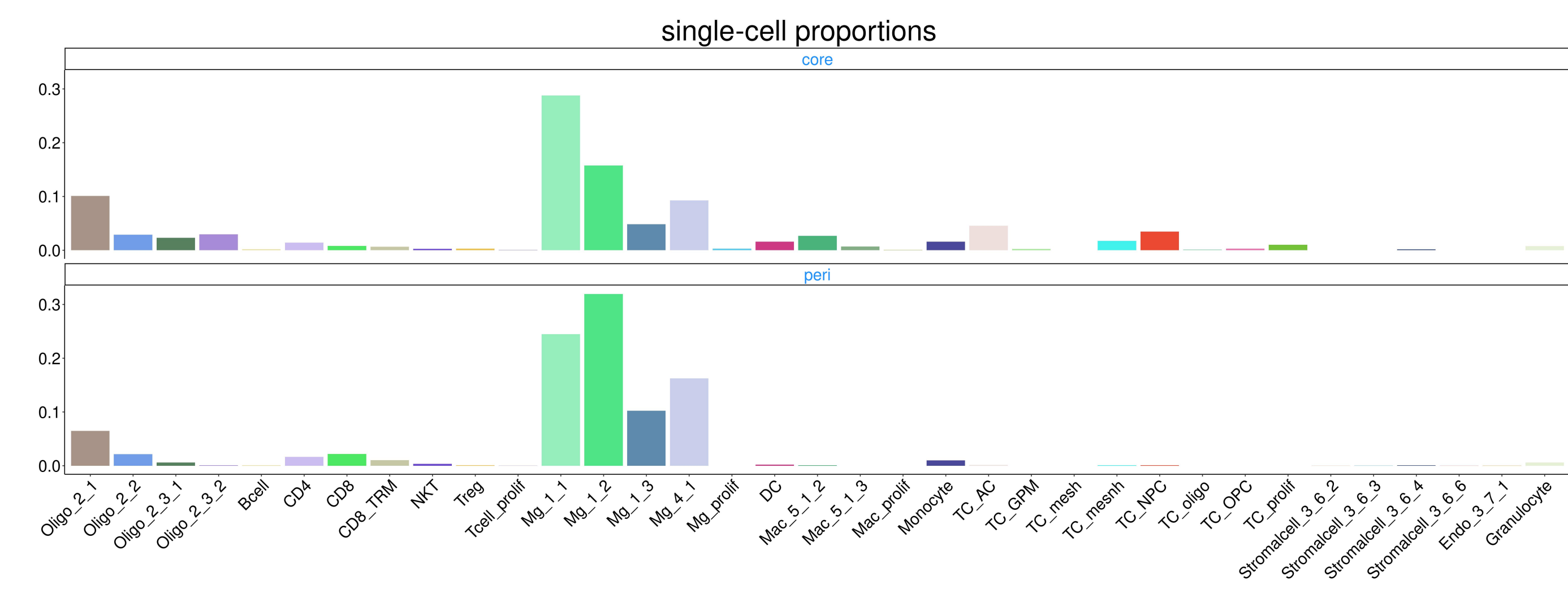
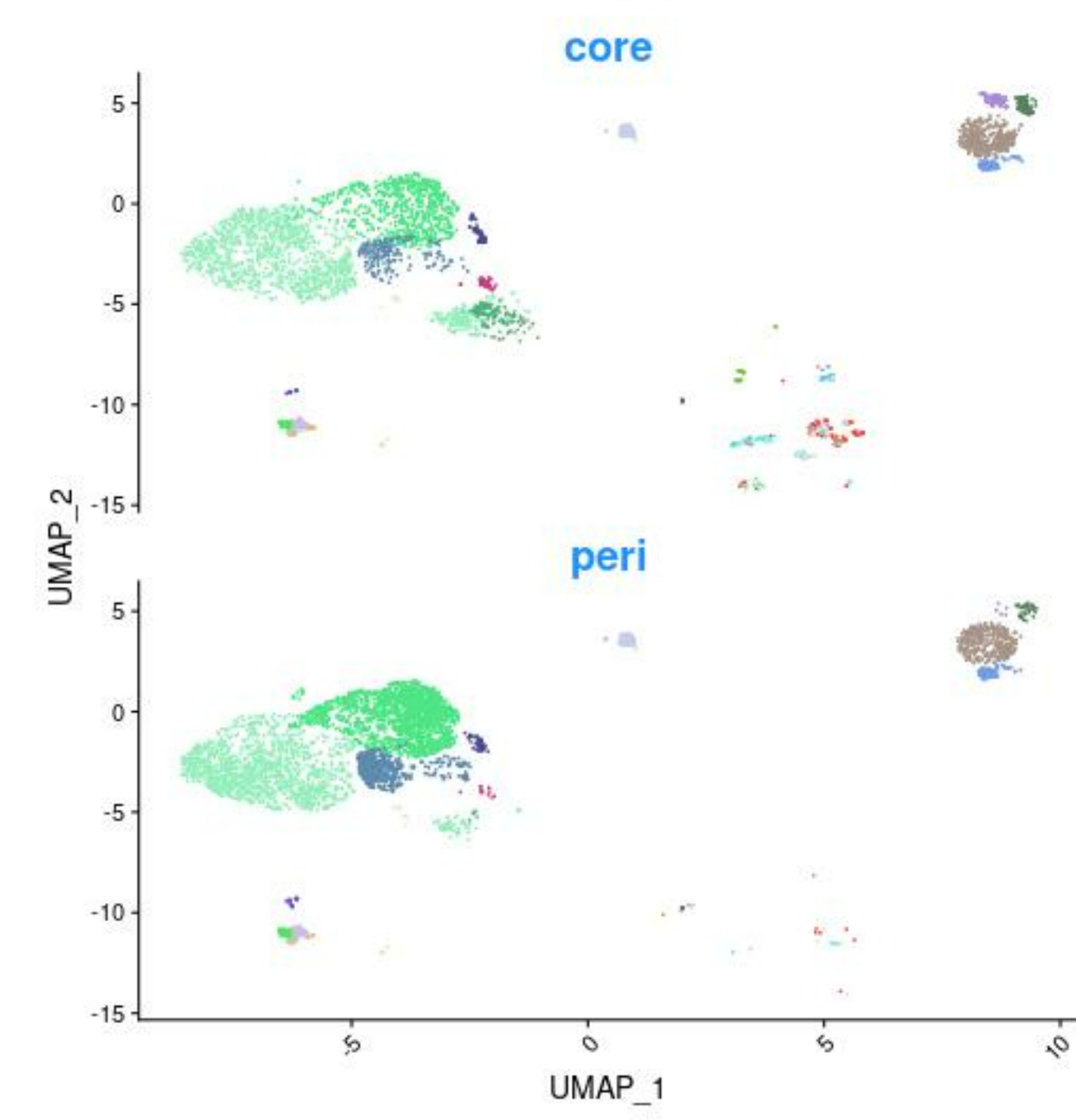
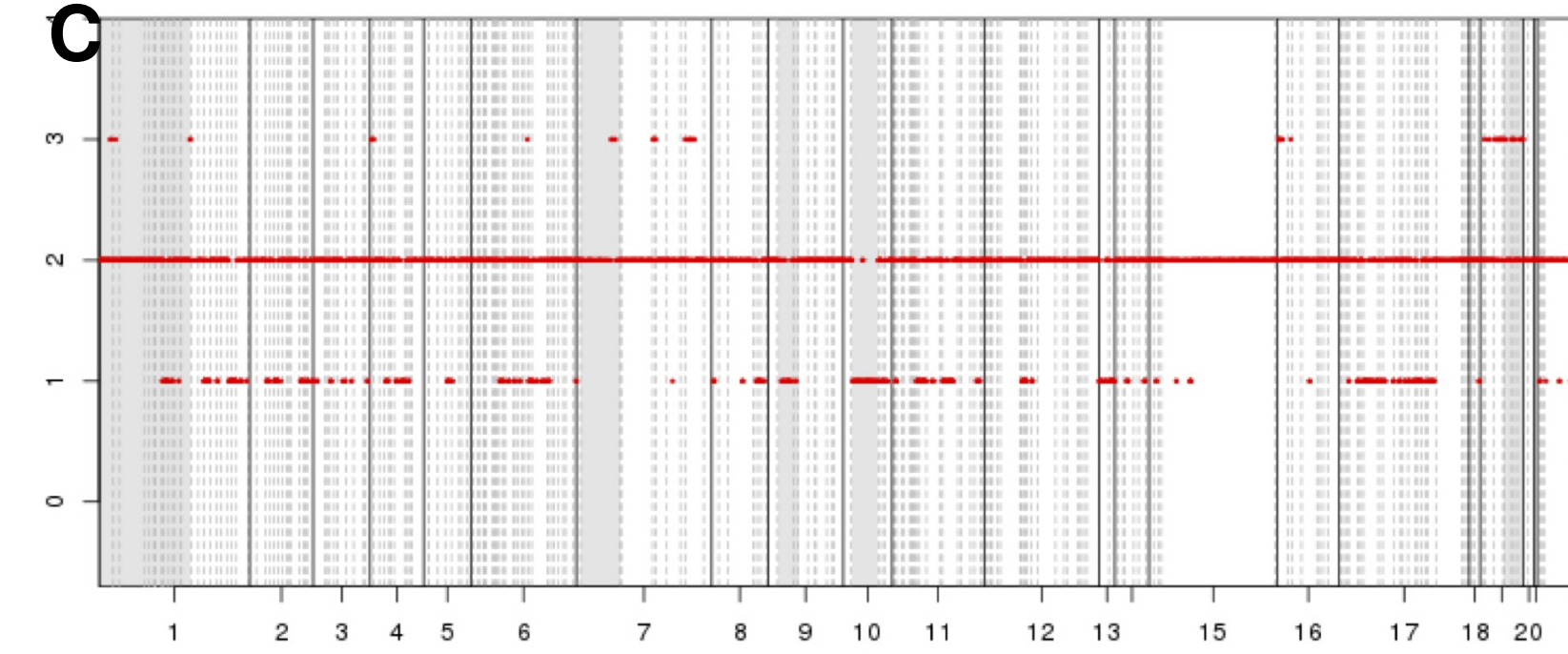
A

B #cells 6434 single-cell umap
SNU32

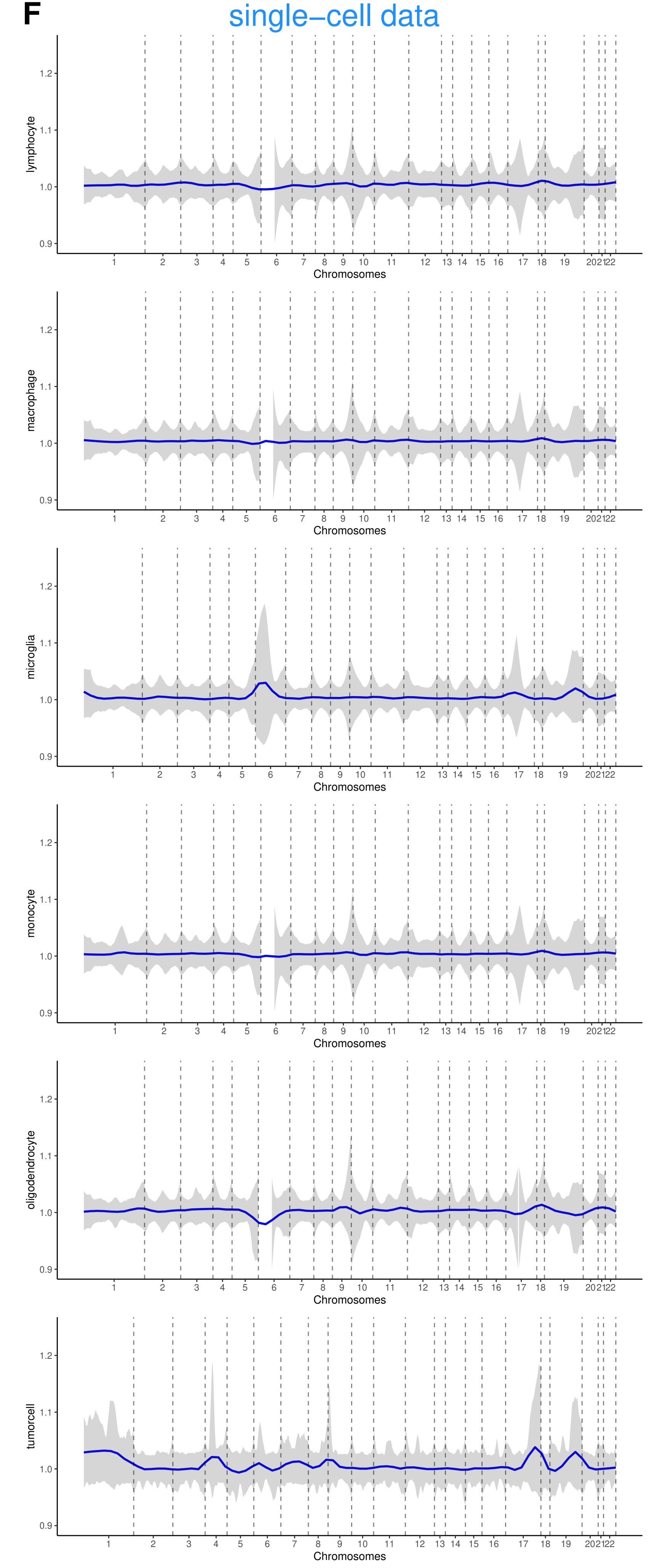
**C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	mutant (p.Tyr2285fs, c.6852_6855delTTAC)
TERP mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

F

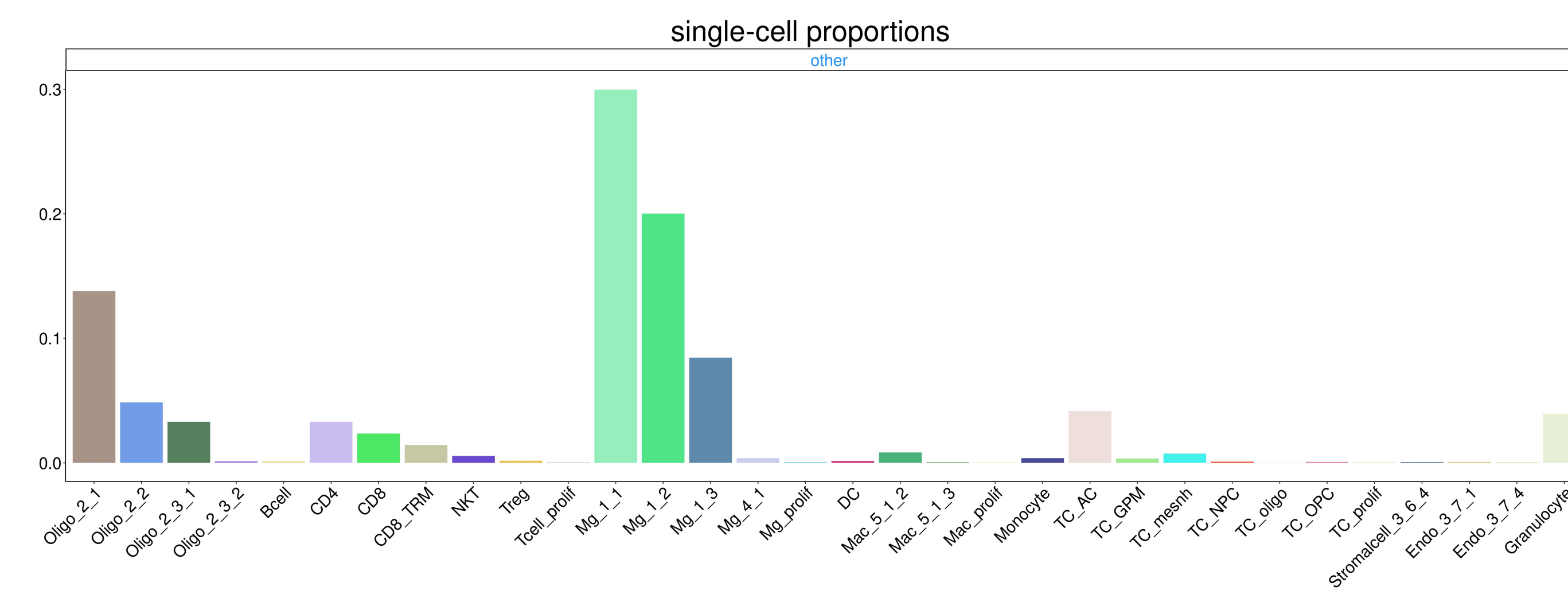
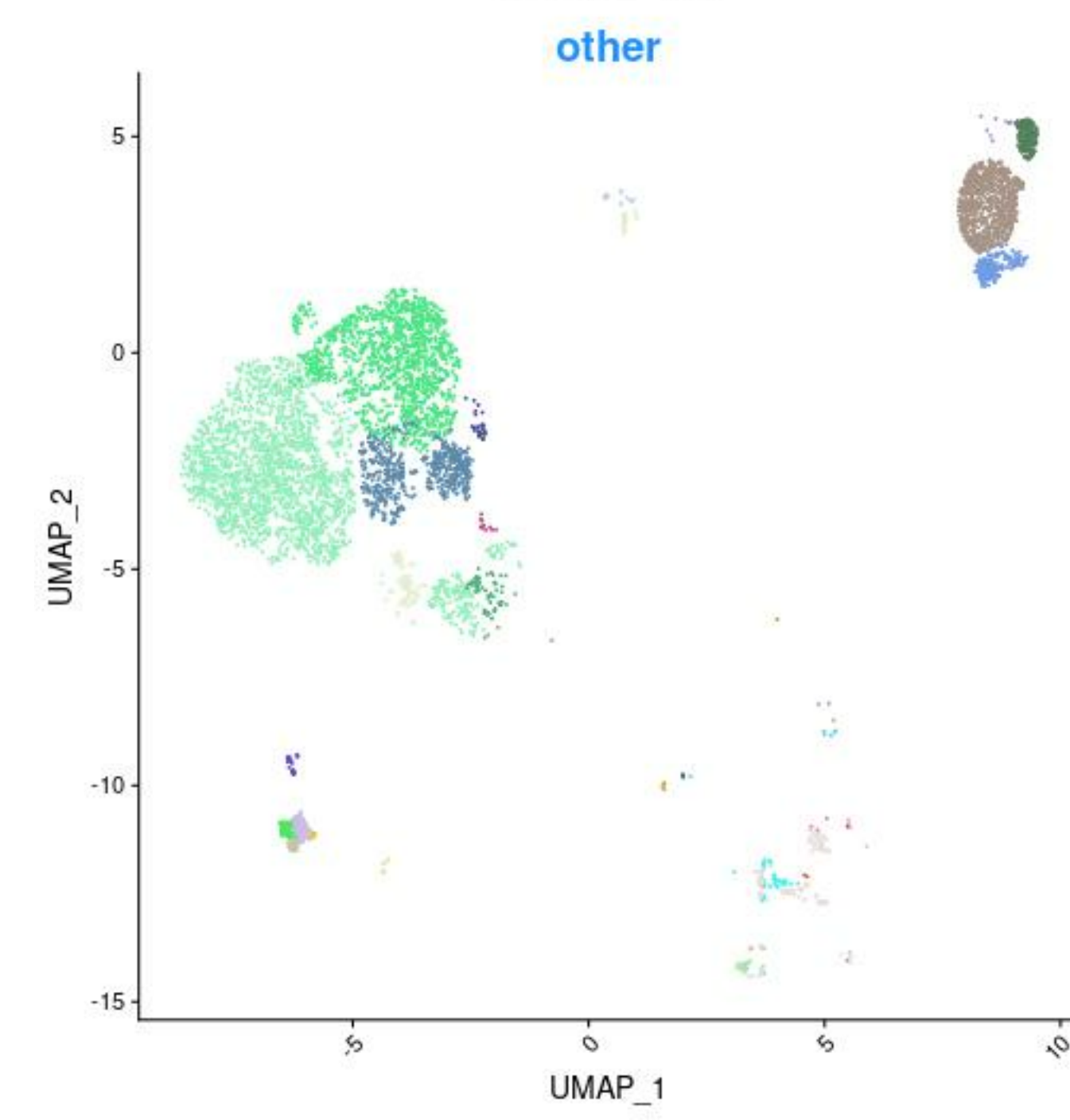
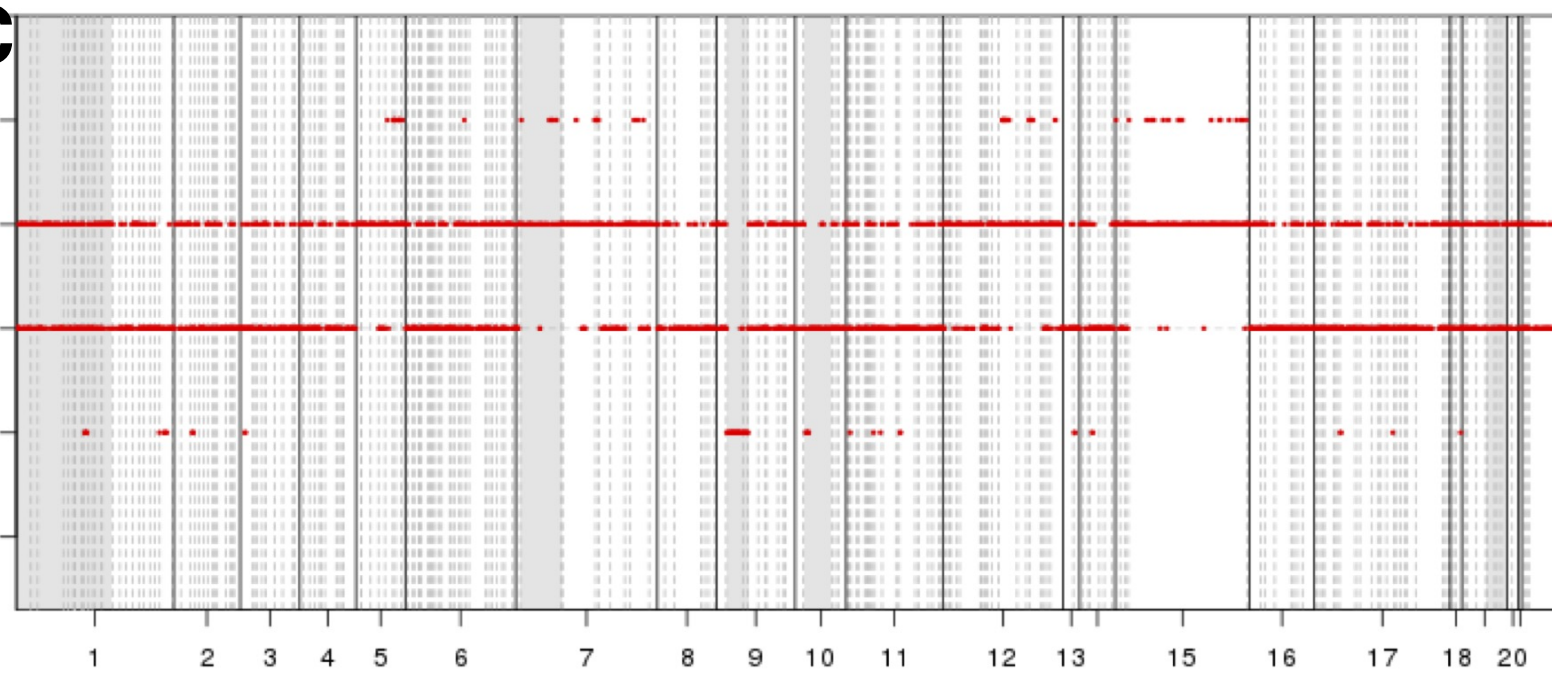
A**B #cells 9849 single-cell umap****C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI mutation	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

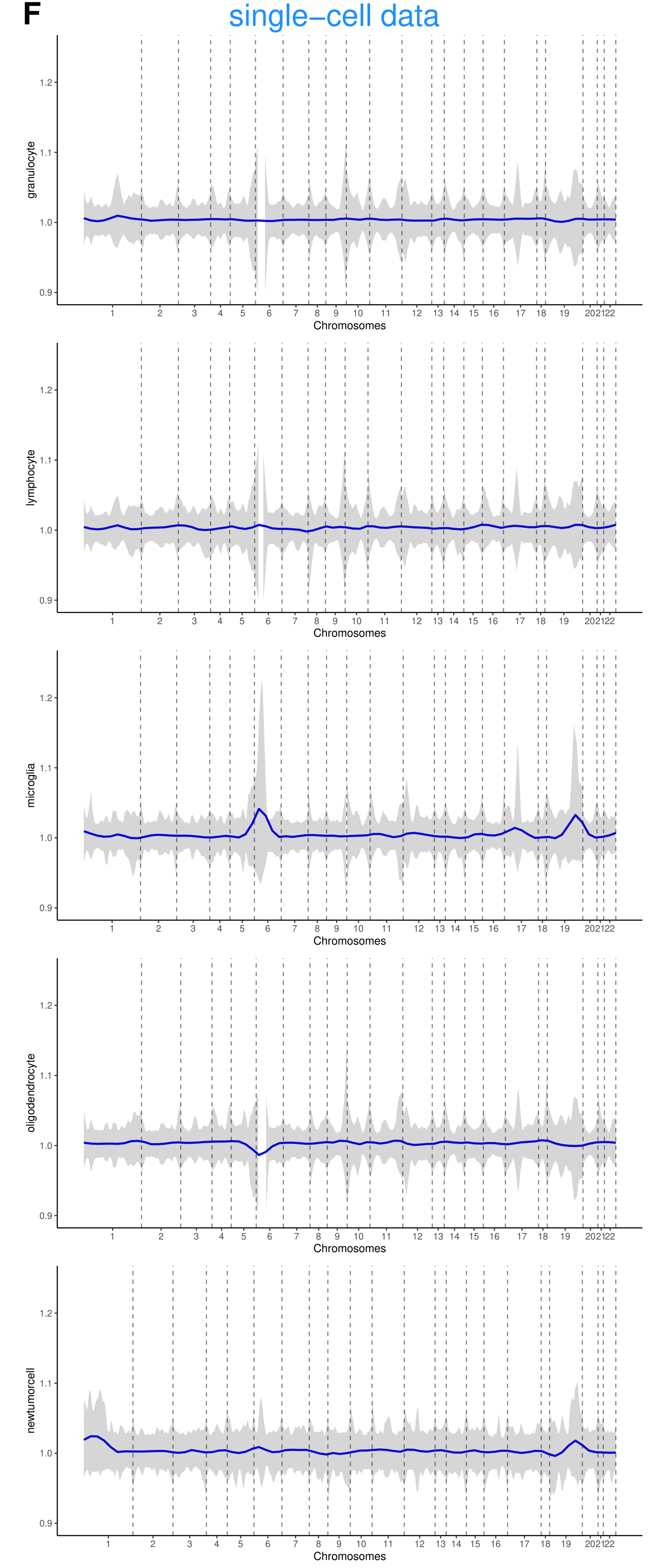
F

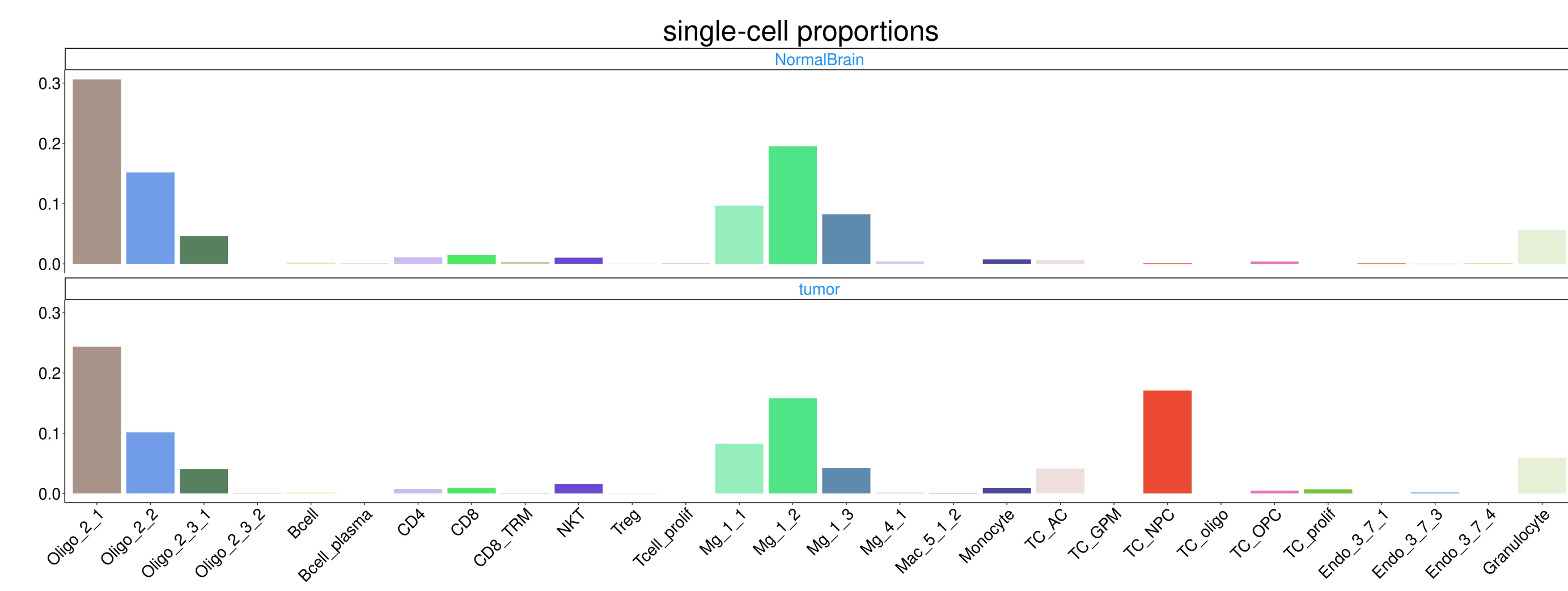
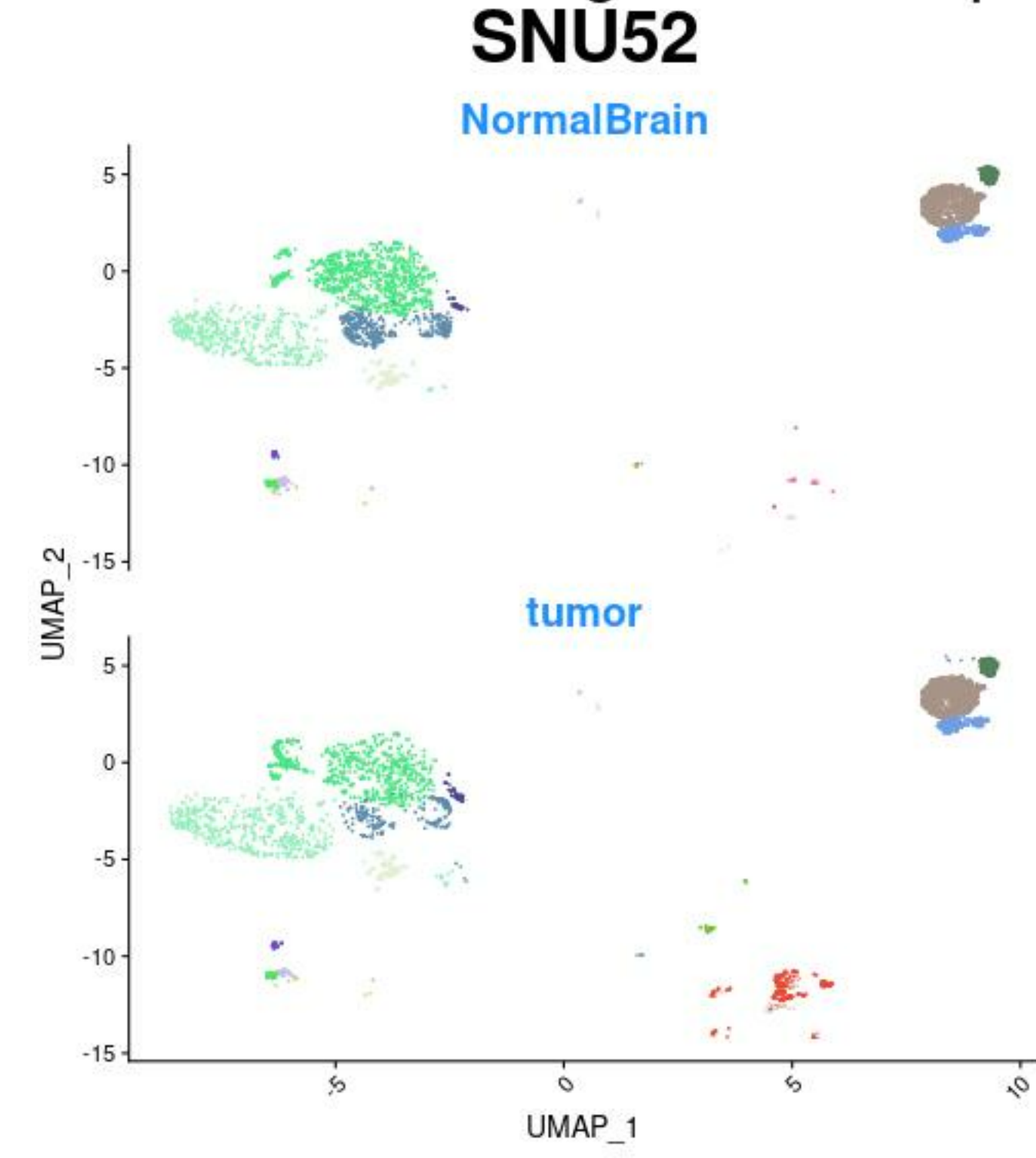
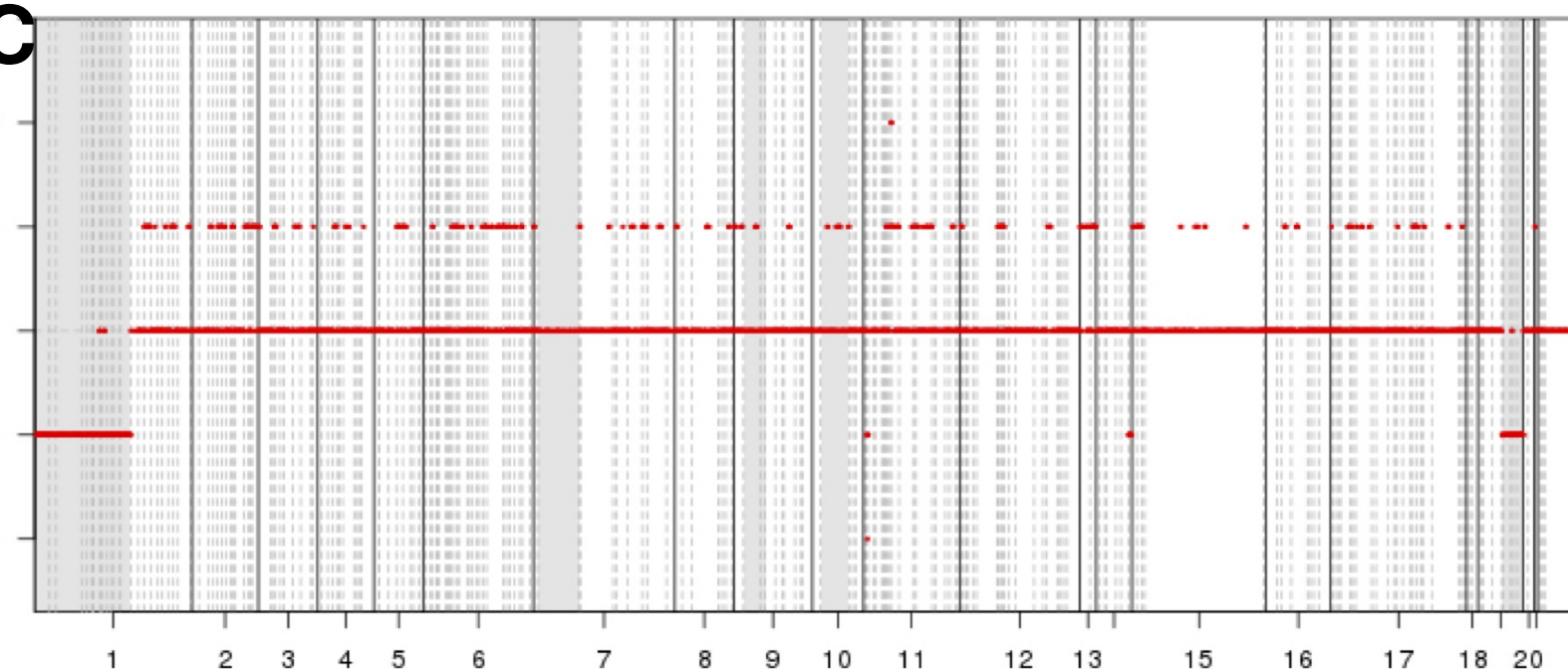
A

B #cells 6966 single-cell umap
SNU49

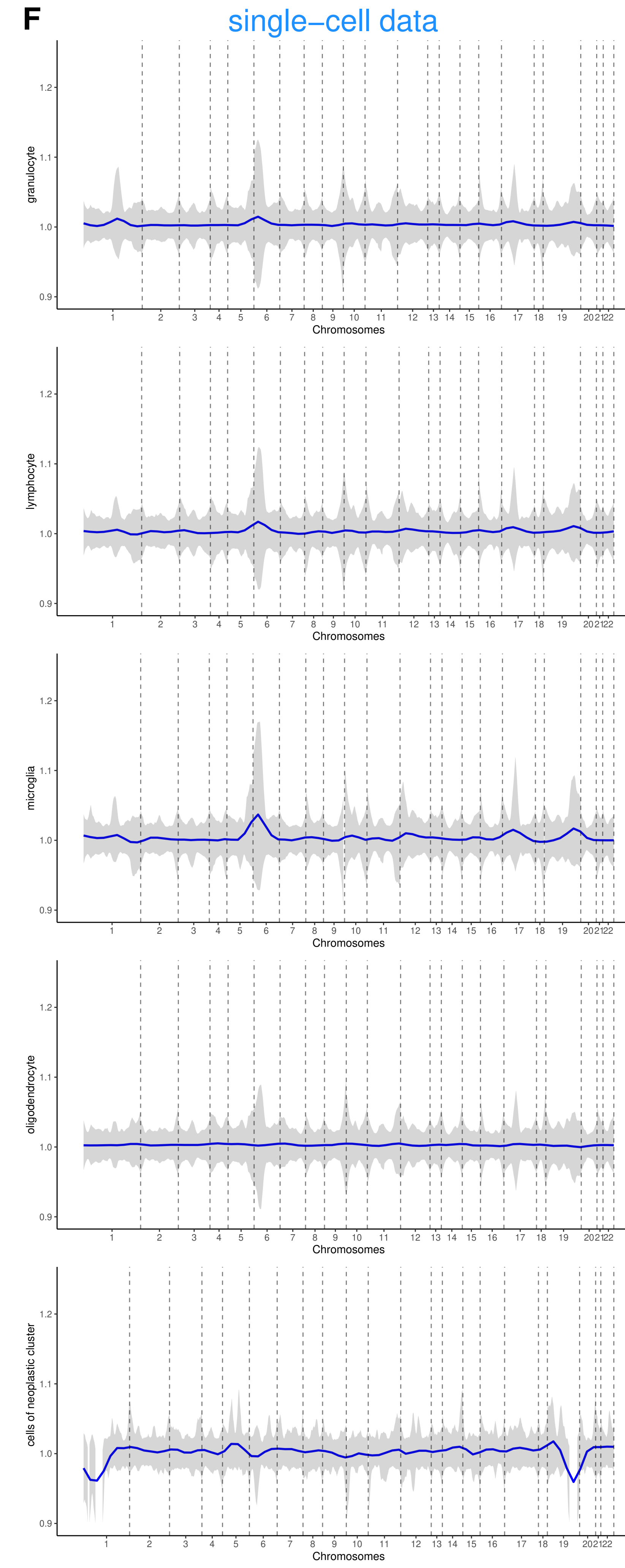
**C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	hemizygous deletion	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TERP mutation	wildtype	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	mutant (p.Val600Glu, c.1799T>A)	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

F

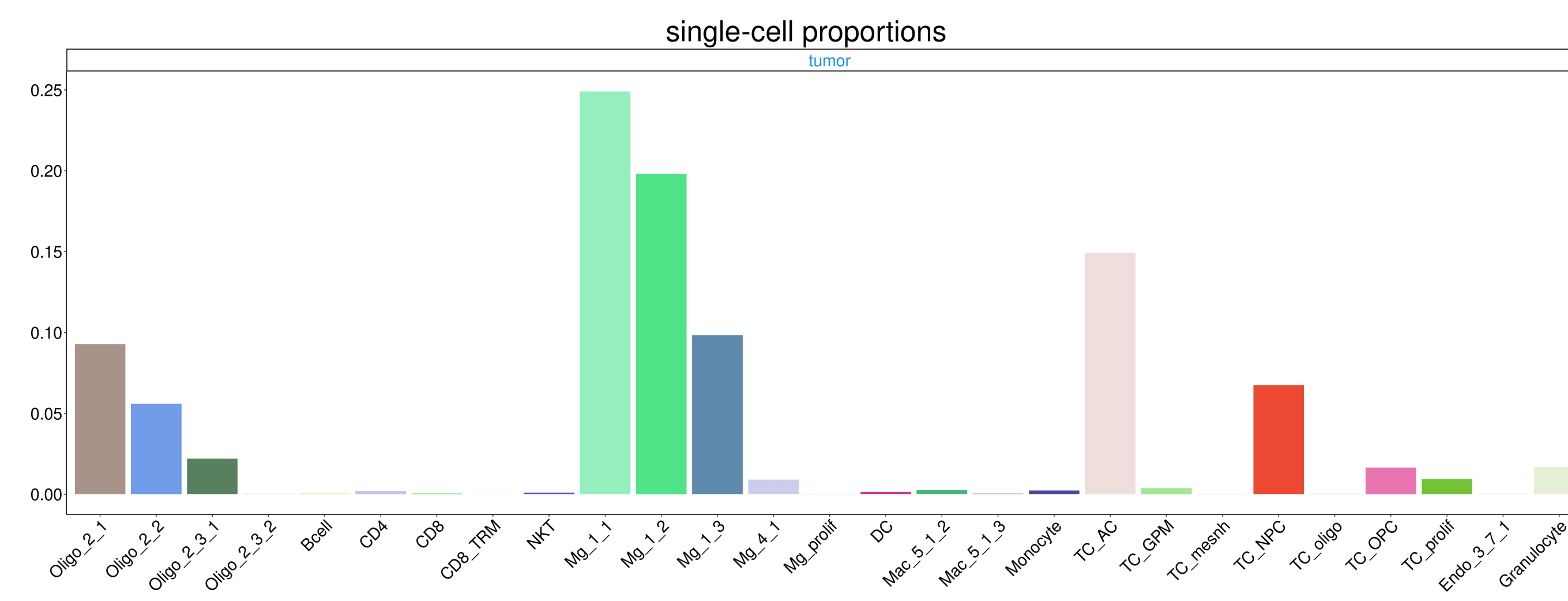
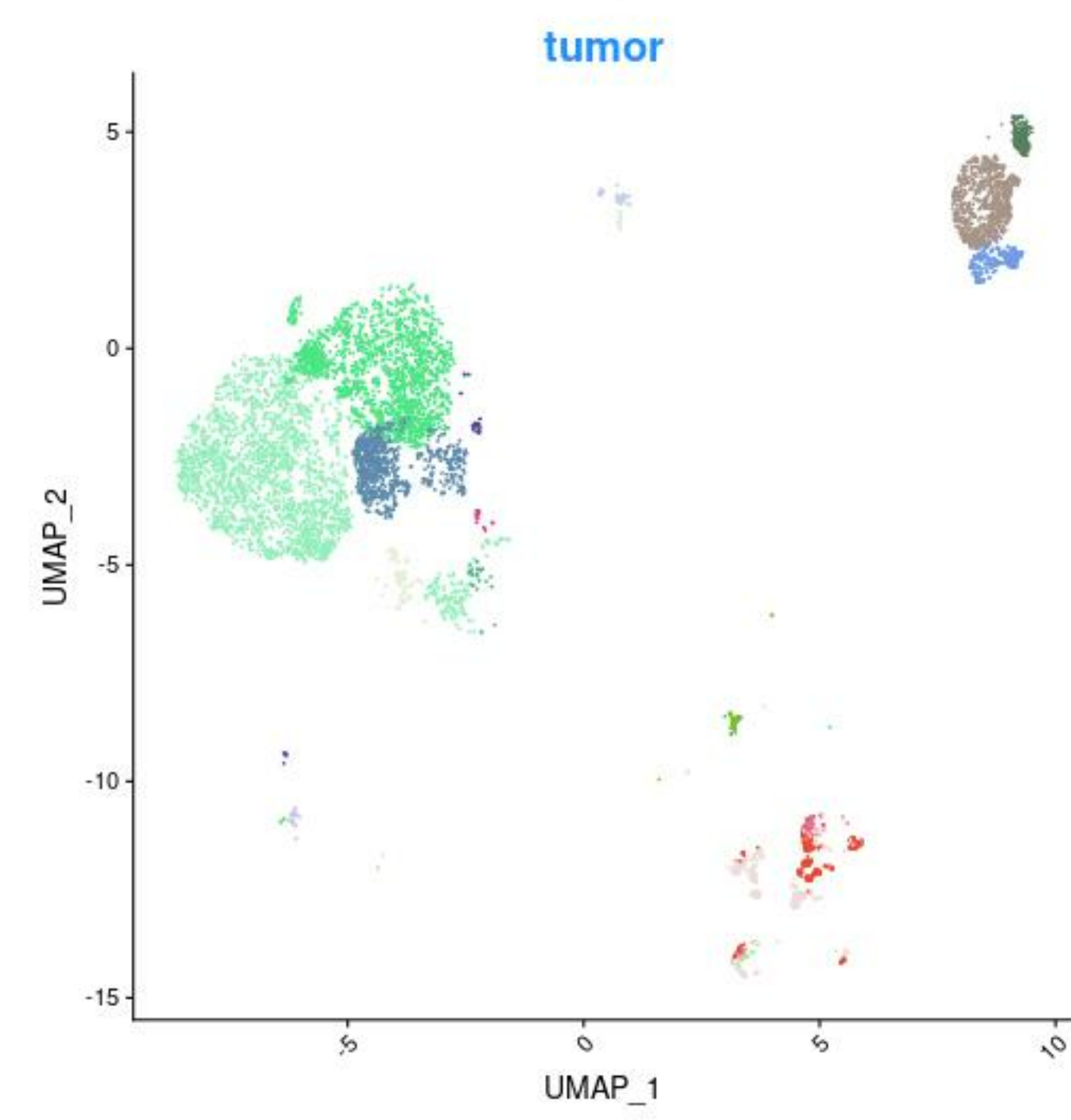
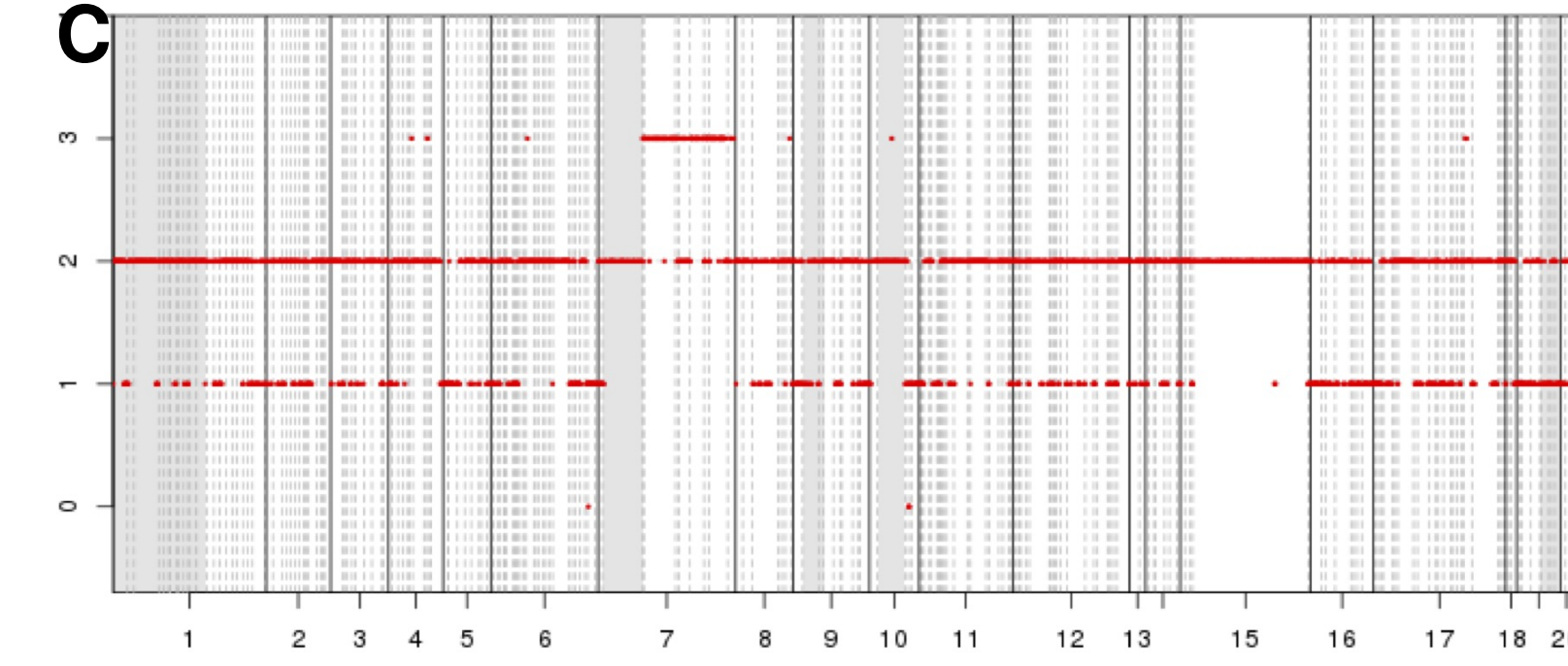
A**B#cells 10202 single-cell umap****C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	mutant (p.Arg132His, c.395G>A)	IDH3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	co-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	mutant (splicing, c.6006+2T>C)
TERTp mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

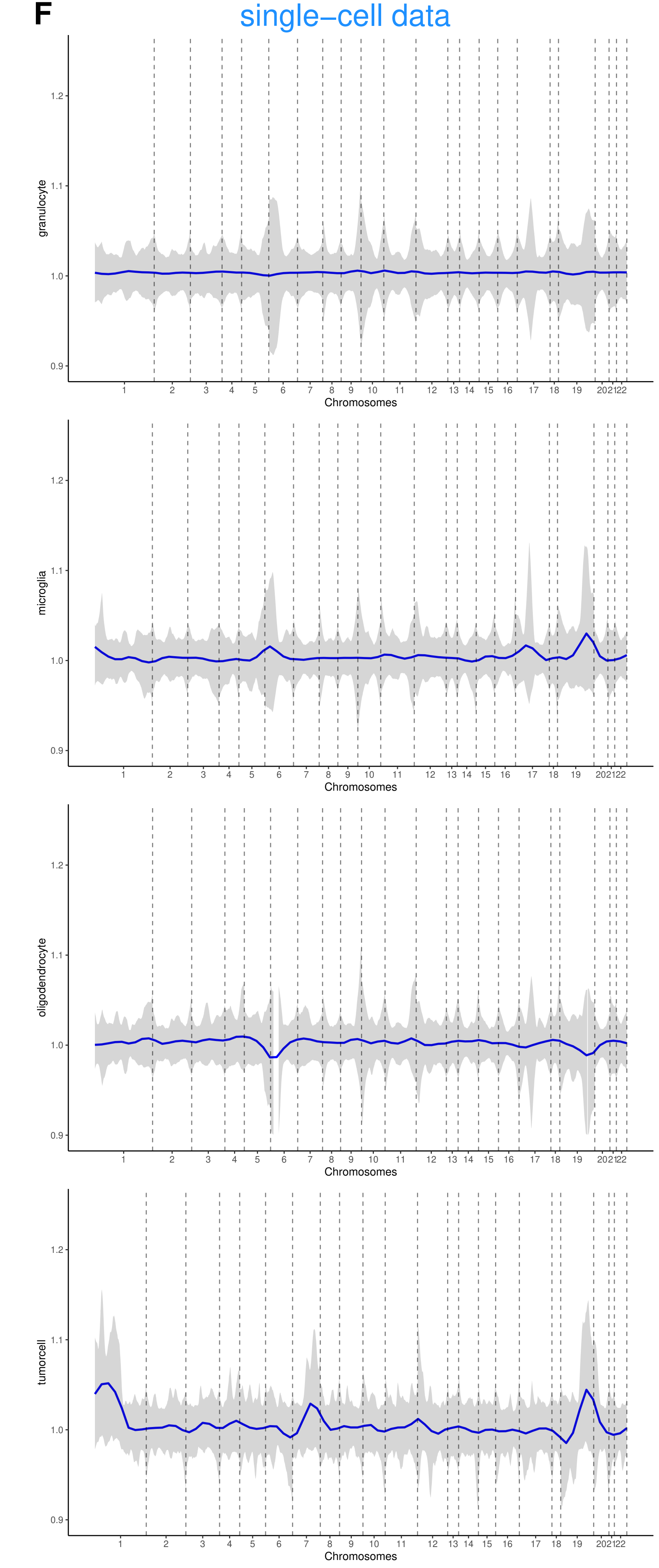
F

A

#cells 8691 single-cell umap
SNU54

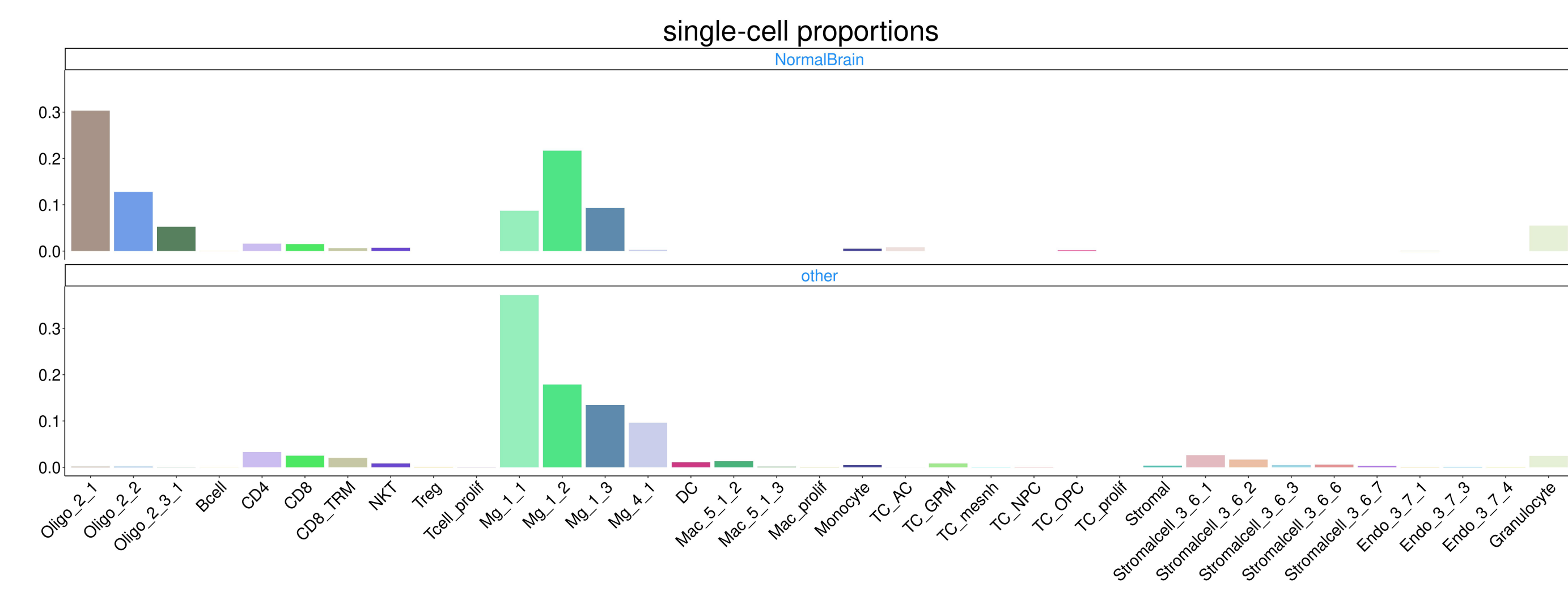
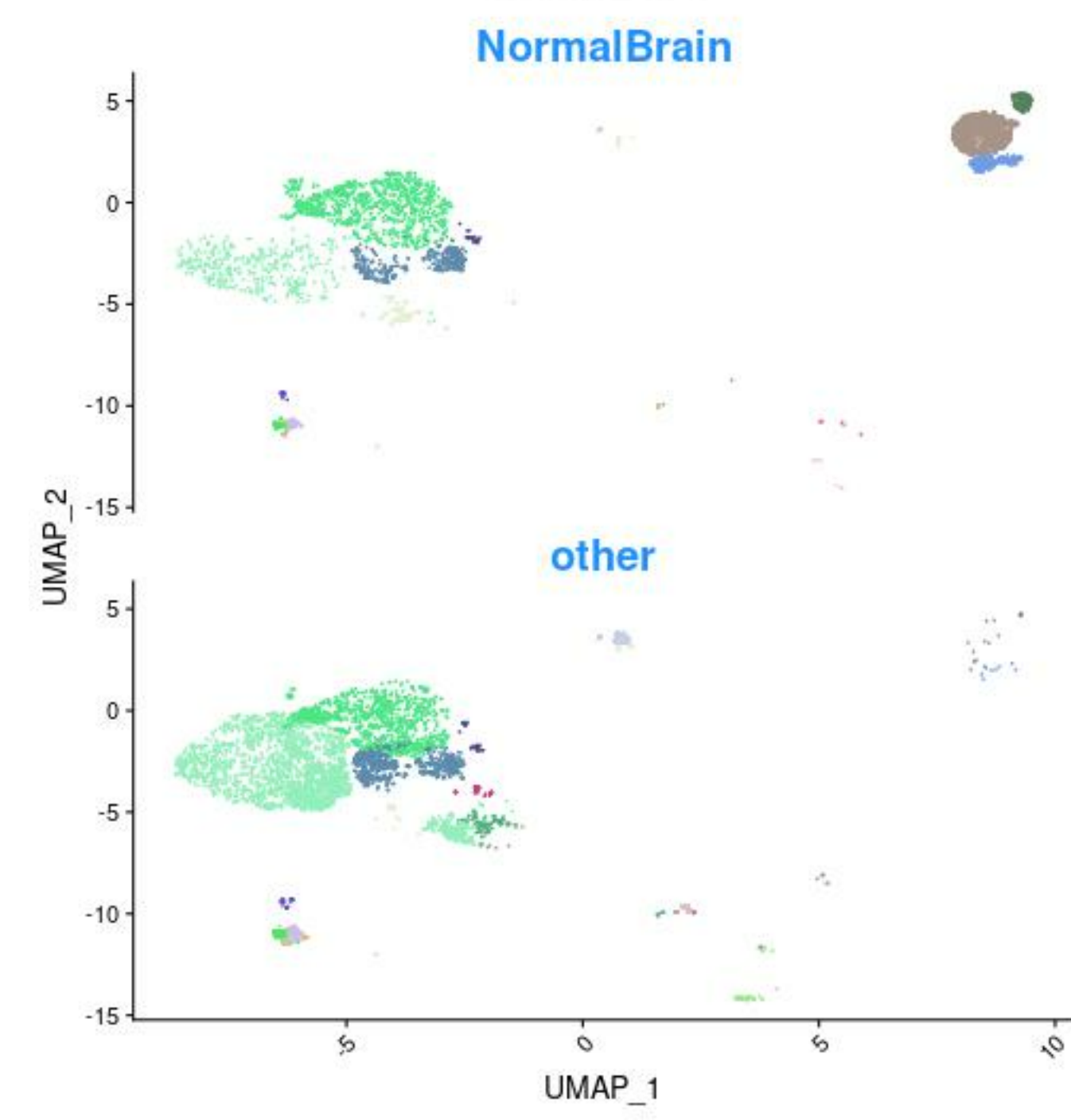
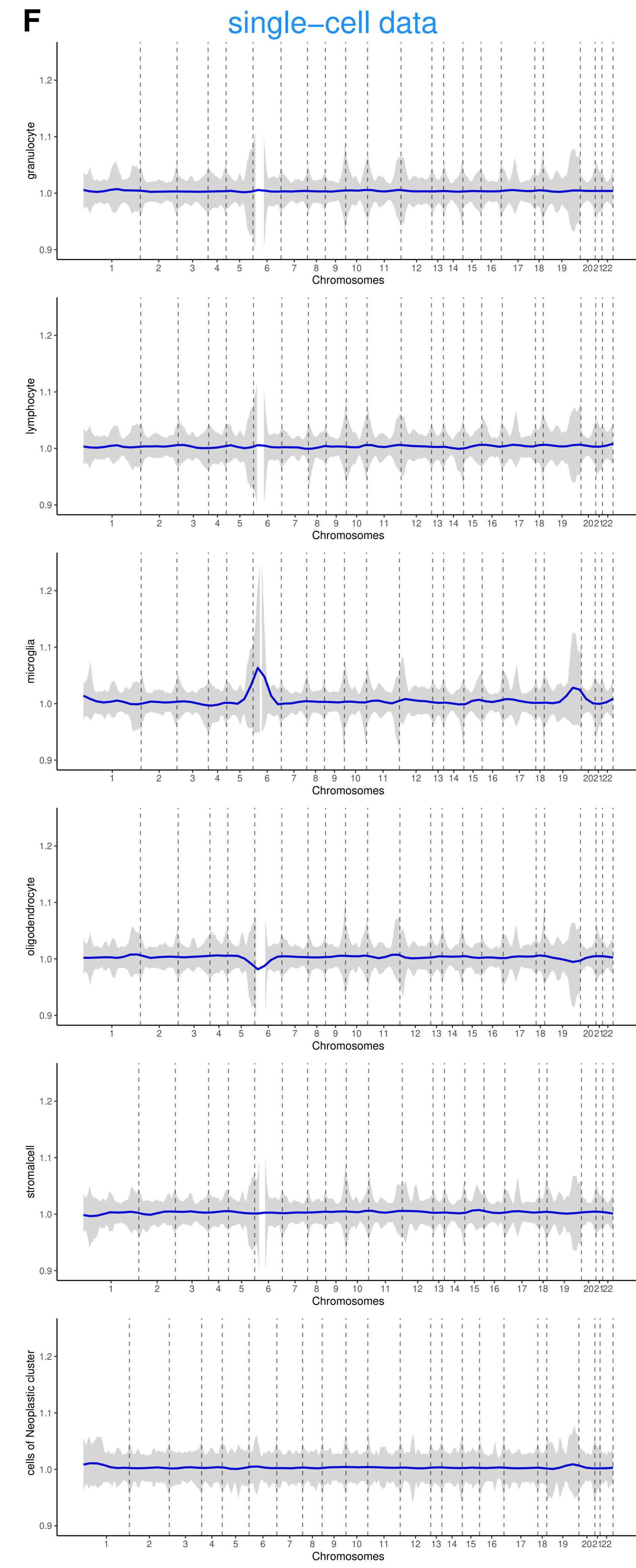
**C****E****D**

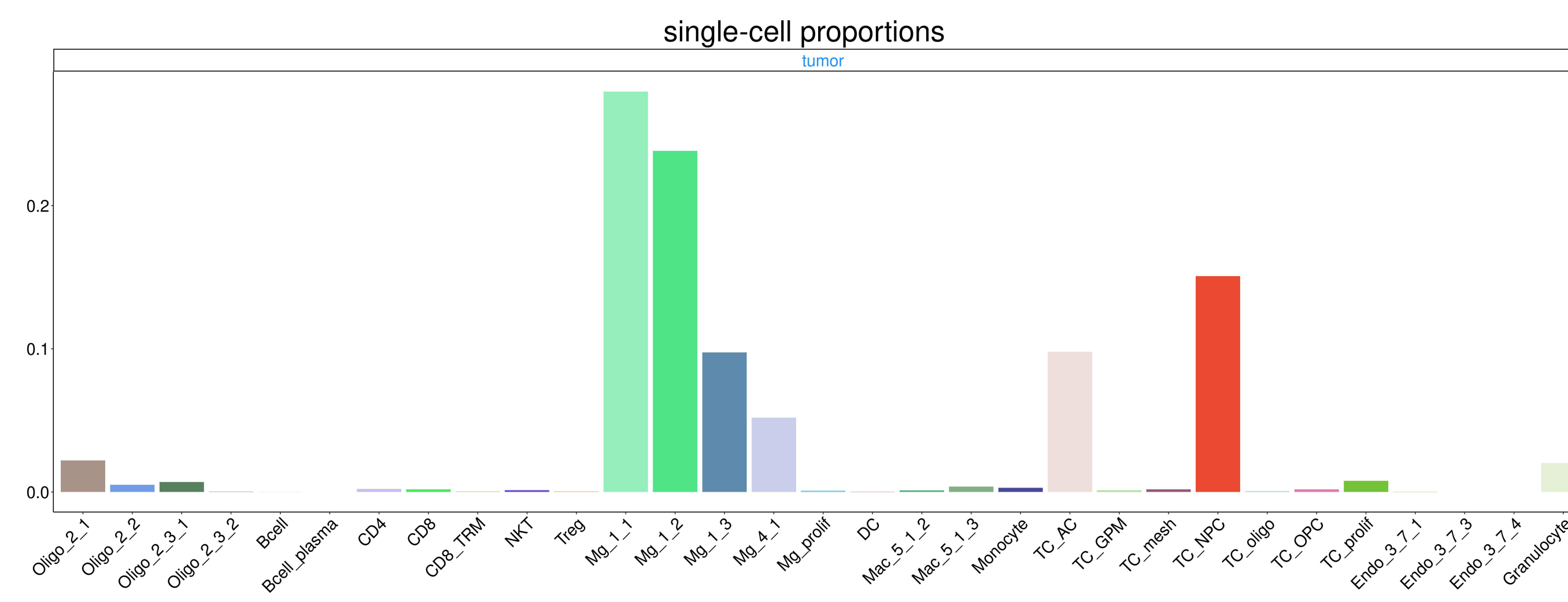
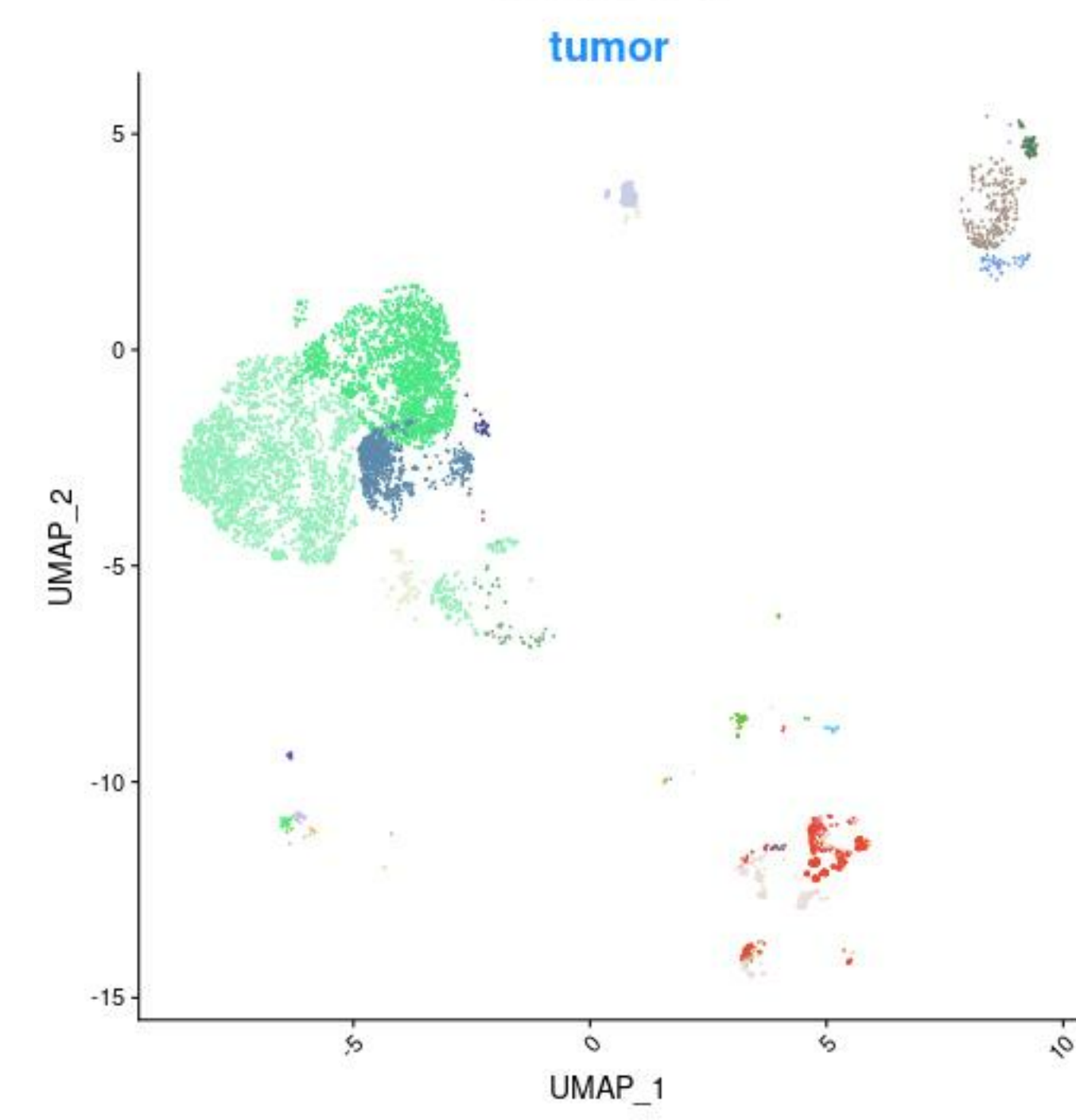
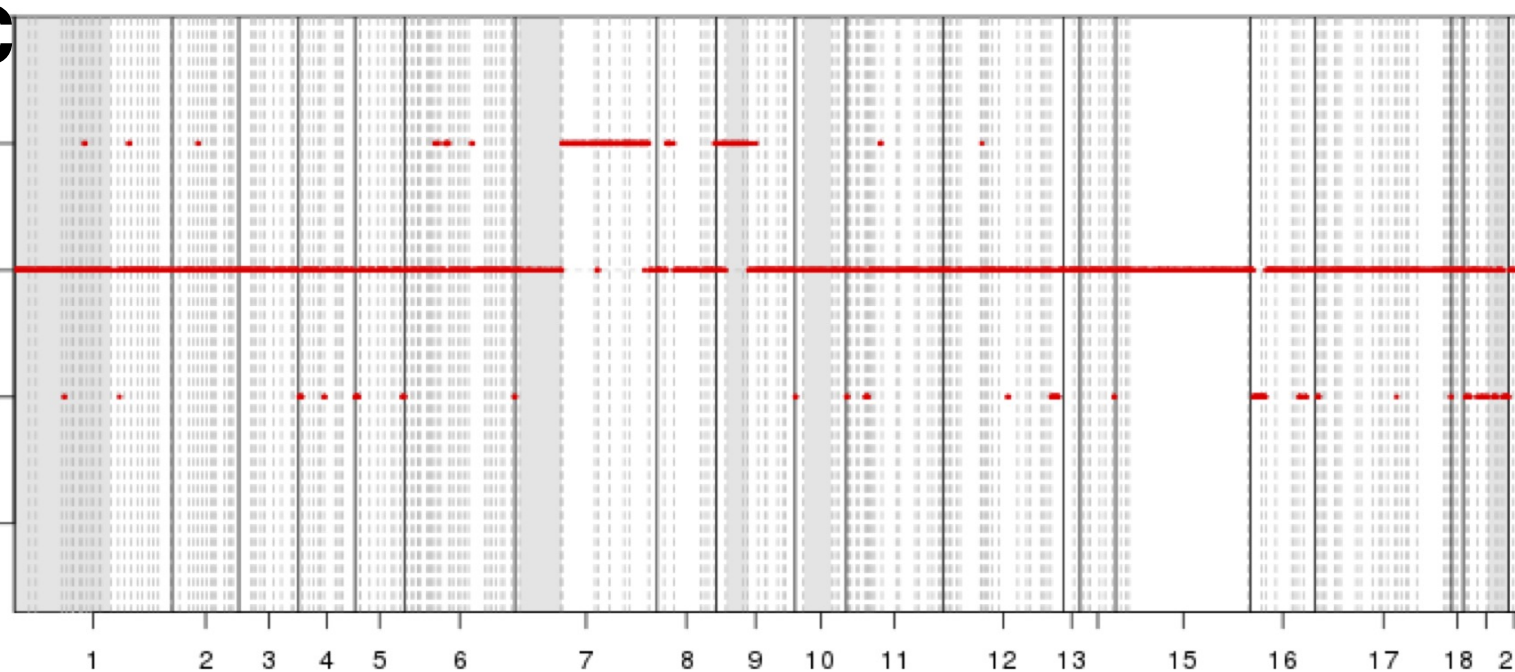
Marker	Alteration	Marker	Alteration
IDH1 mutation	mutant (p.Arg132His, c.395G>A)	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TER1p mutation	wildtype	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

F

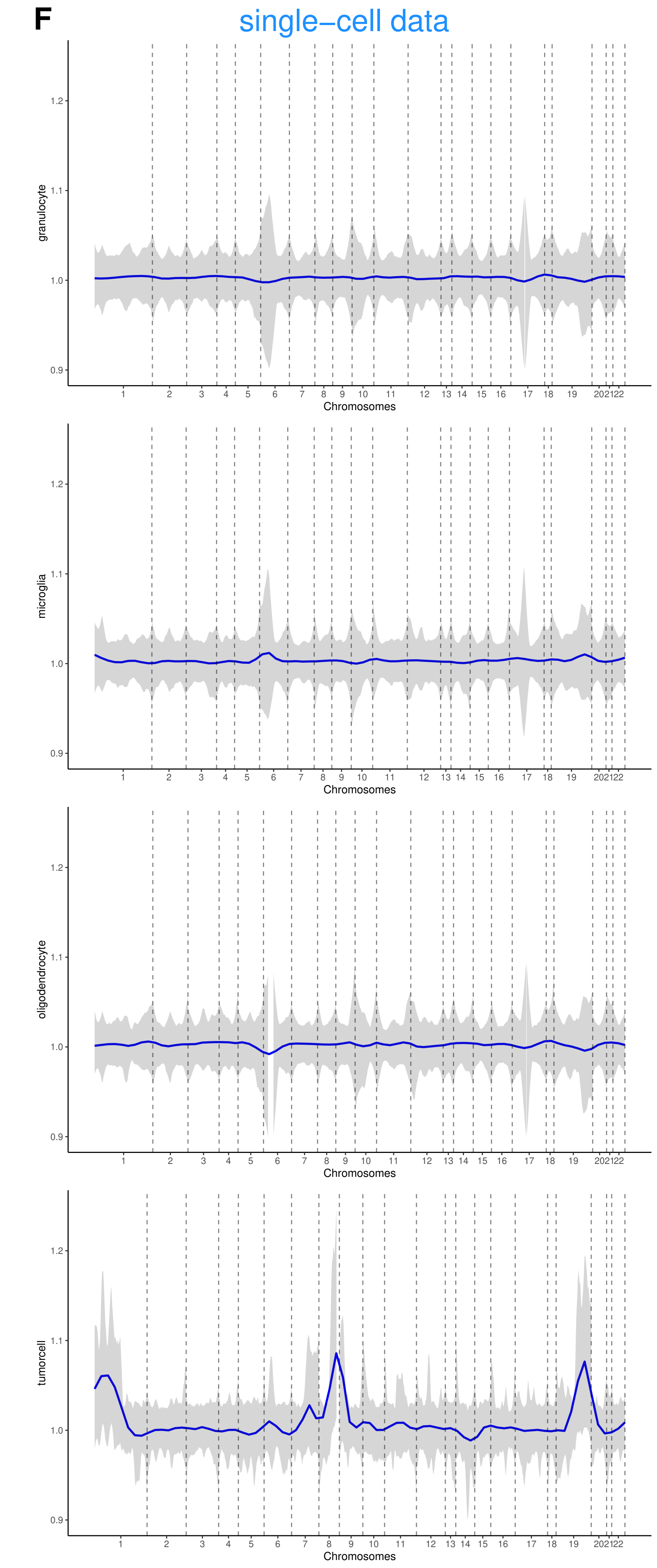
A

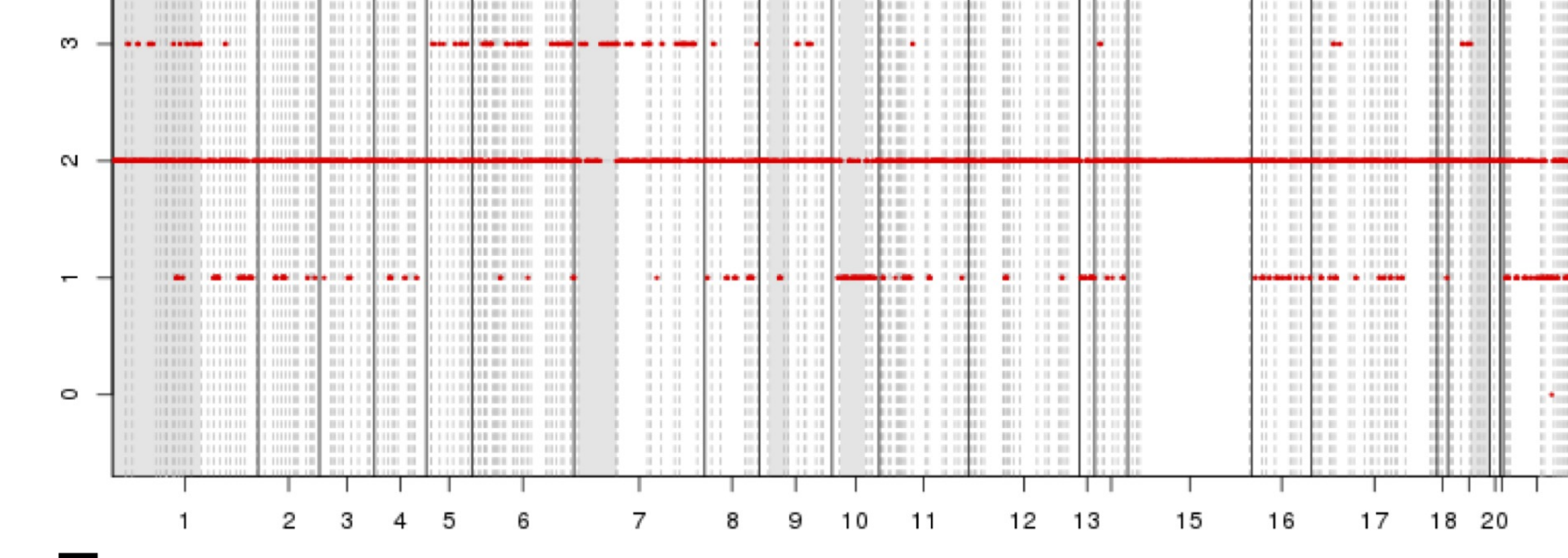
B #cells 10676 single-cell umap
SNU57

**E****F**

A**B #cells 8826 single-cell umap****C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	mutant (p.Arg132His, c.395G>A)	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
Ip19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	mutant (p.Gln973fs, c.2917delC)	NF1 mutation	wildtype
TER1p mutation	wildtype	NF1 deletion	absent
TP53 mutation	mutant (p.Arg273Cys, c.817C>T)	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

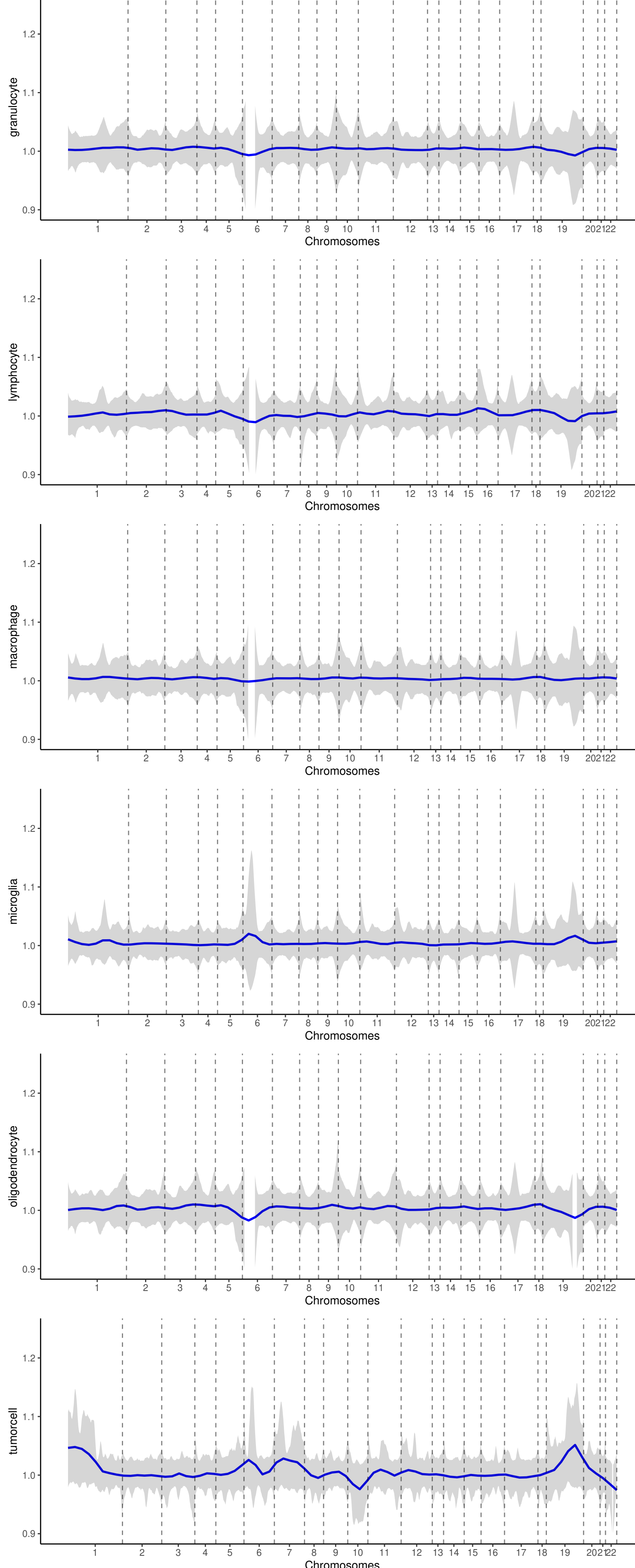
F

A**C****D**

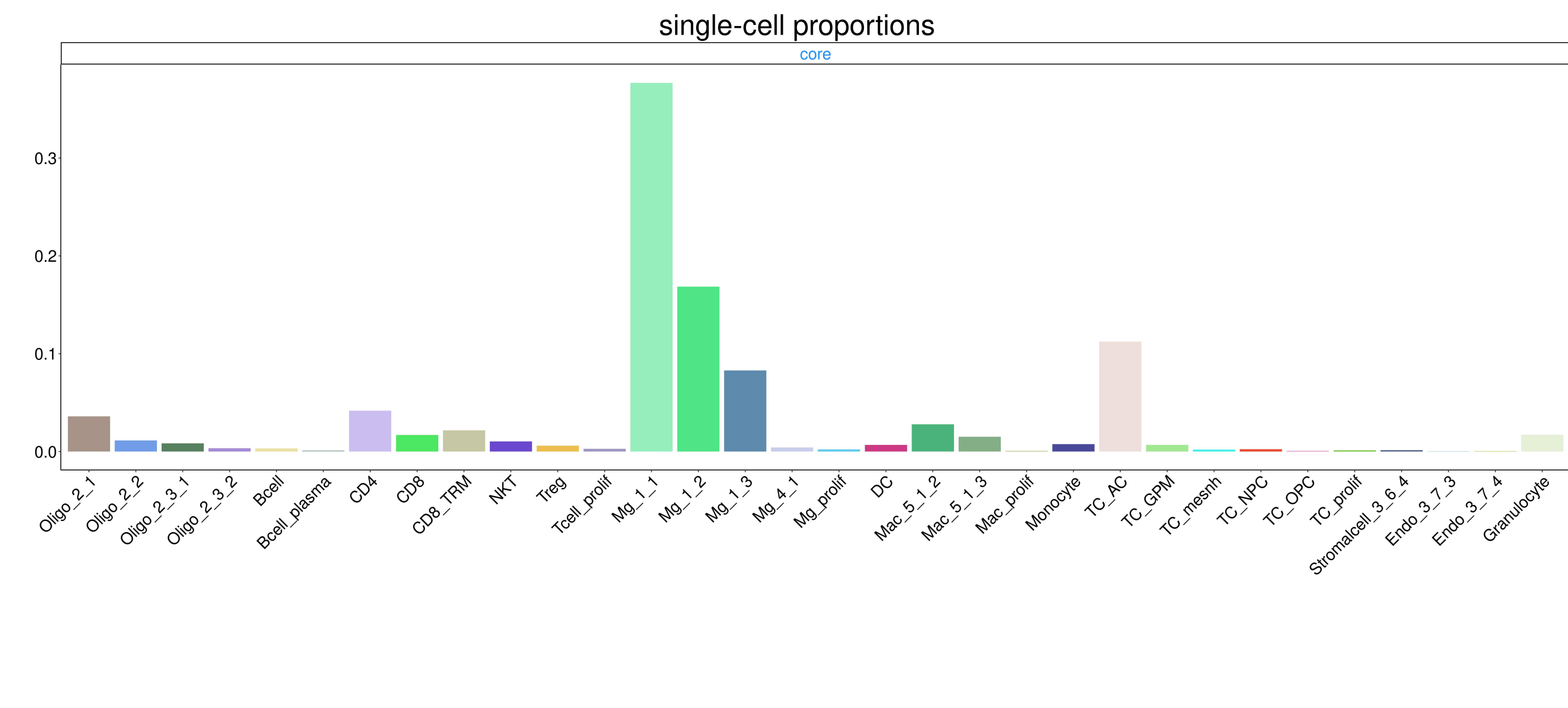
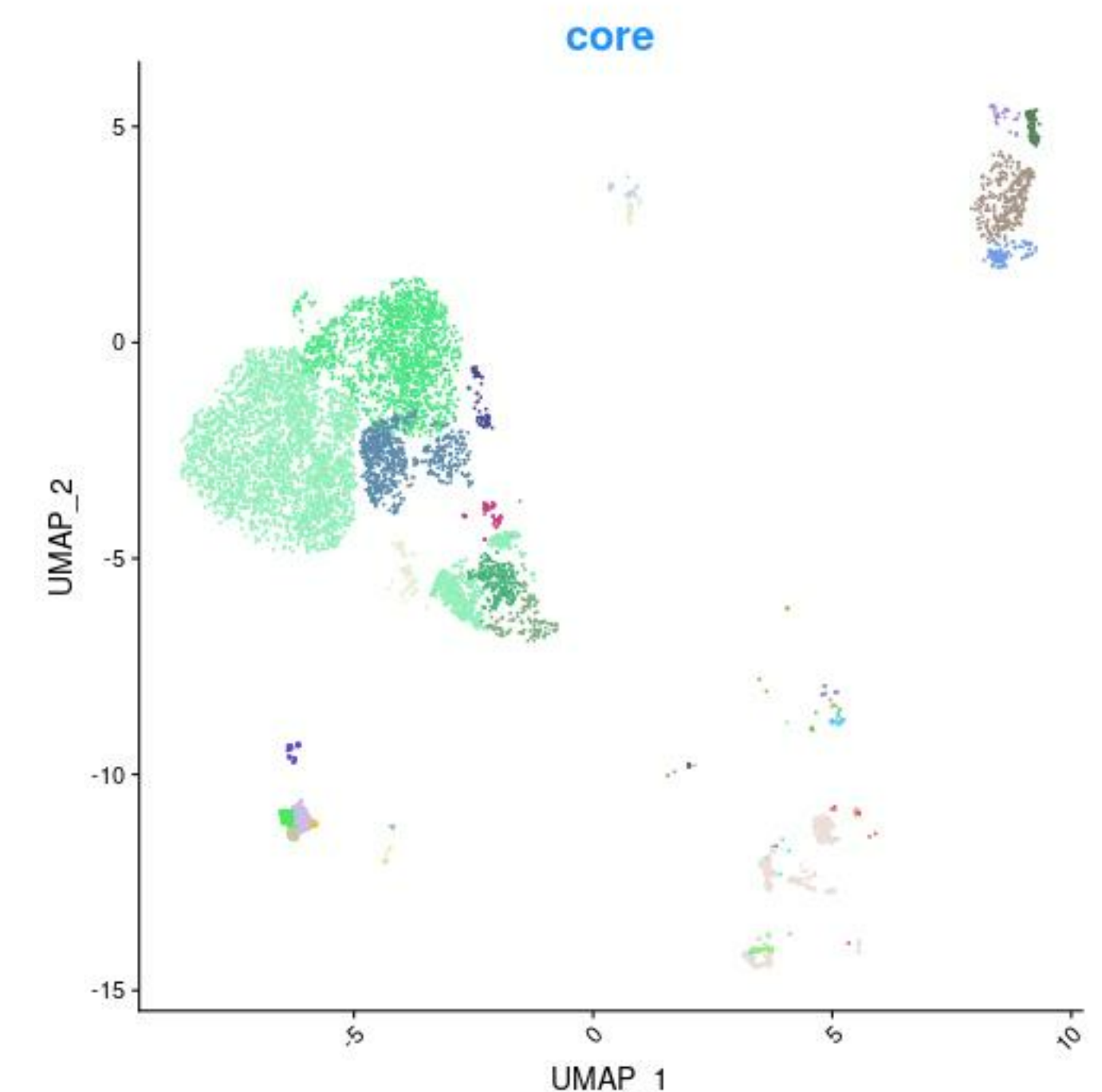
Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3F3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p/19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI1 mutation	wildtype
10q23 (PTEN locus) deletion	hemizygous deletion	RBI1 deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TERTp mutation	mutant (C228T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

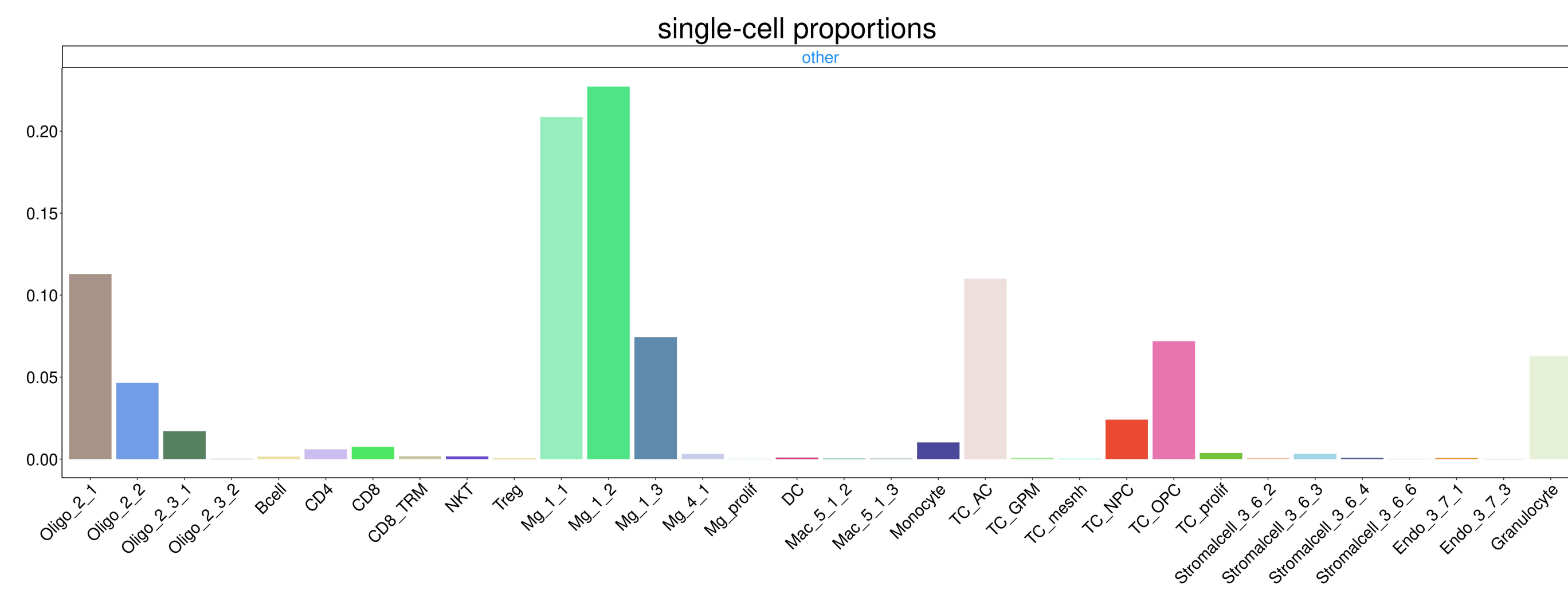
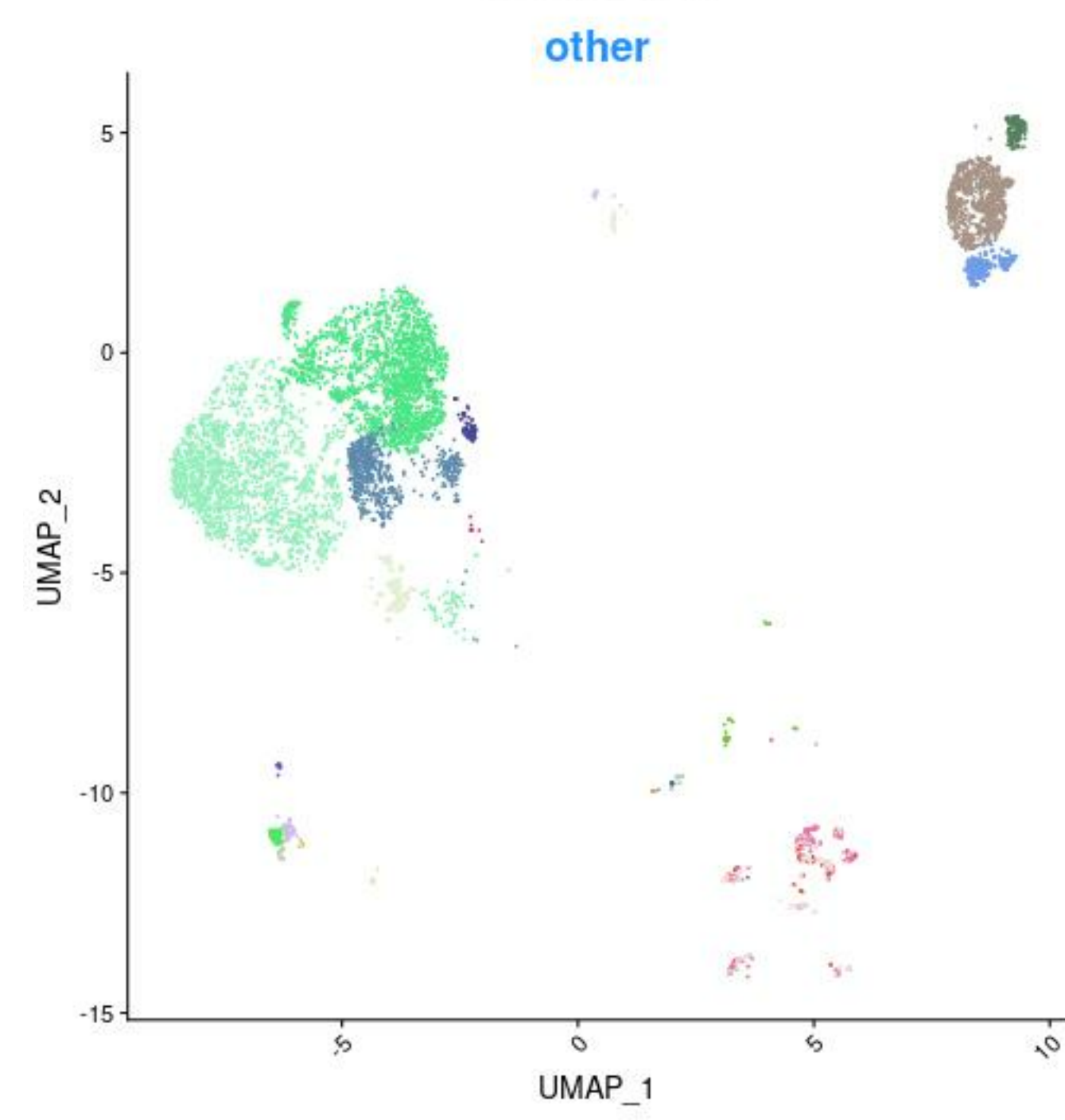
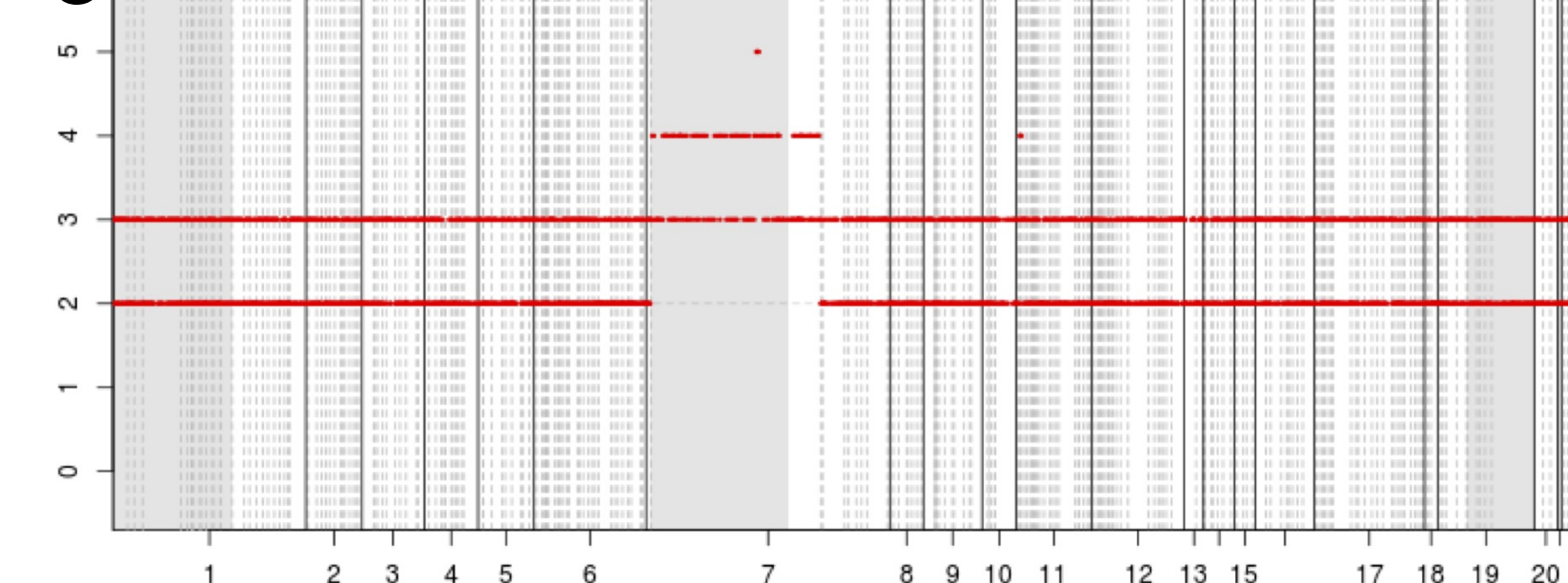
E**F**

single-cell data

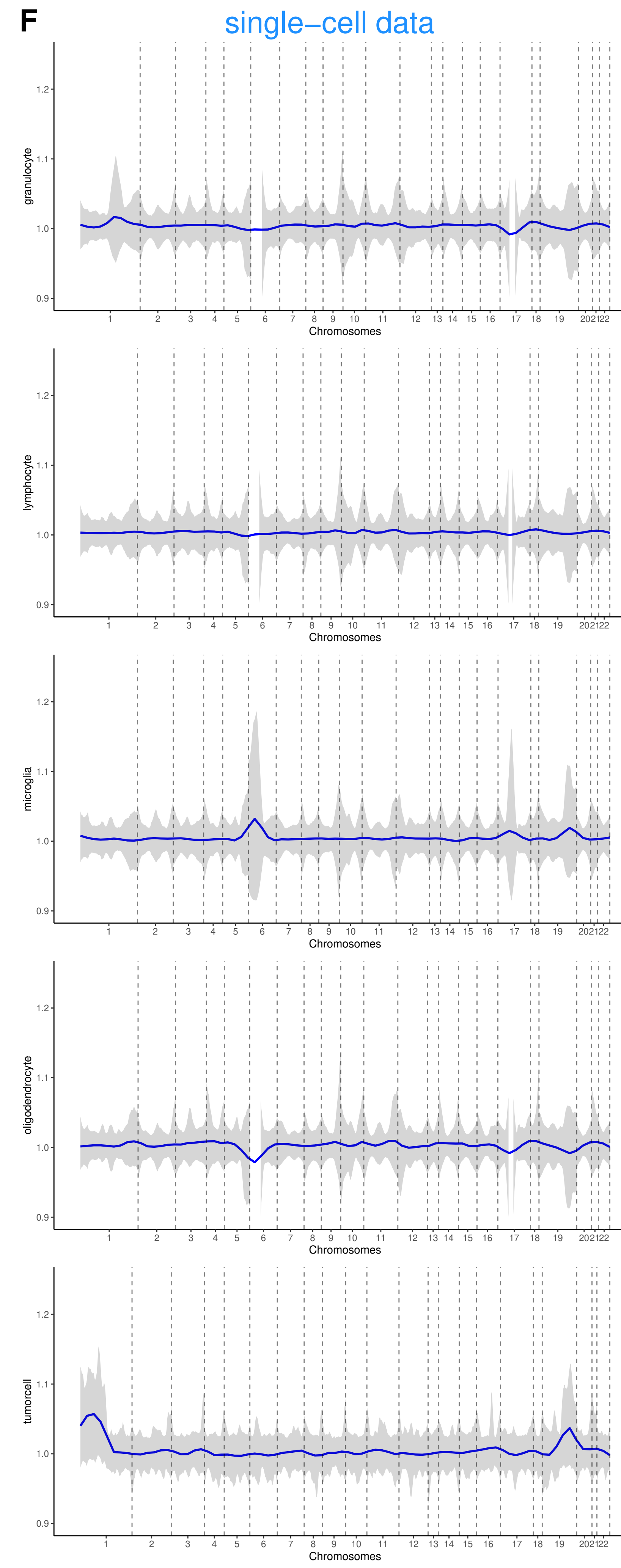


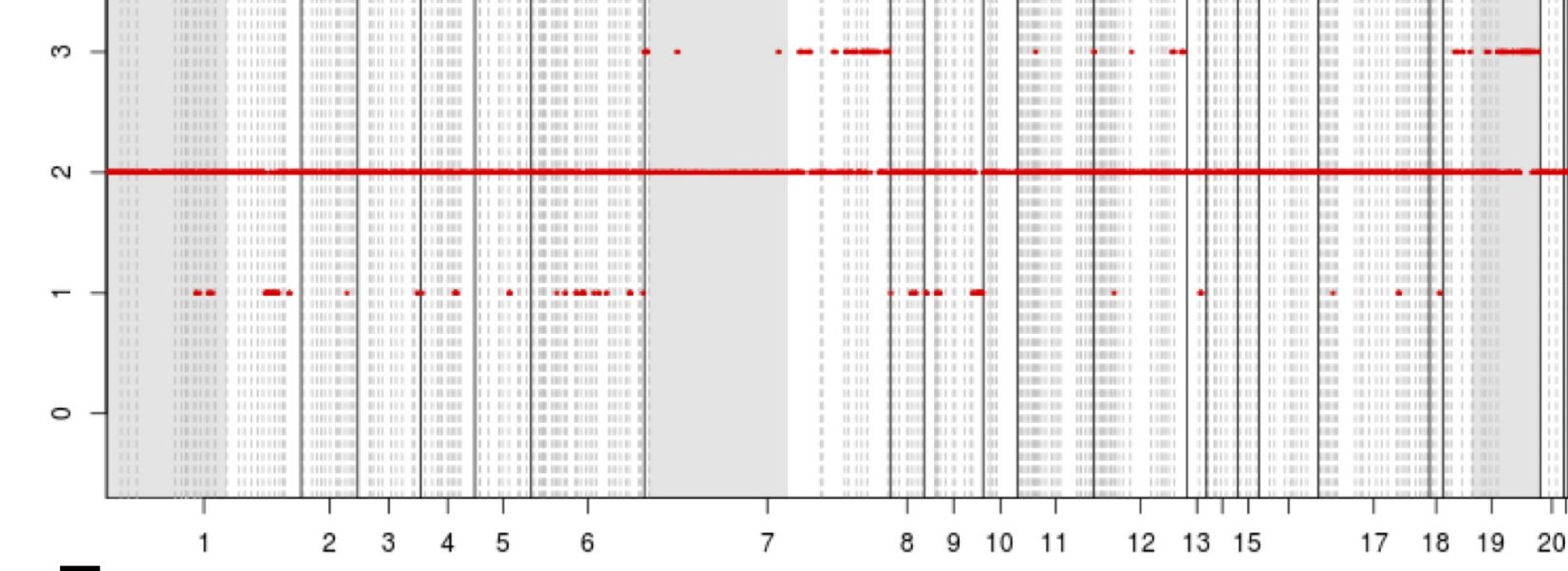
B #cells 8294 single-cell umap
SNU59



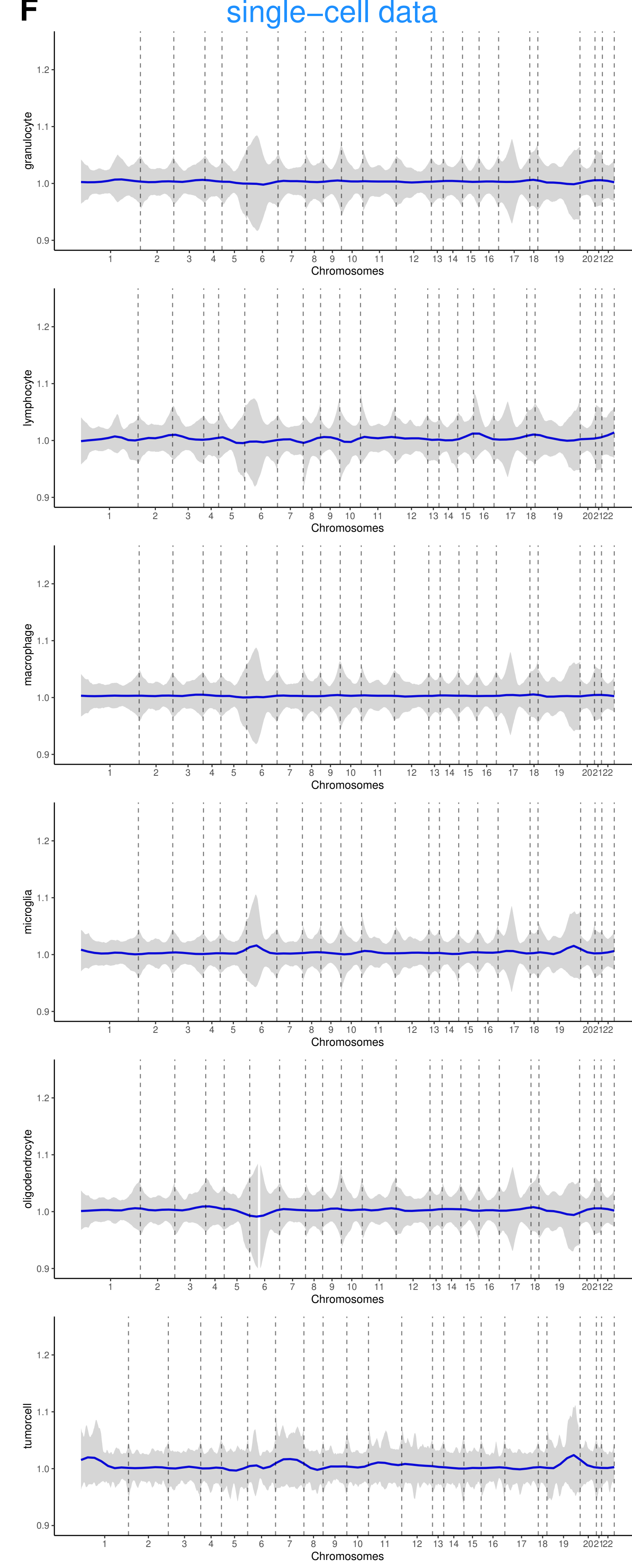
A**B #cells 8511 single-cell umap****C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3-3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	mutant (p.A658I Thr. c.1741C>A); mutant (p.A6637Tys. c.1731C>A)
EGFR amplification	absent	PDGFRA amplification	absent
5p21 (CDKN2A, CDKN2B) deletion	absent	RB1 mutation	wildtype
10q23 (PTEN locus) deletion	absent	RB1 deletion	absent
ATRX mutation	wildtype	NF1 mutation	wildtype
TERTp mutation	wildtype	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

F

A**C****E****D**

Marker	Alteration	Marker	Alteration
IDH1 mutation	wildtype	H3-3A mutation	wildtype
IDH2 mutation	wildtype	HIST1H3B mutation	wildtype
1p19q	no-deletion	FGFR1 mutation	wildtype
EGFR amplification	absent	PDGFRA amplification	absent
9p21 (CDKN2A, CDKN2B) deletion	absent	RBI mutation	wildtype
10q23 (PTEN locus) deletion	absent	RBI deletion	absent
ATRX mutation	wildtype	NF1 mutation	mutant (p.Thr1245fs, c.3734delC), mutant (p.Arg1276Pro, c.3827G>C)
TER1p mutation	mutant (C28T, c.-124C>T)	NF1 deletion	absent
TP53 mutation	wildtype	NF2 mutation	wildtype
BRAF mutation	wildtype	NF2 deletion	absent
BRAF rearrangement	absent	MYCN amplification	absent
Others	absent		

F

B #cells 7832 single-cell umap
SNU64

