

```
In [1]: .libPaths(c("/home/student/anaconda3/envs/renvrspot/lib/R/library",
  "/home/student/anaconda3/envs/renvr4vec/lib/R/library",
  "/home/student/anaconda3/envs/meringue/lib/R/library",
  "/home/student/anaconda3/envs/envrstd/lib/R/library",
  "/home/student/anaconda3/lib/R/library/","/usr/local/lib/R/site-
  "/usr/lib/R/site-library/","/usr/lib/R/library","/usr/lib/R/libr
  "/home/student/R/x86_64-pc-linux-gnu-library/4.5/,.libPaths()))
```

```
In [2]: library(MERINGUE)
library(Matrix)
library(STdeconvolve)
library(SpotClean)
library(S4Vectors)
```

```
Warning message:  
“package ‘MERINGUE’ was built under R version 4.5.0”
```

```
Attaching package: ‘STdeconvolve’
```

```
The following objects are masked from ‘package:MERINGUE’: 
```

```
cleanCounts, getOverdispersedGenes
```

```
Loading required package: stats4
```

```
Loading required package: BiocGenerics
```

```
Attaching package: ‘BiocGenerics’
```

```
The following objects are masked from ‘package:stats’: 
```

```
IQR, mad, sd, var, xtabs
```

```
The following objects are masked from ‘package:base’: 
```

```
anyDuplicated, aperm, append, as.data.frame, basename, cbind,  
colnames, dirname, do.call, duplicated, eval, evalq, Filter, Find,  
get, grep, grepl, intersect, is.unsorted, lapply, Map, mapply,  
match, mget, order, paste, pmax, pmax.int, pmin, pmin.int,  
Position, rank, rbind, Reduce, rownames, sapply, saveRDS, setdiff,  
table, tapply, union, unique, unsplit, which.max, which.min
```

```
Attaching package: ‘S4Vectors’
```

```
The following objects are masked from ‘package:Matrix’: 
```

```
expand, unname
```

```
The following object is masked from ‘package:utils’: 
```

```
findMatches
```

```
The following objects are masked from ‘package:base’: 
```

```
expand.grid, I, unname
```

```
In [3]: setwd("~/projectR1/projectR1/")
```

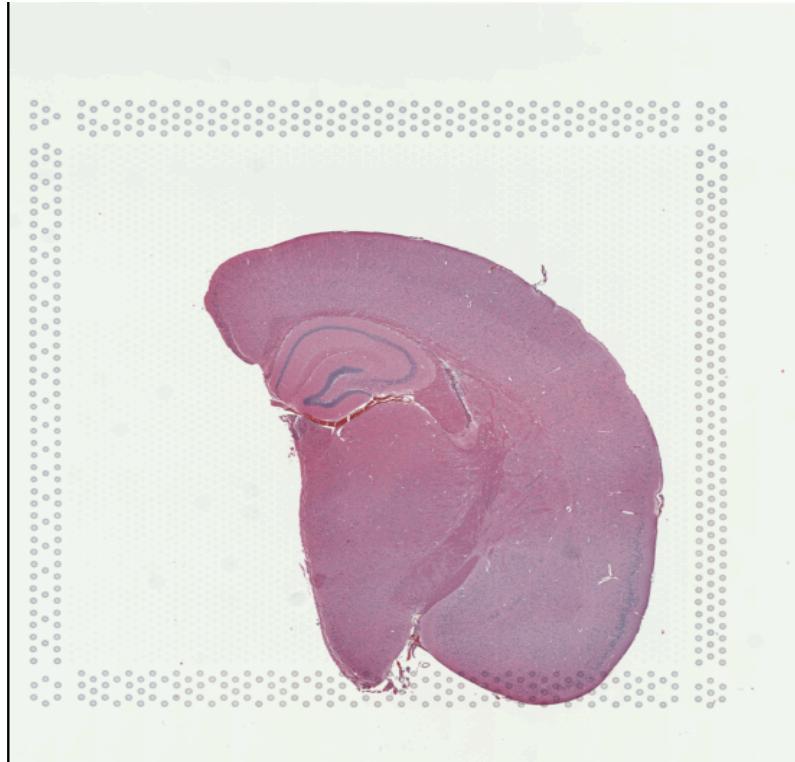
```
In [4]: mbrain_raw <- read10xRaw("data/raw_feature_bc_matrix/")
mbrain_slide_info <- read10xSlide("data/spatial/tissue_positions_list.csv",
                                    "data/spatial/tissue_lowres_image.png",
                                    "data/spatial/scalefactors_json.json")
```

```
In [5]: dim(mbrain_raw)
```

32589 · 4992

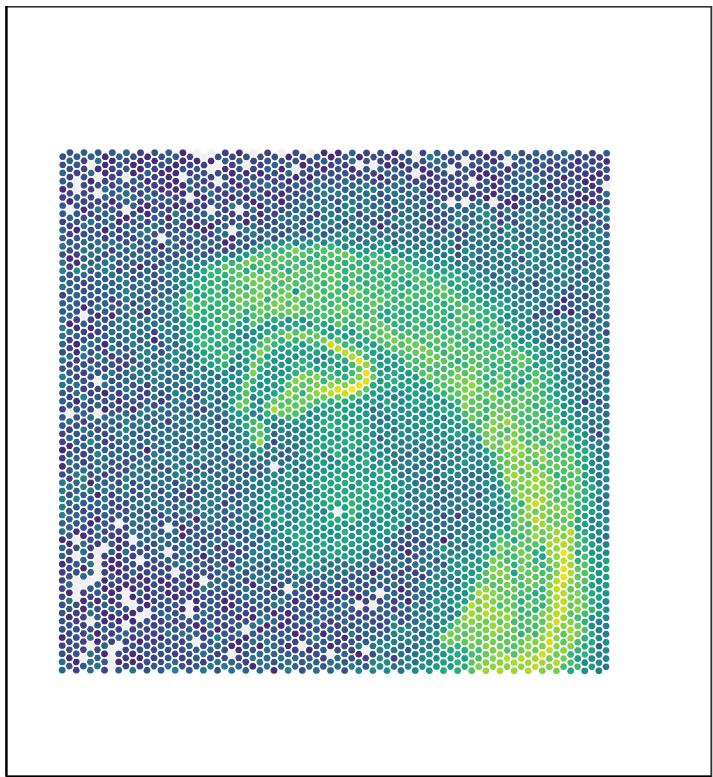
```
In [6]: # Visualize raw data
mbrain_obj <- createSlide(count_mat = mbrain_raw,
                           slide_info = mbrain_slide_info)
visualizeSlide(slide_obj = mbrain_obj)
```

Filtered out 21014 genes with average expressions below or equal to 0.1.

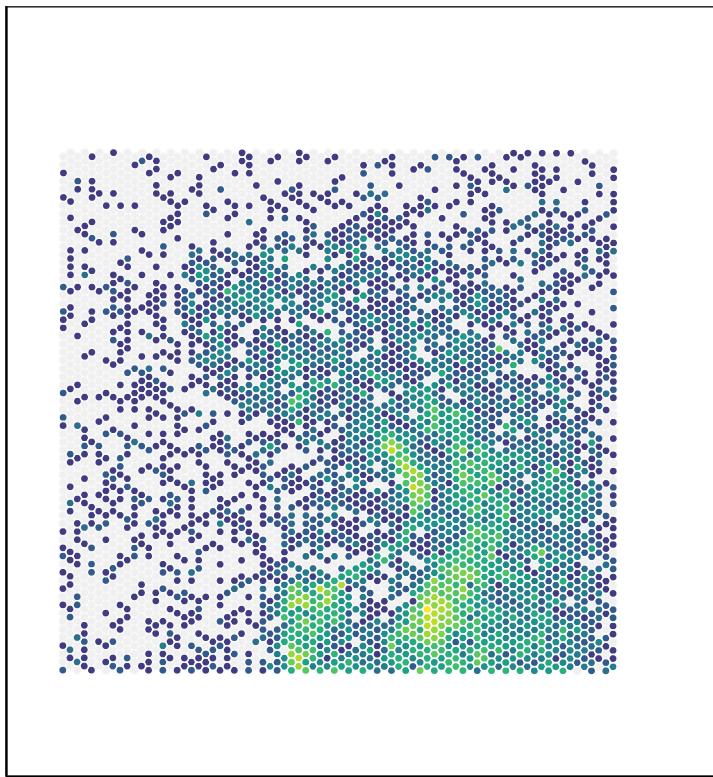


```
In [7]: # Double check some genes
g <- 'Gabbr2'
gg <- 'Gad2'
ggg <- 'Slc17a7'
```

```
In [8]: visualizeHeatmap(mbrain_obj, ggg)
```



```
In [9]: visualizeHeatmap(mbrain_obj, gg)
```



```
In [10]: # Decontaminate raw data  
decont_obj <- spotclean(mbrain_obj)
```

2025-05-01 05:48:02.280057 Start.

Found more than one class "dist" in cache; using the first, from namespace
'BiocGenerics'

Also defined by 'spam'

Found more than one class "dist" in cache; using the first, from namespace
'BiocGenerics'

Also defined by 'spam'

Warning message:

"Feature names cannot have underscores ('_'), replacing with dashes ('-')"

Kept 4575 highly expressed or highly variable genes.

2025-05-01 05:48:05.064699 Estimating contamination parameters...

2025-05-01 05:52:04.954044 Decontaminating genes ...

Iteration: 1

Log-likelihood: 21113825.704

Max difference of decontaminated expressions: 915.228

Iteration: 2

Log-likelihood: 21521194.81

Max difference of decontaminated expressions: 413.074

Iteration: 3

Log-likelihood: 21675319.287

Max difference of decontaminated expressions: 211.429

Iteration: 4

Log-likelihood: 21745987.548

Max difference of decontaminated expressions: 118.03

Iteration: 5

Log-likelihood: 21783259.202

Max difference of decontaminated expressions: 70.379

Iteration: 6

Log-likelihood: 21805007.171

Max difference of decontaminated expressions: 44.279

Iteration: 7

Log-likelihood: 21818675.922
Max difference of decontaminated expressions: 29.163

Iteration: 8

Log-likelihood: 21827763.185
Max difference of decontaminated expressions: 19.994

Iteration: 9

Log-likelihood: 21834074.252
Max difference of decontaminated expressions: 14.207

Iteration: 10

Log-likelihood: 21838612.54
Max difference of decontaminated expressions: 10.421

Iteration: 11

Log-likelihood: 21841969.901
Max difference of decontaminated expressions: 7.863

Iteration: 12

Log-likelihood: 21844512.778
Max difference of decontaminated expressions: 6.082

Iteration: 13

Log-likelihood: 21846477.372
Max difference of decontaminated expressions: 4.809

Iteration: 14

Log-likelihood: 21848021.179
Max difference of decontaminated expressions: 3.875

Iteration: 15

Log-likelihood: 21849252.29
Max difference of decontaminated expressions: 3.174

```
Iteration: 16
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Log-likelihood: 21850246.755  
Max difference of decontaminated expressions: 2.637
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Iteration: 17
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Log-likelihood: 21851059.25  
Max difference of decontaminated expressions: 2.218
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Iteration: 18
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Log-likelihood: 21851729.833  
Max difference of decontaminated expressions: 1.885
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Iteration: 19
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Log-likelihood: 21852288.347  
Max difference of decontaminated expressions: 1.618
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Iteration: 20
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Log-likelihood: 21852757.361  
Max difference of decontaminated expressions: 1.4
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Iteration: 21
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Log-likelihood: 21853154.169  
Max difference of decontaminated expressions: 1.22
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Iteration: 22
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Log-likelihood: 21853492.186  
Max difference of decontaminated expressions: 1.071
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```
Iteration: 23
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Log-likelihood: 21853781.931  
Max difference of decontaminated expressions: 0.945
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```
Parameter converged.
```

```
2025-05-01 05:53:12.710489 Scaling genes...
```

```
2025-05-01 05:53:13.429641 All finished.
```

```
In [11]: ls()
```

```
'decont_obj' · 'g' · 'gg' · 'ggg' · 'installed_packages' · 'mbrain_obj' · 'mbrain_raw' ·  
'mbrain_slide_info'
```

```
In [12]: environment()
```

```
<environment: R_GlobalEnv>
```

```
In [13]: mbrain_raw <- read10xRaw("data/raw_feature_bc_matrix/")
```

```
In [14]: dim(mbrain_raw)
```

```
32589 · 4992
```

```
In [15]: head(mbrain_raw)
```

```
[[ suppressing 4992 column names 'AAACAACGAATAGTTC-1', 'AAACAAGTATCTCCA-  
1', 'AAACAATCTACTAGCA-1' ... ]]
```

6 x 4992 sparse Matrix of class "dgCMatrix"

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Gm37381 . . . . . . . . . . . . . . . . . .  
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Sox17 . . . . . . 1 . . 1 . . . . 1 . 1 . .
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```
In [16]: pos.info <- read.csv('data/spatial/tissue_positions_list.csv', header = F)
```

```
In [17]: ls()
```

```
'decont_obj' · 'g' · 'gg' · 'ggg' · 'installed_packages' · 'mbrain_obj' · 'mbrain_raw' ·  
'mbrain_slide_info' · 'pos.info'
```

```
In [18]: head(pos.info)
```

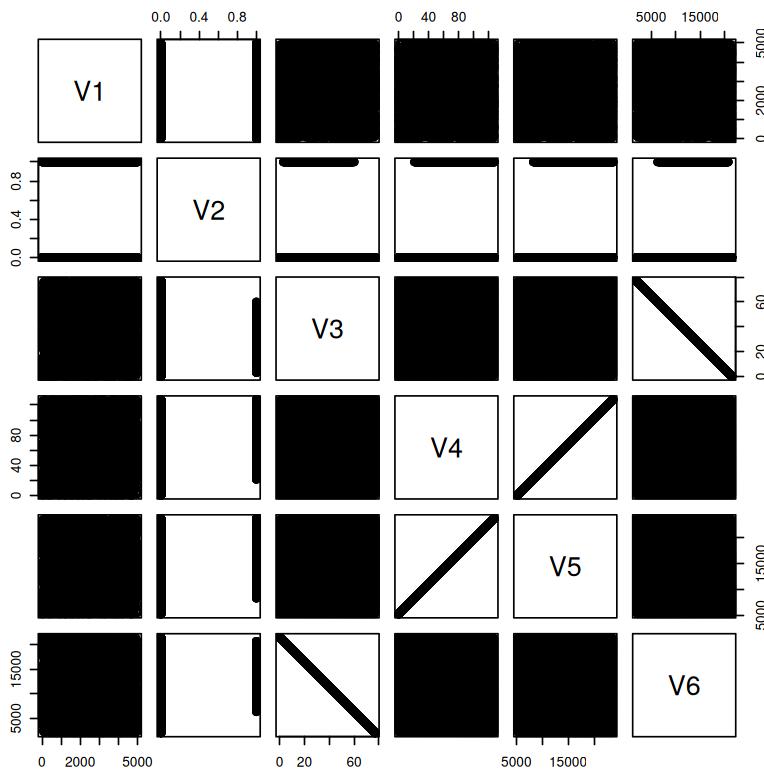
A data.frame: 6 × 6

	V1	V2	V3	V4	V5	V6
	<chr>	<int>	<int>	<int>	<int>	<int>
1	ACGCCTGACACCGCGCT-1	0	0	0	5247	21461
2	TACCGATCCAACACTT-1	0	1	1	5391	21208
3	ATTAAAGCGGACGAGC-1	0	0	2	5537	21460
4	GATAAGGGACGATTAG-1	0	1	3	5682	21207
5	GTGCAAATCACCAATA-1	0	0	4	5827	21460
6	TGTTGGCTGGCGGAAG-1	0	1	5	5972	21207

```
In [19]: dim(pos.info)
```

4992 · 6

```
In [20]: plot(pos.info)
```



```
In [21]: pos <- pos.info[,c(5,6)]
```

```
In [22]: head(pos)
```

A data.frame: 6 × 2

	V5	V6
	<int>	<int>
1	5247	21461
2	5391	21208
3	5537	21460
4	5682	21207
5	5827	21460
6	5972	21207

```
In [23]: rownames(pos) <- pos.info[,1]
```

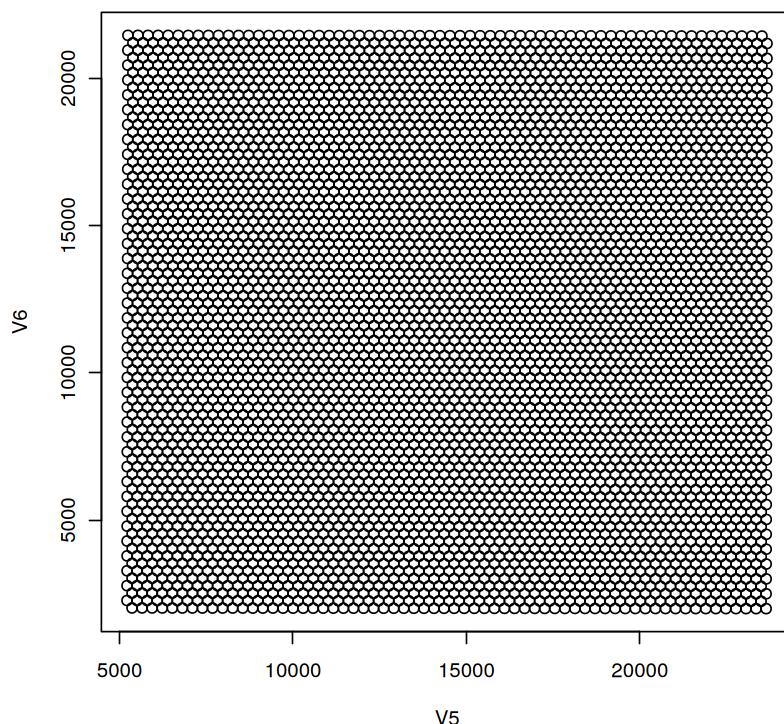
```
In [24]: head(pos)
```

A data.frame: 6 × 2

	V5	V6
	<int>	<int>
ACGCCCTGACACCGCGCT-1	5247	21461
TACCGATCCAACACTT-1	5391	21208
ATTAAAGCGGACGAGC-1	5537	21460
GATAAGGGACGATTAG-1	5682	21207
GTGCAAATCACCAATA-1	5827	21460
TGTTGGCTGGCGGAAG-1	5972	21207

In [25]: `dim(pos)`

4992 · 2

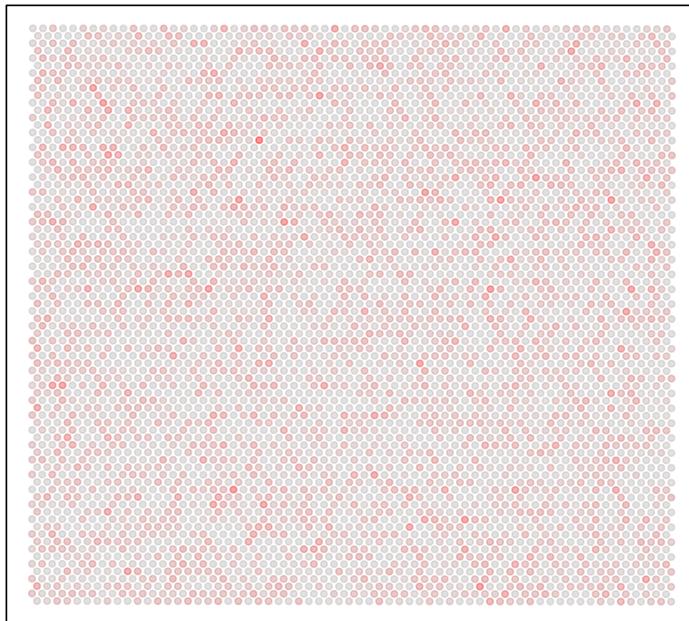
In [26]: `plot(pos)`In [27]: `# library(Matrix)`In [28]: `par(mfrow = c(1,1))`In [29]: `libsizes <- colSums(mbrain_raw)`In [30]: `class(mbrain_raw)`

```
'dgCMatrix'
```

```
In [31]: head(libsize)
```

```
AAACAACGAATAGTTC-1: 2791 AAACAAGTATCTCCA-1: 4008 AAACAATCTACTAGCA-1:  
2714 AACACCCAATAACTGC-1: 1681 AACAGAGCGACTCCT-1: 16036  
AACAGCTTCAGAAG-1: 1797
```

```
In [32]: # library(MERINGUE)  
MERINGUE::plotEmbedding(pos, col=libsize)
```



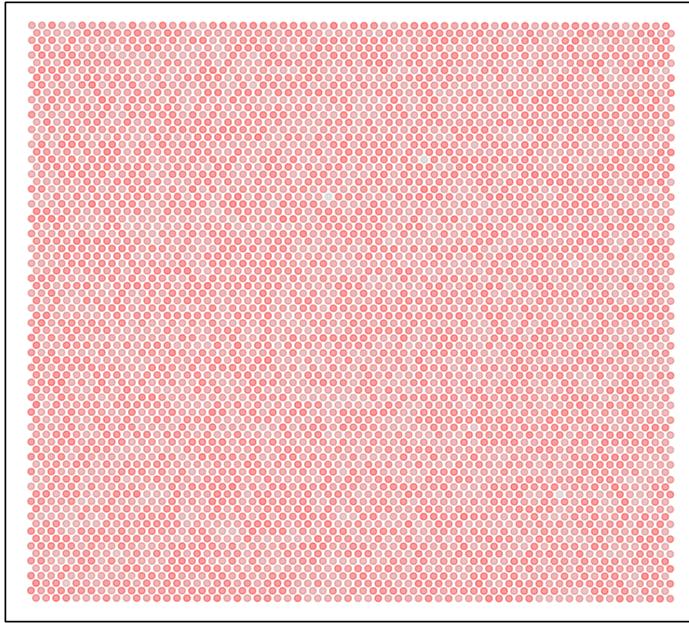
```
In [33]: ls()
```

```
'decont_obj' · 'g' · 'gg' · 'ggg' · 'installed_packages' · 'libsize' · 'mbrain_obj' · 'mbrain_raw'  
'mbrain_slide_info' · 'pos' · 'pos.info'
```

```
In [34]: # library(Matrix)  
libsize <- colSums(mbrain_raw)  
class(mbrain_raw)  
head(libsize)  
par(mfrow=c(1,1))  
# library(MERINGUE)  
MERINGUE::plotEmbedding(pos, col=log10(libsize+1))
```

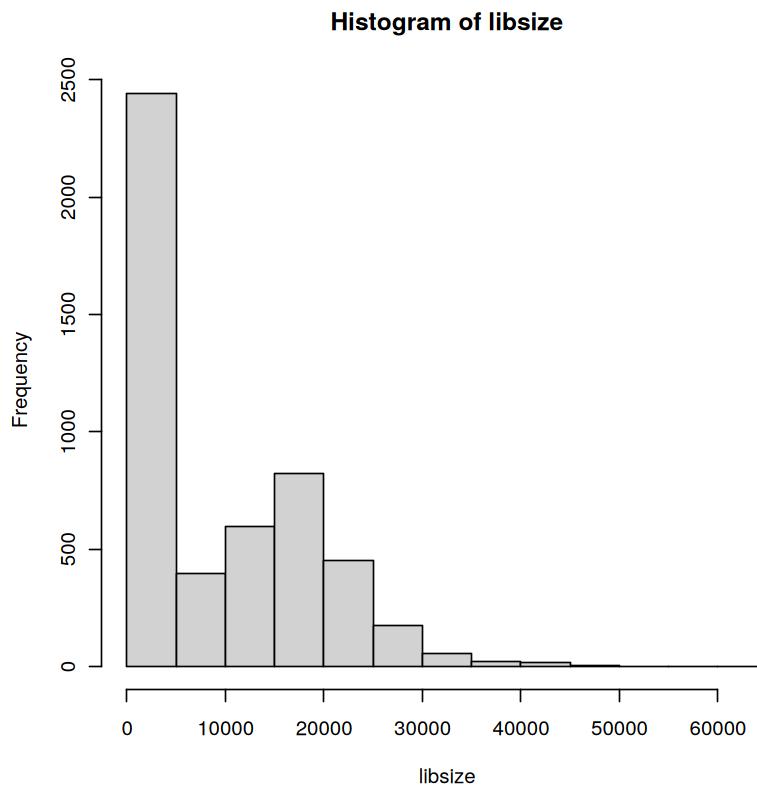
```
'dgCMatrix'
```

AAACAAACGAATAGTTC-1: 2791 **AAACAAGTATCTCCCA-1:** 4008 **AAACAATCTACTAGCA-1:**
2714 **AAACACCAATAACTGC-1:** 1681 **AAACAGAGCGACTCCT-1:** 16036
AAACAGCTTCAGAAG-1: 1797



In []:

In [35]: `hist(libsize)`



```
In [36]: countmat <- Matrix:::readMM('data/raw_feature_bc_matrix/matrix.mtx.gz')
```

```
In [37]: barcode.info <- read.csv('data/raw_feature_bc_matrix/barcodes.tsv.gz')
```

```
In [38]: barcode.info
```

A data.frame: 4991 × 1

AAACAAACGAATAGTTC.1

<chr>

AAACAAAGTATCTCCCA-1

AAACAATCTACTAGCA-1

AAACACCAATAACTGC-1

AAACAGAGCGACTCCT-1

AAACAGCTTCAGAAG-1

AAACAGGGTCTATATT-1

AAACAGTGTTCCTGGG-1

AAACATGGTGAGAGGA-1

AAACATTTCCCGGATT-1

AAACCACATACACAGAT-1

AAACCCGAACGAAATC-1

AAACCGGAAATGTTAA-1

AAACCGGGTAGGTACC-1

AAACCGTTCGTCCAGG-1

AAACCTAACGCCGG-1

AAACCTCATGAAGTTG-1

AAACGAAGAACATACC-1

AAACGAAGATGGAGTA-1

AAACGACAGTCTGCC-1

AAACGAGACGGTTGAT-1

AAACGCCGAGATCGG-1

AAACGCTGGCACGAC-1

AAACGGGCGTACGGGT-1

AAACGGGTTGGTATCC-1

AAACGGTTGCGAACTG-1

AAACGTGTTGCCCTA-1

AAACTAACGTGGCGAC-1

AAACTCGGTTCGCAAT-1

AAACTCGTGTATAAG-1

AAACTGCTGGCTCCAA-1

:

TTGTAAGGACCTAAGT-1

AAACAACGAATAGTTC.1

<chr>

TTGTAAGGCCAGTTGG-1
TTGTAATCCGTACTCG-1
TTGTACACCTCGAACAA-1
TTGTATCACACAGAAT-1
TTGTCACCGCGGTATC-1
TTGTCGTTCAGTTACC-1
TTGTCTCGGCAAGATG-1
TTGTGAAACCTAATCCG-1
TTGTGAGGCATGACGC-1
TTGTGATCTGTTCACT-1
TTGTGCAGCCACGTCA-1
TTGTGCGGAAGCGGAT-1
TTGTGGAGACAGCCGG-1
TTGTGCCCTGACAGT-1
TTGTGGTAGGAGGGAT-1
TTGTGGTATAAGGTATG-1
TTGTGGTGGTACTAAG-1
TTGTGTATGCCACCAA-1
TTGTGTTCCCGAAAG-1
TTGTTAGCAAATTCA-1
TTGTTCACTTGCTAC-1
TTGTTCTAGATAACGCT-1
TTGTTGGCAATGACTG-1
TTGTTGTGTCAAGA-1
TTGTTTCACATCCAGG-1
TTGTTTCATTAGTCTA-1
TTGTTTCATACAACT-1
TTGTTTGATTACACG-1
TTGTTGTGTAAATTCA-1

In [39]: `rownames(barcode.info)`

```
'1' · '2' · '3' · '4' · '5' · '6' · '7' · '8' · '9' · '10' · '11' · '12' · '13' · '14' · '15' · '16' · '17' · '18' · '19' ·  
'20' · '21' · '22' · '23' · '24' · '25' · '26' · '27' · '28' · '29' · '30' · '31' · '32' · '33' · '34' · '35' · '36' ·  
'37' · '38' · '39' · '40' · '41' · '42' · '43' · '44' · '45' · '46' · '47' · '48' · '49' · '50' · '51' · '52' · '53' ·  
'54' · '55' · '56' · '57' · '58' · '59' · '60' · '61' · '62' · '63' · '64' · '65' · '66' · '67' · '68' · '69' · '70' ·  
'71' · '72' · '73' · '74' · '75' · '76' · '77' · '78' · '79' · '80' · '81' · '82' · '83' · '84' · '85' · '86' · '87' ·  
'88' · '89' · '90' · '91' · '92' · '93' · '94' · '95' · '96' · '97' · '98' · '99' · '100' · '101' · '102' · '103' ·  
'104' · '105' · '106' · '107' · '108' · '109' · '110' · '111' · '112' · '113' · '114' · '115' · '116' · '117' ·  
'118' · '119' · '120' · '121' · '122' · '123' · '124' · '125' · '126' · '127' · '128' · '129' · '130' · '131' ·  
'132' · '133' · '134' · '135' · '136' · '137' · '138' · '139' · '140' · '141' · '142' · '143' · '144' · '145' ·  
'146' · '147' · '148' · '149' · '150' · '151' · '152' · '153' · '154' · '155' · '156' · '157' · '158' · '159' ·  
'160' · '161' · '162' · '163' · '164' · '165' · '166' · '167' · '168' · '169' · '170' · '171' · '172' · '173' ·  
'174' · '175' · '176' · '177' · '178' · '179' · '180' · '181' · '182' · '183' · '184' · '185' · '186' · '187' ·  
'188' · '189' · '190' · '191' · '192' · '193' · '194' · '195' · '196' · '197' · '198' · '199' · '200' · ....  
'4792' · '4793' · '4794' · '4795' · '4796' · '4797' · '4798' · '4799' · '4800' · '4801' · '4802' · '4803' ·  
'4804' · '4805' · '4806' · '4807' · '4808' · '4809' · '4810' · '4811' · '4812' · '4813' · '4814' · '4815' ·  
'4816' · '4817' · '4818' · '4819' · '4820' · '4821' · '4822' · '4823' · '4824' · '4825' · '4826' · '4827' ·  
'4828' · '4829' · '4830' · '4831' · '4832' · '4833' · '4834' · '4835' · '4836' · '4837' · '4838' · '4839' ·  
'4840' · '4841' · '4842' · '4843' · '4844' · '4845' · '4846' · '4847' · '4848' · '4849' · '4850' · '4851' ·  
'4852' · '4853' · '4854' · '4855' · '4856' · '4857' · '4858' · '4859' · '4860' · '4861' · '4862' · '4863' ·  
'4864' · '4865' · '4866' · '4867' · '4868' · '4869' · '4870' · '4871' · '4872' · '4873' · '4874' · '4875' ·  
'4876' · '4877' · '4878' · '4879' · '4880' · '4881' · '4882' · '4883' · '4884' · '4885' · '4886' · '4887' ·  
'4888' · '4889' · '4890' · '4891' · '4892' · '4893' · '4894' · '4895' · '4896' · '4897' · '4898' · '4899' ·  
'4900' · '4901' · '4902' · '4903' · '4904' · '4905' · '4906' · '4907' · '4908' · '4909' · '4910' · '4911' ·  
'4912' · '4913' · '4914' · '4915' · '4916' · '4917' · '4918' · '4919' · '4920' · '4921' · '4922' · '4923' ·  
'4924' · '4925' · '4926' · '4927' · '4928' · '4929' · '4930' · '4931' · '4932' · '4933' · '4934' · '4935' ·  
'4936' · '4937' · '4938' · '4939' · '4940' · '4941' · '4942' · '4943' · '4944' · '4945' · '4946' · '4947' ·  
'4948' · '4949' · '4950' · '4951' · '4952' · '4953' · '4954' · '4955' · '4956' · '4957' · '4958' · '4959' ·  
'4960' · '4961' · '4962' · '4963' · '4964' · '4965' · '4966' · '4967' · '4968' · '4969' · '4970' · '4971' ·  
'4972' · '4973' · '4974' · '4975' · '4976' · '4977' · '4978' · '4979' · '4980' · '4981' · '4982' · '4983' ·  
'4984' · '4985' · '4986' · '4987' · '4988' · '4989' · '4990' · '4991'
```

```
In [40]: colnames(barcode.info)
```

```
'AAACAAACGAATAGTTC.1'
```

```
In [41]: head(barcode.info)
```

A data.frame: 6 × 1

AAACAAACGAATAGTTC.1

<chr>

1	AAACAAGTATCTCCA-1
2	AAACAATCTACTAGCA-1
3	AAACACCAATAACTGC-1
4	AAACAGAGCGACTCCT-1
5	AAACAGCTTCAGAAG-1
6	AAACAGGGTCTATATT-1

```
In [42]: barcode.info <- read.csv('data/raw_feature_bc_matrix/barcodes.tsv.gz', header
```

```
In [43]: rownames(barcode.info)
```

```
'1' · '2' · '3' · '4' · '5' · '6' · '7' · '8' · '9' · '10' · '11' · '12' · '13' · '14' · '15' · '16' · '17' · '18' · '19' ·  
'20' · '21' · '22' · '23' · '24' · '25' · '26' · '27' · '28' · '29' · '30' · '31' · '32' · '33' · '34' · '35' · '36' ·  
'37' · '38' · '39' · '40' · '41' · '42' · '43' · '44' · '45' · '46' · '47' · '48' · '49' · '50' · '51' · '52' · '53' ·  
'54' · '55' · '56' · '57' · '58' · '59' · '60' · '61' · '62' · '63' · '64' · '65' · '66' · '67' · '68' · '69' · '70' ·  
'71' · '72' · '73' · '74' · '75' · '76' · '77' · '78' · '79' · '80' · '81' · '82' · '83' · '84' · '85' · '86' · '87' ·  
'88' · '89' · '90' · '91' · '92' · '93' · '94' · '95' · '96' · '97' · '98' · '99' · '100' · '101' · '102' · '103' ·  
'104' · '105' · '106' · '107' · '108' · '109' · '110' · '111' · '112' · '113' · '114' · '115' · '116' · '117' ·  
'118' · '119' · '120' · '121' · '122' · '123' · '124' · '125' · '126' · '127' · '128' · '129' · '130' · '131' ·  
'132' · '133' · '134' · '135' · '136' · '137' · '138' · '139' · '140' · '141' · '142' · '143' · '144' · '145' ·  
'146' · '147' · '148' · '149' · '150' · '151' · '152' · '153' · '154' · '155' · '156' · '157' · '158' · '159' ·  
'160' · '161' · '162' · '163' · '164' · '165' · '166' · '167' · '168' · '169' · '170' · '171' · '172' · '173' ·  
'174' · '175' · '176' · '177' · '178' · '179' · '180' · '181' · '182' · '183' · '184' · '185' · '186' · '187' ·  
'188' · '189' · '190' · '191' · '192' · '193' · '194' · '195' · '196' · '197' · '198' · '199' · '200' · ....  
'4793' · '4794' · '4795' · '4796' · '4797' · '4798' · '4799' · '4800' · '4801' · '4802' · '4803' · '4804' ·  
'4805' · '4806' · '4807' · '4808' · '4809' · '4810' · '4811' · '4812' · '4813' · '4814' · '4815' · '4816' ·  
'4817' · '4818' · '4819' · '4820' · '4821' · '4822' · '4823' · '4824' · '4825' · '4826' · '4827' · '4828' ·  
'4829' · '4830' · '4831' · '4832' · '4833' · '4834' · '4835' · '4836' · '4837' · '4838' · '4839' · '4840' ·  
'4841' · '4842' · '4843' · '4844' · '4845' · '4846' · '4847' · '4848' · '4849' · '4850' · '4851' · '4852' ·  
'4853' · '4854' · '4855' · '4856' · '4857' · '4858' · '4859' · '4860' · '4861' · '4862' · '4863' · '4864' ·  
'4865' · '4866' · '4867' · '4868' · '4869' · '4870' · '4871' · '4872' · '4873' · '4874' · '4875' · '4876' ·  
'4877' · '4878' · '4879' · '4880' · '4881' · '4882' · '4883' · '4884' · '4885' · '4886' · '4887' · '4888' ·  
'4889' · '4890' · '4891' · '4892' · '4893' · '4894' · '4895' · '4896' · '4897' · '4898' · '4899' · '4900' ·  
'4901' · '4902' · '4903' · '4904' · '4905' · '4906' · '4907' · '4908' · '4909' · '4910' · '4911' · '4912' ·  
'4913' · '4914' · '4915' · '4916' · '4917' · '4918' · '4919' · '4920' · '4921' · '4922' · '4923' · '4924' ·  
'4925' · '4926' · '4927' · '4928' · '4929' · '4930' · '4931' · '4932' · '4933' · '4934' · '4935' · '4936' ·  
'4937' · '4938' · '4939' · '4940' · '4941' · '4942' · '4943' · '4944' · '4945' · '4946' · '4947' · '4948' ·  
'4949' · '4950' · '4951' · '4952' · '4953' · '4954' · '4955' · '4956' · '4957' · '4958' · '4959' · '4960' ·  
'4961' · '4962' · '4963' · '4964' · '4965' · '4966' · '4967' · '4968' · '4969' · '4970' · '4971' · '4972' ·  
'4973' · '4974' · '4975' · '4976' · '4977' · '4978' · '4979' · '4980' · '4981' · '4982' · '4983' · '4984' ·  
'4985' · '4986' · '4987' · '4988' · '4989' · '4990' · '4991' · '4992'
```

```
In [44]: colnames(barcode.info)
```

```
'V1'
```

```
In [45]: head(barcode.info)
```

A data.frame: 6 × 1

V1

<chr>

1	AAACAAACGAATAGTTC-1
2	AAACAAGTATCTCCCA-1
3	AAACAATCTACTAGCA-1
4	AAACACCAATAACTGC-1
5	AAACAGAGCGACTCCT-1
6	AAACAGCTTCAGAAG-1

In [46]: `barcode.info`

A data.frame: 4992 × 1

V1

<chr>

AAACAACGAATAGTTC-1
AAACAAGTATCTCCCA-1
AAACAATCTACTAGCA-1
AACACCCAATAACTGC-1
AAACAGAGCGACTCCT-1
AACAGCTTCAGAAG-1
AACAGGGTCTATATT-1
AACAGTGTCTGGG-1
AACATGGTAGAGAGGA-1
AACATTCCCGATT-1
AACCACTACACAGAT-1
AACCCGAACGAAATC-1
AACCGGAAATGTTAA-1
AACCGGGTAGGTACC-1
AACCGTTCGTCCAGG-1
AACCTAAGCAGCCGG-1
AACCTCATGAAGTTG-1
AACGAAGAACATACC-1
AACGAAGATGGAGTA-1
AACGACAGTCTGCC-1
AACGAGACGGTTGAT-1
AACGCCGAGATCGG-1
AACGCTGGCACGAC-1
AACGGCGTACGGGT-1
AACGGGTTGGTATCC-1
AACGGTTCGCAACTG-1
AACGTGTTGCCCTA-1
AAACTAACGTGGCGAC-1
AAACTCGTTCGCAAT-1
AAACTCGTGATATAAG-1
:
TTGTAAGGACCTAAGT-1

V1
<chr>
TTGTAAGGCCAGTTGG-1
TTGTAATCCGTACTCG-1
TTGTACACCTCGAACCA-1
TTGTATCACACAGAAAT-1
TTGTCACCGCGGTATC-1
TTGTCGTTCAGTTACC-1
TTGTCTCGGCAAGATG-1
TTGTGAACCTAATCCG-1
TTGTGAGGCATGACGC-1
TTGTGATCTGTTCACT-1
TTGTGCAGCCACGTCA-1
TTGTGCGGAAGCGGAT-1
TTGTGGAGACAGCCGG-1
TTGTGGCCCTGACAGT-1
TTGTGGTAGGAGGGAT-1
TTGTGGTATAAGGTATG-1
TTGTGGTGGTACTAAG-1
TTGTGTATGCCACCAA-1
TTGTGTTCCCGAAAG-1
TTGTTAGCAAATTGCA-1
TTGTTCAGTGTGCTAC-1
TTGTTCTAGATACGCT-1
TTGTTGGCAATGACTG-1
TTGTTGTGTCAAGA-1
TTGTTTCACATCCAGG-1
TTGTTTCATTAGTCTA-1
TTGTTTCATACAAC-1
TTGTTTGATTACACG-1
TTGTTTGTTGAAATTC-1

```
In [47]: # library(Matrix)
```

```
In [48]: countmat <- Matrix:::readMM('data/raw_feature_bc_matrix/matrix.mtx.gz')
```

```
In [49]: barcode.info <- read.csv('data/raw_feature_bc_matrix/barcodes.tsv.gz')
```

```
In [ ]:
```

```
In [50]: gene.info <- read.csv('data/raw_feature_bc_matrix/features.tsv.gz', header =
```

```
In [51]: head(gene.info)
```

A data.frame: 6 × 1

	V1
	<chr>
1	ENSMUSG00000051951 Xkr4 Gene Expression
2	ENSMUSG00000089699 Gm1992 Gene Expression
3	ENSMUSG00000102331 Gm19938 Gene Expression
4	ENSMUSG00000102343 Gm37381 Gene Expression
5	ENSMUSG00000025900 Rp1 Gene Expression
6	ENSMUSG00000025902 Sox17 Gene Expression

```
In [52]: gene.info <- read.csv('data/raw_feature_bc_matrix/features.tsv.gz', header =
```

```
In [53]: head(gene.info)
```

A data.frame: 6 × 3

	V1	V2	V3
	<chr>	<chr>	<chr>
1	ENSMUSG00000051951	Xkr4	Gene Expression
2	ENSMUSG00000089699	Gm1992	Gene Expression
3	ENSMUSG00000102331	Gm19938	Gene Expression
4	ENSMUSG00000102343	Gm37381	Gene Expression
5	ENSMUSG00000025900	Rp1	Gene Expression
6	ENSMUSG00000025902	Sox17	Gene Expression

```
In [54]: #change again
```

```
In [55]: countmat <- Matrix:::readMM('data/raw_feature_bc_matrix/matrix mtx.gz')
```

```
In [56]: barcode.info <- read.csv('data/raw_feature_bc_matrix/barcodes.tsv.gz', header
```

```
In [57]: barcode <- barcode.info[,1]
```

```
In [58]: head(barcode)
```

```
'AAACAAACGAATAGTTC-1' · 'AAACAAGTATCTCCA-1' · 'AAACAATCTACTAGCA-1' ·  
'AACACCCAATAACTGC-1' · 'AACAGAGCGACTCCT-1' · 'AACAGCTTCAGAAG-1'
```

In [59]: `gene.info <- read.csv('data/raw_feature_bc_matrix/features.tsv.gz', header =`

In [60]: `head(gene.info)`

A data.frame: 6 × 3

	V1	V2	V3
	<chr>	<chr>	<chr>
1	ENSMUSG00000051951	Xkr4	Gene Expression
2	ENSMUSG00000089699	Gm1992	Gene Expression
3	ENSMUSG00000102331	Gm19938	Gene Expression
4	ENSMUSG00000102343	Gm37381	Gene Expression
5	ENSMUSG00000025900	Rp1	Gene Expression
6	ENSMUSG00000025902	Sox17	Gene Expression

In [61]: `gene <- gene.info[, 2]`

In [62]: `head(gene)`

```
'Xkr4' · 'Gm1992' · 'Gm19938' · 'Gm37381' · 'Rp1' · 'Sox17'
```

In [63]: `dim(countmat)`

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In [64]: `length(barcode)`

4992

In [65]: `length(gene)`

32589

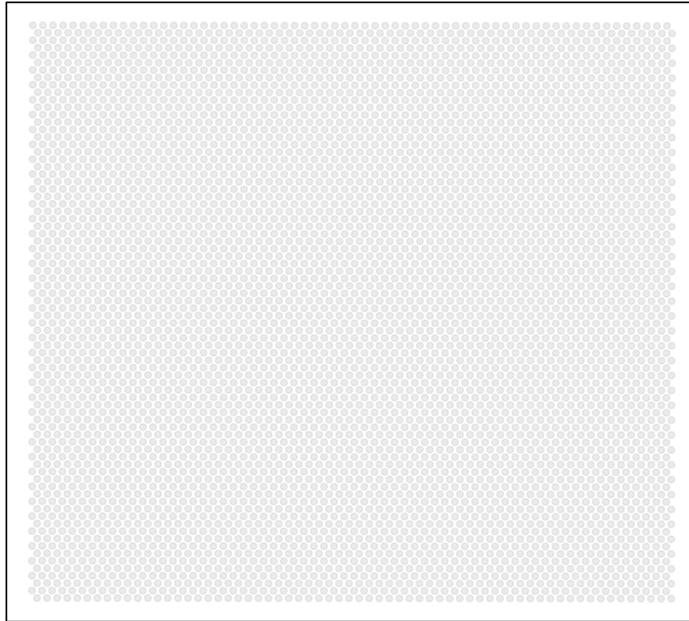
In [66]: `#36:04`

In [67]: `dim(countmat)`

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In [68]: `library(Matrix)`
`libsize <- colSums(countmat)`
`par(mfrow=c(1,1))`
`# library(MERINGUE)`
`MERINGUE::plotEmbedding(pos, col=libsize)`

```
Warning message in MERINGUE::plotEmbedding(pos, col = libsize):  
“provided cluster vector doesn't list colors for all of the cells; unmatched  
cells will be shown in gray. ”
```



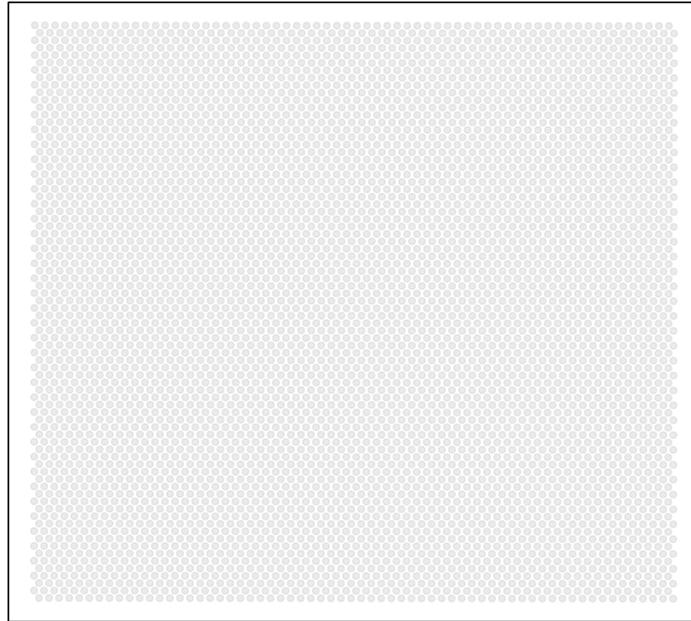
```
In [69]: library(Matrix)
```

```
In [70]: libsize <- colSums(countmat)
```

```
In [71]: par(mfrow=c(1,1))
```

```
In [72]: MERINGUE::plotEmbedding(pos,col=libsize)
```

```
Warning message in MERINGUE::plotEmbedding(pos, col = libsize):  
“provided cluster vector doesn't list colors for all of the cells; unmatched  
cells will be shown in gray. ”
```



```
In [73]: # Save plots to PDF, specifying dimensions  
#pdf('a.pdf')  
#MERINGUE::plotEmbedding(pos,col=libsize)  
#dev.off()
```

```
In [74]: ls()
```

```
'barcode' · 'barcode.info' · 'countmat' · 'decont_obj' · 'g' · 'gene' · 'gene.info' · 'gg' · 'ggg' ·  
'installed_packages' · 'libsize' · 'mbrain_obj' · 'mbrain_raw' · 'mbrain_slide_info' · 'pos' ·  
'pos.info'
```

```
In [75]: library(Matrix)
```

```
In [76]: countmat <- Matrix:::readMM('data/raw_feature_bc_matrix/matrix.mtx.gz')
```

```
In [77]: barcode.info <- read.csv('data/raw_feature_bc_matrix/barcodes.tsv.gz')
```

```
In [78]: colnames(countmat) <- barcode
```

```
In [79]: rownames(countmat) <- make.unique(gene)
```

```
In [80]: libsize <- colSums(countmat)
```

```
In [81]: dim(countmat)
```

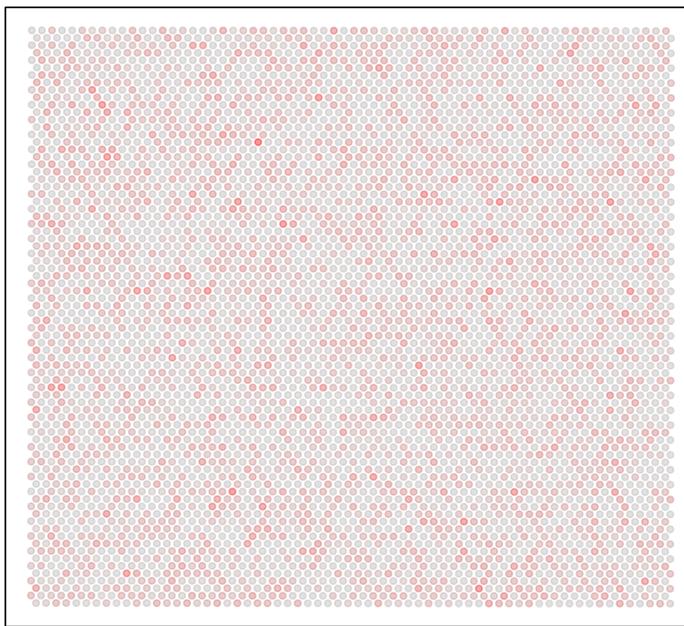
```
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```

```
In [82]: par(mfrow=c(1,1))
```

```
In [83]: 36:18
```

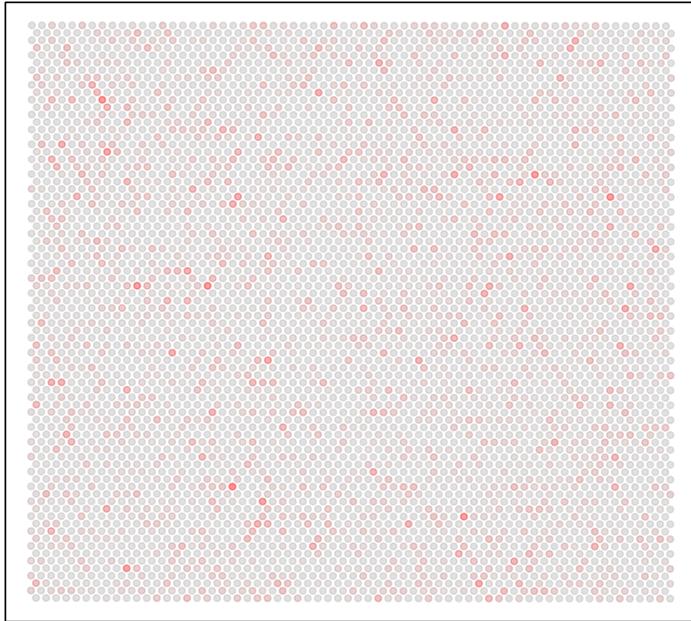
```
36 · 35 · 34 · 33 · 32 · 31 · 30 · 29 · 28 · 27 · 26 · 25 · 24 · 23 · 22 · 21 · 20 · 19 · 18
```

```
In [84]: MERINGUE::plotEmbedding(pos, col=libsize)
```



```
In [ ]:
```

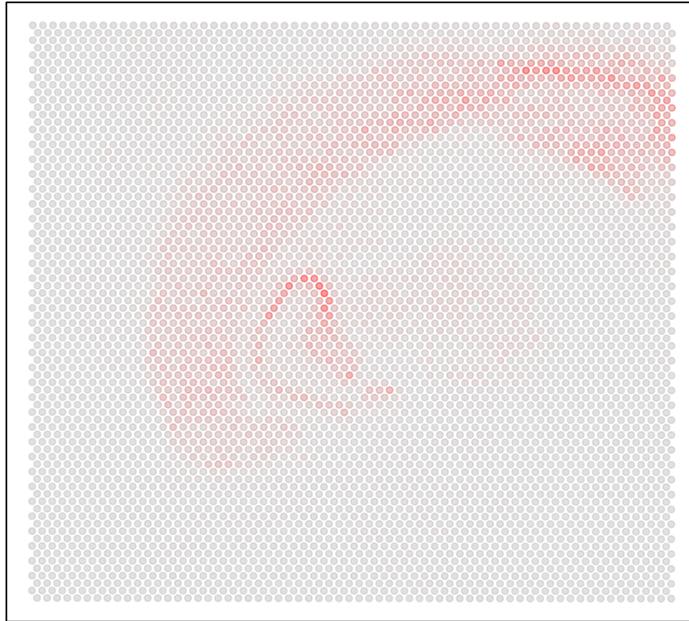
```
In [85]: g <- 'Slc17a7'  
gexp <- countmat[g,]  
MERINGUE::plotEmbedding(pos, col=gexp)
```



```
In [86]: head(gexp)
```

```
AAACAACGAATAGTTC-1: 7 AAACAAGTATCTCCA-1: 5 AAACAATCTACTAGCA-1: 8  
AACACCCAATAACTGC-1: 4 AACAGAGCGACTCCT-1: 38 AACAGCTTCAGAAG-1: 2
```

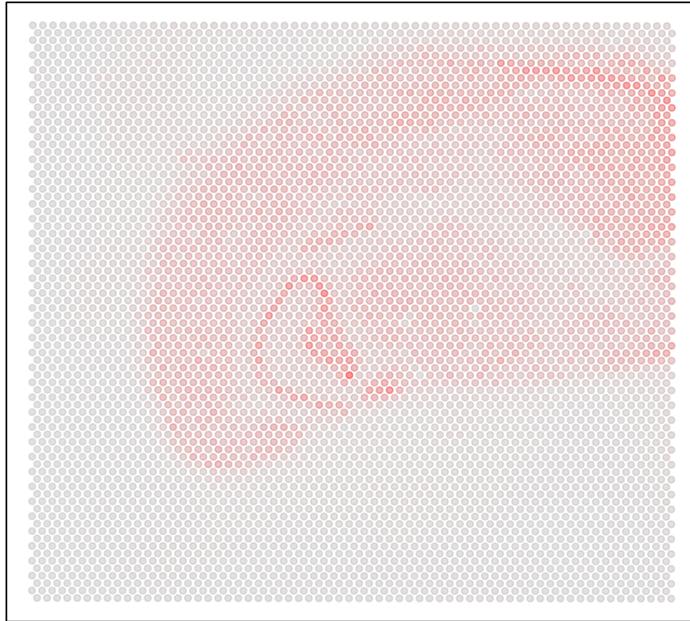
```
In [87]: MERINGUE::plotEmbedding(pos, col=gexp[rownames(pos)])
```



```
In [88]: #####now FIX ORDER
pos <- pos[, colnames(countmat),]
#####and FIX POSITION

library(Matrix)

pos <- pos[, c(2, 1)]
libsize <- colSums(countmat)
par(mfrow = c(1, 1))
g <- 'Slc17a7'
MERINGUE:::plotEmbedding(pos[, c(2, 1)], col=libsize)
##swap X and Y pos[, c(2, 1)]
#the picture is upside down so switched y position
```



```
In [89]: ###and FIX POSITION
pos.info <- read.csv('data/spatial/tissue_positions_list.csv', header = F)
pos <- pos.info[,c(5,6)]
rownames(pos) <- pos.info[,1]

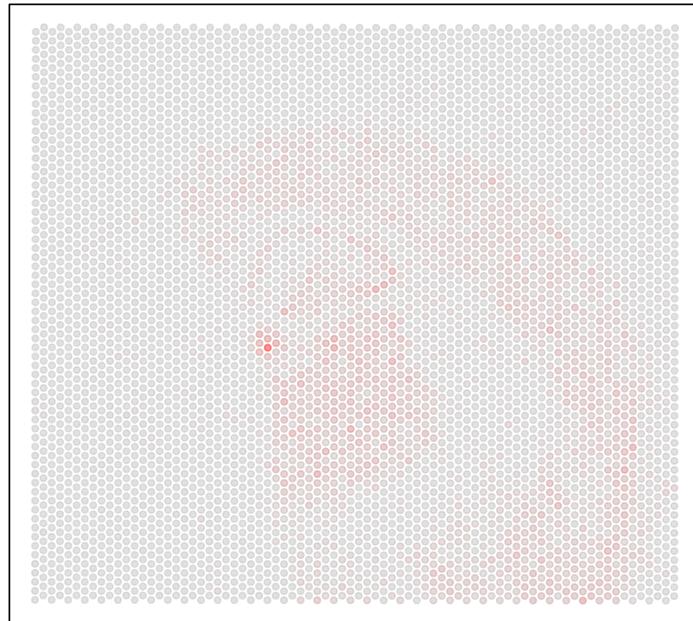
pos <- pos[colnames(countmat),]

pos <- pos[,c(2,1)]
pos[,2] <- -pos[,2]
pos[,2] <- pos[,2] - min(pos[,2])

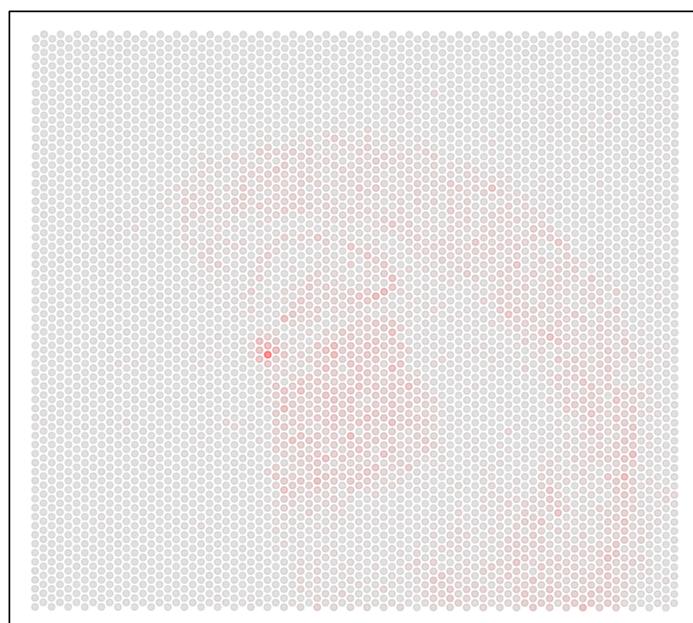
libsize <- colSums(countmat)
par(mfrow = c(1,1))

g <- 'Gabbr2'
gg <- 'Gad2'
ggg <- 'Slc17a7'
gexp <- countmat[g,]
MERINGUE::plotEmbedding(pos, col=gexp[rownames(pos)], main=g)

##swap X and Y pos[,c(2,1)]
```

Gabbr2

```
In [90]: MERINGUE::plotEmbedding(pos, col=gexp[rownames(pos)],main=gg)
```

Gad2

```
In [91]: MERINGUE::plotEmbedding(pos, col=gexp[rownames(pos)],main=ggg)
```

Slc17a7

In [92]: `dim(countmat)`

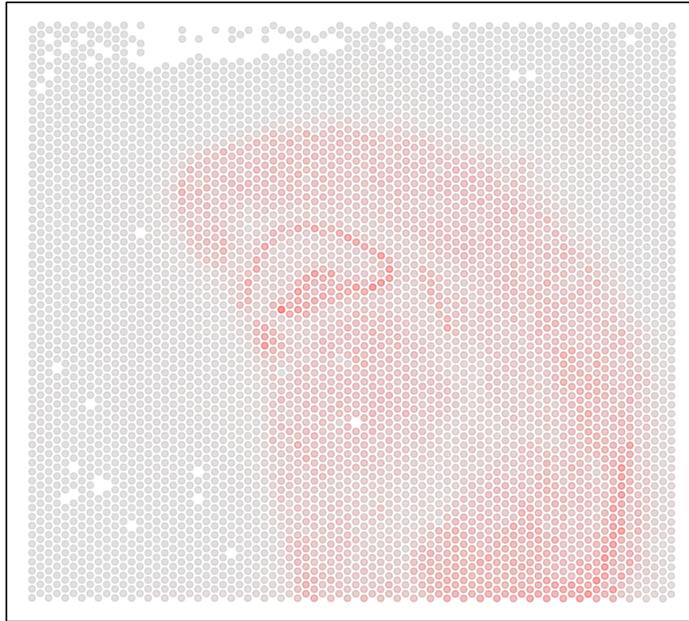
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In [93]: `head(pos)`

A data.frame: 6 × 2

	V6	V5
	<int>	<int>
AAACAACGAATAGTTC-1	21457	16104
AAACAAGTATCTCCCA-1	8819	3643
AAACAATCTACTAGCA-1	20695	12188
AAACACCAATAACTGC-1	6563	15688
AAACAGAGCGACTCCT-1	17908	4792
AAACAGCTTCAGAAG-1	10604	17134

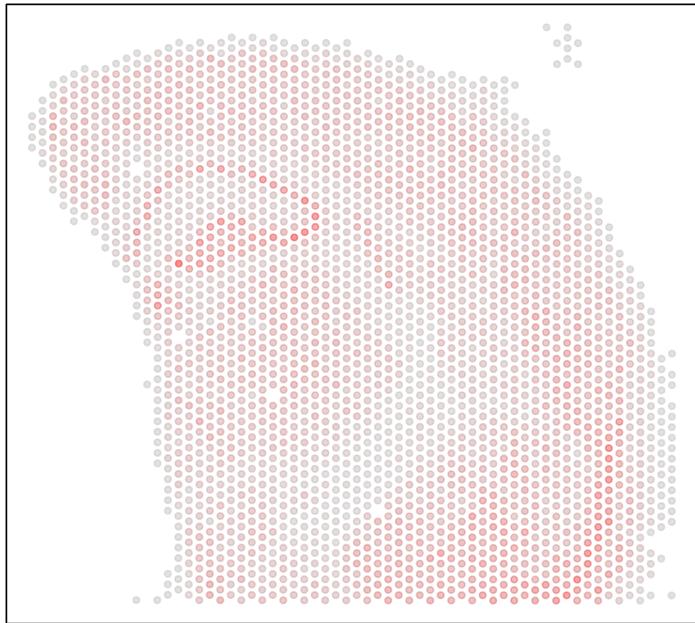
```
In [94]: ##### STdeconvolve
## remove pixels with too few genes
counts <- cleanCounts(countmat,
                        min.lib.size = 1000,
                        min.reads = 1000)
par(mfrow = c(1,1))
MERICUE::plotEmbedding(pos[,colnames(counts)], col=colSums(counts))
```



```
In [95]: dim(countmat)
```

```
32589 · 4992
```

```
In [96]: ###change min  
counts <- cleanCounts(countmat,  
                         min.lib.size = 5000,  
                         min.reads = 5000)  
par(mfrow = c(1,1))  
MERINGUE::plotEmbedding(pos[colnames(counts),], col=colSums(counts))
```



In [97]: 45:08

```
45 · 44 · 43 · 42 · 41 · 40 · 39 · 38 · 37 · 36 · 35 · 34 · 33 · 32 · 31 · 30 · 29 · 28 · 27 · 26 · 25 · 24 ·  
23 · 22 · 21 · 20 · 19 · 18 · 17 · 16 · 15 · 14 · 13 · 12 · 11 · 10 · 9 · 8
```

In [98]: `### chnage
cor.test(x,y)`

Error: object 'x' not found

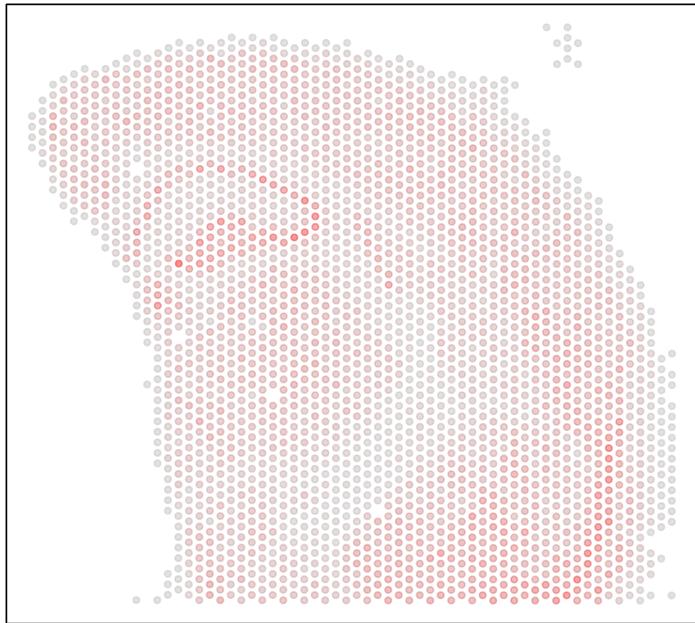
Traceback:

```
1. .handleSimpleError(function (cnd)
. {
.   watcher$capture_plot_and_output()
.   cnd <- sanitize_call(cnd)
.   watcher$push(cnd)
.   switch(on_error, continue = invokeRestart("eval_continue"),
.         stop = invokeRestart("eval_stop"), error = NULL)
. }, "object 'x' not found", base::quote(eval(expr, envir)))
```

In [100...]: `dim(counts)`

```
2100 · 2549
```

In [101...]: `MERINGUE::plotEmbedding(pos[colnames(counts),], col=colSums(counts))`



```
In [102]: ## feature select for genes  
corpus <- restrictCorpus(counts, removeAbove=1.0, removeBelow = 0.05)  
head(corpus)
```

Removing 47 genes present in 100% or more of pixels...

2053 genes remaining...

Removing 0 genes present in 5% or less of pixels...

2053 genes remaining...

Restricting to overdispersed genes with alpha = 0.05...

Calculating variance fit ...

Using gam with k=5...

476 overdispersed genes ...

Using top 1000 overdispersed genes.

number of top overdispersed genes available: 476

```
[[ suppressing 2549 column names 'AACAGAGCGACTCCT-1', 'AAACCACTACACAGAT-  
1', 'AAACCCGAACGAAATC-1' ... ]]
```

6 x 2549 sparse Matrix of class "dgTMatrix"

Vxn	4	5	.	4	16	2	2	.	5	11	7	1	4	3	3	3	4	4	5	12	2	11	3	.	
.	8																								
Ogfrl1	1	3	1	1	3	1	.	3	3	3	4	6	3	.	2	5	.	1	1	6	1	1	.	9	
8	1																								
2010300C02Rik	6	6	1	6	3	4	5	2	8	10	18	1	1	2	5	4	1	3	2	3	2	12	5	1	
1	1																								
Igfbp5	.	3	1	.	1	.	1	10	5	3	5	10	.	3	8	3	.	2	3	.	.	2	1		
2	2																								
Arpc2	8	1	1	4	2	2	.	.	4	4	3	7	1	.	.	4	.	2	1	3	1	4	1	1	
1	2																								
Ptpn	13	6	10	11	7	4	6	10	9	15	21	14	1	1	4	20	4	6	2	17	5	17	5	10	
4	8																								
Vxn	1	1	.	9	1	18	4	9	5	3	1	11	7	9	7	8	2	2	7	1	4	33	7	2	23
3																									
Ogfrl1	2	4	3	5	4	7	2	3	3	.	1	2	7	1	5	3	1	.	2	.	1	8	1	2	4
4																									
2010300C02Rik	1	2	.	43	9	4	4	3	7	1	.	2	2	13	5	3	4	4	3	1	2	2	8	1	12
8																									
Igfbp5	2	9	1	9	4	3	2	2	.	4	1	2	3	2	1	2	9	.	2	5	1	1	.	2	
2																									
Arpc2	1	4	.	13	.	3	3	3	2	.	3	7	5	2	1	3	2	4	.	.	6	2	.	4	
.																									
Ptpn	6	12	1	16	10	12	9	12	7	2	1	4	17	11	14	5	2	4	12	1	3	11	9	3	31
11																									
Vxn	17	4	3	1	3	2	.	9	1	.	1	6	.	2	3	13	9	2	17	.	.	3	15	1	1
0	9																								
Ogfrl1	1	1	3	10	4	1	7	3	.	.	3	4	3	2	2	1	.	2	4	7	1	1	1	7	
2	1																								
2010300C02Rik	10	2	6	1	3	5	.	4	3	1	8	3	2	14	7	7	4	2	5	.	1	5	9	.	5
3																									
Igfbp5	.	1	.	1	.	1	2	1	2	1	1	2	1	.	2	3	.	1	2	.	4	1	.	2	
2	2																								
Arpc2	6	3	1	2	3	1	2	4	2	.	4	2	.	2	4	3	2	5	7	.	2	3	.		
1	2																								
Ptpn	6	10	12	6	9	3	4	10	5	4	12	4	2	26	10	9	1	15	29	5	2	8	13	10	
8	9																								
Vxn	2	20	10	5	7	2	5	.	2	5	.	7	2	11	.	2	17	10	4	1	5	13	1	1	
.																									
Ogfrl1	1	13	1	2	2	7	2	1	15	.	8	1	10	4	2	3	2	1	5	1	7	3	9	.	
2																									
2010300C02Rik	.	8	6	6	5	6	5	3	4	6	.	2	1	2	.	9	20	4	1	4	3	1	.	.	
.																									
Igfbp5	1	2	3	22	3	9	5	2	4	3	2	2	5	1	.	4	2	1	.	3	2	1	2	2	
1																									
Arpc2	.	4	2	5	4	4	4	.	2	1	1	3	2	1	1	6	.	2	1	1	3	7	1	1	
.																									
Ptpn	3	18	9	4	15	17	24	5	10	4	5	13	6	7	3	16	20	3	3	7	6	9	8	4	
10																									
Vxn	4	23	1	1	.	6	4	1	1	9	1	2	4	17	.	7	14	4	5	.	3	28	.	.	
4	2																								

singlecell

Ogfrl1	4	7	1	1	10	3	2	5	2	3	5	3	4	4	.	2	7	1	2	7	1	6	1	2	
.	9																								
2010300C02Rik	4	12	2	.	1	1	4	.	10	8	3	7	9	5	3	5	4	8	1	.	24	7	1	2	
6	.																								
Igfbp5	.	4	6	1	1	.	.	4	5	1	.	3	2	2	.	3	.	3	4	1	4	1	2	2	
.	2																								
Arpc2	4	2	2	.	3	1	2	.	3	1	.	1	2	1	1	.	1	4	1	5	3	7	1	.	
2	2																								
Ptpn	12	28	2	7	5	10	11	5	23	19	4	8	15	7	6	9	8	10	6	3	27	36	3	3	
2	3																							1	
Vxn	1	3	1	1	3	12	1	10	2	2	7	2	2	3	3	6	1	1	2	.	18	5	.	7	
2	1																								
Ogfrl1	.	3	1	2	5	1	3	2	1	.	3	2	1	.	1	3	1	1	4	10	7	4	8	4	
6	2																								
2010300C02Rik	1	7	2	.	8	1	1	3	2	3	3	6	7	2	2	3	15	1	6	1	6	5	.	17	
1	5																								
Igfbp5	3	3	3	.	4	5	11	3	.	2	5	1	.	18	2	1	1	.	6	1	2	.	11	2	
2	6																								
Arpc2	.	1	4	3	3	2	3	4	4	1	5	3	3	2	3	2	6	1	.	3	3	6	.	7	
4	4																								
Ptpn	14	11	15	6	10	12	12	7	5	6	6	4	6	10	3	4	4	1	3	9	17	10	2	12	
6	4																								
Vxn	3	1	12	5	.	1	7	8	11	2	1	11	8	.	15	1	17	9	1	7	1	4	2	5	
2																									
Ogfrl1	6	1	1	1	9	1	3	2	2	3	3	2	5	14	3	2	2	1	.	1	1	2	2	.	
1																									
2010300C02Rik	7	2	5	8	1	2	3	7	12	1	3	4	20	.	3	2	7	4	3	4	1	1	10	2	
1																									
Igfbp5	2	1	3	6	13	3	.	3	3	.	2	2	1	3	3	3	.	3	.	2	2	4	2	1	
1																									
Arpc2	4	.	.	4	.	.	3	2	4	.	2	4	5	3	6	1	2	1	2	4	2	2	3	3	
2																									
Ptpn	14	4	11	15	8	1	12	13	17	4	21	14	27	11	16	7	9	10	2	7	8	2	19	3	
.																									
Vxn	.	3	11	15	7	17	15	3	.	4	23	1	8	3	1	10	11	2	8	14	12	9	4	1	
2																									
Ogfrl1	.	3	5	6	2	5	5	1	6	4	4	9	1	.	2	7	1	1	.	4	2	5	1	4	
1																									
2010300C02Rik	.	3	9	6	1	7	4	1	3	22	6	2	7	2	.	26	8	4	5	5	3	5	3	3	
6																									
Igfbp5	1	2	.	1	2	6	3	1	2	6	4	4	2	1	.	2	1	2	2	7	.	.	13	2	
6																									
Arpc2	1	1	3	1	1	4	2	.	.	7	2	1	3	.	1	9	.	1	1	3	4	2	5	1	
4																									
Ptpn	2	7	12	21	5	16	7	4	6	4	14	5	25	8	6	16	11	3	13	6	9	13	8	8	
20																									
Vxn	.	2	8	.	11	8	.	2	12	2	3	9	2	18	8	10	4	2	2	3	2	.	3	.	1
13																									
Ogfrl1	2	.	4	5	8	2	4	1	4	2	3	5	10	7	3	3	.	1	.	1	3	3	.	2	
.																									
2010300C02Rik	.	3	3	.	2	3	1	2	4	.	5	4	1	5	3	10	3	5	.	.	1	5	4	1	12
10																									

Igfbp5 1	4 6 1 3 3 2 . 4 5 5 2 . . 3 3 3 6 3 . 6 3 2 5 3 1 4 4
Arpc2 4	3 . 2 4 3 . . 2 1 . 3 . 2 2 3 3 3 4 2 1 2 3 . 2 2 . 4
Ptpn 16	10 2 12 1 9 3 10 5 9 1 4 14 7 18 13 30 9 9 7 8 6 1 7 3 7 17
Vxn 3	1 . 1 10 3 2 6 . 23 5 2 4 5 5 2 1 . 14 1 . 1 19 13 2 . 11
Ogfrl1 3	. 2 . 1 1 2 2 2 6 . 2 2 1 1 2 5 3 2 1 . 1 3 1 3 2 1
2010300C02Rik 3	1 . 1 8 1 6 9 1 3 2 1 11 1 6 1 1 6 4 2 1 6 12 18 2 . 9
Igfbp5 4	. 3 4 . 3 2 4 . 5 1 2 5 6 1 5 1 4 . 4 4 1 2 1 4 2 1
Arpc2 6	1 . 2 6 . 4 1 . 2 . 2 2 . 2 5 2 2 6 2 3 3 4 2 1 . 4
Ptpn 19	8 3 6 11 4 5 7 7 10 8 11 10 3 13 4 4 1 10 10 1 10 35 11 3 2 9
Vxn 3 .	6 5 1 11 2 2 20 5 2 4 13 12 16 3 8 2 20 5 5 . 8 1 1 2
Ogfrl1 1 7	3 7 8 2 1 7 7 4 . 1 4 3 6 5 . . 4 3 1 1 4 1 1 1 1
2010300C02Rik . 2	5 3 1 5 4 . 4 7 1 4 5 17 9 4 11 1 2 3 1 . 6 2 . .
Igfbp5 3 .	1 4 2 . 4 4 3 2 2 1 . 3 . 2 . 1 . . 5 1 6 8 6 2
Arpc2 5 2	4 5 4 2 . . 4 2 1 . 4 9 1 3 4 1 1 2 2 1 4 2 1 1
Ptpn 5 3	5 11 11 8 1 6 9 9 1 3 15 20 20 13 12 14 16 15 3 3 18 9 4 5 1
Vxn 6	18 . 2 . 2 31 1 7 2 9 7 6 22 1 6 1 2 1 2 24 . 6 . . 6
Ogfrl1 1	4 2 9 9 . 4 2 4 3 1 3 2 2 5 6 10 1 . 8 3 1 3 2 2 4
2010300C02Rik 15	6 3 . . 2 1 2 34 2 3 3 1 6 1 3 . 2 4 . 6 . 7 . 1 15
Igfbp5 2	2 3 1 4 1 1 3 6 . 11 3 2 3 . 2 2 2 6 1 3 2 9 3 3 1
Arpc2 . .	2 4 2 3 3 1 2 5 . . 2 2 1 1 2 6 . 2 1 4 2 3 2 3 6
Ptpn 8	15 8 5 10 22 13 6 31 9 8 8 5 13 14 3 13 1 7 8 12 1 4 17 3 9
Vxn 1 1	7 1 2 1 5 . 9 6 16 . 10 3 29 2 8 . 3 13 14 20 19 18 2 1
Ogfrl1 3 1	2 1 4 . 4 1 4 1 2 1 3 4 8 1 9 2 3 3 3 1 7 3 . 8
2010300C02Rik 3 2	6 1 3 3 3 . 4 5 . . 8 14 3 3 21 . 4 31 19 2 13 1 1 1
Igfbp5 1 .	. 1 . 7 10 1 2 . 1 . 1 5 1 5 2 1 3 2 5 2 . 2 1 3
Arpc2 4 3	3 . 1 2 1 1 1 2 4 1 2 4 2 . 3 . 1 15 6 2 4 1 1 8

Ptpn5	4 6 6 2 4 3 13 14 13 3 8 17 15 5 13 2 19 37 36 11 29 8 4 3 5 4
Vxn1	22 2 . 3 2 2 4 3 13 . 6 30 . 7 29 32 21 1 2 . 14 1 18 .
Ogfrl1	5 2 1 7 5 12 5 2 5 . 3 3 1 3 5 3 3 1 2 . 5 . 5 2
.	
2010300C02Rik1	6 11 . 4 7 . 6 4 6 1 11 5 . 5 9 7 2 2 2 1 4 . 13 2
Igfbp51	2 4 . 1 6 1 9 1 3 2 . 1 3 2 1 1 3 . 1 . 2 . 2 5
Arpc23	4 2 1 2 2 3 4 4 3 . 2 5 4 8 6 4 4 1 . . 2 . 9 .
Ptpn5	18 11 2 11 9 2 3 14 16 2 15 18 12 7 7 18 11 . 5 4 19 6 24 3
Vxn1	3 9 16 1 3 2 14 . 2 1 10 5 1 2 18 1 1 2 . 1 1 2 1 4 11 1
Ogfrl11	2 2 4 4 1 1 6 1 2 . 2 . 8 . 5 1 . 3 6 6 1 1 . . 3
2010300C02Rik4	10 5 17 1 3 1 26 9 4 2 10 8 2 4 26 9 5 7 . 4 . 2 1 4 4
Igfbp53	. 6 1 1 . 3 1 . 5 1 2 . 12 4 1 . 4 2 6 3 6 . 1 . 3
Arpc24	6 4 5 3 2 1 12 1 . 4 2 6 1 . 11 2 5 2 2 3 . . . 2 .
Ptpn2	13 2 23 6 6 6 12 9 2 4 13 6 8 12 19 7 17 20 6 20 6 1 3 5 10 1
Vxn7	4 16 6 17 10 1 . 3 7 7 3 11 . . 3 3 5 3 29 5 1 1 1 1 3
Ogfrl13	2 10 2 5 7 1 4 2 3 2 4 8 8 5 2 3 4 . 8 3 . 4 1 1 1
2010300C02Rik2	9 14 8 1 7 1 3 4 3 7 3 14 3 . 8 . 2 6 10 4 . 2 2 3 5
Igfbp51	. 2 2 5 3 1 3 4 4 2 2 3 1 4 1 4 2 2 3 1 . 1 6 1 .
Arpc21	4 3 3 . 1 . 4 1 2 2 4 3 . 2 1 4 1 2 2 3 4 1 1 4 1
Ptpn4	11 26 11 5 7 3 9 9 17 13 8 19 11 13 2 5 3 5 16 10 7 9 6 10 3
Vxn4 .	7 14 . 13 3 8 1 4 1 9 5 2 8 2 1 . 1 . 1 5 3 1 8 1 9
Ogfrl11 5	6 7 2 1 1 2 2 4 6 . 1 5 2 5 . 9 3 4 8 2 2 . 2 2 4
2010300C02Rik5 1	8 11 . 9 . 14 . 11 3 14 5 2 6 . . 2 6 1 3 3 4 1 4 1 1 8
Igfbp51 4	2 5 1 4 . 2 4 5 . . 3 . 1 1 7 2 1 4 1 2 . 2 1 3 2
Arpc24 1	4 1 . 3 1 2 . 3 2 7 3 . 1 . . 2 2 3 2 3 . 1 2 1 1
Ptpn4 2	9 10 . 8 4 17 2 2 1 15 19 6 4 2 1 7 12 10 5 19 3 14 8 10 10
Vxn	2 5 1 2 17 2 1 3 1 1 3 5 2 3 3 2 8 1 3 11 2 10 6 4 7

11	
Ogfrl1	. 1 3 . 4 1 6 2 5 1 1 1 4 . 3 . 1 3 3 3 1 2 8 6 5
1	
2010300C02Rik	3 6 1 1 14 3 . 6 1 4 13 7 10 4 13 2 2 10 1 6 1 3 32 7 3
7	
Igfbp5	. 2 . 2 2 2 3 4 2 . 2 1 1 1 1 2 5 2 5 1 2 1 6 . 1
2	
Arpc2	3 2 1 . 2 . 4 3 1 2 2 . 2 2 3 1 1 1 3 1 2 2 9 3 2
1	
Ptpn	18 4 3 . 18 5 6 4 5 5 15 14 8 3 6 3 9 2 15 9 8 16 7 4 10
8	
Vxn	1 1 5 3 1 11 . . 2 5 1 9 5 9 3 1 3 . 1 15 2 . 27 22 1
2	
Ogfrl1	11 . 4 5 1 5 1 2 1 14 2 1 . 6 . 2 9 . 7 2 . 2 5 5 .
8	
2010300C02Rik	. . 8 22 1 15 . . 4 96 1 5 4 6 2 1 2 2 . 5 1 2 4 7 1 2
0	
Igfbp5	2 2 1 5 1 1 4 . 3 18 20 . 1 . 1 2 . 2 . 1 2 1 1 3 .
7	
Arpc2	1 . 3 5 . 2 1 3 . 27 2 3 4 2 2 1 4 1 3 1 . . 1 3 .
3	
Ptpn	4 7 14 20 6 12 1 5 1 39 3 13 9 29 8 3 9 1 8 13 1 5 9 11 3 1
5	
Vxn	21 2 8 3 6 3 1 . 1 2 1 2 . 10 17 7 2 3 2 24 6 2 27 8 10
1	
Ogfrl1	2 3 2 2 1 8 3 3 2 2 . 6 3 3 4 6 1 1 4 2 6 2 4 1 .
3	
2010300C02Rik	5 . 10 1 6 10 3 . . 7 15 3 1 19 1 6 1 2 . 7 2 7 6 3 2
4	
Igfbp5	1 1 1 4 . 4 . 1 . 14 1 2 3 1 2 2 14 . 2 . 2 . . 2 1
7	
Arpc2	. 1 1 2 4 9 . 2 . . 1 3 1 7 5 4 2 1 . 1 3 3 3 4 3
1	
Ptpn	6 4 6 6 6 12 4 4 3 5 12 5 3 21 14 15 3 6 5 14 5 7 22 15 10
5	
Vxn	22 1 6 2 2 8 10 13 4 10 19 7 5 7 2 9 3 3 1 3 1 3 19 3
29	
Ogfrl1	3 . 18 . 4 7 2 5 4 6 3 1 3 2 . 4 3 2 3 3 3 1 3 1
4	
2010300C02Rik	5 1 6 2 5 6 3 11 29 36 33 4 9 2 1 21 4 5 . 4 2 9 5 5
5	
Igfbp5	1 1 1 1 5 2 . 3 4 1 1 4 3 1 1 7 5 3 1 3 5 3 2 2
.	
Arpc2	5 2 4 2 3 3 5 7 4 19 14 3 5 3 1 9 2 3 . 4 1 1 2 1
1	
Ptpn	21 2 11 7 19 14 15 29 30 20 20 6 14 8 2 9 7 9 10 10 7 18 20 3
13	
Vxn	. 1 18 8 . 1 13 13 9 . 5 1 4 8 9 1 7 1 4 1 9 2 1 1 1
2 2	
Ogfrl1	1 2 2 3 . 3 4 3 . 6 1 5 2 1 6 1 3 11 2 3 3 13 1 2 1
2 5	
2010300C02Rik	1 1 9 5 . 6 4 6 6 1 9 3 4 4 1 4 7 2 1 9 9 2 1 2 3

1 2	
Igfbp5	3 3 3 . 1 4 4 . 2 2 1 2 . 4 1 1 . 5 1 1 1 1 3 . .
. 2	
Arpc2	1 1 5 2 1 3 4 4 1 4 4 1 4 . 1 6 5 4 1 1 1 3 . 1 .
1 4	
Ptpn	2 4 10 13 1 22 13 15 9 4 22 8 7 1 11 11 17 9 4 6 16 9 7 6 3
6 5	
Vxn	1 5 1 17 1 1 . 2 . . 14 1 . . . 6 5 1 19 22 13 10 7 4
4	
Ogfrl1	. 2 . 1 3 12 7 4 2 2 3 3 . 4 1 4 2 . 4 3 7 3 2 3
2	
2010300C02Rik	3 11 1 12 5 2 1 11 . 1 5 . . 2 5 12 14 3 2 6 6 5 5 3
4	
Igfbp5	1 3 15 . . 1 1 . 2 6 4 5 8 7 2 1 3 5 6 . 7 2 1 2
1	
Arpc2	. 3 2 2 7 . 1 5 4 . 2 4 1 3 1 6 2 . 6 3 1 4 5 2
3	
Ptpn	8 13 4 19 6 10 8 14 4 2 9 8 2 10 13 9 8 6 20 25 18 5 8 11
10	
Vxn	9 2 1 1 5 23 3 8 . 1 . 3 5 3 8 4 3 5 8 3 3 8 12 8 21 7
.	
Ogfrl1	3 2 4 4 2 5 2 2 1 4 2 1 2 1 6 3 . 1 4 2 1 4 3 4 8 1
2	
2010300C02Rik	4 3 5 1 1 4 2 12 5 6 1 3 34 3 7 5 2 8 10 . 7 16 4 1 11 6
2	
Igfbp5	4 1 . . 3 1 2 2 1 . 3 3 1 1 1 2 3 5 1 1 3 4 3 2 5
.	
Arpc2	4 4 6 2 2 6 4 2 2 1 . 1 9 . 6 3 1 2 10 1 3 5 3 1 7 6
.	
Ptpn	6 7 5 1 10 12 9 13 5 4 3 6 15 6 14 20 1 13 24 2 9 19 18 8 21 8
6	
Vxn	18 8 10 2 7 11 5 8 . 44 9 12 . 7 16 7 7 33 14 1 12 1
4	
Ogfrl1	5 1 5 1 4 4 . 3 . 13 3 2 10 3 2 2 4 7 2 2 2 2
2	
2010300C02Rik	3 7 20 . 15 5 7 4 . 2 3 3 1 15 13 2 14 3 7 2 10 3 1
8	
Igfbp5	. . 1 1 1 3 . . 3 1 3 1 1 1 . 2 . 1 4 2 1 3
4	
Arpc2	6 4 5 . 7 3 1 5 1 5 1 2 . 8 1 . 3 3 3 . 1 2
2	
Ptpn	8 15 14 4 12 7 12 10 1 14 9 4 8 9 11 10 18 15 15 6 5 4
8	
Vxn	12 7 4 14 . 2 2 12 4 8 2 6 10 6 . 3 . . 5 11 3 . 1 . 3
4	
Ogfrl1	1 3 . 4 . 3 2 3 3 3 3 3 2 3 3 1 3 5 1 7 8 . 3 1 .
1	
2010300C02Rik	11 8 7 10 1 1 4 3 9 5 3 5 2 14 20 2 1 2 1 1 1 . 1 . 3
8	
Igfbp5	5 1 2 2 1 . 4 . . 1 2 6 . 3 1 6 5 1 4 5 2 1 . 1 3
6	
Arpc2	3 2 3 2 1 . 6 1 1 1 2 3 3 3 4 2 . 2 . 1 2 2 1 3 2

3	
Ptpn	17 1 10 12 4 6 14 12 14 11 9 13 11 22 19 3 2 6 3 11 9 2 7 4 16
13	
Vxn	18 . 19 3 26 1 2 . 4 6 15 6 1 3 1 6 5 5 18 . 2 1 1 . . 12
10	
Ogfrl1	6 1 4 3 7 1 2 3 1 3 2 1 2 1 5 2 2 1 3 1 1 7 2 1 1 1
2	
2010300C02Rik	3 2 11 4 11 2 2 . 2 4 8 6 . 4 3 16 3 . 8 1 . 3 1 5 3 6
8	
Igfbp5	2 1 4 3 1 2 1 1 2 4 . . 1 10 1 2 1 4 3 2 1 3 2 . 2 .
2	
Arpc2	4 2 2 7 . 1 2 1 1 2 3 1 . 2 3 2 2 2 2 2 1 1 2 1 2 2
4	
Ptpn	12 4 8 16 34 6 4 6 1 7 25 1 5 5 6 21 11 3 12 3 3 8 3 4 5 8
13	
Vxn	. 6 3 10 14 . 9 9 15 10 6 3 6 1 . 6 3 5 2 17 . 3 13 28 7
.	
Ogfrl1	3 2 2 6 6 4 . 3 1 6 3 1 5 2 3 1 3 7 2 2 8 5 1 6 2
4	
2010300C02Rik	1 6 2 3 6 5 4 12 10 . 5 7 5 3 . 8 3 22 1 1 1 2 10 3 16
.	
Igfbp5	1 1 . 1 . 4 1 1 1 2 2 1 3 2 6 2 . 4 1 7 . 3 . 2 1
1	
Arpc2	. 6 1 1 3 3 2 3 3 1 4 . 2 . 1 4 . 4 . . 2 5 9 2 5
1	
Ptpn	3 8 5 10 17 8 14 8 18 11 16 4 7 2 6 9 2 29 2 12 5 11 19 12 23
5	
Vxn	11 4 5 15 11 3 . 13 6 4 3 1 6 29 . 8 5 7 2 1 23 1 1 14
5 .	
Ogfrl1	19 1 12 1 2 1 3 2 3 . 3 2 . 6 1 2 . 2 3 1 4 . 4 5
.	
2010300C02Rik	17 14 10 10 2 13 2 4 3 3 4 . 16 44 1 . 6 3 3 3 4 1 4 1
1 1	
Igfbp5	. 4 6 . 1 1 6 1 3 4 4 1 2 1 2 2 . 2 4 . 2 1 . 4
4 .	
Arpc2	15 5 4 2 5 4 1 . . . 1 6 23 3 1 4 3 1 2 . 2 5 4
. 1	
Ptpn	42 16 23 12 9 16 7 8 4 3 9 3 5 13 4 9 11 8 13 5 22 3 13 3
7 1	
Vxn	6 . 11 25 1 8 3 9 1 13 5 5 4 3 1 3 2 2 14 2 1 6 1 13 1
13	
Ogfrl1	1 . 3 4 2 4 2 3 3 7 1 1 2 6 2 2 1 1 1 6 4 . 3 2 1
2	
2010300C02Rik	2 2 11 6 1 8 1 1 2 13 6 5 1 28 3 1 3 3 2 4 1 3 3 13 .
.	
Igfbp5	. 5 4 3 3 2 7 . 6 3 . 2 2 5 1 5 5 2 1 5 . 3 2 2 .
3	
Arpc2	. 1 3 5 . 6 1 1 3 7 2 2 4 6 1 2 3 1 1 . 1 4 2 8 1
1	
Ptpn	6 5 10 12 14 17 3 6 11 34 16 13 3 26 4 9 3 10 9 6 4 9 6 9 4
3	

singlecell

Vxn	30	3	7	5	4	7	19	20	13	7	3	4	1	3	.	1	3	1	7	.	2	6	.	2	14
10																									
Ogfrl1	1	2	5	.	8	1	4	1	4	2	11	3	4	2	6	.	3	1	2	2	1	1	3	4	
3																									
2010300C02Rik	4	3	2	8	57	7	11	12	4	3	10	31	.	9	1	3	4	2	5	1	2	8	.	1	5
4																									
Igfbp5	3	1	1	2	6	3	2	3	3	.	2	2	3	1	2	1	3	1	3	1	7	.	6	3	1
.																									
Arpc2	1	4	4	2	8	2	.	2	1	1	5	6	1	2	2	.	2	1	3	1	1	4	.	.	3
2																									
Ptprn	11	7	7	7	24	11	15	31	14	4	12	34	12	16	5	7	6	5	12	5	5	19	4	2	12
15																									
Vxn	10	11	2	2	6	9	.	2	23	12	3	2	3	7	2	1	1	5	11	13	3	6	.	2	22
1																									
Ogfrl1	3	3	1	2	.	5	5	4	3	5	1	1	.	3	1	3	1	7	.	5	3	2	2	2	9
4																									
2010300C02Rik	32	1	2	1	6	5	1	4	8	6	4	2	.	9	3	4	2	10	11	4	2	4	1	5	5
5																									
Igfbp5	8	.	2	6	2	.	2	2	2	.	7	1	.	8	3	3	1	2	2	3	3	2	.	.	3
2																									
Arpc2	7	4	1	1	1	2	2	3	3	1	3	2	1	6	2	2	2	1	5	4	2	2	.	3	.
4																									
Ptprn	32	8	5	4	5	11	9	15	14	6	5	5	.	19	4	19	1	11	6	10	6	6	6	7	18
10																									
Vxn	7	13	7	17	2	9	2	4	.	19	.	1	5	10	.	.	.	3	22	2	7	2	.	1	
11																									
Ogfrl1	3	4	4	8	1	4	3	1	7	6	6	2	2	4	4	1	2	1	6	2	2	7	1	1	
2																									
2010300C02Rik	4	8	2	31	10	5	.	9	1	3	1	1	6	3	1	1	5	.	4	1	7	3	3	.	
1																									
Igfbp5	1	3	2	1	.	3	1	2	2	.	.	3	.	1	4	1	4	26	2	1	1	5	5	1	
3																									
Arpc2	1	2	1	10	1	2	2	1	.	3	2	.	.	5	1	.	.	.	2	2	2	2	.	2	
1																									
Ptprn	9	18	5	22	13	14	5	7	12	10	11	3	10	6	5	1	20	3	17	9	18	12	4	7	
4																									
Vxn	3	1	1	16	1	32	1	3	3	1	5	.	.	14	10	3	3	22	11	2	2	13	2	4	2
.																									
Ogfrl1	.	3	1	6	.	7	.	2	1	6	12	6	2	3	1	2	3	.	1	1	1	8	2	8	.
1																									
2010300C02Rik	1	.	1	3	1	5	1	4	3	.	3	8	3	5	6	2	.	9	10	1	1	2	3	.	12
.																									
Igfbp5	3	2	.	.	.	2	2	3	3	4	2	8	2	.	2	2	3	1	5	.	5	3	3	1	
2																									
Arpc2	.	.	1	1	.	2	1	3	.	2	4	6	.	3	.	2	4	2	3	3	.	2	4	3	3
.																									
Ptprn	2	5	3	8	3	12	2	4	1	8	19	17	6	10	9	18	6	16	7	5	1	11	25	9	13
3																									
Vxn	1	1	32	9	6	8	18	.	5	5	4	10	9	.	1	.	1	21	2	2	19	8	.	7	
1																									
Ogfrl1	3	2	5	5	.	2	4	4	1	3	3	.	1	2	8	.	4	3	2	1	2	2	3	3	
1																									

singlecell

2010300C02Rik	1	.	2	12	4	3	2	2	3	.	1	9	14	3	4	2	4	5	14	.	6	7	.	17		
Igfbp5	1	3	4	6	2	4	.	3	2	2	1	1	2	2	1	5	2	5	2	2	.	1	1	3	.	2
Arpc2	7	1	3	13	3	4	2	2	5	3	.	2	2	3	4	.	2	4	3	.	4	1	2	3	.	
Ptpnn	21	10	14	15	8	15	9	5	13	8	9	13	4	22	18	3	1	18	9	4	20	4	3	16	.	
Vxn	.	1	.	3	5	4	.	4	9	2	3	12	1	2	2	10	1	8	5	4	4	5	.	11		
Ogfrl1	0	1	5	2	1	1	2	2	4	3	5	1	7	2	.	1	5	.	3	.	12	6	1	2	3	1
2010300C02Rik	1	1	.	2	3	4	.	6	6	32	3	3	4	2	7	10	.	4	2	2	1	2	1	2	.	
Igfbp5	1	1	.	3	5	8	4	1	2	1	3	7	3	2	1	2	.	4	1	4	.	3	1	4	4	1
Arpc2	3	.	3	1	1	.	1	2	3	3	11	2	2	5	1	3	.	2	1	.	7	6	.	3	.	
Ptpnn	0	7	7	12	2	5	7	9	16	14	19	6	14	25	4	10	18	2	7	9	11	10	11	25	6	1
Vxn	.	4	31	.	5	1	16	2	.	27	1	.	2	15	7	7	1	4	21	.	38	9	.	1	4	.
Ogfrl1	.	4	7	4	1	.	.	3	3	6	2	3	1	7	4	2	1	5	2	11	2	2	.	2	.	
2010300C02Rik	1	1	9	10	3	4	1	1	4	1	4	2	4	3	7	7	6	1	4	5	1	8	6	14	1	3
Igfbp5	6	3	2	4	.	3	1	1	2	4	3	.	1	.	.	8	3	5	.	.	3	1	1	2	1	.
Arpc2	3	.	2	1	2	2	2	1	4	3	1	1	3	4	.	2	.	3	1	1	5	2	5	.	1	
Ptpnn	11	14	31	5	5	16	12	11	4	16	8	2	5	10	11	5	3	17	12	13	23	10	13	5	4	
Vxn	6	.	1	2	2	6	28	2	3	1	1	3	4	2	3	18	3	.	4	6	2	18	.	12	19	6
Ogfrl1	.	.	.	5	.	1	4	1	15	5	1	.	5	5	2	6	1	8	.	1	.	3	3	6	.	
2010300C02Rik	1	1	1	2	3	8	6	3	10	5	.	8	3	1	1	3	7	1	5	36	2	4	4	5	5	9
Igfbp5	3	1	1	1	1	9	.	1	1	2	4	.	1	6	2	1	2	5	8	2	1	6	2	1	.	
Arpc2	1	1	1	3	3	2	3	4	3	3	2	.	1	4	2	3	1	2	7	4	5	3	1	.	1	
Ptpnn	14	2	4	13	13	16	6	10	10	8	13	4	6	4	12	3	5	7	14	6	5	21	4	4	14	
Vxn	1	.	4	7	6	1	25	18	4	25	35	5	5	.	2	10	.	6	11	5	.	7	1	8	2	
Ogfrl1	2	1	4	3	.	6	1	3	2	5	2	2	1	7	4	10	1	5	3	.	2	7	.	2		
2010300C02Rik	.	10	16	3	.	6	4	4	39	8	10	3	3	.	7	.	19	3	2	2	10	.	36	3	.	
Igfbp5	1	5	5	1	1	2	1	1	1	2	1	4	.	1	2	.	1	3	.	.	4	.	9	2	.	

singlecell

Arpc2	1	3	2	1	1	3	3	9	15	3	2	2	.	6	3	.	5	1	3	1	2	3	7	.			
Ptprn	8	9	10	9	5	4	25	8	14	28	21	23	8	4	11	14	5	16	6	9	1	13	3	15	6		
Vxn	20	2	24	2	.	6	1	12	12	2	1	6	.	5	5	6	6	3	8	6	14	6	2	1	4	1	
Ogfrl1	5	.	3	2	2	1	8	5	.	3	9	5	1	.	6	1	4	1	3	2	3	2	4	8	3	3	
2010300C02Rik	1	2	4	5	2	.	3	3	3	.	12	.	3	8	6	7	2	3	7	4	7	2	.	4	2		
Igfbp5	.	2	1	3	2	4	1	3	2	1	2	3	1	2	2	2	2	1	1	3	.	1	1	1	4		
Arpc2	4	1	2	3	5	1	.	3	2	1	2	3	.	2	4	.	3	1	1	1	2	2	.	1	1	6	
Ptprn	18	3	16	14	14	3	7	14	5	10	7	13	4	7	13	4	18	5	11	20	12	3	8	4	4	15	
Vxn	6	2	2	1	7	.	3	1	1	9	2	2	4	2	17	17	4	1	4	2	3	4	12	14	.		
Ogfrl1	1	1	2	13	2	2	.	.	10	5	3	8	4	4	6	4	2	8	3	.	3	2	2	10	11		
2010300C02Rik	4	5	2	2	5	1	12	3	.	12	1	1	9	4	6	36	4	1	2	4	8	12	2	36	1		
Igfbp5	1	.	2	4	6	1	.	.	4	1	.	3	3	3	3	.	2	1	1	1	4	1	.	2	2		
Arpc2	.	4	3	1	.	3	1	3	3	2	4	5	2	7	5	1	1	.	1	6	2	3	15	.			
Ptprn	5	6	11	7	7	2	7	6	5	12	11	12	9	15	18	17	8	7	8	24	12	14	13	22	4		
Vxn	8	2	6	10	9	2	6	5	7	6	5	.	7	7	15	3	2	35	2	2	1	20	3	3	2	1	3
Ogfrl1	.	2	6	6	4	5	4	.	3	5	2	4	9	4	5	1	12	3	.	3	2	1	4	8	1	1	1
2010300C02Rik	3	5	5	4	1	6	9	6	4	8	2	5	12	24	.	2	8	5	6	3	3	.	6	5	.	2	
Igfbp5	2	4	.	1	3	.	.	2	3	2	1	2	2	2	1	2	3	.	3	1	.	2	3	3	6	3	
Arpc2	2	.	3	6	3	1	2	3	5	4	5	1	2	3	10	1	3	4	1	3	.	4	2	3	2	3	4
Ptprn	18	8	15	16	8	1	11	6	11	9	8	5	5	10	16	2	10	26	5	16	1	13	8	7	12	2	8
Vxn	6	1	2	.	4	.	13	.	6	6	1	7	2	1	14	1	11	1	2	13	21	3	2	.	1		
Ogfrl1	3	.	1	1	5	1	6	.	10	2	10	7	8	.	8	1	5	1	.	3	2	5	.	3	.		
2010300C02Rik	7	3	3	1	24	.	1	3	39	12	1	32	2	.	5	1	6	10	1	4	9	11	1	1	2		
Igfbp5	2	15	1	4	6	1	3	3	9	4	4	4	1	16	2	4	4	4	2	6	3	2	.	18	2		
Arpc2	1	3	1	3	1	1	.	1	6	7	1	7	.	.	2	.	2	4	2	5	3	4	1	2	.		
Ptprn	15	4	3	9	9	.	6	9	18	22	10	35	8	7	15	2	18	11	3	6	11	16	2	1	6		

Vxn	9	7	5	21	1	7	1	7	7	4	.	3	17	1	4	3	1	6	2	.	5	3	1	4	13	.	15			
4																														
Ogfrl1	5	6	4	9	1	3	1	5	.	.	3	1	10	2	4	3	3	2	5	5	1	1	.	3	4	.	3			
2																														
2010300C02Rik	7	10	8	5	5	2	2	8	4	5	2	5	3	1	5	6	.	4	.	.	3	1	1	3	4	.	6			
.																														
Igfbp5	1	2	.	1	1	3	6	6	4	1	2	2	.	3	1	1	1	3	6	3	.	.	.	2	2	.	.			
6																														
Arpc2	4	2	6	2	1	1	5	4	3	.	1	1	1	.	4	5	2	6	2	2	2	.	1	1	2	.	1			
.																														
Ptprrn	9	15	10	25	4	1	12	22	4	3	3	6	15	6	5	8	3	8	4	6	4	.	1	4	18	3	19			
10																														
Vxn	2	9	14	3	10	10	5	9	1	2	18	1	28	1	8	13	6	.	2	4	.	.	7	7						
26																														
Ogfrl1	1	2	7	4	4	2	4	5	2	1	3	3	4	4	5	5	5	2	.	1	3	10	2	3	18					
8																														
2010300C02Rik	1	8	11	6	11	3	3	26	2	2	3	2	5	1	23	9	8	.	2	1	2	8	6	4	5					
5																														
Igfbp5	1	1	4	.	3	3	3	6	1	1	.	.	2	7	5	.	1	1	3	5	3	.	2	3	2					
2																														
Arpc2	4	3	2	2	3	1	2	14	1	2	3	.	2	4	10	4	4	2	1	1	5	7	.	13	2					
2																														
Ptprrn	7	7	17	3	13	2	11	15	2	6	14	3	17	3	20	22	19	1	2	11	9	16	15	25	23					
23																														
Vxn	.	.	3	9	7	9	12	.	1	1	2	.	39	3	11	2	1	2	7	7	2	3	5	10	12					
4																														
Ogfrl1	1	2	2	3	1	3	3	.	4	7	2	2	4	8	8	4	1	2	9	3	1	3	1	13	3	5	1			
1																														
2010300C02Rik	.	2	4	4	.	18	1	1	2	3	6	.	1	5	2	3	6	3	2	2	6	37	6	.	8	4	3			
5																														
Igfbp5	1	2	.	1	1	2	.	1	1	1	1	.	4	6	.	.	1	4	1	2	.	2	5	.	2	4	1			
1																														
Arpc2	1	1	1	3	3	5	1	.	2	2	.	1	2	1	4	.	3	2	5	2	1	7	1	1	2	6				
6																														
Ptprrn	5	2	8	4	5	13	10	1	3	9	3	3	2	14	8	14	7	6	9	5	5	21	11	7	23	11	2	6		
6																														
Vxn	9	.	.	1	3	7	13	3	6	1	16	23	.	9	5	3	3	1	1	11	2	2	3	.						
4																														
Ogfrl1	6	.	.	3	2	3	2	1	2	1	7	4	2	10	3	2	3	1	7	1	.	2	4	3						
11																														
2010300C02Rik	11	4	1	3	4	5	5	2	7	.	4	6	1	25	1	4	6	3	.	5	1	9	4	2	1					
1																														
Igfbp5	3	2	8	.	6	.	4	.	1	1	.	.	2	3	11	1	3	4	.	2	.	2	4	9						
5																														
Arpc2	3	2	1	1	2	3	2	4	3	1	1	1	3	7	2	1	1	2	1	3	.	5	1	2						
2																														
Ptprrn	18	6	4	6	10	14	20	19	7	1	13	17	9	17	5	5	7	13	6	10	.	18	14	12	7					
7																														
Vxn	9	1	18	.	3	5	6	5	2	.	.	1	5	2	4	17	.	4	18	2	28	8	5	4						
11																														
Ogfrl1	8	.	11	12	2	4	3	3	.	1	.	2	1	1	2	7	5	2	4	4	2	2	5	1	3					

2
 2010300C02Rik 7 1 8 1 2 22 3 6 9 . . 1 6 10 5 13 9 1 3 7 6 5 11 3 5
 9
 Igfbp5 3 2 4 3 1 3 3 6 4 3 3 2 3 1 3 2 1 3 3 . 1 2 7 6 1
 4
 Arpc2 8 . 3 2 . 4 3 2 2 . 2 4 2 4 3 3 2 1 1 8 . 6 6 1 .
 3
 Ptprn 20 3 22 7 3 17 4 5 11 2 5 . 16 11 10 5 16 6 2 20 5 17 14 4 7
 17

Vxn 1 2 3 4 1 . 1 12 4 . . . 4 . 2 3 1 3 . 4 2 3 12 9 9 16
 10
 Ogfrl1 6 4 9 2 9 2 1 1 8 9 9 1 2 2 7 3 3 1 2 3 12 5 1 1 2 2
 5
 2010300C02Rik 8 1 . . 1 1 3 4 11 1 . . 10 2 1 3 4 6 2 6 . 6 8 5 3 6
 6
 Igfbp5 . 2 7 2 2 2 1 3 3 6 2 . 2 3 1 2 4 9 4 1 1 3 1 3 1 4
 1
 Arpc2 1 . 5 2 1 1 2 4 . 3 2 . 1 2 . 3 3 2 1 1 1 4 3 2 4 1
 2
 Ptprn 7 5 14 3 4 7 4 12 19 10 3 3 7 7 2 7 9 5 4 9 5 3 19 10 12 20
 12

Vxn 2 6 1 8 6 1 1 5 8 4 11 4 . 9 6 14 2 2 3 2 6 . 1 4 1
 .
 Ogfrl1 6 2 . 2 . 3 1 7 2 2 5 5 5 4 2 4 . . 10 3 2 2 10 7 1
 .
 2010300C02Rik 11 2 . 7 6 3 6 3 3 2 3 8 . 14 5 5 3 1 3 1 10 3 2 47 2
 3
 Igfbp5 1 13 3 1 2 8 9 2 1 2 1 1 1 3 2 2 2 1 1 1 2 1 2 13 1
 1
 Arpc2 3 2 1 2 1 2 4 2 2 1 1 2 3 2 6 4 2 1 1 . 2 1 4 11 .
 .
 Ptprn 13 17 . 6 12 7 20 6 5 4 8 19 6 19 10 6 8 5 7 3 16 2 9 10 1
 4

Vxn 1 9 . 15 1 2 2 20 2 3 3 4 10 3 22 23 6 5 5 1 15 6 9 2
 5
 Ogfrl1 3 . 5 2 1 2 1 5 2 1 2 2 2 3 7 2 2 3 2 3 4 5 3 2
 1
 2010300C02Rik 9 3 2 3 3 2 2 5 . 3 . 8 10 5 12 2 2 6 10 14 3 7 4 4
 11
 Igfbp5 . 3 1 1 6 5 2 3 . . 3 3 2 25 3 5 9 . 2 5 3 4 . 3
 5
 Arpc2 3 . . 1 2 1 1 5 . 1 1 2 3 2 3 6 1 6 1 3 2 3 . 6
 3
 Ptprn 10 5 3 16 10 6 4 16 4 7 3 11 10 4 24 14 1 12 19 10 12 14 9 14
 12

Vxn 1 8 4 5 5 2 3 1 7 1 13 15 3 4 . 21 3 42 8 2 4 20 1 . 5
 5
 Ogfrl1 6 1 7 3 2 . 4 2 3 8 11 3 2 9 1 2 1 5 3 1 2 5 3 8 2
 7
 2010300C02Rik . 13 7 3 . 3 4 4 14 1 52 3 5 2 1 8 3 4 1 3 8 6 9 . 6
 3
 Igfbp5 4 8 2 1 1 5 1 3 1 3 1 . 2 2 1 2 . 4 1 4 3 . . 8 2

1	
Arpc2	. 4 3 2 1 1 4 4 2 4 17 3 1 4 1 5 2 3 1 . 4 3 2 3 2
5	
Ptpn	4 17 28 2 7 5 10 11 10 10 18 12 8 7 8 17 6 17 12 7 3 23 4 5 8
11	
Vxn	2 4 5 1 2 19 1 7 1 . 5 20 2 8 . 1 29 5 . 10 2 . 4 1 12 2
6	
Ogfrl1	. 2 3 4 1 4 5 1 7 1 2 4 2 1 . . 5 1 1 2 2 3 2 1 1
5	
2010300C02Rik	1 4 14 . . 2 . 10 . 3 3 4 1 7 . 1 5 6 5 2 3 . 2 10 10
3	
Igfbp5	2 3 2 1 2 2 3 4 2 1 5 1 5 . . 4 2 2 8 1 3 2 2 1 4
.	
Arpc2	1 1 2 5 1 2 1 . 3 3 . 1 3 2 . . 3 1 1 . . 2 . 7 5
3	
Ptpn	. 2 10 2 4 15 8 6 7 5 8 10 5 12 8 3 18 6 11 9 5 13 6 21 10 1
0	
Vxn	5 17 2 . . 7 7 1 9 10 9 4 8 5 13 1 . . 4 2 . 8 10 2 1
2	
Ogfrl1	. 3 . . . 2 4 8 4 2 . 2 2 4 1 4 3 3 . . 2 3 . 4
1	
2010300C02Rik	. 4 2 4 . 8 3 1 21 4 1 3 6 5 6 5 1 2 2 . 2 18 5 . 1
4	
Igfbp5	4 . . 1 1 1 . 4 3 6 24 1 . . 1 1 4 11 3 . 1 1 2 1 2
.	
Arpc2	1 2 2 4 1 4 2 . 3 2 1 . 1 3 . 2 1 4 3 1 4 2 1 . 4
4	
Ptpn	10 13 4 6 2 8 6 4 11 18 11 4 13 12 10 6 12 17 7 3 4 18 12 2 6
13	
Vxn	4 . 24 1 4 1 1 12 2 6 7 9 6 4 . 5 3 1 22 3 3 . 3 2
1 .	
Ogfrl1	3 1 4 . . 2 3 5 . 3 . 7 3 5 3 . 8 1 1 3 2 1 2 9
1 2	
2010300C02Rik	3 . 10 7 4 9 . 1 3 12 3 4 17 8 . 6 1 1 40 2 6 1 3 1
5 1	
Igfbp5	4 . 6 2 3 4 2 2 2 1 3 8 2 6 1 . . 3 1 5 4 . 3 .
1 2	
Arpc2	3 3 4 4 5 2 1 2 4 5 1 4 3 1 2 1 4 . 15 . . 2 1 .
1 1	
Ptpn	10 18 24 12 15 6 6 15 10 14 5 15 5 17 6 6 4 8 20 6 2 9 10 14
4 1	
Vxn	3 7 5 1 . . 15 13 27 4 . . 2 16 7 5 19 5 9 1 . 4 27 5
6 7	
Ogfrl1	2 3 2 . 4 1 2 6 5 1 3 9 . 3 2 5 . 2 15 3 5 2 1 2 9
2 3	
2010300C02Rik	2 2 6 2 1 1 1 6 8 3 4 4 2 . 1 15 5 6 4 5 1 2 11 12 7
8 8	
Igfbp5	. 6 9 5 5 4 2 3 4 1 1 3 . 5 3 2 5 2 1 3 6 1 2 1 1
2 .	
Arpc2	2 4 2 . 2 . 4 4 4 1 2 4 . 2 1 6 4 5 3 3 3 1 3 2 3
. 1	
Ptpn	6 1 7 9 11 2 20 12 13 9 3 9 2 3 8 14 3 26 17 9 8 4 18 27 18 1

0 6

Vxn	2	27	1	8	3	2	10	3	1	21	1	2	7	.	19	28	3	4	.	10	8	1	4	4	
4																									
Ogfrl1	1	7	4	1	9	.	7	7	1	1	1	4	6	2	2	2	4	4	2	2	6	.	6	5	
5																									
2010300C02Rik	2	5	9	7	5	.	8	.	.	6	.	5	2	.	3	9	3	2	4	3	.	8	20	3	
5																									
Igfbp5	1	.	3	3	3	1	4	1	2	2	2	1	2	1	6	3	.	7	1	2	4	3	1	1	
2																									
Arpc2	.	7	6	2	3	1	6	.	.	1	.	4	2	.	2	4	3	2	.	3	2	3	4	1	
2																									
Ptpnn	4	8	11	10	9	3	29	3	6	13	3	3	10	7	14	18	13	13	12	15	12	3	26	5	
6																									

Vxn	26	1	9	10	2	4	4	4	1	.	1	.	2	1	28	1	12	3	9	.	.	11	.	4	5
4																									
Ogfrl1	3	1	3	3	1	2	10	.	8	.	2	1	1	.	4	.	2	.	2	1	1	4	1	3	2
1																									
2010300C02Rik	2	.	8	4	7	11	6	12	1	.	2	2	1	4	5	1	9	4	1	2	.	26	.	8	3
9																									
Igfbp5	6	.	.	1	1	5	2	3	2	4	5	1	5	1	.	1	3	1	.	2	.	6	1	1	4
2																									
Arpc2	2	.	9	1	4	3	7	4	1	.	1	.	2	1	2	2	6	.	4	3	.	8	3	2	.
2																									
Ptpnn	8	2	18	7	13	21	24	17	11	3	2	2	3	7	15	1	10	7	3	5	5	27	14	6	13
8																									

Vxn	20	12	2	5	7	.	1	15	3	.	5	.	14	5	3	1	8	5	1	2	.	2	2	4	.
Ogfrl1	5	2	.	.	5	1	2	4	8	4	2	3	2	3	1	13	3	4	8	1	1	.	2	4	.
1																									
2010300C02Rik	7	7	.	2	30	2	2	4	9	1	5	1	8	6	3	2	16	3	.	4	.	4	2	11	.
2																									
Igfbp5	5	1	1	4	9	1	2	.	4	.	1	5	1	2	.	.	3	2	5	6	1	1	1	1	1
1																									
Arpc2	2	1	1	3	7	3	1	2	2	.	2	1	2	4	.	2	.	.	4	1	1	1	4	2	.
1																									
Ptpnn	6	15	5	6	10	14	6	8	11	22	10	6	16	6	4	5	15	14	5	7	2	9	3	18	6
18																									

Vxn	5	4	14	3	3	.	.	2	.	2	3	5	1	.	3	3	6	.	23	1	1	8	14	7	2	4	1
9																											
Ogfrl1	1	1	3	8	3	2	1	10	1	1	4	1	2	.	1	3	5	4	4	4	2	2	5	.	2	.	
3																											
2010300C02Rik	9	1	4	2	3	.	.	2	.	2	1	5	2	9	2	1	2	1	3	4	4	4	8	7	5	6	
.																											
Igfbp5	1	1	.	2	1	1	3	3	.	4	4	2	1	.	3	3	5	1	2	1	4	9	5	3	.	1	
.																											
Arpc2	2	2	.	1	.	1	2	2	.	2	2	1	.	4	.	.	2	.	5	4	4	3	6	5	2	.	
1																											
Ptpnn	12	9	12	5	5	5	1	4	.	5	7	3	14	5	4	2	10	5	11	12	16	7	20	5	5	4	
9																											

Vxn	1	16	2	2	.	10	1	.	1	7	5	1	4	15	11	1	1	7	11	1	2	11	6	1	.
2																									

singlecell

Ogfrl1	1 . 6 1 11 1 3 . 4 1 . 1 . 4 6 1 2 2 4 11 . 3 1 . 1
5	
2010300C02Rik	2 2 . 5 . . 1 2 1 12 2 . 2 7 2 2 2 . 9 1 2 1 3 6 6 1
4	
Igfbp5	5 2 3 2 2 . 7 3 2 . 2 3 4 1 4 3 2 2 5 1 1 6 3 1 1
1	
Arpc2	3 1 2 1 3 2 . 2 1 8 1 2 2 3 1 2 1 1 1 2 . 3 1 3 4
2	
Ptpnn	5 8 9 14 6 7 3 4 9 17 5 9 7 11 8 13 12 3 8 9 6 10 8 6 6
7	
Vxn	1 4 13 2 8 18 1 . 2 . 10 . 8 . 7 14 . . 4 . 3 4 2 1
6 .	
Ogfrl1	13 . 3 2 2 5 . 5 8 1 9 5 9 3 3 2 1 5 5 1 2 2 5
7 1	
2010300C02Rik	1 3 5 8 5 7 2 . 1 . 24 . 29 3 6 6 4 . 27 9 2 17 26
4 8	
Igfbp5	5 1 . . 1 3 3 1 . . . 3 . 3 . 2 2 5 2 1 2 4
1 .	
Arpc2	3 2 1 2 2 2 . 2 1 . 7 4 6 3 2 3 1 1 5 4 1 11 4
6 1	
Ptpnn	12 4 13 10 11 12 6 4 7 1 29 12 29 3 14 22 3 11 16 16 4 9 13 2
1 8	
Vxn	2 1 2 19 2 4 18 7 14 1 3 1 1 3 . 16 5 2 . 4 1 10 3 2 3
9	
Ogfrl1	3 2 1 4 . 1 3 2 2 7 . . 1 2 15 2 6 10 5 3 6 1 2 2 4
1	
2010300C02Rik	. 2 1 7 4 8 12 7 7 4 2 1 . 10 2 7 2 1 2 3 . 16 7 7 1
3	
Igfbp5	1 . 5 2 . 1 3 . 3 4 2 2 3 7 2 2 . . 1 3 2 3 9 1 2
.	
Arpc2	2 1 . 4 1 4 4 2 2 1 1 2 . 1 1 4 1 5 3 2 3 1 2 3 2
2	
Ptpnn	8 4 5 27 4 13 14 16 20 . 2 5 15 8 14 17 12 15 9 9 5 14 3 5 7
15	
Vxn	3 6 . 5 4 4 8 4 4 6 2 2 1 3 1 15 9 5 4 13 3 3 2 7 16
12	
Ogfrl1	1 3 1 1 2 3 1 1 2 1 1 1 1 3 5 3 2 7 1 7 2 4 2 3 2
4	
2010300C02Rik	13 7 1 3 3 8 6 8 33 9 1 6 7 1 1 12 17 36 11 2 . 2 . 7 5
7	
Igfbp5	3 1 6 1 4 1 1 1 3 1 1 1 2 3 . 5 1 7 2 3 4 . 2 3 8
1	
Arpc2	4 2 2 3 2 6 1 1 8 3 3 2 1 1 1 5 2 4 4 1 3 4 2 2 4
3	
Ptpnn	9 29 2 2 8 9 15 7 32 17 7 21 5 4 4 34 11 10 3 8 3 8 5 14 13
12	
Vxn	1 6 3 1 5 9 8 2 4 5 2 1 19 3 . 4 1 1 9 3 1 6 15 15 4 1 4
1 2	
Ogfrl1	3 4 1 1 1 1 3 1 1 . 3 3 5 1 8 1 11 4 6 5 . 1 2 3 2 2 3
2 4	
2010300C02Rik	1 8 2 3 1 3 6 2 4 2 3 . 13 7 . 7 2 1 8 8 1 8 3 4 6 5 6
. 3	

Igfbp5	1 3 2 . . . 2 1 2 1 3 1 4 1 . . 2 1 4 8 3 1 2 2 2 . . 2
1 3	
Arpc2	1 3 . 1 2 1 5 1 1 2 2 3 4 1 4 1 3 2 2 2 3 4 3 . 1 3 1
. 4	
Ptpnn	1 19 2 2 3 3 16 4 4 3 9 4 26 5 6 5 8 2 14 11 3 5 6 11 5 7 8
. 7	
Vxn	5 . 19 6 2 3 . 1 4 1 10 24 13 3 37 4 1 8 1 . . 2 . 1 3 9 1
2	
Ogfrl1	1 1 4 1 5 1 . 2 2 1 3 6 2 1 10 2 2 1 1 1 . 2 1 1 5 1 .
.	
2010300C02Rik	. 2 10 4 3 4 5 4 13 2 9 4 2 . 8 . 5 8 6 1 . 2 . 4 34 8 1
1	
Igfbp5	2 . 3 1 3 1 1 2 2 5 3 3 4 3 1 . 1 4 4 2 4 1 3 2 8 . 1
.	
Arpc2	. 1 2 4 2 2 . 2 2 . 3 2 4 2 6 . 1 3 3 . 1 3 . 1 8 1 .
.	
Ptpnn	6 2 14 14 4 1 3 7 6 4 16 16 7 6 15 2 4 3 18 1 4 4 3 9 8 8 3
4	
Vxn	1 2 7 3 18 6 2 29 5 13 4 . 1 19 . 1 10 . 3 4 1 1 3 1 .
2	
Ogfrl1	1 1 . 10 4 3 5 4 1 4 5 2 . 3 2 5 2 2 3 6 2 2 2 6 4
4	
2010300C02Rik	1 6 7 . 3 1 2 6 5 21 25 . 7 2 . 2 8 4 10 9 1 9 1 3 1
7	
Igfbp5	. 3 . 6 3 4 1 1 1 . 1 1 2 2 2 1 . 5 3 6 2 6 3 2 1
4	
Arpc2	1 1 3 1 3 . 3 . 3 6 5 . . 6 2 2 3 1 2 4 1 2 2 4 2
3	
Ptpnn	14 9 8 13 19 7 2 10 6 9 27 19 6 22 6 4 13 3 8 22 8 27 3 7 5
11	
Vxn	2 12 13 5 5 10 1 7 1 . 6 3 1 14 2 12 5 4 13 1 3 . . 2 1 12
4	
Ogfrl1	2 3 5 1 2 8 4 3 2 . 5 6 4 3 2 2 2 1 3 1 2 5 . 1 2 6
2	
2010300C02Rik	3 7 17 5 10 3 . 3 . 1 . 1 . 5 . 5 3 2 6 . 2 . 5 5 3 6
1	
Igfbp5	. 1 4 2 4 1 . 1 3 1 6 . 1 2 7 3 3 5 2 2 . 1 8 4 2 3
.	
Arpc2	1 9 5 4 2 4 2 4 2 . 1 4 4 1 1 4 . . 3 . 2 3 1 . . 2
5	
Ptpnn	5 33 15 5 12 6 4 13 13 . 2 9 5 7 4 13 1 8 7 4 8 8 5 6 4 5
5	
Vxn	2 1 1 7 3 1 33 3 2 1 . 5 27 2 10 9 4 5 . 4 7 6 1 . 1
8	
Ogfrl1	10 3 8 2 1 5 5 1 1 . 9 4 3 10 6 3 2 3 3 4 . 3 5 6 7
2	
2010300C02Rik	1 3 . 14 1 5 5 2 1 6 1 22 7 . 5 8 6 8 9 4 2 14 3 1 2
3	
Igfbp5	3 5 2 . . . 2 . 7 4 . 4 3 2 8 2 2 3 1 1 1 5 3 2 . 3
13	
Arpc2	1 . 2 2 2 . . 2 . 1 2 3 6 3 7 6 4 1 1 1 1 4 4 1 2
1	

Ptpn6	11 3 8 15 . 2 8 9 12 2 8 21 18 6 22 8 10 8 12 10 6 15 7 9 7
Vxn1	36 4 3 . 4 10 1 3 1 2 . . 3 5 1 1 8 27 2 . 1 . 1 4 2
Ogfrl12	5 1 1 4 2 6 3 5 . 1 2 2 3 1 1 2 3 3 2 . . 1 2 6
2010300C02Rik6	9 11 4 . 12 7 9 34 9 1 5 1 9 1 3 11 18 1 1 1 . 1 10 5 2
Igfbp55	. 5 9 1 3 3 1 7 . 2 4 1 2 2 4 1 2 2 . 2 3 3 3 1 1
Arpc21	4 2 . 1 1 1 1 7 1 2 1 2 1 1 1 3 5 2 1 1 . 1 2 5 2
Ptpn17	31 5 6 3 12 6 9 21 5 3 12 6 6 2 7 14 11 13 10 6 4 . 40 17 8
Vxn6	1 6 4 1 11 6 . 4 16 29 19 29 19 . 17 11 6 1 14 . 8 3 2 5
Ogfrl11	. 4 2 10 1 2 4 3 3 1 2 8 4 4 2 6 1 8 4 7 16 1 4 1
2010300C02Rik3	. 1 7 . 5 5 1 28 7 1 8 5 5 2 24 7 11 2 11 1 9 1 8 4
Igfbp52	2 4 3 1 1 1 2 8 1 5 . 1 2 . 1 5 3 1 2 2 . . 1 1
Arpc22	2 1 5 4 1 2 3 7 2 1 2 2 5 4 7 1 1 3 2 3 3 1 3 3
Ptpn8	1 7 10 5 9 5 1 15 12 16 19 7 14 4 21 6 10 2 21 3 21 10 1 9
Vxn4	. 10 . 2 8 8 19 . . 13 2 3 1 9 1 2 2 2 . 9 3 3 8 1 1 3 6
Ogfrl13	1 2 1 . . 1 1 6 1 2 . 5 3 3 7 8 . 1 1 1 . 1 2 . 2 . 2
2010300C02Rik3	. 1 1 2 3 4 9 1 . 4 1 2 8 16 . 3 . 2 2 1 1 9 3 1 11 4 .
Igfbp53	5 2 1 . 4 2 1 2 2 3 1 1 1 5 4 . 3 1 2 . 4 . . 5 2 5 1
Arpc22	. 2 . . 1 4 5 1 . 2 1 3 1 5 4 . . 2 1 2 1 3 . . . 2 .
Ptpn3	12 8 3 5 5 6 16 3 3 9 3 20 10 12 6 6 1 8 4 6 4 8 13 4 12 6 7
Vxn2 2	4 4 2 9 9 . . 11 3 20 12 . 19 1 5 12 2 4 2 8 27 1 9 1 2
Ogfrl12 3	4 4 2 2 2 3 . 5 3 1 6 4 1 2 4 7 . 1 3 2 4 7 . 5 .
2010300C02Rik2 5	4 5 . 8 8 1 1 8 3 3 4 . 6 6 1 27 1 8 16 2 7 . 3 . 15
Igfbp53 1	. 2 1 4 2 4 1 4 1 4 2 3 1 1 1 3 1 1 3 . 6 . 5 3 3
Arpc22 5	. . . 4 2 3 . 3 2 2 1 1 9 1 2 5 1 4 1 . 3 2 1 1 1
Ptpn2 5	7 8 1 13 2 7 1 23 12 9 10 12 19 11 7 23 7 8 5 9 18 2 4 5 8
Vxn	10 . 4 . 4 2 5 10 3 . 2 1 8 4 . 2 8 5 2 1 2 7 1 8 5 2 19

17	
Ogfrl1	2 3 . . 2 6 5 2 3 4 3 4 2 3 . 1 8 2 . 5 3 3 5 2 . 5
4	
2010300C02Rik	. 1 3 1 9 1 5 6 11 . 2 . 6 7 . 7 19 5 . 4 . 13 3 2 11 3
5	
Igfbp5	2 4 1 3 1 6 5 4 1 1 1 3 1 4 3 2 3 1 3 3 2 6 . . 2 2
3	
Arpc2	3 . 1 2 3 2 3 2 2 . 1 2 6 3 . 2 8 2 1 1 1 1 3 1 1 2
1	
Ptpn	5 23 4 5 9 13 4 11 15 6 4 4 9 20 . 2 31 8 2 7 9 16 8 5 5 15
13	
Vxn	2 2 8 2 2 2 10 1 6 3 1 2 5 10 3 2 . 3 5 . 4 9 6 6 1 10 2
14	
Ogfrl1	5 3 7 4 . 3 2 2 2 2 4 5 2 5 3 1 5 . . 2 3 3 . 1 4 3 1
2	
2010300C02Rik	6 3 6 4 1 1 10 1 4 3 3 31 1 22 5 2 . 4 2 4 5 7 1 5 6 7 12
2	
Igfbp5	4 1 4 2 . 2 2 2 2 . 2 5 4 1 2 2 2 1 . . 2 2 3 4 3 1 5
3	
Arpc2	3 1 4 1 2 1 2 . 3 2 3 3 2 6 3 . 2 1 . . 4 1 . 2 1 1 4
5	
Ptpn	17 7 18 4 1 3 10 4 3 16 11 12 6 10 8 2 8 5 8 1 8 9 3 5 6 7 8
8	
Vxn	4 2 10 . 1 2 3 2 6 6 1 4 6 2 5 . 1 1 7 1 12 . . 4 7
4	
Ogfrl1	1 14 2 1 1 4 . . 5 6 . . 2 3 2 1 8 1 1 9 4 4 3 2 2
2	
2010300C02Rik	7 10 4 2 . 7 1 5 3 5 6 4 4 5 5 2 1 1 10 1 3 . 1 6 4
3	
Igfbp5	5 1 1 4 1 2 12 4 3 7 1 1 6 3 2 . 1 3 3 1 1 . 2 . 1
22	
Arpc2	. 4 3 3 2 2 2 . 1 1 5 1 1 1 4 . 1 3 3 . 3 5 4 4 5
3	
Ptpn	3 16 15 13 . 6 6 5 8 11 2 10 7 20 11 . 13 4 11 9 12 5 5 10 8
6	
Vxn	5 13 1 2 . 1 1 2 4 4 3 3 . . 16 2 2 8 1 3 4 3 6 6 8
3	
Ogfrl1	2 2 3 10 4 2 6 1 2 4 2 3 1 5 4 1 3 4 10 10 1 2 4 4 2
3	
2010300C02Rik	9 7 13 . 3 . 4 4 5 25 1 14 3 1 8 3 1 10 . 2 4 1 4 1 4
6	
Igfbp5	1 3 3 1 1 2 4 13 2 3 2 5 . 2 1 5 3 3 2 2 2 2 1 1 3
2	
Arpc2	5 . 2 1 2 1 2 2 2 4 3 2 1 3 . . 1 2 3 2 2 3 2 2 1 3
2	
Ptpn	2 12 8 6 9 5 13 4 4 23 1 15 5 8 15 2 3 7 8 13 8 4 11 8 5
10	
Vxn	31 5 4 6 1 4 1 . 21 . 1 18 2 3 8 9 3 6 3 10 4 3 2 8 7
1	
Ogfrl1	6 1 2 3 2 5 3 3 7 1 . 2 2 1 . 1 1 2 1 10 4 . 1 2 2
2	
2010300C02Rik	2 5 2 11 5 3 . 3 8 6 1 5 . 4 1 5 . 3 2 31 2 7 11 3 6

5	
Igfbp5	3 2 2 1 1 12 4 3 2 2 3 2 3 2 1 1 . 3 5 7 2 2 2 4 1
4	
Arpc2	1 3 . 2 2 4 3 1 4 5 . 5 5 . 4 . 2 5 . 5 4 3 3 1 .
1	
Ptprn	20 12 8 16 4 3 5 2 15 9 3 17 3 9 13 14 3 11 6 9 6 24 14 10 9
14	
Vxn	5 2 10 . . 1 6 . 3 6 14 2 . 13 2 7 3 5 9 1 14 8 8 4 .
4	
Ogfrl1	5 2 23 . 2 5 3 3 8 2 1 3 1 4 2 5 2 3 5 2 4 4 3 . 3
2	
2010300C02Rik	3 3 8 . 7 1 2 1 2 6 4 3 . 4 4 5 4 1 4 4 4 18 4 8 .
4	
Igfbp5	1 . 1 . 2 2 16 . 4 2 . 3 1 . 3 1 4 4 3 4 3 5 . . .
5	
Arpc2	3 2 5 1 . 1 . 3 1 . 6 . 1 1 2 2 1 1 3 3 4 8 4 5 .
4	
Ptprn	6 3 44 3 12 8 16 4 11 2 17 13 2 15 6 12 2 2 9 9 14 15 15 12 4
16	
Vxn	. 8 6 1 8 6 1 7 6 3 3 6 3 . 1 2 3 2 6 2 12 6 1 5 . 2
18	
Ogfrl1	4 2 2 5 1 7 9 4 4 2 1 5 1 . . 2 4 . 7 1 4 6 3 2 1 1
2	
2010300C02Rik	. 1 2 1 1 4 4 1 9 4 4 2 8 3 . 2 12 3 1 10 3 1 4 4 2 8 2
5	
Igfbp5	5 2 4 . 10 16 2 6 9 2 4 1 1 2 4 4 1 . 1 3 2 . 2 . 4 15
2	
Arpc2	1 . 3 . 1 14 3 . . 3 1 . 5 . 3 6 1 . 4 . . 5 2 . 3 1
3	
Ptprn	10 3 7 6 2 20 5 8 6 8 1 17 10 3 7 23 3 1 15 4 10 11 5 11 7 2
9	
Vxn	4 . 2 4 15 6 3 1 1 8 10 11 4 5 . 2 8 19 3 6 7 3 1
2	
Ogfrl1	2 2 1 10 6 2 6 12 3 1 6 3 . 3 . . 17 4 . . 2 3 2
4	
2010300C02Rik	5 10 19 . 3 2 2 . 7 . 14 9 7 11 . 1 13 8 1 4 4 2 6
1	
Igfbp5	1 . 5 3 3 2 3 2 2 4 10 . 5 2 1 2 3 1 6 4 3 . 4
8	
Arpc2	2 2 6 . 2 2 . 2 2 . 5 2 2 . 2 1 8 1 . . 2 . 2
1	
Ptprn	7 5 21 8 11 10 7 6 16 4 28 18 21 8 10 6 30 10 5 3 16 8 11
13	
Vxn	. 9 3 8 2 17 3 12 6 . 2 . 6 1 1 4 4 1 18 1 3 1 7 19 32
7	
Ogfrl1	1 3 3 1 . 5 2 5 3 5 6 . 1 . 1 2 2 12 3 1 . 7 3 5 5
6	
2010300C02Rik	2 15 8 8 1 3 2 8 2 . . 1 4 . 1 9 3 . 4 2 2 2 6 5 3
9	
Igfbp5	3 2 . 3 4 4 1 1 . 2 2 5 2 3 4 4 1 1 4 . 5 1 1 1 4
3	
Arpc2	3 2 1 4 1 2 2 1 2 2 1 1 2 . . 7 2 . 1 2 3 1 5 5 3

1	
Ptprn	10 13 10 16 1 5 6 13 6 6 5 1 10 1 9 7 4 6 10 6 . 4 15 16 20
13	
Vxn	11 . 20 3 14 1 12 3 11 1 8 21 17 4 3 5 1 2 7 4 1 8 4 . 7
2	
Ogfrl1	2 5 3 2 3 6 2 1 3 1 1 3 1 . . 2 . 3 2 . 2 . 4 1
4	
2010300C02Rik	5 3 4 2 9 . 7 1 3 . 6 3 3 2 4 . 2 4 7 8 1 12 7 2 6
1	
Igfbp5	2 . 1 . 2 1 2 3 1 2 2 . 1 . . 1 2 1 2 1 2 5 . 2 1
1	
Arpc2	3 . 2 2 2 . 2 3 4 . 2 5 3 2 3 1 2 2 3 1 1 3 7 3 2
1	
Ptprn	9 8 6 4 18 9 13 10 25 5 8 7 13 8 6 6 14 2 12 11 1 13 6 8 10
6	
Vxn	2 2 2 10 25 7 15 3 12 3 2 15 9 7 6 5 1 7 6 13 11 3 5 15 10
3 .	
Ogfrl1	3 1 5 1 7 5 7 . 3 1 4 . 1 1 2 4 . . 4 4 4 4 2 5 .
2 2	
2010300C02Rik	6 1 2 5 6 9 18 . 6 2 1 13 10 2 2 14 3 4 4 4 26 2 10 3 4
4 1	
Igfbp5	5 . 3 1 1 1 1 3 2 . . 1 4 . . 1 . 4 1 1 1 2 4 5 .
2 3	
Arpc2	5 3 2 2 3 4 10 . 1 . . 7 2 . 2 6 1 5 1 3 9 4 6 3 3
1 2	
Ptprn	7 . 3 14 27 8 15 3 14 4 3 12 24 6 6 21 2 1 8 13 27 7 34 12 13
5 1	
Vxn	2 7 5 8 . 5 16 1 11 7 . 2 3 . . 3 2 8 . 2 2 7 3 1
15	
Ogfrl1	5 8 2 4 1 2 4 1 8 2 8 4 1 . 3 2 4 3 1 . 9 3 2 10
3	
2010300C02Rik	. 12 9 8 . 13 3 1 5 7 . 1 7 . . 6 1 10 6 1 1 3 11 1
5	
Igfbp5	. 1 1 4 1 . 1 . 2 2 2 1 3 1 5 7 1 4 1 1 4 2 6 .
.	
Arpc2	3 7 3 5 1 2 1 2 . 3 2 2 3 2 . 1 3 4 4 . . 3 7 2
2	
Ptprn	6 27 10 16 3 8 9 2 14 21 3 8 15 7 6 14 4 22 14 9 4 12 13 5
15	
Vxn	8 . 4 . 2 . 1 1 5 . . 7 1 . 10 14 . 24 9 4 3 13 . 15
4	
Ogfrl1	5 1 1 29 2 10 8 3 1 2 2 2 4 . 3 4 10 4 3 3 3 3 7 . 4
3	
2010300C02Rik	11 . 4 1 2 . . 1 3 1 1 9 2 2 6 4 3 10 9 . . 10 1 7
3	
Igfbp5	. 1 1 2 1 . 1 3 2 3 3 1 2 3 1 2 5 5 5 3 3 . 1 1
6	
Arpc2	1 1 6 1 2 1 2 4 1 4 3 2 . 2 2 4 3 . 6 1 1 8 . 4
.	
Ptprn	12 4 12 13 6 11 14 10 6 6 6 12 2 7 10 13 13 23 36 3 9 11 4 10
2	

Vxn 11	1 2 1 1 10 1 3 1 27 1 4 4 3 14 6 3 8 6 20 3 2 8 11 6
Ogfrl1 1	3 3 6 3 4 5 2 . 3 1 2 1 3 4 1 1 . 3 5 4 2 7 2 1
2010300C02Rik 5	12 3 . . 6 1 6 9 3 4 6 . 1 1 8 2 2 3 6 11 . 16 3 10
Igfbp5 2	3 1 . 3 2 1 2 1 1 3 4 5 1 . 1 3 7 2 3 . 2 . 2 2
Arpc2 3	5 2 5 2 1 1 6 6 2 2 1 1 . 1 4 2 3 5 3 4 3 5 3 3
Ptprrn 8	10 5 9 2 8 5 11 20 11 13 3 3 5 9 16 7 5 10 13 10 7 20 9 11
Vxn 19	3 4 5 25 6 2 5 1 9 . 2 4 3 1 1 2 3 . 1 . . 1 2 5 9 3
Ogfrl1 2	1 . 2 3 3 . 4 1 4 6 3 7 1 2 3 2 1 1 1 . 4 . 4 2 2 .
2010300C02Rik 4	1 2 9 10 5 . 15 4 1 1 3 10 4 5 2 3 9 . 8 . 1 . 2 11 14 3
Igfbp5 2	. 1 2 5 . . 1 2 6 1 2 . 5 2 1 6 . . 3 1 5 3 2 . . .
Arpc2 1	1 2 1 1 3 2 5 1 6 3 1 7 1 . 1 2 6 . 1 1 3 2 1 2 7 .
Ptprrn 15	3 8 18 10 8 1 11 2 19 11 13 18 5 4 6 7 10 5 7 3 7 1 10 10 8 2
Vxn 9	5 20 3 1 5 6 4 2 12 13 2 3 1 1 6 8 1 1 9 5 9 3 3
Ogfrl1 4	4 9 1 2 3 1 2 1 4 3 7 1 9 3 5 3 10 3 4 3 1 2 10
2010300C02Rik 4	9 7 3 . 4 7 5 1 3 4 3 7 . 8 17 6 4 1 4 5 9 6 . 1
Igfbp5 5	2 3 1 6 2 1 2 1 2 1 3 1 3 4 2 . 4 8 2 1 3 1 2
Arpc2 3	4 3 2 3 1 6 1 1 4 3 . 1 . 2 9 5 1 . 2 1 5 1 .
Ptprrn 2	10 12 3 10 5 7 12 4 6 7 6 3 8 15 20 14 12 13 15 12 7 17 12 2
Vxn 8	3 14 . 2 9 7 4 3 3 7 11 16 10 1 25 2 25 3 2 38 4 . 5 3 3
Ogfrl1 2	4 3 . . 3 4 2 1 . 4 2 1 3 2 8 . 3 4 10 6 2 2 5 5 2
2010300C02Rik 1	5 2 1 1 21 20 9 1 4 6 23 16 2 . 12 . 5 9 1 8 6 . 5 4 8
Igfbp5 . .	5 1 . 3 2 8 6 1 . 1 . 4 3 2 6 . 2 7 1 . 2 4 2 1 1
Arpc2 2	4 6 . . 2 4 . 3 . 4 7 3 3 2 3 . 3 1 2 6 1 5 3 2 1
Ptprrn 13	16 7 4 4 12 13 4 6 10 8 6 26 18 4 29 3 13 14 9 15 8 5 9 8 7
Vxn 2	2 1 19 15 . 1 7 3 16 1 2 2 3 7 4 1 11 3 6 4 4 2 3 1 1
Ogfrl1 2	1 . 5 1 4 1 18 . 3 8 1 3 3 1 . 14 4 2 6 3 3 2 . 3 1

singlecell

2010300C02Rik	5	3	9	2	3	16	10	3	10	.	4	3	5	7	3	.	9	2	6	3	7	13	1	2	3		
4																											
Igfbp5	5	1	1	3	2	5	2	.	1	1	.	2	4	3	3	3	.	5	.	.	2	1	2	3			
1																											
Arpc2	2	.	4	4	1	2	7	1	2	3	3	3	4	.	3	2	5	5	4	1	4	3	3	2	2		
4																											
Ptpn	16	2	15	16	16	14	23	3	18	5	9	9	17	7	6	5	11	16	7	7	4	10	1	10	9		
10																											
Vxn	.	1	8	.	8	13	.	.	2	10	11	1	3	23	4	7	11	5	.	22	13	9	.	5	17		
21																											
Ogfrl1	.	7	4	2	6	5	1	1	1	3	3	.	2	4	3	5	1	7	6	5	3	7	1	3	6		
1																											
2010300C02Rik	1	.	5	5	14	4	6	1	2	8	5	6	.	7	12	8	17	17	.	7	5	9	3	2	6		
5																											
Igfbp5	3	5	6	3	4	.	1	2	3	2	2	.	1	1	2	.	4	.	4	2	1	2	7	.	.		
2																											
Arpc2	1	1	2	4	4	3	.	.	1	3	6	2	.	.	3	8	6	11	.	2	4	4	4	.	2		
1																											
Ptpn	1	9	5	2	13	14	6	7	1	17	16	9	2	12	13	20	19	15	7	18	13	7	8	3	8		
7																											
Vxn	.	2	.	5	4	1	2	1	.	.	19	4	17	1	3	4	1	.	.	1	7	8	1	3	5	5	
6																											
Ogfrl1	1	2	3	.	1	1	4	.	5	6	3	2	2	.	3	3	7	.	1	8	3	3	4	2	1	13	
4																											
2010300C02Rik	2	5	.	6	14	1	1	5	1	.	6	17	7	6	12	2	3	1	2	1	1	5	1	4	9	1	1
0																											
Igfbp5	1	2	5	.	2	.	2	2	3	2	2	4	2	4	.	3	.	2	2	1	3	1	.	1	2	1	
4																											
Arpc2	2	3	2	2	4	1	1	2	.	1	3	2	.	2	2	2	1	1	.	1	4	5	3	3	4	.	
4																											
Ptpn	5	5	3	10	11	1	6	5	6	4	3	16	29	5	12	4	8	1	8	8	6	7	1	13	19	11	
2																											
Vxn	16	3	9	3	2	9	3	8	44	2	8	4	2	.	1	16	5	2	23	1	1	4	11	2			
2	.																										
Ogfrl1	1	1	1	6	3	2	6	3	7	12	3	1	5	6	2	6	1	2	6	.	2	5	3	3			
2	6																										
2010300C02Rik	2	4	8	2	2	4	3	.	1	.	5	5	1	9	2	23	2	.	1	5	7	33	3	5			
2	.																										
Igfbp5	2	5	1	2	3	1	1	1	.	2	.	4	2	.	.	3	3	3	.	2	12	3	1				
1	4																										
Arpc2	2	4	3	1	2	2	.	.	8	3	5	1	1	2	2	8	3	.	1	2	2	8	1	3			
2	2																										
Ptpn	8	6	10	11	2	12	5	14	22	5	11	2	4	6	6	15	3	8	15	4	23	14	9	7	1		
3	7																										
Vxn	13	1	2	7	4	10	.	.	3	8	3	3	9	1	20	8	1	3	2	2	7	3	1	1			
1																											
Ogfrl1	2	4	1	.	10	3	3	1	3	3	2	7	1	1	1	2	1	2	3	4	3	1	4	4			
9																											
2010300C02Rik	7	.	.	8	43	2	3	3	11	18	8	2	4	1	5	10	12	3	.	7	5	7	8	2			
1																											
Igfbp5	1	2	.	.	1	3	2	.	1	3	2	4	.	.	1	1	3	1	1	3	3	.	4	5			
.																											

```

Arpc2      3 1 1 2 9 5 . 2 2 5 7 1 1 . 3 3 2 3 . 5 5 4 1 3
5
Ptprn     11 2 . 9 30 18 5 11 12 16 10 17 6 5 12 15 7 8 4 15 10 9 13 15
4

Vxn       1 4 24 . 1 10 . 7 1 7 1 4 5 . 1 . 15 . 14 5 1 6 . 18 1 1
8
Ogfrl1    1 1 5 1 2 . . 2 2 2 5 4 1 7 6 7 . . 2 2 5 . 4 7 1 1
3
2010300C02Rik . 5 8 2 1 2 1 2 7 6 3 10 3 1 . . 3 2 2 5 . 1 . 5 4 3
15
Igfbp5    2 7 1 1 1 5 4 1 . . 2 2 7 2 . 5 2 . 1 1 . 1 1 4 3 1
3
Arpc2    . 3 5 . 1 3 . 1 . 1 3 3 1 7 2 1 2 1 3 . 1 5 . 2 2 .
1
Ptprn    2 6 10 1 3 2 7 10 12 11 8 10 5 4 9 7 13 3 14 7 4 2 5 17 23 3
17

Vxn       4 1 2 19 . 13 6 4 23 4 13 . 11 13 11 6 4 2 18 4 8 3 2 8
7
Ogfrl1    1 1 2 4 . 4 2 3 6 1 3 . 4 8 2 3 5 . 3 3 1 2 2 2
2
2010300C02Rik 2 1 7 5 . 4 6 15 7 3 8 . 5 6 . 2 11 9 7 3 14 1 2 3
6
Igfbp5    1 1 3 . 1 2 . 3 1 . 3 1 3 7 2 . 1 1 3 3 1 1 2 1
1
Arpc2    1 . . 3 . . 4 3 1 . 3 4 4 . . 4 3 6 2 1 . 6 1
3
Ptprn    9 6 19 14 7 8 4 11 13 4 11 12 8 16 3 4 9 11 16 6 18 2 1 3
15

Vxn       5 2 . 1 4 2 14 1 10 5 . 2 13 1 12 23 8 17 3 1 12 4 6 2 4 9
3
Ogfrl1    1 . 1 3 4 1 9 1 3 3 2 . 1 3 3 9 1 4 2 5 5 1 3 7 3 4
.
2010300C02Rik 4 1 . 5 2 2 7 . 21 19 2 4 3 1 2 8 5 5 7 8 29 3 3 1 2 7
4
Igfbp5    1 . 2 . 4 1 2 3 2 2 3 . 1 1 4 4 1 1 1 3 2 . 4 . 6 4
.
Arpc2    2 3 . 2 . 2 1 1 7 7 1 . 1 2 4 2 8 1 1 8 9 2 2 2 3 2
.
Ptprn    4 4 4 6 7 8 30 1 10 27 4 4 11 9 14 18 4 14 3 20 12 11 8 2 8 16
3

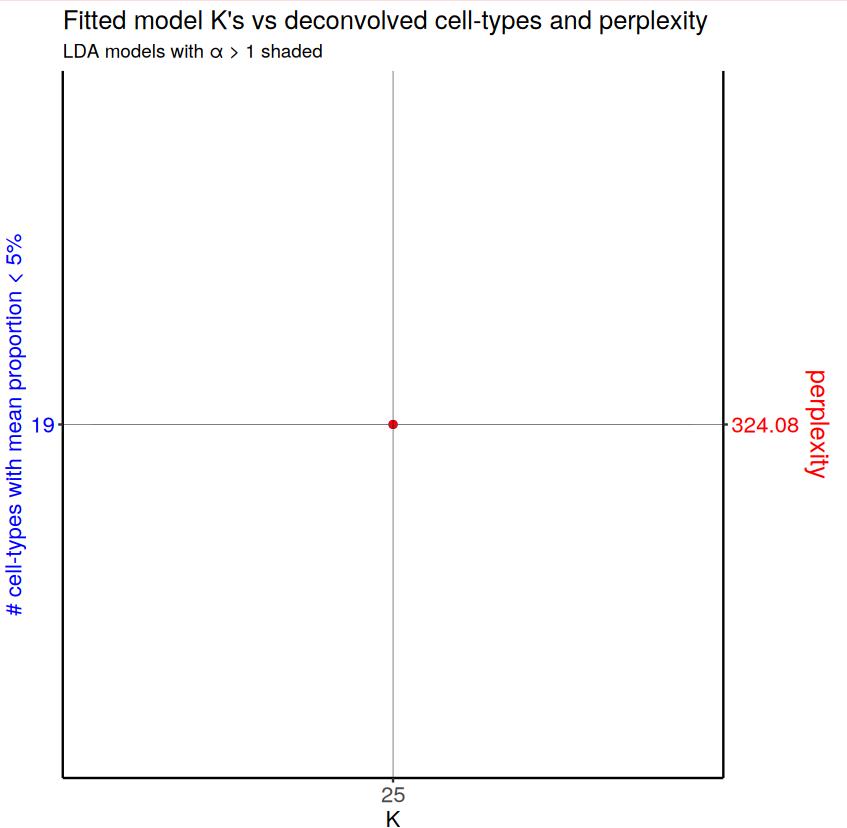
```

In [103]: `dim(corpus)`

476 · 2549

In [104]: `## choose optimal number of cell-types
ldas <- fitLDA(t(as.matrix(corpus)), Ks = c(25))`

```
Time to fit LDA models was 14.8 mins
Computing perplexity for each fitted model...
Time to compute perplexities was 0 mins
Getting predicted cell-types at low proportions...
Time to compute cell-types at low proportions was 0 mins
Plotting...
Warning message in ggplot2::geom_point(ggplot2::aes(y = rareCtsAdj, x = K),
  col = "blue", :
  "Ignoring unknown parameters: `linewidth`"
Warning message in ggplot2::geom_point(ggplot2::aes(y = perplexAdj, x = K),
  col = "red", :
  "Ignoring unknown parameters: `linewidth`"
`geom_line()`: Each group consists of only one observation.
  i Do you need to adjust the group aesthetic?
`geom_line()`: Each group consists of only one observation.
  i Do you need to adjust the group aesthetic?
```



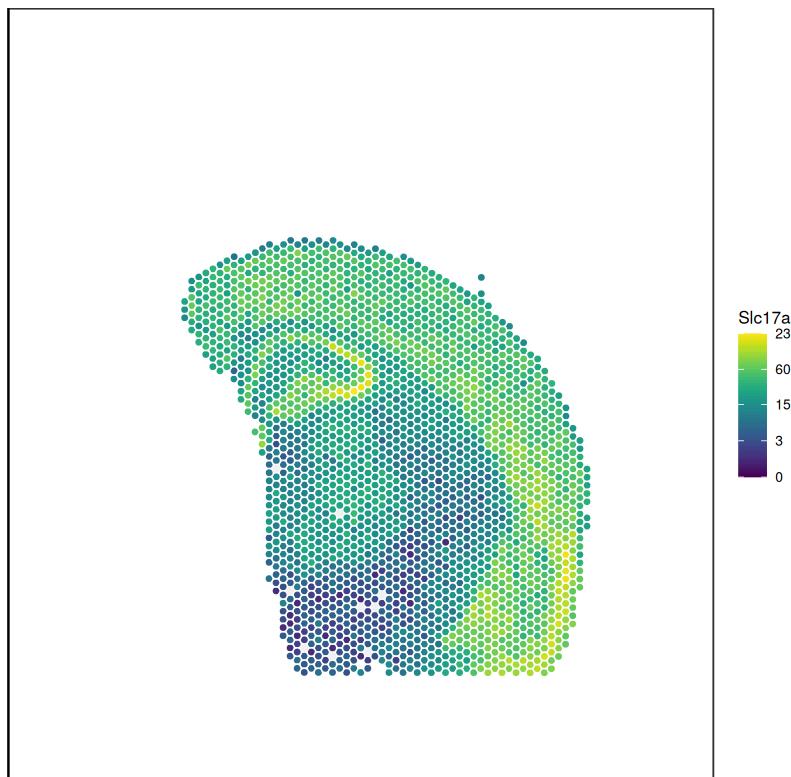
In [105... `dim(mbrain_obj)`

11575 · 4992

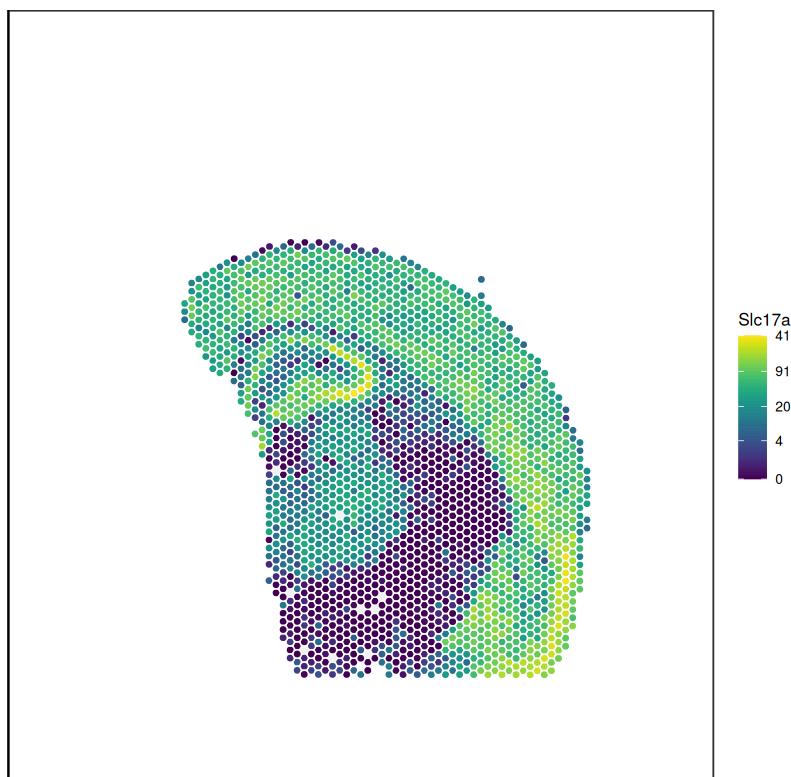
In [106... `dim(mbrain_obj[, colnames(decont_obj)])`

11575 · 2264

```
In [107...]: visualizeHeatmap(mbrain_obj[, colnames(decont_obj)], ggg)
```



```
In [108...]: visualizeHeatmap(decont_obj, ggg)
```



```
In [109... orginal <- mbrain_obj[g,colnames(decont_obj)]
```

```
In [110... new <- decont_obj[g, ]
```

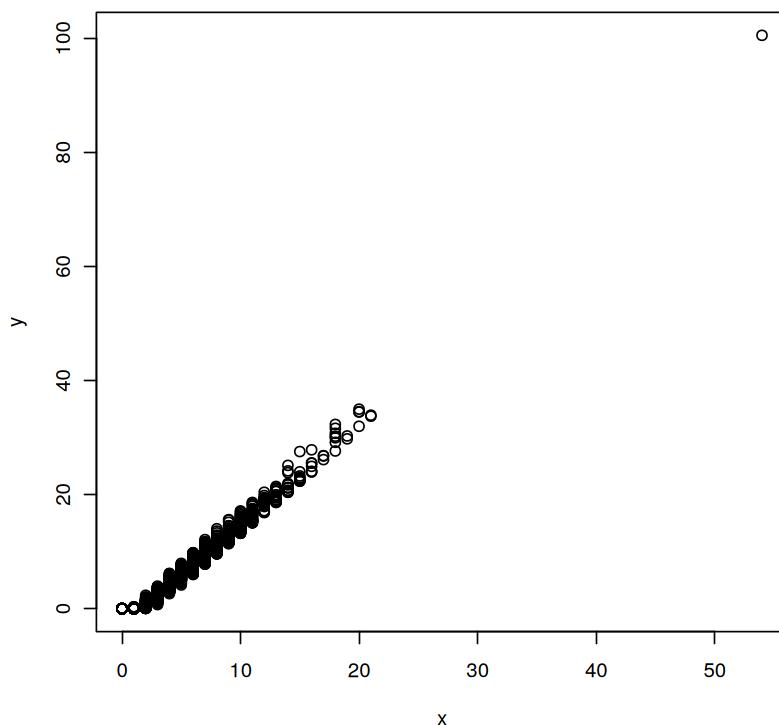
```
In [111... x <- orginal@assays@data$raw  
y<- new@assays@data$decont
```

```
In [112... dim(x)  
dim(y)
```

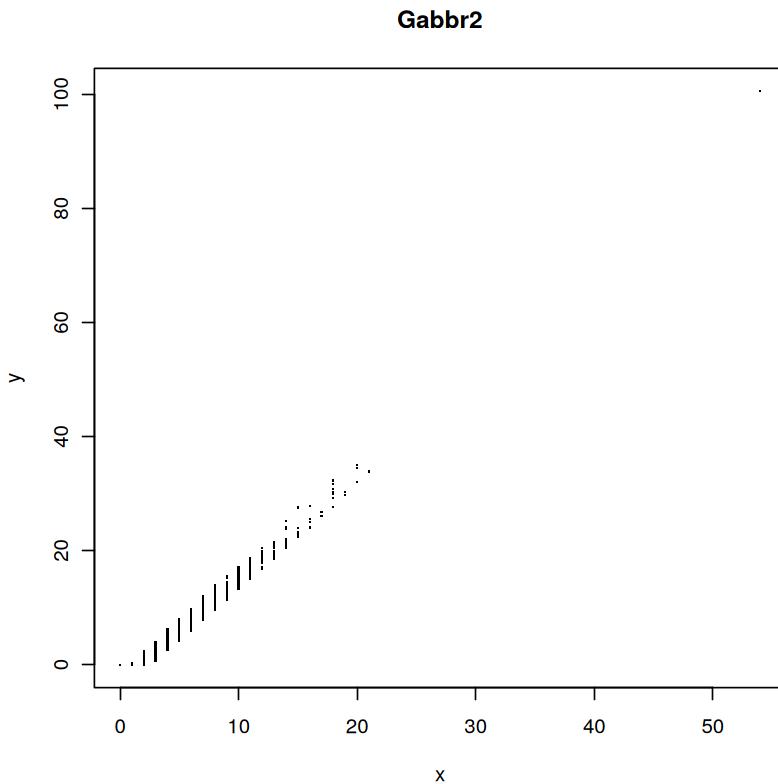
```
1 2264
```

```
1 2264
```

```
In [113... plot(x,y)
```



```
In [114... plot(x,y,main=g,pch = ".")
```



```
In [115... cor.test(x,y)
```

```
Error in cor.test.default(x, y): 'x' must be a numeric vector
Traceback:
```

```
1. cor.test.default(x, y)
2. stop("'x' must be a numeric vector")
3. .handleSimpleError(function (cnd)
. {
.   watcher$capture_plot_and_output()
.   cnd <- sanitize_call(cnd)
.   watcher$push(cnd)
.   switch(on_error, continue = invokeRestart("eval_continue"),
.         stop = invokeRestart("eval_stop"), error = NULL)
. }, "'x' must be a numeric vector", base::quote(cor.test.default(x,
. y)))
```

```
In [117... cor.test(as.numeric(x),as.numeric(y))
```

Pearson's product-moment correlation

```
data: as.numeric(x) and as.numeric(y)
t = 281.05, df = 2262, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.9847867 0.9870842
sample estimates:
      cor
0.9859821
```

```
In [118... #cor.test(x,y) show super corelation before and after cleaning
```

```
In [119... #####STdeconvolve
```

```
cd <- decont_obj@assays@data$decont  
class(cd)  
dim(cd)
```

'dgCMatrix'

11575 · 2264

```
In [120... counts2 <- cleanCounts(cd, min.lib.size=10^3.75, min.reads=2000, )
```

class(counts2)

```
In [121... dim(counts2)
```

5844 · 2238

```
In [122... corpus2 <- restrictCorpus(counts2, removeAbove=1.0, removeBelow = 0.05)  
head(corpus)
```

Removing 88 genes present in 100% or more of pixels...

5756 genes remaining...

Removing 0 genes present in 5% or less of pixels...

5756 genes remaining...

Restricting to overdispersed genes with alpha = 0.05...

Calculating variance fit ...

Using gam with k=5...

1063 overdispersed genes ...

Using top 1000 overdispersed genes.

```
[[ suppressing 2549 column names 'AACAGAGCGACTCCT-1', 'AAACCACTACACAGAT-  
1', 'AAACCCGAAACGAAATC-1' ... ]]
```

6 x 2549 sparse Matrix of class "dgTMatrix"

Vxn	4	5	.	4	16	2	2	.	5	11	7	1	4	3	3	3	4	4	5	12	2	11	3	.	
.	8																								
Ogfrl1	1	3	1	1	3	1	.	3	3	3	4	6	3	.	2	5	.	1	1	6	1	1	.	9	
8	1																								
2010300C02Rik	6	6	1	6	3	4	5	2	8	10	18	1	1	2	5	4	1	3	2	3	2	12	5	1	
1	1																								
Igfbp5	.	3	1	.	1	.	1	10	5	3	5	10	.	3	8	3	.	2	3	.	.	2	1		
2	2																								
Arpc2	8	1	1	4	2	2	.	.	4	4	3	7	1	.	.	4	.	2	1	3	1	4	1	1	
1	2																								
Ptpn	13	6	10	11	7	4	6	10	9	15	21	14	1	1	4	20	4	6	2	17	5	17	5	10	
4	8																								
Vxn	1	1	.	9	1	18	4	9	5	3	1	11	7	9	7	8	2	2	7	1	4	33	7	2	23
3																									
Ogfrl1	2	4	3	5	4	7	2	3	3	.	1	2	7	1	5	3	1	.	2	.	1	8	1	2	4
4																									
2010300C02Rik	1	2	.	43	9	4	4	3	7	1	.	2	2	13	5	3	4	4	3	1	2	2	8	1	12
8																									
Igfbp5	2	9	1	9	4	3	2	2	.	4	1	2	3	2	1	2	9	.	2	5	1	1	.	2	
2																									
Arpc2	1	4	.	13	.	3	3	3	2	.	3	7	5	2	1	3	2	4	.	.	6	2	.	4	
.																									
Ptpn	6	12	1	16	10	12	9	12	7	2	1	4	17	11	14	5	2	4	12	1	3	11	9	3	31
11																									
Vxn	17	4	3	1	3	2	.	9	1	.	1	6	.	2	3	13	9	2	17	.	.	3	15	1	1
0	9																								
Ogfrl1	1	1	3	10	4	1	7	3	.	.	3	4	3	2	2	1	.	2	4	7	1	1	1	7	
2	1																								
2010300C02Rik	10	2	6	1	3	5	.	4	3	1	8	3	2	14	7	7	4	2	5	.	1	5	9	.	5
3																									
Igfbp5	.	1	.	1	.	1	2	1	2	1	1	2	1	.	2	3	.	1	2	.	4	1	.	2	
2	2																								
Arpc2	6	3	1	2	3	1	2	4	2	.	4	2	.	2	4	3	2	5	7	.	2	3	.		
1	2																								
Ptpn	6	10	12	6	9	3	4	10	5	4	12	4	2	26	10	9	1	15	29	5	2	8	13	10	
8	9																								
Vxn	2	20	10	5	7	2	5	.	2	5	.	7	2	11	.	2	17	10	4	1	5	13	1	1	
.																									
Ogfrl1	1	13	1	2	2	7	2	1	15	.	8	1	10	4	2	3	2	1	5	1	7	3	9	.	
2																									
2010300C02Rik	.	8	6	6	5	6	5	3	4	6	.	2	1	2	.	9	20	4	1	4	3	1	.	.	
.																									
Igfbp5	1	2	3	22	3	9	5	2	4	3	2	2	5	1	.	4	2	1	.	3	2	1	2	2	
1																									
Arpc2	.	4	2	5	4	4	4	.	2	1	1	3	2	1	1	6	.	2	1	1	3	7	1	1	
.																									
Ptpn	3	18	9	4	15	17	24	5	10	4	5	13	6	7	3	16	20	3	3	7	6	9	8	4	
10																									
Vxn	4	23	1	1	.	6	4	1	1	9	1	2	4	17	.	7	14	4	5	.	3	28	.	.	
4	2																								

singlecell

Ogfrl1	4	7	1	1	10	3	2	5	2	3	5	3	4	4	.	2	7	1	2	7	1	6	1	2	
.	9																								
2010300C02Rik	4	12	2	.	1	1	4	.	10	8	3	7	9	5	3	5	4	8	1	.	24	7	1	2	
6	.																								
Igfbp5	.	4	6	1	1	.	.	4	5	1	.	3	2	2	.	3	.	3	4	1	4	1	2	2	
.	2																								
Arpc2	4	2	2	.	3	1	2	.	3	1	.	1	2	1	1	.	1	4	1	5	3	7	1	.	
2	2																								
Ptpn	12	28	2	7	5	10	11	5	23	19	4	8	15	7	6	9	8	10	6	3	27	36	3	3	
2	3																							1	
Vxn	1	3	1	1	3	12	1	10	2	2	7	2	2	3	3	6	1	1	2	.	18	5	.	7	
2	1																								
Ogfrl1	.	3	1	2	5	1	3	2	1	.	3	2	1	.	1	3	1	1	4	10	7	4	8	4	
6	2																								
2010300C02Rik	1	7	2	.	8	1	1	3	2	3	3	6	7	2	2	3	15	1	6	1	6	5	.	17	
1	5																								
Igfbp5	3	3	3	.	4	5	11	3	.	2	5	1	.	18	2	1	1	.	6	1	2	.	11	2	
2	6																								
Arpc2	.	1	4	3	3	2	3	4	4	1	5	3	3	2	3	2	6	1	.	3	3	6	.	7	
4	4																								
Ptpn	14	11	15	6	10	12	12	7	5	6	6	4	6	10	3	4	4	1	3	9	17	10	2	12	
6	4																								
Vxn	3	1	12	5	.	1	7	8	11	2	1	11	8	.	15	1	17	9	1	7	1	4	2	5	
2																									
Ogfrl1	6	1	1	1	9	1	3	2	2	3	3	2	5	14	3	2	2	1	.	1	1	2	2	.	
1																									
2010300C02Rik	7	2	5	8	1	2	3	7	12	1	3	4	20	.	3	2	7	4	3	4	1	1	10	2	
1																									
Igfbp5	2	1	3	6	13	3	.	3	3	.	2	2	1	3	3	3	.	3	.	2	2	4	2	1	
1																									
Arpc2	4	.	.	4	.	.	3	2	4	.	2	4	5	3	6	1	2	1	2	4	2	2	3	3	
2																									
Ptpn	14	4	11	15	8	1	12	13	17	4	21	14	27	11	16	7	9	10	2	7	8	2	19	3	
.																									
Vxn	.	3	11	15	7	17	15	3	.	4	23	1	8	3	1	10	11	2	8	14	12	9	4	1	
2																									
Ogfrl1	.	3	5	6	2	5	5	1	6	4	4	9	1	.	2	7	1	1	.	4	2	5	1	4	
1																									
2010300C02Rik	.	3	9	6	1	7	4	1	3	22	6	2	7	2	.	26	8	4	5	5	3	5	3	3	
6																									
Igfbp5	1	2	.	1	2	6	3	1	2	6	4	4	2	1	.	2	1	2	2	7	.	.	13	2	
6																									
Arpc2	1	1	3	1	1	4	2	.	.	7	2	1	3	.	1	9	.	1	1	3	4	2	5	1	
4																									
Ptpn	2	7	12	21	5	16	7	4	6	4	14	5	25	8	6	16	11	3	13	6	9	13	8	8	
20																									
Vxn	.	2	8	.	11	8	.	2	12	2	3	9	2	18	8	10	4	2	2	3	2	.	3	.	1
13																									
Ogfrl1	2	.	4	5	8	2	4	1	4	2	3	5	10	7	3	3	.	1	.	1	3	3	.	2	
.																									
2010300C02Rik	.	3	3	.	2	3	1	2	4	.	5	4	1	5	3	10	3	5	.	.	1	5	4	1	
10																									

Igfbp5	4	6	1	3	3	2	.	4	5	5	2	.	.	3	3	6	3	.	6	3	2	5	3	1	4	4
1																										
Arpc2	3	.	2	4	3	.	.	2	1	.	3	.	2	2	3	3	4	2	1	2	3	.	2	2	.	4
4																										
Ptpn	10	2	12	1	9	3	10	5	9	1	4	14	7	18	13	30	9	9	7	8	6	1	7	3	7	17
16																										
Vxn	1	.	1	10	3	2	6	.	23	5	2	4	5	5	2	1	.	14	1	.	1	19	13	2	.	11
3																										
Ogfrl1	.	2	.	1	1	2	2	2	6	.	2	2	1	1	2	5	3	2	1	.	1	3	1	3	2	1
3																										
2010300C02Rik	1	.	1	8	1	6	9	1	3	2	1	11	1	6	1	1	6	4	2	1	6	12	18	2	.	9
3																										
Igfbp5	.	3	4	.	3	2	4	.	5	1	2	5	6	1	5	1	4	.	4	4	1	2	1	4	2	1
4																										
Arpc2	1	.	2	6	.	4	1	.	2	.	2	2	.	2	5	2	2	6	2	3	3	4	2	1	.	4
6																										
Ptpn	8	3	6	11	4	5	7	7	10	8	11	10	3	13	4	4	1	10	10	1	10	35	11	3	2	9
19																										
Vxn	6	5	1	11	2	2	20	5	2	4	13	12	16	3	8	2	20	5	5	.	8	1	1	2		
3	.																									
Ogfrl1	3	7	8	2	1	7	7	4	.	1	4	3	6	5	.	.	4	3	1	1	4	1	1	1	1	
17																										
2010300C02Rik	5	3	1	5	4	.	4	7	1	4	5	17	9	4	11	1	2	3	1	.	6	2	.	.	2	
2																										
Igfbp5	1	4	2	.	4	4	3	2	2	1	.	3	.	2	.	1	.	.	5	1	6	8	6	2		
3	.																									
Arpc2	4	5	4	2	.	.	4	2	1	.	4	9	1	3	4	1	1	2	2	1	4	2	1	1		
52																										
Ptpn	5	11	11	8	1	6	9	9	1	3	15	20	20	13	12	14	16	15	3	3	18	9	4	5	1	
53																										
Vxn	18	.	2	.	2	31	1	7	2	9	7	6	22	1	6	1	2	1	2	24	.	6	.	.	6	
6																										
Ogfrl1	4	2	9	9	.	4	2	4	3	1	3	2	2	5	6	10	1	.	8	3	1	3	2	2	4	
1																										
2010300C02Rik	6	3	.	.	2	1	2	34	2	3	3	1	6	1	3	.	2	4	.	6	.	7	.	1	15	
15																										
Igfbp5	2	3	1	4	1	1	3	6	.	11	3	2	3	.	2	2	6	1	3	2	9	3	3	1		
2																										
Arpc2	2	4	2	3	3	1	2	5	.	.	2	2	1	1	2	6	.	2	1	4	2	3	2	3	6	
.																										
Ptpn	15	8	5	10	22	13	6	31	9	8	8	5	13	14	3	13	1	7	8	12	1	4	17	3	9	
8																										
Vxn	7	1	2	1	5	.	9	6	16	.	10	3	29	2	8	.	3	13	14	20	19	18	2	1		
11																										
Ogfrl1	2	1	4	.	4	1	4	1	2	1	3	4	8	1	9	2	3	3	3	1	7	3	.	8		
31																										
2010300C02Rik	6	1	3	3	3	.	4	5	.	8	14	3	3	21	.	4	31	19	2	13	1	1	1	1		
32																										
Igfbp5	.	1	.	7	10	1	2	.	1	.	1	5	1	5	2	1	3	2	5	2	.	2	1	3		
1.																										
Arpc2	3	.	1	2	1	1	1	2	4	1	2	4	2	.	3	.	1	15	6	2	4	1	1	8		
43																										

Ptpn5	4 6 6 2 4 3 13 14 13 3 8 17 15 5 13 2 19 37 36 11 29 8 4 3 5 4
Vxn1	22 2 . 3 2 2 4 3 13 . 6 30 . 7 29 32 21 1 2 . 14 1 18 .
Ogfrl1	5 2 1 7 5 12 5 2 5 . 3 3 1 3 5 3 3 1 2 . 5 . 5 2
.	
2010300C02Rik1	6 11 . 4 7 . 6 4 6 1 11 5 . 5 9 7 2 2 2 1 4 . 13 2
Igfbp51	2 4 . 1 6 1 9 1 3 2 . 1 3 2 1 1 3 . 1 . 2 . 2 5
Arpc23	4 2 1 2 2 3 4 4 3 . 2 5 4 8 6 4 4 1 . . 2 . 9 .
Ptpn5	18 11 2 11 9 2 3 14 16 2 15 18 12 7 7 18 11 . 5 4 19 6 24 3
Vxn1	3 9 16 1 3 2 14 . 2 1 10 5 1 2 18 1 1 2 . 1 1 2 1 4 11 1
Ogfrl11	2 2 4 4 1 1 6 1 2 . 2 . 8 . 5 1 . 3 6 6 1 1 . . 3
2010300C02Rik4	10 5 17 1 3 1 26 9 4 2 10 8 2 4 26 9 5 7 . 4 . 2 1 4 4
Igfbp53	. 6 1 1 . 3 1 . 5 1 2 . 12 4 1 . 4 2 6 3 6 . 1 . 3
Arpc24	6 4 5 3 2 1 12 1 . 4 2 6 1 . 11 2 5 2 2 3 . . . 2 .
Ptpn2	13 2 23 6 6 6 12 9 2 4 13 6 8 12 19 7 17 20 6 20 6 1 3 5 10 1
Vxn7	4 16 6 17 10 1 . 3 7 7 3 11 . . 3 3 5 3 29 5 1 1 1 1 3
Ogfrl13	2 10 2 5 7 1 4 2 3 2 4 8 8 5 2 3 4 . 8 3 . 4 1 1 1
2010300C02Rik2	9 14 8 1 7 1 3 4 3 7 3 14 3 . 8 . 2 6 10 4 . 2 2 3 5
Igfbp51	. 2 2 5 3 1 3 4 4 2 2 3 1 4 1 4 2 2 3 1 . 1 6 1 .
Arpc21	4 3 3 . 1 . 4 1 2 2 4 3 . 2 1 4 1 2 2 3 4 1 1 4 1
Ptpn4	11 26 11 5 7 3 9 9 17 13 8 19 11 13 2 5 3 5 16 10 7 9 6 10 3
Vxn4 .	7 14 . 13 3 8 1 4 1 9 5 2 8 2 1 . 1 . 1 5 3 1 8 1 9
Ogfrl11 5	6 7 2 1 1 2 2 4 6 . 1 5 2 5 . 9 3 4 8 2 2 . 2 2 4
2010300C02Rik5 1	8 11 . 9 . 14 . 11 3 14 5 2 6 . . 2 6 1 3 3 4 1 4 1 1 8
Igfbp51 4	2 5 1 4 . 2 4 5 . . 3 . 1 1 7 2 1 4 1 2 . 2 1 3 2 2
Arpc24 1	4 1 . 3 1 2 . 3 2 7 3 . 1 . . 2 2 3 2 3 . 1 2 1 1
Ptpn4 2	9 10 . 8 4 17 2 2 1 15 19 6 4 2 1 7 12 10 5 19 3 14 8 10 10
Vxn	2 5 1 2 17 2 1 3 1 1 3 5 2 3 3 2 8 1 3 11 2 10 6 4 7

11	
Ogfrl1	. 1 3 . 4 1 6 2 5 1 1 1 4 . 3 . 1 3 3 3 1 2 8 6 5
1	
2010300C02Rik	3 6 1 1 14 3 . 6 1 4 13 7 10 4 13 2 2 10 1 6 1 3 32 7 3
7	
Igfbp5	. 2 . 2 2 2 3 4 2 . 2 1 1 1 1 2 5 2 5 1 2 1 6 . 1
2	
Arpc2	3 2 1 . 2 . 4 3 1 2 2 . 2 2 3 1 1 1 3 1 2 2 9 3 2
1	
Ptpn	18 4 3 . 18 5 6 4 5 5 15 14 8 3 6 3 9 2 15 9 8 16 7 4 10
8	
Vxn	1 1 5 3 1 11 . . 2 5 1 9 5 9 3 1 3 . 1 15 2 . 27 22 1
2	
Ogfrl1	11 . 4 5 1 5 1 2 1 14 2 1 . 6 . 2 9 . 7 2 . 2 5 5 .
8	
2010300C02Rik	. . 8 22 1 15 . . 4 96 1 5 4 6 2 1 2 2 . 5 1 2 4 7 1 2
0	
Igfbp5	2 2 1 5 1 1 4 . 3 18 20 . 1 . 1 2 . 2 . 1 2 1 1 3 .
7	
Arpc2	1 . 3 5 . 2 1 3 . 27 2 3 4 2 2 1 4 1 3 1 . . 1 3 .
3	
Ptpn	4 7 14 20 6 12 1 5 1 39 3 13 9 29 8 3 9 1 8 13 1 5 9 11 3 1
5	
Vxn	21 2 8 3 6 3 1 . 1 2 1 2 . 10 17 7 2 3 2 24 6 2 27 8 10
1	
Ogfrl1	2 3 2 2 1 8 3 3 2 2 . 6 3 3 4 6 1 1 4 2 6 2 4 1 .
3	
2010300C02Rik	5 . 10 1 6 10 3 . . 7 15 3 1 19 1 6 1 2 . 7 2 7 6 3 2
4	
Igfbp5	1 1 1 4 . 4 . 1 . 14 1 2 3 1 2 2 14 . 2 . 2 . . 2 1
7	
Arpc2	. 1 1 2 4 9 . 2 . . 1 3 1 7 5 4 2 1 . 1 3 3 3 4 3
1	
Ptpn	6 4 6 6 6 12 4 4 3 5 12 5 3 21 14 15 3 6 5 14 5 7 22 15 10
5	
Vxn	22 1 6 2 2 8 10 13 4 10 19 7 5 7 2 9 3 3 1 3 1 3 19 3
29	
Ogfrl1	3 . 18 . 4 7 2 5 4 6 3 1 3 2 . 4 3 2 3 3 3 1 3 1
4	
2010300C02Rik	5 1 6 2 5 6 3 11 29 36 33 4 9 2 1 21 4 5 . 4 2 9 5 5
5	
Igfbp5	1 1 1 1 5 2 . 3 4 1 1 4 3 1 1 7 5 3 1 3 5 3 2 2
.	
Arpc2	5 2 4 2 3 3 5 7 4 19 14 3 5 3 1 9 2 3 . 4 1 1 2 1
1	
Ptpn	21 2 11 7 19 14 15 29 30 20 20 6 14 8 2 9 7 9 10 10 7 18 20 3
13	
Vxn	. 1 18 8 . 1 13 13 9 . 5 1 4 8 9 1 7 1 4 1 9 2 1 1 1
2 2	
Ogfrl1	1 2 2 3 . 3 4 3 . 6 1 5 2 1 6 1 3 11 2 3 3 13 1 2 1
2 5	
2010300C02Rik	1 1 9 5 . 6 4 6 6 1 9 3 4 4 1 4 7 2 1 9 9 2 1 2 3

1 2	
Igfbp5	3 3 3 . 1 4 4 . 2 2 1 2 . 4 1 1 . 5 1 1 1 1 3 . .
. 2	
Arpc2	1 1 5 2 1 3 4 4 1 4 4 1 4 . 1 6 5 4 1 1 1 3 . 1 .
1 4	
Ptpn	2 4 10 13 1 22 13 15 9 4 22 8 7 1 11 11 17 9 4 6 16 9 7 6 3
6 5	
Vxn	1 5 1 17 1 1 . 2 . . 14 1 . . . 6 5 1 19 22 13 10 7 4
4	
Ogfrl1	. 2 . 1 3 12 7 4 2 2 3 3 . 4 1 4 2 . 4 3 7 3 2 3
2	
2010300C02Rik	3 11 1 12 5 2 1 11 . 1 5 . . 2 5 12 14 3 2 6 6 5 5 3
4	
Igfbp5	1 3 15 . . 1 1 . 2 6 4 5 8 7 2 1 3 5 6 . 7 2 1 2
1	
Arpc2	. 3 2 2 7 . 1 5 4 . 2 4 1 3 1 6 2 . 6 3 1 4 5 2
3	
Ptpn	8 13 4 19 6 10 8 14 4 2 9 8 2 10 13 9 8 6 20 25 18 5 8 11
10	
Vxn	9 2 1 1 5 23 3 8 . 1 . 3 5 3 8 4 3 5 8 3 3 8 12 8 21 7
.	
Ogfrl1	3 2 4 4 2 5 2 2 1 4 2 1 2 1 6 3 . 1 4 2 1 4 3 4 8 1
2	
2010300C02Rik	4 3 5 1 1 4 2 12 5 6 1 3 34 3 7 5 2 8 10 . 7 16 4 1 11 6
2	
Igfbp5	4 1 . . 3 1 2 2 1 . 3 3 1 1 1 2 3 5 1 1 3 4 3 2 5
.	
Arpc2	4 4 6 2 2 6 4 2 2 1 . 1 9 . 6 3 1 2 10 1 3 5 3 1 7 6
.	
Ptpn	6 7 5 1 10 12 9 13 5 4 3 6 15 6 14 20 1 13 24 2 9 19 18 8 21 8
6	
Vxn	18 8 10 2 7 11 5 8 . 44 9 12 . 7 16 7 7 33 14 1 12 1
4	
Ogfrl1	5 1 5 1 4 4 . 3 . 13 3 2 10 3 2 2 4 7 2 2 2 2
2	
2010300C02Rik	3 7 20 . 15 5 7 4 . 2 3 3 1 15 13 2 14 3 7 2 10 3 1
8	
Igfbp5	. . 1 1 1 3 . . 3 1 3 1 1 1 . 2 . 1 4 2 1 3
4	
Arpc2	6 4 5 . 7 3 1 5 1 5 1 2 . 8 1 . 3 3 3 . 1 2
2	
Ptpn	8 15 14 4 12 7 12 10 1 14 9 4 8 9 11 10 18 15 15 6 5 4
8	
Vxn	12 7 4 14 . 2 2 12 4 8 2 6 10 6 . 3 . . 5 11 3 . 1 . 3
4	
Ogfrl1	1 3 . 4 . 3 2 3 3 3 3 3 2 3 3 1 3 5 1 7 8 . 3 1 .
1	
2010300C02Rik	11 8 7 10 1 1 4 3 9 5 3 5 2 14 20 2 1 2 1 1 1 . 1 . 3
8	
Igfbp5	5 1 2 2 1 . 4 . . 1 2 6 . 3 1 6 5 1 4 5 2 1 . 1 3
6	
Arpc2	3 2 3 2 1 . 6 1 1 1 2 3 3 3 4 2 . 2 . 1 2 2 1 3 2

3	
Ptpn	17 1 10 12 4 6 14 12 14 11 9 13 11 22 19 3 2 6 3 11 9 2 7 4 16
13	
Vxn	18 . 19 3 26 1 2 . 4 6 15 6 1 3 1 6 5 5 18 . 2 1 1 . . 12
10	
Ogfrl1	6 1 4 3 7 1 2 3 1 3 2 1 2 1 5 2 2 1 3 1 1 7 2 1 1 1
2	
2010300C02Rik	3 2 11 4 11 2 2 . 2 4 8 6 . 4 3 16 3 . 8 1 . 3 1 5 3 6
8	
Igfbp5	2 1 4 3 1 2 1 1 2 4 . . 1 10 1 2 1 4 3 2 1 3 2 . 2 .
2	
Arpc2	4 2 2 7 . 1 2 1 1 2 3 1 . 2 3 2 2 2 2 2 1 1 2 1 2 2
4	
Ptpn	12 4 8 16 34 6 4 6 1 7 25 1 5 5 6 21 11 3 12 3 3 8 3 4 5 8
13	
Vxn	. 6 3 10 14 . 9 9 15 10 6 3 6 1 . 6 3 5 2 17 . 3 13 28 7
.	
Ogfrl1	3 2 2 6 6 4 . 3 1 6 3 1 5 2 3 1 3 7 2 2 8 5 1 6 2
4	
2010300C02Rik	1 6 2 3 6 5 4 12 10 . 5 7 5 3 . 8 3 22 1 1 1 2 10 3 16
.	
Igfbp5	1 1 . 1 . 4 1 1 1 2 2 1 3 2 6 2 . 4 1 7 . 3 . 2 1
1	
Arpc2	. 6 1 1 3 3 2 3 3 1 4 . 2 . 1 4 . 4 . . 2 5 9 2 5
1	
Ptpn	3 8 5 10 17 8 14 8 18 11 16 4 7 2 6 9 2 29 2 12 5 11 19 12 23
5	
Vxn	11 4 5 15 11 3 . 13 6 4 3 1 6 29 . 8 5 7 2 1 23 1 1 14
5 .	
Ogfrl1	19 1 12 1 2 1 3 2 3 . 3 2 . 6 1 2 . 2 3 1 4 . 4 5
.	
2010300C02Rik	17 14 10 10 2 13 2 4 3 3 4 . 16 44 1 . 6 3 3 3 4 1 4 1
1 1	
Igfbp5	. 4 6 . 1 1 6 1 3 4 4 1 2 1 2 2 . 2 4 . 2 1 . 4
4 .	
Arpc2	15 5 4 2 5 4 1 . . . 1 6 23 3 1 4 3 1 2 . 2 5 4
. 1	
Ptpn	42 16 23 12 9 16 7 8 4 3 9 3 5 13 4 9 11 8 13 5 22 3 13 3
7 1	
Vxn	6 . 11 25 1 8 3 9 1 13 5 5 4 3 1 3 2 2 14 2 1 6 1 13 1
13	
Ogfrl1	1 . 3 4 2 4 2 3 3 7 1 1 2 6 2 2 1 1 1 6 4 . 3 2 1
2	
2010300C02Rik	2 2 11 6 1 8 1 1 2 13 6 5 1 28 3 1 3 3 2 4 1 3 3 13 .
.	
Igfbp5	. 5 4 3 3 2 7 . 6 3 . 2 2 5 1 5 5 2 1 5 . 3 2 2 .
3	
Arpc2	. 1 3 5 . 6 1 1 3 7 2 2 4 6 1 2 3 1 1 . 1 4 2 8 1
1	
Ptpn	6 5 10 12 14 17 3 6 11 34 16 13 3 26 4 9 3 10 9 6 4 9 6 9 4
3	

singlecell

Vxn	30	3	7	5	4	7	19	20	13	7	3	4	1	3	.	1	3	1	7	.	2	6	.	2	14
10																									
Ogfrl1	1	2	5	.	8	1	4	1	4	2	11	3	4	2	6	.	3	1	2	2	1	1	1	3	4
3																									
2010300C02Rik	4	3	2	8	57	7	11	12	4	3	10	31	.	9	1	3	4	2	5	1	2	8	.	1	5
4																									
Igfbp5	3	1	1	2	6	3	2	3	3	.	2	2	3	1	2	1	3	1	3	1	7	.	6	3	1
.																									
Arpc2	1	4	4	2	8	2	.	2	1	1	5	6	1	2	2	.	2	1	3	1	1	4	.	.	3
2																									
Ptprn	11	7	7	7	24	11	15	31	14	4	12	34	12	16	5	7	6	5	12	5	5	19	4	2	12
15																									
Vxn	10	11	2	2	6	9	.	2	23	12	3	2	3	7	2	1	1	5	11	13	3	6	.	2	22
1																									
Ogfrl1	3	3	1	2	.	5	5	4	3	5	1	1	.	3	1	3	1	7	.	5	3	2	2	2	9
4																									
2010300C02Rik	32	1	2	1	6	5	1	4	8	6	4	2	.	9	3	4	2	10	11	4	2	4	1	5	5
5																									
Igfbp5	8	.	2	6	2	.	2	2	2	.	7	1	.	8	3	3	1	2	2	3	3	2	.	3	
2																									
Arpc2	7	4	1	1	1	2	2	3	3	1	3	2	1	6	2	2	2	1	5	4	2	2	.	3	.
4																									
Ptprn	32	8	5	4	5	11	9	15	14	6	5	5	.	19	4	19	1	11	6	10	6	6	6	7	18
10																									
Vxn	7	13	7	17	2	9	2	4	.	19	.	1	5	10	.	.	.	3	22	2	7	2	.	1	
11																									
Ogfrl1	3	4	4	8	1	4	3	1	7	6	6	2	2	4	4	1	2	1	6	2	2	7	1	1	
2																									
2010300C02Rik	4	8	2	31	10	5	.	9	1	3	1	1	6	3	1	1	5	.	4	1	7	3	3	.	
1																									
Igfbp5	1	3	2	1	.	3	1	2	2	.	.	3	.	1	4	1	4	26	2	1	1	5	5	1	
3																									
Arpc2	1	2	1	10	1	2	2	1	.	3	2	.	.	5	1	.	.	.	2	2	2	2	.	2	
1																									
Ptprn	9	18	5	22	13	14	5	7	12	10	11	3	10	6	5	1	20	3	17	9	18	12	4	7	
4																									
Vxn	3	1	1	16	1	32	1	3	3	1	5	.	.	14	10	3	3	22	11	2	2	13	2	4	2
.																									
Ogfrl1	.	3	1	6	.	7	.	2	1	6	12	6	2	3	1	2	3	.	1	1	1	8	2	8	.
1																									
2010300C02Rik	1	.	1	3	1	5	1	4	3	.	3	8	3	5	6	2	.	9	10	1	1	2	3	.	12
.																									
Igfbp5	3	2	.	.	.	2	2	3	3	4	2	8	2	.	2	2	3	1	5	.	5	3	3	1	
2																									
Arpc2	.	.	1	1	.	2	1	3	.	2	4	6	.	3	.	2	4	2	3	3	.	2	4	3	3
.																									
Ptprn	2	5	3	8	3	12	2	4	1	8	19	17	6	10	9	18	6	16	7	5	1	11	25	9	13
3																									
Vxn	1	1	32	9	6	8	18	.	5	5	4	10	9	.	1	.	1	21	2	2	19	8	.	7	
1																									
Ogfrl1	3	2	5	5	.	2	4	4	1	3	3	.	1	2	8	.	4	3	2	1	2	2	3	3	
1																									

singlecell

2010300C02Rik	1	.	2	12	4	3	2	2	3	.	1	9	14	3	4	2	4	5	14	.	6	7	.	17		
Igfbp5	1	3	4	6	2	4	.	3	2	2	1	1	2	2	1	5	2	5	2	2	.	1	1	3	.	2
Arpc2	7	1	3	13	3	4	2	2	5	3	.	2	2	3	4	.	2	4	3	.	4	1	2	3	.	
Ptprn	21	10	14	15	8	15	9	5	13	8	9	13	4	22	18	3	1	18	9	4	20	4	3	16	.	
Vxn	.	1	.	3	5	4	.	4	9	2	3	12	1	2	2	10	1	8	5	4	4	5	.	11		
Ogfrl1	0	1	5	2	1	1	2	2	4	3	5	1	7	2	.	1	5	.	3	.	12	6	1	2	3	1
2010300C02Rik	1	1	.	2	3	4	.	6	6	32	3	3	4	2	7	10	.	4	2	2	1	2	1	2	.	
Igfbp5	1	1	.	3	5	8	4	1	2	1	3	7	3	2	1	2	.	4	1	4	.	3	1	4	4	1
Arpc2	3	.	3	1	1	.	1	2	3	3	11	2	2	5	1	3	.	2	1	.	7	6	.	3	.	
Ptprn	0	7	7	12	2	5	7	9	16	14	19	6	14	25	4	10	18	2	7	9	11	10	11	25	6	1
Vxn	.	4	31	.	5	1	16	2	.	27	1	.	2	15	7	7	1	4	21	.	38	9	.	1	4	.
Ogfrl1	.	4	7	4	1	.	.	3	3	6	2	3	1	7	4	2	1	5	2	11	2	2	.	2	.	
2010300C02Rik	1	1	9	10	3	4	1	1	4	1	4	2	4	3	7	7	6	1	4	5	1	8	6	14	1	3
Igfbp5	6	3	2	4	.	3	1	1	2	4	3	.	1	.	.	8	3	5	.	.	3	1	1	2	1	.
Arpc2	3	.	2	1	2	2	2	1	4	3	1	1	3	4	.	2	.	3	1	1	5	2	5	.	1	
Ptprn	11	14	31	5	5	16	12	11	4	16	8	2	5	10	11	5	3	17	12	13	23	10	13	5	4	
Vxn	6	.	1	2	2	6	28	2	3	1	1	3	4	2	3	18	3	.	4	6	2	18	.	12	19	6
Ogfrl1	.	.	.	5	.	1	4	1	15	5	1	.	5	5	2	6	1	8	.	1	.	3	3	6	.	
2010300C02Rik	1	1	1	2	3	8	6	3	10	5	.	8	3	1	1	3	7	1	5	36	2	4	4	5	5	9
Igfbp5	3	1	1	1	1	9	.	1	1	2	4	.	1	6	2	1	2	5	8	2	1	6	2	1	.	
Arpc2	1	1	1	3	3	2	3	4	3	3	2	.	1	4	2	3	1	2	7	4	5	3	1	.	1	
Ptprn	14	2	4	13	13	16	6	10	10	8	13	4	6	4	12	3	5	7	14	6	5	21	4	4	14	.
Vxn	1	.	4	7	6	1	25	18	4	25	35	5	5	.	2	10	.	6	11	5	.	7	1	8	2	
Ogfrl1	2	1	4	3	.	6	1	3	2	5	2	2	1	7	4	10	1	5	3	.	2	7	.	2		
2010300C02Rik	.	10	16	3	.	6	4	4	39	8	10	3	3	.	7	.	19	3	2	2	10	.	36	3	.	
Igfbp5	1	5	5	1	1	2	1	1	1	2	1	4	.	1	2	.	1	3	.	.	4	.	9	2	.	

singlecell

Arpc2	1	3	2	1	1	3	3	9	15	3	2	2	.	6	3	.	5	1	3	1	2	3	7	.			
Ptprn	8	9	10	9	5	4	25	8	14	28	21	23	8	4	11	14	5	16	6	9	1	13	3	15	6		
Vxn	20	2	24	2	.	6	1	12	12	2	1	6	.	5	5	6	6	3	8	6	14	6	2	1	4	1	
Ogfrl1	5	.	3	2	2	1	8	5	.	3	9	5	1	.	6	1	4	1	3	2	3	2	4	8	3	3	
2010300C02Rik	1	2	4	5	2	.	3	3	3	.	12	.	3	8	6	7	2	3	7	4	7	2	.	4	2		
Igfbp5	.	2	1	3	2	4	1	3	2	1	2	3	1	2	2	2	2	1	1	3	.	1	1	1	4		
Arpc2	4	1	2	3	5	1	.	3	2	1	2	3	.	2	4	.	3	1	1	1	2	2	.	1	1	6	
Ptprn	18	3	16	14	14	3	7	14	5	10	7	13	4	7	13	4	18	5	11	20	12	3	8	4	4	15	
Vxn	6	2	2	1	7	.	3	1	1	9	2	2	4	2	17	17	4	1	4	2	3	4	12	14	.		
Ogfrl1	1	1	2	13	2	2	.	.	10	5	3	8	4	4	6	4	2	8	3	.	3	2	2	10	11		
2010300C02Rik	4	5	2	2	5	1	12	3	.	12	1	1	9	4	6	36	4	1	2	4	8	12	2	36	1		
Igfbp5	1	.	2	4	6	1	.	.	4	1	.	3	3	3	3	.	2	1	1	1	4	1	.	2	2		
Arpc2	.	4	3	1	.	3	1	3	3	2	4	5	2	7	5	1	1	.	1	6	2	3	15	.			
Ptprn	5	6	11	7	7	2	7	6	5	12	11	12	9	15	18	17	8	7	8	24	12	14	13	22	4		
Vxn	8	2	6	10	9	2	6	5	7	6	5	.	7	7	15	3	2	35	2	2	1	20	3	3	2	1	3
Ogfrl1	.	2	6	6	4	5	4	.	3	5	2	4	9	4	5	1	12	3	.	3	2	1	4	8	1	1	1
2010300C02Rik	3	5	5	4	1	6	9	6	4	8	2	5	12	24	.	2	8	5	6	3	3	.	6	5	.	2	
Igfbp5	2	4	.	1	3	.	.	2	3	2	1	2	2	2	1	2	3	.	3	1	.	2	3	3	6	3	
Arpc2	2	.	3	6	3	1	2	3	5	4	5	1	2	3	10	1	3	4	1	3	.	4	2	3	2	3	4
Ptprn	18	8	15	16	8	1	11	6	11	9	8	5	5	10	16	2	10	26	5	16	1	13	8	7	12	2	8
Vxn	6	1	2	.	4	.	13	.	6	6	1	7	2	1	14	1	11	1	2	13	21	3	2	.	1		
Ogfrl1	3	.	1	1	5	1	6	.	10	2	10	7	8	.	8	1	5	1	.	3	2	5	.	3	.		
2010300C02Rik	7	3	3	1	24	.	1	3	39	12	1	32	2	.	5	1	6	10	1	4	9	11	1	1	2		
Igfbp5	2	15	1	4	6	1	3	3	9	4	4	4	1	16	2	4	4	4	2	6	3	2	.	18	2		
Arpc2	1	3	1	3	1	1	.	1	6	7	1	7	.	.	2	.	2	4	2	5	3	4	1	2	.		
Ptprn	15	4	3	9	9	.	6	9	18	22	10	35	8	7	15	2	18	11	3	6	11	16	2	1	6		

Vxn	9	7	5	21	1	7	1	7	7	4	.	3	17	1	4	3	1	6	2	.	5	3	1	4	13	.	15			
4																														
Ogfrl1	5	6	4	9	1	3	1	5	.	.	3	1	10	2	4	3	3	2	5	5	1	1	.	3	4	.	3			
2																														
2010300C02Rik	7	10	8	5	5	2	2	8	4	5	2	5	3	1	5	6	.	4	.	.	3	1	1	3	4	.	6			
.																														
Igfbp5	1	2	.	1	1	3	6	6	4	1	2	2	.	3	1	1	1	3	6	3	.	.	.	2	2	.	.			
6																														
Arpc2	4	2	6	2	1	1	5	4	3	.	1	1	1	.	4	5	2	6	2	2	2	.	1	1	2	.	1			
.																														
Ptprrn	9	15	10	25	4	1	12	22	4	3	3	6	15	6	5	8	3	8	4	6	4	.	1	4	18	3	19			
10																														
Vxn	2	9	14	3	10	10	5	9	1	2	18	1	28	1	8	13	6	.	2	4	.	.	7	7						
26																														
Ogfrl1	1	2	7	4	4	2	4	5	2	1	3	3	4	4	5	5	5	2	.	1	3	10	2	3	18					
8																														
2010300C02Rik	1	8	11	6	11	3	3	26	2	2	3	2	5	1	23	9	8	.	2	1	2	8	6	4	5					
5																														
Igfbp5	1	1	4	.	3	3	3	6	1	1	.	.	2	7	5	.	1	1	3	5	3	.	2	3	2					
2																														
Arpc2	4	3	2	2	3	1	2	14	1	2	3	.	2	4	10	4	4	2	1	1	5	7	.	13	2					
2																														
Ptprrn	7	7	17	3	13	2	11	15	2	6	14	3	17	3	20	22	19	1	2	11	9	16	15	25	23					
23																														
Vxn	.	.	3	9	7	9	12	.	1	1	2	.	39	3	11	2	1	2	7	7	2	3	5	10	12					
4																														
Ogfrl1	1	2	2	3	1	3	3	.	4	7	2	2	4	8	8	4	1	2	9	3	1	3	1	13	3	5	1			
1																														
2010300C02Rik	.	2	4	4	.	18	1	1	2	3	6	.	1	5	2	3	6	3	2	2	6	37	6	.	8	4	3			
5																														
Igfbp5	1	2	.	1	1	2	.	1	1	1	1	.	4	6	.	.	1	4	1	2	.	2	5	.	2	4	1			
1																														
Arpc2	1	1	1	3	3	5	1	.	2	2	.	1	2	1	4	.	3	2	5	2	1	7	1	1	2	6				
6																														
Ptprrn	5	2	8	4	5	13	10	1	3	9	3	3	2	14	8	14	7	6	9	5	5	21	11	7	23	11	2	6		
6																														
Vxn	9	.	.	1	3	7	13	3	6	1	16	23	.	9	5	3	3	1	1	11	2	2	3	.						
4																														
Ogfrl1	6	.	.	3	2	3	2	1	2	1	7	4	2	10	3	2	3	1	7	1	.	2	4	3						
11																														
2010300C02Rik	11	4	1	3	4	5	5	2	7	.	4	6	1	25	1	4	6	3	.	5	1	9	4	2	1					
1																														
Igfbp5	3	2	8	.	6	.	4	.	1	1	.	.	2	3	11	1	3	4	.	2	.	2	4	9						
5																														
Arpc2	3	2	1	1	2	3	2	4	3	1	1	1	3	7	2	1	1	2	1	3	.	5	1	2						
2																														
Ptprrn	18	6	4	6	10	14	20	19	7	1	13	17	9	17	5	5	7	13	6	10	.	18	14	12	7					
7																														
Vxn	9	1	18	.	3	5	6	5	2	.	.	1	5	2	4	17	.	4	18	2	28	8	5	4						
11																														
Ogfrl1	8	.	11	12	2	4	3	3	.	1	.	2	1	1	2	7	5	2	4	4	2	2	5	1	3					

2
 2010300C02Rik 7 1 8 1 2 22 3 6 9 . . 1 6 10 5 13 9 1 3 7 6 5 11 3 5
 9
 Igfbp5 3 2 4 3 1 3 3 6 4 3 3 2 3 1 3 2 1 3 3 . 1 2 7 6 1
 4
 Arpc2 8 . 3 2 . 4 3 2 2 . 2 4 2 4 3 3 2 1 1 8 . 6 6 1 .
 3
 Ptprn 20 3 22 7 3 17 4 5 11 2 5 . 16 11 10 5 16 6 2 20 5 17 14 4 7
 17

Vxn 1 2 3 4 1 . 1 12 4 . . . 4 . 2 3 1 3 . 4 2 3 12 9 9 16
 10
 Ogfrl1 6 4 9 2 9 2 1 1 8 9 9 1 2 2 7 3 3 1 2 3 12 5 1 1 2 2
 5
 2010300C02Rik 8 1 . . 1 1 3 4 11 1 . . 10 2 1 3 4 6 2 6 . 6 8 5 3 6
 6
 Igfbp5 . 2 7 2 2 2 1 3 3 6 2 . 2 3 1 2 4 9 4 1 1 3 1 3 1 4
 1
 Arpc2 1 . 5 2 1 1 2 4 . 3 2 . 1 2 . 3 3 2 1 1 1 4 3 2 4 1
 2
 Ptprn 7 5 14 3 4 7 4 12 19 10 3 3 7 7 2 7 9 5 4 9 5 3 19 10 12 20
 12

Vxn 2 6 1 8 6 1 1 5 8 4 11 4 . 9 6 14 2 2 3 2 6 . 1 4 1
 .
 Ogfrl1 6 2 . 2 . 3 1 7 2 2 5 5 5 4 2 4 . . 10 3 2 2 10 7 1
 .
 2010300C02Rik 11 2 . 7 6 3 6 3 3 2 3 8 . 14 5 5 3 1 3 1 10 3 2 47 2
 3
 Igfbp5 1 13 3 1 2 8 9 2 1 2 1 1 1 3 2 2 2 1 1 1 2 1 2 13 1
 1
 Arpc2 3 2 1 2 1 2 4 2 2 1 1 2 3 2 6 4 2 1 1 . 2 1 4 11 .
 .
 Ptprn 13 17 . 6 12 7 20 6 5 4 8 19 6 19 10 6 8 5 7 3 16 2 9 10 1
 4

Vxn 1 9 . 15 1 2 2 20 2 3 3 4 10 3 22 23 6 5 5 1 15 6 9 2
 5
 Ogfrl1 3 . 5 2 1 2 1 5 2 1 2 2 2 3 7 2 2 3 2 3 4 5 3 2
 1
 2010300C02Rik 9 3 2 3 3 2 2 5 . 3 . 8 10 5 12 2 2 6 10 14 3 7 4 4
 11
 Igfbp5 . 3 1 1 6 5 2 3 . . 3 3 2 25 3 5 9 . 2 5 3 4 . 3
 5
 Arpc2 3 . . 1 2 1 1 5 . 1 1 2 3 2 3 6 1 6 1 3 2 3 . 6
 3
 Ptprn 10 5 3 16 10 6 4 16 4 7 3 11 10 4 24 14 1 12 19 10 12 14 9 14
 12

Vxn 1 8 4 5 5 2 3 1 7 1 13 15 3 4 . 21 3 42 8 2 4 20 1 . 5
 5
 Ogfrl1 6 1 7 3 2 . 4 2 3 8 11 3 2 9 1 2 1 5 3 1 2 5 3 8 2
 7
 2010300C02Rik . 13 7 3 . 3 4 4 14 1 52 3 5 2 1 8 3 4 1 3 8 6 9 . 6
 3
 Igfbp5 4 8 2 1 1 5 1 3 1 3 1 . 2 2 1 2 . 4 1 4 3 . . 8 2

1	
Arpc2	. 4 3 2 1 1 4 4 2 4 17 3 1 4 1 5 2 3 1 . 4 3 2 3 2
5	
Ptpn	4 17 28 2 7 5 10 11 10 10 18 12 8 7 8 17 6 17 12 7 3 23 4 5 8
11	
Vxn	2 4 5 1 2 19 1 7 1 . 5 20 2 8 . 1 29 5 . 10 2 . 4 1 12 2
6	
Ogfrl1	. 2 3 4 1 4 5 1 7 1 2 4 2 1 . . 5 1 1 2 2 3 2 1 1
5	
2010300C02Rik	1 4 14 . . 2 . 10 . 3 3 4 1 7 . 1 5 6 5 2 3 . 2 10 10
3	
Igfbp5	2 3 2 1 2 2 3 4 2 1 5 1 5 . . 4 2 2 8 1 3 2 2 1 4
.	
Arpc2	1 1 2 5 1 2 1 . 3 3 . 1 3 2 . . 3 1 1 . . 2 . 7 5
3	
Ptpn	. 2 10 2 4 15 8 6 7 5 8 10 5 12 8 3 18 6 11 9 5 13 6 21 10 1
0	
Vxn	5 17 2 . . 7 7 1 9 10 9 4 8 5 13 1 . . 4 2 . 8 10 2 1
2	
Ogfrl1	. 3 . . . 2 4 8 4 2 . 2 2 4 1 4 3 3 . . 2 3 . 4
1	
2010300C02Rik	. 4 2 4 . 8 3 1 21 4 1 3 6 5 6 5 1 2 2 . 2 18 5 . 1
4	
Igfbp5	4 . . 1 1 1 . 4 3 6 24 1 . . 1 1 4 11 3 . 1 1 2 1 2
.	
Arpc2	1 2 2 4 1 4 2 . 3 2 1 . 1 3 . 2 1 4 3 1 4 2 1 . 4
4	
Ptpn	10 13 4 6 2 8 6 4 11 18 11 4 13 12 10 6 12 17 7 3 4 18 12 2 6
13	
Vxn	4 . 24 1 4 1 1 12 2 6 7 9 6 4 . 5 3 1 22 3 3 . 3 2
1 .	
Ogfrl1	3 1 4 . . 2 3 5 . 3 . 7 3 5 3 . 8 1 1 3 2 1 2 9
1 2	
2010300C02Rik	3 . 10 7 4 9 . 1 3 12 3 4 17 8 . 6 1 1 40 2 6 1 3 1
5 1	
Igfbp5	4 . 6 2 3 4 2 2 2 1 3 8 2 6 1 . . 3 1 5 4 . 3 .
1 2	
Arpc2	3 3 4 4 5 2 1 2 4 5 1 4 3 1 2 1 4 . 15 . . 2 1 .
1 1	
Ptpn	10 18 24 12 15 6 6 15 10 14 5 15 5 17 6 6 4 8 20 6 2 9 10 14
4 1	
Vxn	3 7 5 1 . . 15 13 27 4 . . 2 16 7 5 19 5 9 1 . 4 27 5
6 7	
Ogfrl1	2 3 2 . 4 1 2 6 5 1 3 9 . 3 2 5 . 2 15 3 5 2 1 2 9
2 3	
2010300C02Rik	2 2 6 2 1 1 1 6 8 3 4 4 2 . 1 15 5 6 4 5 1 2 11 12 7
8 8	
Igfbp5	. 6 9 5 5 4 2 3 4 1 1 3 . 5 3 2 5 2 1 3 6 1 2 1 1
2 .	
Arpc2	2 4 2 . 2 . 4 4 4 1 2 4 . 2 1 6 4 5 3 3 3 1 3 2 3
. 1	
Ptpn	6 1 7 9 11 2 20 12 13 9 3 9 2 3 8 14 3 26 17 9 8 4 18 27 18 1

0 6

Vxn	2	27	1	8	3	2	10	3	1	21	1	2	7	.	19	28	3	4	.	10	8	1	4	4
4																								
Ogfrl1	1	7	4	1	9	.	7	7	1	1	1	4	6	2	2	2	4	4	2	2	6	.	6	5
5																								
2010300C02Rik	2	5	9	7	5	.	8	.	.	6	.	5	2	.	3	9	3	2	4	3	.	8	20	3
5																								
Igfbp5	1	.	3	3	3	1	4	1	2	2	2	1	2	1	6	3	.	7	1	2	4	3	1	1
2																								
Arpc2	.	7	6	2	3	1	6	.	.	1	.	4	2	.	2	4	3	2	.	3	2	3	4	1
2																								
Ptpnn	4	8	11	10	9	3	29	3	6	13	3	3	10	7	14	18	13	13	12	15	12	3	26	5
6																								

Vxn	26	1	9	10	2	4	4	4	1	.	1	.	2	1	28	1	12	3	9	.	.	11	.	4	5
4																									
Ogfrl1	3	1	3	3	1	2	10	.	8	.	2	1	1	.	4	.	2	.	2	1	1	4	1	3	2
1																									
2010300C02Rik	2	.	8	4	7	11	6	12	1	.	2	2	1	4	5	1	9	4	1	2	.	26	.	8	3
9																									
Igfbp5	6	.	.	1	1	5	2	3	2	4	5	1	5	1	.	1	3	1	.	2	.	6	1	1	4
2																									
Arpc2	2	.	9	1	4	3	7	4	1	.	1	.	2	1	2	2	6	.	4	3	.	8	3	2	.
2																									
Ptpnn	8	2	18	7	13	21	24	17	11	3	2	2	3	7	15	1	10	7	3	5	5	27	14	6	13
8																									

Vxn	20	12	2	5	7	.	1	15	3	.	5	.	14	5	3	1	8	5	1	2	.	2	2	4	.
1																									
Ogfrl1	5	2	.	.	5	1	2	4	8	4	2	3	2	3	1	13	3	4	8	1	1	.	2	4	.
1																									
2010300C02Rik	7	7	.	2	30	2	2	4	9	1	5	1	8	6	3	2	16	3	.	4	.	4	2	11	.
2																									
Igfbp5	5	1	1	4	9	1	2	.	4	.	1	5	1	2	.	.	3	2	5	6	1	1	1	1	1
1																									
Arpc2	2	1	1	3	7	3	1	2	2	.	2	1	2	4	.	2	.	.	4	1	1	1	4	2	.
1																									
Ptpnn	6	15	5	6	10	14	6	8	11	22	10	6	16	6	4	5	15	14	5	7	2	9	3	18	6
18																									

Vxn	5	4	14	3	3	.	.	2	.	2	3	5	1	.	3	3	6	.	23	1	1	8	14	7	2	4	1
9																											
Ogfrl1	1	1	3	8	3	2	1	10	1	1	4	1	2	.	1	3	5	4	4	4	2	2	5	.	2	.	
3																											
2010300C02Rik	9	1	4	2	3	.	.	2	.	2	1	5	2	9	2	1	2	1	3	4	4	4	8	7	5	6	
.																											
Igfbp5	1	1	.	2	1	1	3	3	.	4	4	2	1	.	3	3	5	1	2	1	4	9	5	3	.	1	
.																											
Arpc2	2	2	.	1	.	1	2	2	.	2	2	1	.	4	.	.	2	.	5	4	4	3	6	5	2	.	
1																											
Ptpnn	12	9	12	5	5	5	1	4	.	5	7	3	14	5	4	2	10	5	11	12	16	7	20	5	5	4	
9																											

Vxn	1	16	2	2	.	10	1	.	1	7	5	1	4	15	11	1	1	7	11	1	2	11	6	1	.
2																									

singlecell

Ogfrl1	1 . 6 1 11 1 3 . 4 1 . 1 . 4 6 1 2 2 4 11 . 3 1 . 1
5	
2010300C02Rik	2 2 . 5 . . 1 2 1 12 2 . 2 7 2 2 2 . 9 1 2 1 3 6 6 1
4	
Igfbp5	5 2 3 2 2 . 7 3 2 . 2 3 4 1 4 3 2 2 5 1 1 6 3 1 1
1	
Arpc2	3 1 2 1 3 2 . 2 1 8 1 2 2 3 1 2 1 1 1 2 . 3 1 3 4
2	
Ptpnn	5 8 9 14 6 7 3 4 9 17 5 9 7 11 8 13 12 3 8 9 6 10 8 6 6
7	
Vxn	1 4 13 2 8 18 1 . 2 . 10 . 8 . 7 14 . . 4 . 3 4 2 1
6 .	
Ogfrl1	13 . 3 2 2 5 . 5 8 1 9 5 9 3 3 2 1 5 5 1 2 2 5
7 1	
2010300C02Rik	1 3 5 8 5 7 2 . 1 . 24 . 29 3 6 6 4 . 27 9 2 17 26
4 8	
Igfbp5	5 1 . . 1 3 3 1 . . . 3 . 3 . 2 2 5 2 1 2 4
1 .	
Arpc2	3 2 1 2 2 2 . 2 1 . 7 4 6 3 2 3 1 1 5 4 1 11 4
6 1	
Ptpnn	12 4 13 10 11 12 6 4 7 1 29 12 29 3 14 22 3 11 16 16 4 9 13 2
1 8	
Vxn	2 1 2 19 2 4 18 7 14 1 3 1 1 3 . 16 5 2 . 4 1 10 3 2 3
9	
Ogfrl1	3 2 1 4 . 1 3 2 2 7 . . 1 2 15 2 6 10 5 3 6 1 2 2 4
1	
2010300C02Rik	. 2 1 7 4 8 12 7 7 4 2 1 . 10 2 7 2 1 2 3 . 16 7 7 1
3	
Igfbp5	1 . 5 2 . 1 3 . 3 4 2 2 3 7 2 2 . . 1 3 2 3 9 1 2
.	
Arpc2	2 1 . 4 1 4 4 2 2 1 1 2 . 1 1 4 1 5 3 2 3 1 2 3 2
2	
Ptpnn	8 4 5 27 4 13 14 16 20 . 2 5 15 8 14 17 12 15 9 9 5 14 3 5 7
15	
Vxn	3 6 . 5 4 4 8 4 4 6 2 2 1 3 1 15 9 5 4 13 3 3 2 7 16
12	
Ogfrl1	1 3 1 1 2 3 1 1 2 1 1 1 1 3 5 3 2 7 1 7 2 4 2 3 2
4	
2010300C02Rik	13 7 1 3 3 8 6 8 33 9 1 6 7 1 1 12 17 36 11 2 . 2 . 7 5
7	
Igfbp5	3 1 6 1 4 1 1 1 3 1 1 1 2 3 . 5 1 7 2 3 4 . 2 3 8
1	
Arpc2	4 2 2 3 2 6 1 1 8 3 3 2 1 1 1 5 2 4 4 1 3 4 2 2 4
3	
Ptpnn	9 29 2 2 8 9 15 7 32 17 7 21 5 4 4 34 11 10 3 8 3 8 5 14 13
12	
Vxn	1 6 3 1 5 9 8 2 4 5 2 1 19 3 . 4 1 1 9 3 1 6 15 15 4 1 4
1 2	
Ogfrl1	3 4 1 1 1 1 3 1 1 . 3 3 5 1 8 1 11 4 6 5 . 1 2 3 2 2 3
2 4	
2010300C02Rik	1 8 2 3 1 3 6 2 4 2 3 . 13 7 . 7 2 1 8 8 1 8 3 4 6 5 6
. 3	

singlecell

Igfbp5	1 3 2 . . . 2 1 2 1 3 1 4 1 . . 2 1 4 8 3 1 2 2 2 . . 2
1 3	
Arpc2	1 3 . 1 2 1 5 1 1 2 2 3 4 1 4 1 3 2 2 2 3 4 3 . 1 3 1
. 4	
Ptpn	1 19 2 2 3 3 16 4 4 3 9 4 26 5 6 5 8 2 14 11 3 5 6 11 5 7 8
. 7	
Vxn	5 . 19 6 2 3 . 1 4 1 10 24 13 3 37 4 1 8 1 . . 2 . 1 3 9 1
2	
Ogfrl1	1 1 4 1 5 1 . 2 2 1 3 6 2 1 10 2 2 1 1 1 . 2 1 1 5 1 .
.	
2010300C02Rik	. 2 10 4 3 4 5 4 13 2 9 4 2 . 8 . 5 8 6 1 . 2 . 4 34 8 1
1	
Igfbp5	2 . 3 1 3 1 1 2 2 5 3 3 4 3 1 . 1 4 4 2 4 1 3 2 8 . 1
.	
Arpc2	. 1 2 4 2 2 . 2 2 . 3 2 4 2 6 . 1 3 3 . 1 3 . 1 8 1 .
.	
Ptpn	6 2 14 14 4 1 3 7 6 4 16 16 7 6 15 2 4 3 18 1 4 4 3 9 8 8 3
4	
Vxn	1 2 7 3 18 6 2 29 5 13 4 . 1 19 . 1 10 . 3 4 1 1 3 1 .
2	
Ogfrl1	1 1 . 10 4 3 5 4 1 4 5 2 . 3 2 5 2 2 3 6 2 2 2 6 4
4	
2010300C02Rik	1 6 7 . 3 1 2 6 5 21 25 . 7 2 . 2 8 4 10 9 1 9 1 3 1
7	
Igfbp5	. 3 . 6 3 4 1 1 1 . 1 1 2 2 2 1 . 5 3 6 2 6 3 2 1
4	
Arpc2	1 1 3 1 3 . 3 . 3 6 5 . . 6 2 2 3 1 2 4 1 2 2 4 2
3	
Ptpn	14 9 8 13 19 7 2 10 6 9 27 19 6 22 6 4 13 3 8 22 8 27 3 7 5
11	
Vxn	2 12 13 5 5 10 1 7 1 . 6 3 1 14 2 12 5 4 13 1 3 . . 2 1 12
4	
Ogfrl1	2 3 5 1 2 8 4 3 2 . 5 6 4 3 2 2 2 1 3 1 2 5 . 1 2 6
2	
2010300C02Rik	3 7 17 5 10 3 . 3 . 1 . 1 . 5 . 5 3 2 6 . 2 . 5 5 3 6
1	
Igfbp5	. 1 4 2 4 1 . 1 3 1 6 . 1 2 7 3 3 5 2 2 . 1 8 4 2 3
.	
Arpc2	1 9 5 4 2 4 2 4 2 . 1 4 4 1 1 4 . . 3 . 2 3 1 . . 2
5	
Ptpn	5 33 15 5 12 6 4 13 13 . 2 9 5 7 4 13 1 8 7 4 8 8 5 6 4 5
5	
Vxn	2 1 1 7 3 1 33 3 2 1 . 5 27 2 10 9 4 5 . 4 7 6 1 . 1
8	
Ogfrl1	10 3 8 2 1 5 5 1 1 . 9 4 3 10 6 3 2 3 3 4 . 3 5 6 7
2	
2010300C02Rik	1 3 . 14 1 5 5 2 1 6 1 22 7 . 5 8 6 8 9 4 2 14 3 1 2
3	
Igfbp5	3 5 2 . . . 2 . 7 4 . 4 3 2 8 2 2 3 1 1 1 5 3 2 . 3
13	
Arpc2	1 . 2 2 2 . . 2 . 1 2 3 6 3 7 6 4 1 1 1 1 4 4 1 2
1	

Ptpn6	11 3 8 15 . 2 8 9 12 2 8 21 18 6 22 8 10 8 12 10 6 15 7 9 7
Vxn1	36 4 3 . 4 10 1 3 1 2 . . 3 5 1 1 8 27 2 . 1 . 1 4 2
Ogfrl12	5 1 1 4 2 6 3 5 . 1 2 2 3 1 1 2 3 3 2 . . 1 2 6
2010300C02Rik6	9 11 4 . 12 7 9 34 9 1 5 1 9 1 3 11 18 1 1 1 . 1 10 5 2
Igfbp55	. 5 9 1 3 3 1 7 . 2 4 1 2 2 4 1 2 2 . 2 3 3 3 1 1
Arpc21	4 2 . 1 1 1 1 7 1 2 1 2 1 1 1 3 5 2 1 1 . 1 2 5 2
Ptpn17	31 5 6 3 12 6 9 21 5 3 12 6 6 2 7 14 11 13 10 6 4 . 40 17 8
Vxn6	1 6 4 1 11 6 . 4 16 29 19 29 19 . 17 11 6 1 14 . 8 3 2 5
Ogfrl11	. 4 2 10 1 2 4 3 3 1 2 8 4 4 2 6 1 8 4 7 16 1 4 1
2010300C02Rik3	. 1 7 . 5 5 1 28 7 1 8 5 5 2 24 7 11 2 11 1 9 1 8 4
Igfbp52	2 4 3 1 1 1 2 8 1 5 . 1 2 . 1 5 3 1 2 2 . . 1 1
Arpc22	2 1 5 4 1 2 3 7 2 1 2 2 5 4 7 1 1 3 2 3 3 1 3 3
Ptpn8	1 7 10 5 9 5 1 15 12 16 19 7 14 4 21 6 10 2 21 3 21 10 1 9
Vxn4	. 10 . 2 8 8 19 . . 13 2 3 1 9 1 2 2 2 . 9 3 3 8 1 1 3 6
Ogfrl13	1 2 1 . . 1 1 6 1 2 . 5 3 3 7 8 . 1 1 1 . 1 2 . 2 . 2
2010300C02Rik3	. 1 1 2 3 4 9 1 . 4 1 2 8 16 . 3 . 2 2 1 1 9 3 1 11 4 .
Igfbp53	5 2 1 . 4 2 1 2 2 3 1 1 1 5 4 . 3 1 2 . 4 . . 5 2 5 1
Arpc22	. 2 . . 1 4 5 1 . 2 1 3 1 5 4 . . 2 1 2 1 3 . . . 2 .
Ptpn3	12 8 3 5 5 6 16 3 3 9 3 20 10 12 6 6 1 8 4 6 4 8 13 4 12 6 7
Vxn2 2	4 4 2 9 9 . . 11 3 20 12 . 19 1 5 12 2 4 2 8 27 1 9 1 2
Ogfrl12 3	4 4 2 2 2 3 . 5 3 1 6 4 1 2 4 7 . 1 3 2 4 7 . 5 .
2010300C02Rik2 5	4 5 . 8 8 1 1 8 3 3 4 . 6 6 1 27 1 8 16 2 7 . 3 . 15
Igfbp53 1	. 2 1 4 2 4 1 4 1 4 2 3 1 1 1 3 1 1 3 . 6 . 5 3 3
Arpc22 5	. . . 4 2 3 . 3 2 2 1 1 9 1 2 5 1 4 1 . 3 2 1 1 1
Ptpn2 5	7 8 1 13 2 7 1 23 12 9 10 12 19 11 7 23 7 8 5 9 18 2 4 5 8
Vxn	10 . 4 . 4 2 5 10 3 . 2 1 8 4 . 2 8 5 2 1 2 7 1 8 5 2 19

17	
Ogfrl1	2 3 . . 2 6 5 2 3 4 3 4 2 3 . 1 8 2 . 5 3 3 5 2 . 5
4	
2010300C02Rik	. 1 3 1 9 1 5 6 11 . 2 . 6 7 . 7 19 5 . 4 . 13 3 2 11 3
5	
Igfbp5	2 4 1 3 1 6 5 4 1 1 1 3 1 4 3 2 3 1 3 3 2 6 . . 2 2
3	
Arpc2	3 . 1 2 3 2 3 2 2 . 1 2 6 3 . 2 8 2 1 1 1 1 3 1 1 2
1	
Ptprrn	5 23 4 5 9 13 4 11 15 6 4 4 9 20 . 2 31 8 2 7 9 16 8 5 5 15
13	
Vxn	2 2 8 2 2 2 10 1 6 3 1 2 5 10 3 2 . 3 5 . 4 9 6 6 1 10 2
14	
Ogfrl1	5 3 7 4 . 3 2 2 2 2 4 5 2 5 3 1 5 . . 2 3 3 . 1 4 3 1
2	
2010300C02Rik	6 3 6 4 1 1 10 1 4 3 3 31 1 22 5 2 . 4 2 4 5 7 1 5 6 7 12
2	
Igfbp5	4 1 4 2 . 2 2 2 2 . 2 5 4 1 2 2 2 1 . . 2 2 3 4 3 1 5
3	
Arpc2	3 1 4 1 2 1 2 . 3 2 3 3 2 6 3 . 2 1 . . 4 1 . 2 1 1 4
5	
Ptprrn	17 7 18 4 1 3 10 4 3 16 11 12 6 10 8 2 8 5 8 1 8 9 3 5 6 7 8
8	
Vxn	4 2 10 . 1 2 3 2 6 6 1 4 6 2 5 . 1 1 7 1 12 . . 4 7
4	
Ogfrl1	1 14 2 1 1 4 . . 5 6 . . 2 3 2 1 8 1 1 9 4 4 3 2 2
2	
2010300C02Rik	7 10 4 2 . 7 1 5 3 5 6 4 4 5 5 2 1 1 10 1 3 . 1 6 4
3	
Igfbp5	5 1 1 4 1 2 12 4 3 7 1 1 6 3 2 . 1 3 3 1 1 . 2 . 1
22	
Arpc2	. 4 3 3 2 2 2 . 1 1 5 1 1 1 4 . 1 3 3 . 3 5 4 4 5
3	
Ptprrn	3 16 15 13 . 6 6 5 8 11 2 10 7 20 11 . 13 4 11 9 12 5 5 10 8
6	
Vxn	5 13 1 2 . 1 1 2 4 4 3 3 . . 16 2 2 8 1 3 4 3 6 6 8
3	
Ogfrl1	2 2 3 10 4 2 6 1 2 4 2 3 1 5 4 1 3 4 10 10 1 2 4 4 2
3	
2010300C02Rik	9 7 13 . 3 . 4 4 5 25 1 14 3 1 8 3 1 10 . 2 4 1 4 1 4
6	
Igfbp5	1 3 3 1 1 2 4 13 2 3 2 5 . 2 1 5 3 3 2 2 2 2 1 1 3
2	
Arpc2	5 . 2 1 2 1 2 2 2 4 3 2 1 3 . . 1 2 3 2 2 3 2 2 1 3
2	
Ptprrn	2 12 8 6 9 5 13 4 4 23 1 15 5 8 15 2 3 7 8 13 8 4 11 8 5
10	
Vxn	31 5 4 6 1 4 1 . 21 . 1 18 2 3 8 9 3 6 3 10 4 3 2 8 7
1	
Ogfrl1	6 1 2 3 2 5 3 3 7 1 . 2 2 1 . 1 1 2 1 10 4 . 1 2 2
2	
2010300C02Rik	2 5 2 11 5 3 . 3 8 6 1 5 . 4 1 5 . 3 2 31 2 7 11 3 6

5	
Igfbp5	3 2 2 1 1 12 4 3 2 2 3 2 3 2 1 1 . 3 5 7 2 2 2 4 1
4	
Arpc2	1 3 . 2 2 4 3 1 4 5 . 5 5 . 4 . 2 5 . 5 4 3 3 1 .
1	
Ptpn	20 12 8 16 4 3 5 2 15 9 3 17 3 9 13 14 3 11 6 9 6 24 14 10 9
14	
Vxn	5 2 10 . . 1 6 . 3 6 14 2 . 13 2 7 3 5 9 1 14 8 8 4 .
4	
Ogfrl1	5 2 23 . 2 5 3 3 8 2 1 3 1 4 2 5 2 3 5 2 4 4 3 . 3
2	
2010300C02Rik	3 3 8 . 7 1 2 1 2 6 4 3 . 4 4 5 4 1 4 4 4 18 4 8 .
4	
Igfbp5	1 . 1 . 2 2 16 . 4 2 . 3 1 . 3 1 4 4 3 4 3 5 . . .
5	
Arpc2	3 2 5 1 . 1 . 3 1 . 6 . 1 1 2 2 1 1 3 3 4 8 4 5 .
4	
Ptpn	6 3 44 3 12 8 16 4 11 2 17 13 2 15 6 12 2 2 9 9 14 15 15 12 4
16	
Vxn	. 8 6 1 8 6 1 7 6 3 3 6 3 . 1 2 3 2 6 2 12 6 1 5 . 2
18	
Ogfrl1	4 2 2 5 1 7 9 4 4 2 1 5 1 . . 2 4 . 7 1 4 6 3 2 1 1
2	
2010300C02Rik	. 1 2 1 1 4 4 1 9 4 4 2 8 3 . 2 12 3 1 10 3 1 4 4 2 8 2
5	
Igfbp5	5 2 4 . 10 16 2 6 9 2 4 1 1 2 4 4 1 . 1 3 2 . 2 . 4 15
2	
Arpc2	1 . 3 . 1 14 3 . 3 1 . 5 . 3 6 1 . 4 . . 5 2 . 3 1
3	
Ptpn	10 3 7 6 2 20 5 8 6 8 1 17 10 3 7 23 3 1 15 4 10 11 5 11 7 2
9	
Vxn	4 . 2 4 15 6 3 1 1 8 10 11 4 5 . 2 8 19 3 6 7 3 1
2	
Ogfrl1	2 2 1 10 6 2 6 12 3 1 6 3 . 3 . . 17 4 . . 2 3 2
4	
2010300C02Rik	5 10 19 . 3 2 2 . 7 . 14 9 7 11 . 1 13 8 1 4 4 2 6
1	
Igfbp5	1 . 5 3 3 2 3 2 2 4 10 . 5 2 1 2 3 1 6 4 3 . 4
8	
Arpc2	2 2 6 . 2 2 . 2 2 . 5 2 2 . 2 1 8 1 . . 2 . 2
1	
Ptpn	7 5 21 8 11 10 7 6 16 4 28 18 21 8 10 6 30 10 5 3 16 8 11
13	
Vxn	. 9 3 8 2 17 3 12 6 . 2 . 6 1 1 4 4 1 18 1 3 1 7 19 32
7	
Ogfrl1	1 3 3 1 . 5 2 5 3 5 6 . 1 . 1 2 2 12 3 1 . 7 3 5 5
6	
2010300C02Rik	2 15 8 8 1 3 2 8 2 . . 1 4 . 1 9 3 . 4 2 2 2 6 5 3
9	
Igfbp5	3 2 . 3 4 4 1 1 . 2 2 5 2 3 4 4 1 1 4 . 5 1 1 1 4
3	
Arpc2	3 2 1 4 1 2 2 1 2 2 1 1 2 . . 7 2 . 1 2 3 1 5 5 3

1	
Ptprn	10 13 10 16 1 5 6 13 6 6 5 1 10 1 9 7 4 6 10 6 . 4 15 16 20
13	
Vxn	11 . 20 3 14 1 12 3 11 1 8 21 17 4 3 5 1 2 7 4 1 8 4 . 7
2	
Ogfrl1	2 5 3 2 3 6 2 1 3 1 1 3 1 . . 2 . 3 2 . 2 . 4 1
4	
2010300C02Rik	5 3 4 2 9 . 7 1 3 . 6 3 3 2 4 . 2 4 7 8 1 12 7 2 6
1	
Igfbp5	2 . 1 . 2 1 2 3 1 2 2 . 1 . . 1 2 1 2 1 2 5 . 2 1
1	
Arpc2	3 . 2 2 2 . 2 3 4 . 2 5 3 2 3 1 2 2 3 1 1 3 7 3 2
1	
Ptprn	9 8 6 4 18 9 13 10 25 5 8 7 13 8 6 6 14 2 12 11 1 13 6 8 10
6	
Vxn	2 2 2 10 25 7 15 3 12 3 2 15 9 7 6 5 1 7 6 13 11 3 5 15 10
3 .	
Ogfrl1	3 1 5 1 7 5 7 . 3 1 4 . 1 1 2 4 . . 4 4 4 4 2 5 .
2 2	
2010300C02Rik	6 1 2 5 6 9 18 . 6 2 1 13 10 2 2 14 3 4 4 4 26 2 10 3 4
4 1	
Igfbp5	5 . 3 1 1 1 1 3 2 . . 1 4 . . 1 . 4 1 1 1 2 4 5 .
2 3	
Arpc2	5 3 2 2 3 4 10 . 1 . . 7 2 . 2 6 1 5 1 3 9 4 6 3 3
1 2	
Ptprn	7 . 3 14 27 8 15 3 14 4 3 12 24 6 6 21 2 1 8 13 27 7 34 12 13
5 1	
Vxn	2 7 5 8 . 5 16 1 11 7 . 2 3 . . 3 2 8 . 2 2 7 3 1
15	
Ogfrl1	5 8 2 4 1 2 4 1 8 2 8 4 1 . 3 2 4 3 1 . 9 3 2 10
3	
2010300C02Rik	. 12 9 8 . 13 3 1 5 7 . 1 7 . . 6 1 10 6 1 1 3 11 1
5	
Igfbp5	. 1 1 4 1 . 1 . 2 2 2 1 3 1 5 7 1 4 1 1 4 2 6 .
.	
Arpc2	3 7 3 5 1 2 1 2 . 3 2 2 3 2 . 1 3 4 4 . . 3 7 2
2	
Ptprn	6 27 10 16 3 8 9 2 14 21 3 8 15 7 6 14 4 22 14 9 4 12 13 5
15	
Vxn	8 . 4 . 2 . 1 1 5 . . 7 1 . 10 14 . 24 9 4 3 13 . 15
4	
Ogfrl1	5 1 1 29 2 10 8 3 1 2 2 2 4 . 3 4 10 4 3 3 3 3 7 . 4
3	
2010300C02Rik	11 . 4 1 2 . . 1 3 1 1 9 2 2 6 4 3 10 9 . . 10 1 7
3	
Igfbp5	. 1 1 2 1 . 1 3 2 3 3 1 2 3 1 2 5 5 5 3 3 . 1 1
6	
Arpc2	1 1 6 1 2 1 2 4 1 4 3 2 . 2 2 4 3 . 6 1 1 8 . 4
.	
Ptprn	12 4 12 13 6 11 14 10 6 6 6 12 2 7 10 13 13 23 36 3 9 11 4 10
2	

singlecell

Vxn	1	2	1	1	10	1	3	1	27	1	4	4	3	14	6	3	8	6	20	3	2	8	11	6		
11																										
Ogfrl1	3	3	6	3	4	5	2	.	3	1	2	1	3	4	1	1	.	3	5	4	2	7	2	1		
1																										
2010300C02Rik	12	3	.	.	6	1	6	9	3	4	6	.	1	1	8	2	2	3	6	11	.	16	3	10		
5																										
Igfbp5	3	1	.	3	2	1	2	1	1	3	4	5	1	.	1	3	7	2	3	.	2	.	2	2		
2																										
Arpc2	5	2	5	2	1	1	6	6	2	2	1	1	.	1	4	2	3	5	3	4	3	5	3	3		
3																										
Ptprn	10	5	9	2	8	5	11	20	11	13	3	3	5	9	16	7	5	10	13	10	7	20	9	11		
8																										
Vxn	3	4	5	25	6	2	5	1	9	.	2	4	3	1	1	2	3	.	1	.	1	2	5	9	3	
19																										
Ogfrl1	1	.	2	3	3	.	4	1	4	6	3	7	1	2	3	2	1	1	1	.	4	.	4	2	2	
2																										
2010300C02Rik	1	2	9	10	5	.	15	4	1	1	3	10	4	5	2	3	9	.	8	.	1	.	2	11	14	
4																										
Igfbp5	.	1	2	5	.	.	1	2	6	1	2	.	5	2	1	6	.	.	3	1	5	3	2	.	.	
2																										
Arpc2	1	2	1	1	3	2	5	1	6	3	1	7	1	.	1	2	6	.	1	1	3	2	1	2	7	
1																										
Ptprn	3	8	18	10	8	1	11	2	19	11	13	18	5	4	6	7	10	5	7	3	7	1	10	10	8	2
15																										
Vxn	5	20	3	1	5	6	4	2	12	13	2	3	1	1	6	8	1	1	9	5	9	3	3	3		
9																										
Ogfrl1	4	9	1	2	3	1	2	1	4	3	7	1	9	3	5	3	10	3	4	3	1	2	10			
4																										
2010300C02Rik	9	7	3	.	4	7	5	1	3	4	3	7	.	8	17	6	4	1	4	5	9	6	.	1		
4																										
Igfbp5	2	3	1	6	2	1	2	1	2	1	3	1	3	4	2	.	4	8	2	1	3	1	2			
5																										
Arpc2	4	3	2	3	1	6	1	1	4	3	.	1	.	2	9	5	1	.	2	1	5	1	.			
3																										
Ptprn	10	12	3	10	5	7	12	4	6	7	6	3	8	15	20	14	12	13	15	12	7	17	12	2		
2																										
Vxn	3	14	.	2	9	7	4	3	3	7	11	16	10	1	25	2	25	3	2	38	4	.	5	3	3	
8																										
Ogfrl1	4	3	.	.	3	4	2	1	.	4	2	1	3	2	8	.	3	4	10	6	2	2	5	5	2	
2																										
2010300C02Rik	5	2	1	1	21	20	9	1	4	6	23	16	2	.	12	.	5	9	1	8	6	.	5	4	8	
1																										
Igfbp5	5	1	.	3	2	8	6	1	.	1	.	4	3	2	6	.	2	7	1	.	2	4	2	1	1	
.																										
Arpc2	4	6	.	.	2	4	.	3	.	4	7	3	3	2	3	.	3	1	2	6	1	5	3	2	1	
2																										
Ptprn	16	7	4	4	12	13	4	6	10	8	6	26	18	4	29	3	13	14	9	15	8	5	9	8	7	
13																										
Vxn	2	1	19	15	.	1	7	3	16	1	2	2	3	7	4	1	11	3	6	4	4	2	3	1	1	
2																										
Ogfrl1	1	.	5	1	4	1	18	.	3	8	1	3	3	1	.	14	4	2	6	3	3	2	.	3	1	
2																										

singlecell

2010300C02Rik	5	3	9	2	3	16	10	3	10	.	4	3	5	7	3	.	9	2	6	3	7	13	1	2	3		
4																											
Igfbp5	5	1	1	3	2	5	2	.	1	1	.	2	4	3	3	3	.	5	.	.	2	1	2	3			
1																											
Arpc2	2	.	4	4	1	2	7	1	2	3	3	3	4	.	3	2	5	5	4	1	4	3	3	2	2		
4																											
Ptpn	16	2	15	16	16	14	23	3	18	5	9	9	17	7	6	5	11	16	7	7	4	10	1	10	9		
10																											
Vxn	.	1	8	.	8	13	.	.	2	10	11	1	3	23	4	7	11	5	.	22	13	9	.	5	17		
21																											
Ogfrl1	.	7	4	2	6	5	1	1	1	3	3	.	2	4	3	5	1	7	6	5	3	7	1	3	6		
1																											
2010300C02Rik	1	.	5	5	14	4	6	1	2	8	5	6	.	7	12	8	17	17	.	7	5	9	3	2	6		
5																											
Igfbp5	3	5	6	3	4	.	1	2	3	2	2	.	1	1	2	.	4	.	4	2	1	2	7	.	.		
2																											
Arpc2	1	1	2	4	4	3	.	.	1	3	6	2	.	.	3	8	6	11	.	2	4	4	4	.	2		
1																											
Ptpn	1	9	5	2	13	14	6	7	1	17	16	9	2	12	13	20	19	15	7	18	13	7	8	3	8		
7																											
Vxn	.	2	.	5	4	1	2	1	.	19	4	17	1	3	4	1	.	1	7	8	1	3	5	5	5		
6																											
Ogfrl1	1	2	3	.	1	1	4	.	5	6	3	2	2	.	3	3	7	.	1	8	3	3	4	2	1	13	
4																											
2010300C02Rik	2	5	.	6	14	1	1	5	1	.	6	17	7	6	12	2	3	1	2	1	1	5	1	4	9	1	1
0																											
Igfbp5	1	2	5	.	2	.	2	2	3	2	2	4	2	4	.	3	.	2	2	1	3	1	.	1	2	1	
4																											
Arpc2	2	3	2	2	4	1	1	2	.	1	3	2	.	2	2	2	1	1	.	1	4	5	3	3	4	.	
4																											
Ptpn	5	5	3	10	11	1	6	5	6	4	3	16	29	5	12	4	8	1	8	8	6	7	1	13	19	11	1
2																											
Vxn	16	3	9	3	2	9	3	8	44	2	8	4	2	.	1	16	5	2	23	1	1	4	11	2	.		
2	.																										
Ogfrl1	1	1	1	6	3	2	6	3	7	12	3	1	5	6	2	6	1	2	6	.	2	5	3	3	2		
6																											
2010300C02Rik	2	4	8	2	2	4	3	.	1	.	5	5	1	9	2	23	2	.	1	5	7	33	3	5	2	.	
2	.																										
Igfbp5	2	5	1	2	3	1	1	1	.	2	.	4	2	.	.	3	3	3	.	2	12	3	1	1	4	4	
1	4																										
Arpc2	2	4	3	1	2	2	.	.	8	3	5	1	1	2	2	8	3	.	1	2	2	8	1	3	2	2	
2	2																										
Ptpn	8	6	10	11	2	12	5	14	22	5	11	2	4	6	6	15	3	8	15	4	23	14	9	7	1		
3	7																										
Vxn	13	1	2	7	4	10	.	.	3	8	3	3	9	1	20	8	1	3	2	2	7	3	1	1	1		
1																											
Ogfrl1	2	4	1	.	10	3	3	1	3	3	2	7	1	1	1	2	1	2	3	4	3	1	4	4	4		
9																											
2010300C02Rik	7	.	.	8	43	2	3	3	11	18	8	2	4	1	5	10	12	3	.	7	5	7	8	2	1		
1																											
Igfbp5	1	2	.	.	1	3	2	.	1	3	2	4	.	.	1	1	3	1	1	3	3	.	4	5	.		
.																											

```

Arpc2      3 1 1 2 9 5 . 2 2 5 7 1 1 . 3 3 2 3 . 5 5 4 1 3
5
Ptprn     11 2 . 9 30 18 5 11 12 16 10 17 6 5 12 15 7 8 4 15 10 9 13 15
4

Vxn       1 4 24 . 1 10 . 7 1 7 1 4 5 . 1 . 15 . 14 5 1 6 . 18 1 1
8
Ogfrl1    1 1 5 1 2 . . 2 2 2 5 4 1 7 6 7 . . 2 2 5 . 4 7 1 1
3
2010300C02Rik . 5 8 2 1 2 1 2 7 6 3 10 3 1 . . 3 2 2 5 . 1 . 5 4 3
15
Igfbp5    2 7 1 1 1 5 4 1 . . 2 2 7 2 . 5 2 . 1 1 . 1 1 4 3 1
3
Arpc2    . 3 5 . 1 3 . 1 . 1 3 3 1 7 2 1 2 1 3 . 1 5 . 2 2 .
1
Ptprn    2 6 10 1 3 2 7 10 12 11 8 10 5 4 9 7 13 3 14 7 4 2 5 17 23 3
17

Vxn       4 1 2 19 . 13 6 4 23 4 13 . 11 13 11 6 4 2 18 4 8 3 2 8
7
Ogfrl1    1 1 2 4 . 4 2 3 6 1 3 . 4 8 2 3 5 . 3 3 1 2 2 2
2
2010300C02Rik 2 1 7 5 . 4 6 15 7 3 8 . 5 6 . 2 11 9 7 3 14 1 2 3
6
Igfbp5    1 1 3 . 1 2 . 3 1 . 3 1 3 7 2 . 1 1 3 3 1 1 2 1
1
Arpc2    1 . . 3 . . 4 3 1 . 3 4 4 . . 4 3 6 2 1 . 6 1
3
Ptprn    9 6 19 14 7 8 4 11 13 4 11 12 8 16 3 4 9 11 16 6 18 2 1 3
15

Vxn       5 2 . 1 4 2 14 1 10 5 . 2 13 1 12 23 8 17 3 1 12 4 6 2 4 9
3
Ogfrl1    1 . 1 3 4 1 9 1 3 3 2 . 1 3 3 9 1 4 2 5 5 1 3 7 3 4
.
2010300C02Rik 4 1 . 5 2 2 7 . 21 19 2 4 3 1 2 8 5 5 7 8 29 3 3 1 2 7
4
Igfbp5    1 . 2 . 4 1 2 3 2 2 3 . 1 1 4 4 1 1 1 3 2 . 4 . 6 4
.
Arpc2    2 3 . 2 . 2 1 1 7 7 1 . 1 2 4 2 8 1 1 8 9 2 2 2 3 2
.
Ptprn    4 4 4 6 7 8 30 1 10 27 4 4 11 9 14 18 4 14 3 20 12 11 8 2 8 16
3

```

In [123... `dim(corpus2)`

1000 · 2238

In [124... `class(cd)`

'dgCMatrix'

In [125... `## choose optimal number of cell-types`
`ldas2 <- fitLDA(t(as.matrix(corpus2)), Ks = c(25))`

```
Error in fitLDA(t(as.matrix(corpus2)), Ks = c(25)): `counts` must contain integer gene counts
Traceback:

1. stop("`counts` must contain integer gene counts")
2. .handleSimpleError(function (cnd)
   {
   .   watcher$capture_plot_and_output()
   .   cnd <- sanitize_call(cnd)
   .   watcher$push(cnd)
   .   switch(on_error, continue = invokeRestart("eval_continue"),
   .         stop = invokeRestart("eval_stop"), error = NULL)
   . }, "`counts` must contain integer gene counts", base::quote(fitLDA(t(as.matrix(corpus2)),
   .   Ks = c(25))))
```

In [127... *##make integer counts*
cd <- floor(cd)

In [129... class(cd)

'dgCMatrix'

In [131... counts2 <- cleanCounts(cd, min.lib.size=10^3.75, min.reads=2000,)

In [132... corpus2 <- restrictCorpus(counts2, removeAbove=1.0, removeBelow = 0.05)
head(corpus)

Removing 1 genes present in 100% or more of pixels...

4906 genes remaining...

Removing 0 genes present in 5% or less of pixels...

4906 genes remaining...

Restricting to overdispersed genes with alpha = 0.05...

Calculating variance fit ...

Using gam with k=5...

1511 overdispersed genes ...

Using top 1000 overdispersed genes.

[suppresssing 2549 column names 'AACAGAGCGACTCCT-1', 'AAACCACTACACAGAT-1', 'AAACCCGAACGAAATC-1' ...]]

6 x 2549 sparse Matrix of class "dgTMatrix"

Vxn	4	5	.	4	16	2	2	.	5	11	7	1	4	3	3	3	4	4	5	12	2	11	3	.	
.	8																								
Ogfrl1	1	3	1	1	3	1	.	3	3	3	4	6	3	.	2	5	.	1	1	6	1	1	.	9	
8	1																								
2010300C02Rik	6	6	1	6	3	4	5	2	8	10	18	1	1	2	5	4	1	3	2	3	2	12	5	1	
1	1																								
Igfbp5	.	3	1	.	1	.	1	10	5	3	5	10	.	3	8	3	.	2	3	.	.	2	1		
2	2																								
Arpc2	8	1	1	4	2	2	.	.	4	4	3	7	1	.	.	4	.	2	1	3	1	4	1	1	
1	2																								
Ptpn	13	6	10	11	7	4	6	10	9	15	21	14	1	1	4	20	4	6	2	17	5	17	5	10	
4	8																								
Vxn	1	1	.	9	1	18	4	9	5	3	1	11	7	9	7	8	2	2	7	1	4	33	7	2	23
3																									
Ogfrl1	2	4	3	5	4	7	2	3	3	.	1	2	7	1	5	3	1	.	2	.	1	8	1	2	4
4																									
2010300C02Rik	1	2	.	43	9	4	4	3	7	1	.	2	2	13	5	3	4	4	3	1	2	2	8	1	12
8																									
Igfbp5	2	9	1	9	4	3	2	2	.	4	1	2	3	2	1	2	9	.	2	5	1	1	.	2	
2																									
Arpc2	1	4	.	13	.	3	3	3	2	.	3	7	5	2	1	3	2	4	.	.	6	2	.	4	
.																									
Ptpn	6	12	1	16	10	12	9	12	7	2	1	4	17	11	14	5	2	4	12	1	3	11	9	3	31
11																									
Vxn	17	4	3	1	3	2	.	9	1	.	1	6	.	2	3	13	9	2	17	.	.	3	15	1	1
0	9																								
Ogfrl1	1	1	3	10	4	1	7	3	.	.	3	4	3	2	2	1	.	2	4	7	1	1	1	7	
2	1																								
2010300C02Rik	10	2	6	1	3	5	.	4	3	1	8	3	2	14	7	7	4	2	5	.	1	5	9	.	5
3																									
Igfbp5	.	1	.	1	.	1	2	1	2	1	1	2	1	.	2	3	.	1	2	.	4	1	.	2	
2	2																								
Arpc2	6	3	1	2	3	1	2	4	2	.	4	2	.	2	4	3	2	5	7	.	2	3	.		
1	2																								
Ptpn	6	10	12	6	9	3	4	10	5	4	12	4	2	26	10	9	1	15	29	5	2	8	13	10	
8	9																								
Vxn	2	20	10	5	7	2	5	.	2	5	.	7	2	11	.	2	17	10	4	1	5	13	1	1	
.																									
Ogfrl1	1	13	1	2	2	7	2	1	15	.	8	1	10	4	2	3	2	1	5	1	7	3	9	.	
2																									
2010300C02Rik	.	8	6	6	5	6	5	3	4	6	.	2	1	2	.	9	20	4	1	4	3	1	.	.	
.																									
Igfbp5	1	2	3	22	3	9	5	2	4	3	2	2	5	1	.	4	2	1	.	3	2	1	2	2	
1																									
Arpc2	.	4	2	5	4	4	4	.	2	1	1	3	2	1	1	6	.	2	1	1	3	7	1	1	
.																									
Ptpn	3	18	9	4	15	17	24	5	10	4	5	13	6	7	3	16	20	3	3	7	6	9	8	4	
10																									
Vxn	4	23	1	1	.	6	4	1	1	9	1	2	4	17	.	7	14	4	5	.	3	28	.	.	
4	2																								

singlecell

Ogfrl1	4	7	1	1	10	3	2	5	2	3	5	3	4	4	.	2	7	1	2	7	1	6	1	2	
.	9																								
2010300C02Rik	4	12	2	.	1	1	4	.	10	8	3	7	9	5	3	5	4	8	1	.	24	7	1	2	
6	.																								
Igfbp5	.	4	6	1	1	.	.	4	5	1	.	3	2	2	.	3	.	3	4	1	4	1	2	2	
.	2																								
Arpc2	4	2	2	.	3	1	2	.	3	1	.	1	2	1	1	.	1	4	1	5	3	7	1	.	
2	2																								
Ptpn	12	28	2	7	5	10	11	5	23	19	4	8	15	7	6	9	8	10	6	3	27	36	3	3	
2	3																							1	
Vxn	1	3	1	1	3	12	1	10	2	2	7	2	2	3	3	6	1	1	2	.	18	5	.	7	
2	1																								
Ogfrl1	.	3	1	2	5	1	3	2	1	.	3	2	1	.	1	3	1	1	4	10	7	4	8	4	
6	2																								
2010300C02Rik	1	7	2	.	8	1	1	3	2	3	3	6	7	2	2	3	15	1	6	1	6	5	.	17	
1	5																								
Igfbp5	3	3	3	.	4	5	11	3	.	2	5	1	.	18	2	1	1	.	6	1	2	.	11	2	
2	6																								
Arpc2	.	1	4	3	3	2	3	4	4	1	5	3	3	2	3	2	6	1	.	3	3	6	.	7	
4	4																								
Ptpn	14	11	15	6	10	12	12	7	5	6	6	4	6	10	3	4	4	1	3	9	17	10	2	12	
6	4																								
Vxn	3	1	12	5	.	1	7	8	11	2	1	11	8	.	15	1	17	9	1	7	1	4	2	5	
2																									
Ogfrl1	6	1	1	1	9	1	3	2	2	3	3	2	5	14	3	2	2	1	.	1	1	2	2	.	
1																									
2010300C02Rik	7	2	5	8	1	2	3	7	12	1	3	4	20	.	3	2	7	4	3	4	1	1	10	2	
1																									
Igfbp5	2	1	3	6	13	3	.	3	3	.	2	2	1	3	3	3	.	3	.	2	2	4	2	1	
1																									
Arpc2	4	.	.	4	.	.	3	2	4	.	2	4	5	3	6	1	2	1	2	4	2	2	3	3	
2																									
Ptpn	14	4	11	15	8	1	12	13	17	4	21	14	27	11	16	7	9	10	2	7	8	2	19	3	
.																									
Vxn	.	3	11	15	7	17	15	3	.	4	23	1	8	3	1	10	11	2	8	14	12	9	4	1	
2																									
Ogfrl1	.	3	5	6	2	5	5	1	6	4	4	9	1	.	2	7	1	1	.	4	2	5	1	4	
1																									
2010300C02Rik	.	3	9	6	1	7	4	1	3	22	6	2	7	2	.	26	8	4	5	5	3	5	3	3	
6																									
Igfbp5	1	2	.	1	2	6	3	1	2	6	4	4	2	1	.	2	1	2	2	7	.	.	13	2	
6																									
Arpc2	1	1	3	1	1	4	2	.	.	7	2	1	3	.	1	9	.	1	1	3	4	2	5	1	
4																									
Ptpn	2	7	12	21	5	16	7	4	6	4	14	5	25	8	6	16	11	3	13	6	9	13	8	8	
20																									
Vxn	.	2	8	.	11	8	.	2	12	2	3	9	2	18	8	10	4	2	2	3	2	.	3	.	1
13																									
Ogfrl1	2	.	4	5	8	2	4	1	4	2	3	5	10	7	3	3	.	1	.	1	3	3	.	2	
.																									
2010300C02Rik	.	3	3	.	2	3	1	2	4	.	5	4	1	5	3	10	3	5	.	.	1	5	4	1	
10																									

Igfbp5 1	4 6 1 3 3 2 . 4 5 5 2 . . 3 3 3 6 3 . 6 3 2 5 3 1 4 4
Arpc2 4	3 . 2 4 3 . . 2 1 . 3 . 2 2 3 3 3 4 2 1 2 3 . 2 2 . 4
Ptprn 16	10 2 12 1 9 3 10 5 9 1 4 14 7 18 13 30 9 9 7 8 6 1 7 3 7 17
Vxn 3	1 . 1 10 3 2 6 . 23 5 2 4 5 5 2 1 . 14 1 . 1 19 13 2 . 11
Ogfrl1 3	. 2 . 1 1 2 2 2 6 . 2 2 1 1 2 5 3 2 1 . 1 3 1 3 2 1
2010300C02Rik 3	1 . 1 8 1 6 9 1 3 2 1 11 1 6 1 1 6 4 2 1 6 12 18 2 . 9
Igfbp5 4	. 3 4 . 3 2 4 . 5 1 2 5 6 1 5 1 4 . 4 4 1 2 1 4 2 1
Arpc2 6	1 . 2 6 . 4 1 . 2 . 2 2 . 2 5 2 2 6 2 3 3 4 2 1 . 4
Ptprn 19	8 3 6 11 4 5 7 7 10 8 11 10 3 13 4 4 1 10 10 1 10 35 11 3 2 9
Vxn 3 .	6 5 1 11 2 2 20 5 2 4 13 12 16 3 8 2 20 5 5 . 8 1 1 2
Ogfrl1 1 7	3 7 8 2 1 7 7 4 . 1 4 3 6 5 . . 4 3 1 1 4 1 1 1 1
2010300C02Rik . 2	5 3 1 5 4 . 4 7 1 4 5 17 9 4 11 1 2 3 1 . 6 2 . .
Igfbp5 3 .	1 4 2 . 4 4 3 2 2 1 . 3 . 2 . 1 . . 5 1 6 8 6 2
Arpc2 5 2	4 5 4 2 . . 4 2 1 . 4 9 1 3 4 1 1 2 2 1 4 2 1 1
Ptprn 5 3	5 11 11 8 1 6 9 9 1 3 15 20 20 13 12 14 16 15 3 3 18 9 4 5 1
Vxn 6	18 . 2 . 2 31 1 7 2 9 7 6 22 1 6 1 2 1 2 24 . 6 . . 6
Ogfrl1 1	4 2 9 9 . 4 2 4 3 1 3 2 2 5 6 10 1 . 8 3 1 3 2 2 4
2010300C02Rik 15	6 3 . . 2 1 2 34 2 3 3 1 6 1 3 . 2 4 . 6 . 7 . 1 15
Igfbp5 2	2 3 1 4 1 1 3 6 . 11 3 2 3 . 2 2 2 6 1 3 2 9 3 3 1
Arpc2 . .	2 4 2 3 3 1 2 5 . . 2 2 1 1 2 6 . 2 1 4 2 3 2 3 6
Ptprn 8	15 8 5 10 22 13 6 31 9 8 8 5 13 14 3 13 1 7 8 12 1 4 17 3 9
Vxn 1 1	7 1 2 1 5 . 9 6 16 . 10 3 29 2 8 . 3 13 14 20 19 18 2 1
Ogfrl1 3 1	2 1 4 . 4 1 4 1 2 1 3 4 8 1 9 2 3 3 3 1 7 3 . 8
2010300C02Rik 3 2	6 1 3 3 3 . 4 5 . . 8 14 3 3 21 . 4 31 19 2 13 1 1 1
Igfbp5 1 .	. 1 . 7 10 1 2 . 1 . 1 5 1 5 2 1 3 2 5 2 . 2 1 3
Arpc2 4 3	3 . 1 2 1 1 1 2 4 1 2 4 2 . 3 . 1 15 6 2 4 1 1 8

Ptpn5	4 6 6 2 4 3 13 14 13 3 8 17 15 5 13 2 19 37 36 11 29 8 4 3 5 4
Vxn1	22 2 . 3 2 2 4 3 13 . 6 30 . 7 29 32 21 1 2 . 14 1 18 .
Ogfrl1	5 2 1 7 5 12 5 2 5 . 3 3 1 3 5 3 3 1 2 . 5 . 5 2
.	
2010300C02Rik1	6 11 . 4 7 . 6 4 6 1 11 5 . 5 9 7 2 2 2 1 4 . 13 2
Igfbp51	2 4 . 1 6 1 9 1 3 2 . 1 3 2 1 1 3 . 1 . 2 . 2 5
Arpc23	4 2 1 2 2 3 4 4 3 . 2 5 4 8 6 4 4 1 . . 2 . 9 .
Ptpn5	18 11 2 11 9 2 3 14 16 2 15 18 12 7 7 18 11 . 5 4 19 6 24 3
Vxn1	3 9 16 1 3 2 14 . 2 1 10 5 1 2 18 1 1 2 . 1 1 2 1 4 11 1
Ogfrl11	2 2 4 4 1 1 6 1 2 . 2 . 8 . 5 1 . 3 6 6 1 1 . . 3
2010300C02Rik4	10 5 17 1 3 1 26 9 4 2 10 8 2 4 26 9 5 7 . 4 . 2 1 4 4
Igfbp53	. 6 1 1 . 3 1 . 5 1 2 . 12 4 1 . 4 2 6 3 6 . 1 . 3
Arpc24	6 4 5 3 2 1 12 1 . 4 2 6 1 . 11 2 5 2 2 3 . . . 2 .
Ptpn2	13 2 23 6 6 6 12 9 2 4 13 6 8 12 19 7 17 20 6 20 6 1 3 5 10 1
Vxn7	4 16 6 17 10 1 . 3 7 7 3 11 . . 3 3 5 3 29 5 1 1 1 1 3
Ogfrl13	2 10 2 5 7 1 4 2 3 2 4 8 8 5 2 3 4 . 8 3 . 4 1 1 1
2010300C02Rik2	9 14 8 1 7 1 3 4 3 7 3 14 3 . 8 . 2 6 10 4 . 2 2 3 5
Igfbp51	. 2 2 5 3 1 3 4 4 2 2 3 1 4 1 4 2 2 3 1 . 1 6 1 .
Arpc21	4 3 3 . 1 . 4 1 2 2 4 3 . 2 1 4 1 2 2 3 4 1 1 4 1
Ptpn4	11 26 11 5 7 3 9 9 17 13 8 19 11 13 2 5 3 5 16 10 7 9 6 10 3
Vxn4 .	7 14 . 13 3 8 1 4 1 9 5 2 8 2 1 . 1 . 1 5 3 1 8 1 9
Ogfrl11 5	6 7 2 1 1 2 2 4 6 . 1 5 2 5 . 9 3 4 8 2 2 . 2 2 4
2010300C02Rik5 1	8 11 . 9 . 14 . 11 3 14 5 2 6 . . 2 6 1 3 3 4 1 4 1 1 8
Igfbp51 4	2 5 1 4 . 2 4 5 . . 3 . 1 1 7 2 1 4 1 2 . 2 1 3 2
Arpc24 1	4 1 . 3 1 2 . 3 2 7 3 . 1 . . 2 2 3 2 3 . 1 2 1 1
Ptpn4 2	9 10 . 8 4 17 2 2 1 15 19 6 4 2 1 7 12 10 5 19 3 14 8 10 10
Vxn	2 5 1 2 17 2 1 3 1 1 3 5 2 3 3 2 8 1 3 11 2 10 6 4 7

11	
Ogfrl1	. 1 3 . 4 1 6 2 5 1 1 1 4 . 3 . 1 3 3 3 1 2 8 6 5
1	
2010300C02Rik	3 6 1 1 14 3 . 6 1 4 13 7 10 4 13 2 2 10 1 6 1 3 32 7 3
7	
Igfbp5	. 2 . 2 2 2 3 4 2 . 2 1 1 1 1 2 5 2 5 1 2 1 6 . 1
2	
Arpc2	3 2 1 . 2 . 4 3 1 2 2 . 2 2 3 1 1 1 3 1 2 2 9 3 2
1	
Ptpn	18 4 3 . 18 5 6 4 5 5 15 14 8 3 6 3 9 2 15 9 8 16 7 4 10
8	
Vxn	1 1 5 3 1 11 . . 2 5 1 9 5 9 3 1 3 . 1 15 2 . 27 22 1
2	
Ogfrl1	11 . 4 5 1 5 1 2 1 14 2 1 . 6 . 2 9 . 7 2 . 2 5 5 .
8	
2010300C02Rik	. . 8 22 1 15 . . 4 96 1 5 4 6 2 1 2 2 . 5 1 2 4 7 1 2
0	
Igfbp5	2 2 1 5 1 1 4 . 3 18 20 . 1 . 1 2 . 2 . 1 2 1 1 3 .
7	
Arpc2	1 . 3 5 . 2 1 3 . 27 2 3 4 2 2 1 4 1 3 1 . . 1 3 .
3	
Ptpn	4 7 14 20 6 12 1 5 1 39 3 13 9 29 8 3 9 1 8 13 1 5 9 11 3 1
5	
Vxn	21 2 8 3 6 3 1 . 1 2 1 2 . 10 17 7 2 3 2 24 6 2 27 8 10
1	
Ogfrl1	2 3 2 2 1 8 3 3 2 2 . 6 3 3 4 6 1 1 4 2 6 2 4 1 .
3	
2010300C02Rik	5 . 10 1 6 10 3 . . 7 15 3 1 19 1 6 1 2 . 7 2 7 6 3 2
4	
Igfbp5	1 1 1 4 . 4 . 1 . 14 1 2 3 1 2 2 14 . 2 . 2 . . 2 1
7	
Arpc2	. 1 1 2 4 9 . 2 . . 1 3 1 7 5 4 2 1 . 1 3 3 3 4 3
1	
Ptpn	6 4 6 6 6 12 4 4 3 5 12 5 3 21 14 15 3 6 5 14 5 7 22 15 10
5	
Vxn	22 1 6 2 2 8 10 13 4 10 19 7 5 7 2 9 3 3 1 3 1 3 19 3
29	
Ogfrl1	3 . 18 . 4 7 2 5 4 6 3 1 3 2 . 4 3 2 3 3 3 1 3 1
4	
2010300C02Rik	5 1 6 2 5 6 3 11 29 36 33 4 9 2 1 21 4 5 . 4 2 9 5 5
5	
Igfbp5	1 1 1 1 5 2 . 3 4 1 1 4 3 1 1 7 5 3 1 3 5 3 2 2
.	
Arpc2	5 2 4 2 3 3 5 7 4 19 14 3 5 3 1 9 2 3 . 4 1 1 2 1
1	
Ptpn	21 2 11 7 19 14 15 29 30 20 20 6 14 8 2 9 7 9 10 10 7 18 20 3
13	
Vxn	. 1 18 8 . 1 13 13 9 . 5 1 4 8 9 1 7 1 4 1 9 2 1 1 1
2 2	
Ogfrl1	1 2 2 3 . 3 4 3 . 6 1 5 2 1 6 1 3 11 2 3 3 13 1 2 1
2 5	
2010300C02Rik	1 1 9 5 . 6 4 6 6 1 9 3 4 4 1 4 7 2 1 9 9 2 1 2 3

1 2	
Igfbp5	3 3 3 . 1 4 4 . 2 2 1 2 . 4 1 1 . 5 1 1 1 1 3 . .
. 2	
Arpc2	1 1 5 2 1 3 4 4 1 4 4 1 4 . 1 6 5 4 1 1 1 3 . 1 .
1 4	
Ptpn	2 4 10 13 1 22 13 15 9 4 22 8 7 1 11 11 17 9 4 6 16 9 7 6 3
6 5	
Vxn	1 5 1 17 1 1 . 2 . . 14 1 . . . 6 5 1 19 22 13 10 7 4
4	
Ogfrl1	. 2 . 1 3 12 7 4 2 2 3 3 . 4 1 4 2 . 4 3 7 3 2 3
2	
2010300C02Rik	3 11 1 12 5 2 1 11 . 1 5 . . 2 5 12 14 3 2 6 6 5 5 3
4	
Igfbp5	1 3 15 . . 1 1 . 2 6 4 5 8 7 2 1 3 5 6 . 7 2 1 2
1	
Arpc2	. 3 2 2 7 . 1 5 4 . 2 4 1 3 1 6 2 . 6 3 1 4 5 2
3	
Ptpn	8 13 4 19 6 10 8 14 4 2 9 8 2 10 13 9 8 6 20 25 18 5 8 11
10	
Vxn	9 2 1 1 5 23 3 8 . 1 . 3 5 3 8 4 3 5 8 3 3 8 12 8 21 7
.	
Ogfrl1	3 2 4 4 2 5 2 2 1 4 2 1 2 1 6 3 . 1 4 2 1 4 3 4 8 1
2	
2010300C02Rik	4 3 5 1 1 4 2 12 5 6 1 3 34 3 7 5 2 8 10 . 7 16 4 1 11 6
2	
Igfbp5	4 1 . . 3 1 2 2 1 . 3 3 1 1 1 2 3 5 1 1 3 4 3 2 5
.	
Arpc2	4 4 6 2 2 6 4 2 2 1 . 1 9 . 6 3 1 2 10 1 3 5 3 1 7 6
.	
Ptpn	6 7 5 1 10 12 9 13 5 4 3 6 15 6 14 20 1 13 24 2 9 19 18 8 21 8
6	
Vxn	18 8 10 2 7 11 5 8 . 44 9 12 . 7 16 7 7 33 14 1 12 1
4	
Ogfrl1	5 1 5 1 4 4 . 3 . 13 3 2 10 3 2 2 4 7 2 2 2 2
2	
2010300C02Rik	3 7 20 . 15 5 7 4 . 2 3 3 1 15 13 2 14 3 7 2 10 3 1
8	
Igfbp5	. . 1 1 1 3 . . 3 1 3 1 1 1 . 2 . 1 4 2 1 3
4	
Arpc2	6 4 5 . 7 3 1 5 1 5 1 2 . 8 1 . 3 3 3 . 1 2
2	
Ptpn	8 15 14 4 12 7 12 10 1 14 9 4 8 9 11 10 18 15 15 6 5 4
8	
Vxn	12 7 4 14 . 2 2 12 4 8 2 6 10 6 . 3 . . 5 11 3 . 1 . 3
4	
Ogfrl1	1 3 . 4 . 3 2 3 3 3 3 3 2 3 3 1 3 5 1 7 8 . 3 1 .
1	
2010300C02Rik	11 8 7 10 1 1 4 3 9 5 3 5 2 14 20 2 1 2 1 1 1 . 1 . 3
8	
Igfbp5	5 1 2 2 1 . 4 . . 1 2 6 . 3 1 6 5 1 4 5 2 1 . 1 3
6	
Arpc2	3 2 3 2 1 . 6 1 1 1 2 3 3 3 4 2 . 2 . 1 2 2 1 3 2

3	
Ptpn	17 1 10 12 4 6 14 12 14 11 9 13 11 22 19 3 2 6 3 11 9 2 7 4 16
13	
Vxn	18 . 19 3 26 1 2 . 4 6 15 6 1 3 1 6 5 5 18 . 2 1 1 . . 12
10	
Ogfrl1	6 1 4 3 7 1 2 3 1 3 2 1 2 1 5 2 2 1 3 1 1 7 2 1 1 1
2	
2010300C02Rik	3 2 11 4 11 2 2 . 2 4 8 6 . 4 3 16 3 . 8 1 . 3 1 5 3 6
8	
Igfbp5	2 1 4 3 1 2 1 1 2 4 . . 1 10 1 2 1 4 3 2 1 3 2 . 2 .
2	
Arpc2	4 2 2 7 . 1 2 1 1 2 3 1 . 2 3 2 2 2 2 2 1 1 2 1 2 2
4	
Ptpn	12 4 8 16 34 6 4 6 1 7 25 1 5 5 6 21 11 3 12 3 3 8 3 4 5 8
13	
Vxn	. 6 3 10 14 . 9 9 15 10 6 3 6 1 . 6 3 5 2 17 . 3 13 28 7
.	
Ogfrl1	3 2 2 6 6 4 . 3 1 6 3 1 5 2 3 1 3 7 2 2 8 5 1 6 2
4	
2010300C02Rik	1 6 2 3 6 5 4 12 10 . 5 7 5 3 . 8 3 22 1 1 1 2 10 3 16
.	
Igfbp5	1 1 . 1 . 4 1 1 1 2 2 1 3 2 6 2 . 4 1 7 . 3 . 2 1
1	
Arpc2	. 6 1 1 3 3 2 3 3 1 4 . 2 . 1 4 . 4 . . 2 5 9 2 5
1	
Ptpn	3 8 5 10 17 8 14 8 18 11 16 4 7 2 6 9 2 29 2 12 5 11 19 12 23
5	
Vxn	11 4 5 15 11 3 . 13 6 4 3 1 6 29 . 8 5 7 2 1 23 1 1 14
5 .	
Ogfrl1	19 1 12 1 2 1 3 2 3 . 3 2 . 6 1 2 . 2 3 1 4 . 4 5
.	
2010300C02Rik	17 14 10 10 2 13 2 4 3 3 4 . 16 44 1 . 6 3 3 3 4 1 4 1
1 1	
Igfbp5	. 4 6 . 1 1 6 1 3 4 4 1 2 1 2 2 . 2 4 . 2 1 . 4
4 .	
Arpc2	15 5 4 2 5 4 1 . . . 1 6 23 3 1 4 3 1 2 . 2 5 4
. 1	
Ptpn	42 16 23 12 9 16 7 8 4 3 9 3 5 13 4 9 11 8 13 5 22 3 13 3
7 1	
Vxn	6 . 11 25 1 8 3 9 1 13 5 5 4 3 1 3 2 2 14 2 1 6 1 13 1
13	
Ogfrl1	1 . 3 4 2 4 2 3 3 7 1 1 2 6 2 2 1 1 1 6 4 . 3 2 1
2	
2010300C02Rik	2 2 11 6 1 8 1 1 2 13 6 5 1 28 3 1 3 3 2 4 1 3 3 13 .
.	
Igfbp5	. 5 4 3 3 2 7 . 6 3 . 2 2 5 1 5 5 2 1 5 . 3 2 2 .
3	
Arpc2	. 1 3 5 . 6 1 1 3 7 2 2 4 6 1 2 3 1 1 . 1 4 2 8 1
1	
Ptpn	6 5 10 12 14 17 3 6 11 34 16 13 3 26 4 9 3 10 9 6 4 9 6 9 4
3	

singlecell

Vxn	30	3	7	5	4	7	19	20	13	7	3	4	1	3	.	1	3	1	7	.	2	6	.	2	14
10																									
Ogfrl1	1	2	5	.	8	1	4	1	4	2	11	3	4	2	6	.	3	1	2	2	1	1	3	4	
3																									
2010300C02Rik	4	3	2	8	57	7	11	12	4	3	10	31	.	9	1	3	4	2	5	1	2	8	.	1	5
4																									
Igfbp5	3	1	1	2	6	3	2	3	3	.	2	2	3	1	2	1	3	1	3	1	7	.	6	3	1
.																									
Arpc2	1	4	4	2	8	2	.	2	1	1	5	6	1	2	2	.	2	1	3	1	1	4	.	.	3
2																									
Ptprn	11	7	7	7	24	11	15	31	14	4	12	34	12	16	5	7	6	5	12	5	5	19	4	2	12
15																									
Vxn	10	11	2	2	6	9	.	2	23	12	3	2	3	7	2	1	1	5	11	13	3	6	.	2	22
1																									
Ogfrl1	3	3	1	2	.	5	5	4	3	5	1	1	.	3	1	3	1	7	.	5	3	2	2	2	9
4																									
2010300C02Rik	32	1	2	1	6	5	1	4	8	6	4	2	.	9	3	4	2	10	11	4	2	4	1	5	5
5																									
Igfbp5	8	.	2	6	2	.	2	2	2	.	7	1	.	8	3	3	1	2	2	3	3	2	.	.	3
2																									
Arpc2	7	4	1	1	1	2	2	3	3	1	3	2	1	6	2	2	2	1	5	4	2	2	.	3	.
4																									
Ptprn	32	8	5	4	5	11	9	15	14	6	5	5	.	19	4	19	1	11	6	10	6	6	6	7	18
10																									
Vxn	7	13	7	17	2	9	2	4	.	19	.	1	5	10	.	.	.	3	22	2	7	2	.	1	
11																									
Ogfrl1	3	4	4	8	1	4	3	1	7	6	6	2	2	4	4	1	2	1	6	2	2	7	1	1	
2																									
2010300C02Rik	4	8	2	31	10	5	.	9	1	3	1	1	6	3	1	1	5	.	4	1	7	3	3	.	1
Igfbp5	1	3	2	1	.	3	1	2	2	.	.	3	.	1	4	1	4	26	2	1	1	5	5	1	3
3																									
Arpc2	1	2	1	10	1	2	2	1	.	3	2	.	.	5	1	.	.	.	2	2	2	2	2	.	2
1																									
Ptprn	9	18	5	22	13	14	5	7	12	10	11	3	10	6	5	1	20	3	17	9	18	12	4	7	
4																									
Vxn	3	1	1	16	1	32	1	3	3	1	5	.	.	14	10	3	3	22	11	2	2	13	2	4	2
.																									
Ogfrl1	.	3	1	6	.	7	.	2	1	6	12	6	2	3	1	2	3	.	1	1	1	8	2	8	.
1																									
2010300C02Rik	1	.	1	3	1	5	1	4	3	.	3	8	3	5	6	2	.	9	10	1	1	2	3	.	12
.																									
Igfbp5	3	2	2	2	3	3	4	2	8	2	.	2	2	3	1	5	.	5	3	3	1	
2																									
Arpc2	.	.	1	1	.	2	1	3	.	2	4	6	.	3	.	2	4	2	3	3	.	2	4	3	3
.																									
Ptprn	2	5	3	8	3	12	2	4	1	8	19	17	6	10	9	18	6	16	7	5	1	11	25	9	13
3																									
Vxn	1	1	32	9	6	8	18	.	5	5	4	10	9	.	1	.	1	21	2	2	19	8	.	7	
1																									
Ogfrl1	3	2	5	5	.	2	4	4	1	3	3	.	1	2	8	.	4	3	2	1	2	2	3	3	
1																									

singlecell

2010300C02Rik	1	.	2	12	4	3	2	2	3	.	1	9	14	3	4	2	4	5	14	.	6	7	.	17		
Igfbp5	1	4	6	2	4	.	3	2	2	1	1	2	2	1	5	2	5	2	2	.	1	1	3	.	2	
Arpc2	3	7	1	3	13	3	4	2	2	5	3	.	2	2	3	4	.	2	4	3	.	4	1	2	3	
Ptpn	.	21	10	14	15	8	15	9	5	13	8	9	13	4	22	18	3	1	18	9	4	20	4	3	16	
Vxn	.	.	1	.	3	5	4	.	4	9	2	3	12	1	2	2	10	1	8	5	4	4	5	.	11	
Ogfrl1	0	1	5	2	1	1	2	2	4	3	5	1	7	2	.	1	5	.	3	.	12	6	1	2	3	1
2010300C02Rik	1	1	.	.	2	3	4	.	6	6	32	3	3	4	2	7	10	.	4	2	2	1	2	1	2	
Igfbp5	1	.	3	5	8	4	1	2	1	3	7	3	2	1	2	.	4	1	4	.	3	1	4	4	1	
Arpc2	3	.	3	1	1	.	1	2	3	3	11	2	2	5	1	3	.	2	1	.	7	6	.	3		
Ptpn	0	7	7	12	2	5	7	9	16	14	19	6	14	25	4	10	18	2	7	9	11	10	11	25	6	1
Vxn	.	4	31	.	5	1	16	2	.	27	1	.	2	15	7	7	1	4	21	.	38	9	.	1	4	
Ogfrl1	.	4	7	4	1	.	.	3	3	6	2	3	1	7	4	2	1	5	2	11	2	2	.	2		
2010300C02Rik	1	9	10	3	4	1	1	4	1	4	2	4	3	7	7	6	1	4	5	1	8	6	14	1	3	
Igfbp5	6	3	2	4	.	3	1	1	2	4	3	.	1	.	.	8	3	5	.	.	3	1	1	2	1	
Arpc2	3	.	2	1	2	2	2	1	4	3	1	1	3	4	.	2	.	3	1	1	5	2	5	.	1	
Ptpn	11	14	31	5	5	16	12	11	4	16	8	2	5	10	11	5	3	17	12	13	23	10	13	5	4	
Vxn	6	.	1	2	2	6	28	2	3	1	1	3	4	2	3	18	3	.	4	6	2	18	.	12	19	6
Ogfrl1	.	.	.	5	.	1	4	1	15	5	1	.	5	5	2	6	1	8	.	1	.	3	3	6		
2010300C02Rik	1	1	2	3	8	6	3	10	5	.	8	3	1	1	3	7	1	5	36	2	4	4	5	5	9	
Igfbp5	3	1	1	1	1	9	.	1	1	2	4	.	1	6	2	1	2	5	8	2	1	6	2	1		
Arpc2	1	1	1	3	3	2	3	4	3	3	2	.	1	4	2	3	1	2	7	4	5	3	1	.	1	
Ptpn	1	4	2	4	13	13	16	6	10	10	8	13	4	6	4	12	3	5	7	14	6	5	21	4	4	14
Vxn	1	.	4	7	6	1	25	18	4	25	35	5	5	.	2	10	.	6	11	5	.	7	1	8	2	
Ogfrl1	2	1	4	3	.	6	1	3	2	5	2	2	1	7	4	10	1	5	3	.	2	7	.			
2010300C02Rik	.	10	16	3	.	6	4	4	39	8	10	3	3	.	7	.	19	3	2	2	10	.	36	3		
Igfbp5	1	5	5	1	1	2	1	1	1	2	1	4	.	1	2	.	1	3	.	.	4	.	9	2		

singlecell

Arpc2	1	3	2	1	1	3	3	9	15	3	2	2	.	6	3	.	5	1	3	1	2	3	7	.			
Ptprn	8	9	10	9	5	4	25	8	14	28	21	23	8	4	11	14	5	16	6	9	1	13	3	15	6		
Vxn	20	2	24	2	.	6	1	12	12	2	1	6	.	5	5	6	6	3	8	6	14	6	2	1	4	1	
Ogfrl1	5	.	3	2	2	1	8	5	.	3	9	5	1	.	6	1	4	1	3	2	3	2	4	8	3	3	
2010300C02Rik	1	2	4	5	2	.	3	3	3	.	12	.	3	8	6	7	2	3	7	4	7	2	.	4	2		
Igfbp5	.	2	1	3	2	4	1	3	2	1	2	3	1	2	2	2	2	1	1	3	.	1	1	1	4		
Arpc2	4	1	2	3	5	1	.	3	2	1	2	3	.	2	4	.	3	1	1	1	2	2	.	1	1	6	
Ptprn	18	3	16	14	14	3	7	14	5	10	7	13	4	7	13	4	18	5	11	20	12	3	8	4	4	15	
Vxn	6	2	2	1	7	.	3	1	1	9	2	2	4	2	17	17	4	1	4	2	3	4	12	14	.		
Ogfrl1	1	1	2	13	2	2	.	.	10	5	3	8	4	4	6	4	2	8	3	.	3	2	2	10	11		
2010300C02Rik	4	5	2	2	5	1	12	3	.	12	1	1	9	4	6	36	4	1	2	4	8	12	2	36	1		
Igfbp5	1	.	2	4	6	1	.	.	4	1	.	3	3	3	3	.	2	1	1	1	4	1	.	2	2		
Arpc2	.	4	3	1	.	3	1	3	3	2	4	5	2	7	5	1	1	.	1	6	2	3	15	.			
Ptprn	5	6	11	7	7	2	7	6	5	12	11	12	9	15	18	17	8	7	8	24	12	14	13	22	4		
Vxn	8	2	6	10	9	2	6	5	7	6	5	.	7	7	15	3	2	35	2	2	1	20	3	3	2	1	3
Ogfrl1	.	2	6	6	4	5	4	.	3	5	2	4	9	4	5	1	12	3	.	3	2	1	4	8	1	1	1
2010300C02Rik	3	5	5	4	1	6	9	6	4	8	2	5	12	24	.	2	8	5	6	3	3	.	6	5	.	2	
Igfbp5	2	4	.	1	3	.	.	2	3	2	1	2	2	2	1	2	3	.	3	1	.	2	3	3	6	3	
Arpc2	2	.	3	6	3	1	2	3	5	4	5	1	2	3	10	1	3	4	1	3	.	4	2	3	2	3	4
Ptprn	18	8	15	16	8	1	11	6	11	9	8	5	5	10	16	2	10	26	5	16	1	13	8	7	12	2	8
Vxn	6	1	2	.	4	.	13	.	6	6	1	7	2	1	14	1	11	1	2	13	21	3	2	.	1		
Ogfrl1	3	.	1	1	5	1	6	.	10	2	10	7	8	.	8	1	5	1	.	3	2	5	.	3	.		
2010300C02Rik	7	3	3	1	24	.	1	3	39	12	1	32	2	.	5	1	6	10	1	4	9	11	1	1	2		
Igfbp5	2	15	1	4	6	1	3	3	9	4	4	4	1	16	2	4	4	4	2	6	3	2	.	18	2		
Arpc2	1	3	1	3	1	1	.	1	6	7	1	7	.	.	2	.	2	4	2	5	3	4	1	2	.		
Ptprn	15	4	3	9	9	.	6	9	18	22	10	35	8	7	15	2	18	11	3	6	11	16	2	1	6		

Vxn 4	9 7 5 21 1 7 1 7 7 4 . 3 17 1 4 3 1 6 2 . 5 3 1 4 13 . 15
Ogfrl1 2	5 6 4 9 1 3 1 5 . . 3 1 10 2 4 3 3 2 5 5 1 1 . 3 4 . 3
2010300C02Rik	7 10 8 5 5 2 2 8 4 5 2 5 3 1 5 6 . 4 . . 3 1 1 3 4 . 6
Igfbp5 6	1 2 . 1 1 3 6 6 4 1 2 2 . 3 1 1 1 3 6 3 . . . 2 2 .
Arpc2	4 2 6 2 1 1 5 4 3 . 1 1 1 . 4 5 2 6 2 2 2 . 1 1 2 . 1
Ptprn 10	9 15 10 25 4 1 12 22 4 3 3 6 15 6 5 8 3 8 4 6 4 . 1 4 18 3 19
Vxn 26	2 9 14 3 10 10 5 9 1 2 18 1 28 1 8 13 6 . 2 4 . . 7 7
Ogfrl1 8	1 2 7 4 4 2 4 5 2 1 3 3 4 4 5 5 5 2 . 1 3 10 2 3 18
2010300C02Rik	1 8 11 6 11 3 3 26 2 2 3 2 5 1 23 9 8 . 2 1 2 8 6 4
Igfbp5 2	1 1 4 . 3 3 3 6 1 1 . . 2 7 5 . 1 1 3 5 3 . 2 3
Arpc2 2	4 3 2 2 3 1 2 14 1 2 3 . 2 4 10 4 4 2 1 1 5 7 . 13
Ptprn 23	7 7 17 3 13 2 11 15 2 6 14 3 17 3 20 22 19 1 2 11 9 16 15 25
Vxn 4	. . 3 9 7 9 12 . . 1 1 2 . 39 3 11 2 1 2 7 7 2 3 5 10 12
Ogfrl1 1	1 2 2 3 1 3 3 . 4 7 2 2 4 8 8 4 1 2 9 3 1 3 1 13 3 5 1
2010300C02Rik	. 2 4 4 . 18 1 1 2 3 6 . 1 5 2 3 6 3 2 2 6 37 6 . 8 4 3
Igfbp5 1	1 2 . 1 1 2 . 1 1 1 1 . 4 6 . . 1 4 1 2 . 2 5 . 2 4
Arpc2 6	1 1 1 3 3 5 1 . 2 2 . 1 2 1 4 . 3 2 5 2 1 7 1 1 2 6
Ptprn 6	5 2 8 4 5 13 10 1 3 9 3 3 2 14 8 14 7 6 9 5 5 21 11 7 23 11 2
Vxn 4	9 . . 1 3 7 13 3 6 1 16 23 . 9 5 3 3 1 1 11 2 2 3 .
Ogfrl1 11	6 . . 3 2 3 2 1 2 1 7 4 2 10 3 2 3 1 7 1 . 2 4 3
2010300C02Rik	11 4 1 3 4 5 5 2 7 . 4 6 1 25 1 4 6 3 . 5 1 9 4 2
Igfbp5 5	3 2 8 . 6 . 4 . 1 1 . . 2 3 11 1 3 4 . 2 . 2 4 9
Arpc2 2	3 2 1 1 2 3 2 4 3 1 1 1 3 7 2 1 1 2 1 3 . 5 1 2
Ptprn 7	18 6 4 6 10 14 20 19 7 1 13 17 9 17 5 5 7 13 6 10 . 18 14 12
Vxn 11	9 1 18 . 3 5 6 5 2 . . . 1 5 2 4 17 . 4 18 2 28 8 5 4
Ogfrl1	8 . 11 12 2 4 3 3 . 1 . 2 1 1 2 7 5 2 4 4 2 2 5 1 3

2
2010300C02Rik 7 1 8 1 2 22 3 6 9 . . 1 6 10 5 13 9 1 3 7 6 5 11 3 5
9
Igfbp5 3 2 4 3 1 3 3 6 4 3 3 2 3 1 3 2 1 3 3 . 1 2 7 6 1
4
Arpc2 8 . 3 2 . 4 3 2 2 . 2 4 2 4 3 3 2 1 1 8 . 6 6 1 .
3
Ptprn 20 3 22 7 3 17 4 5 11 2 5 . 16 11 10 5 16 6 2 20 5 17 14 4 7
17

Vxn 1 2 3 4 1 . 1 12 4 . . . 4 . 2 3 1 3 . 4 2 3 12 9 9 16
10
Ogfrl1 6 4 9 2 9 2 1 1 8 9 9 1 2 2 7 3 3 1 2 3 12 5 1 1 2 2
5
2010300C02Rik 8 1 . . 1 1 3 4 11 1 . . 10 2 1 3 4 6 2 6 . 6 8 5 3 6
6
Igfbp5 . 2 7 2 2 2 1 3 3 6 2 . 2 3 1 2 4 9 4 1 1 3 1 3 1 4
1
Arpc2 1 . 5 2 1 1 2 4 . 3 2 . 1 2 . 3 3 2 1 1 1 4 3 2 4 1
2
Ptprn 7 5 14 3 4 7 4 12 19 10 3 3 7 7 2 7 9 5 4 9 5 3 19 10 12 20
12

Vxn 2 6 1 8 6 1 1 5 8 4 11 4 . 9 6 14 2 2 3 2 6 . 1 4 1
.
Ogfrl1 6 2 . 2 . 3 1 7 2 2 5 5 5 4 2 4 . . 10 3 2 2 10 7 1
.
2010300C02Rik 11 2 . 7 6 3 6 3 3 2 3 8 . 14 5 5 3 1 3 1 10 3 2 4 7 2
3
Igfbp5 1 13 3 1 2 8 9 2 1 2 1 1 1 3 2 2 2 1 1 1 2 1 2 13 1
1
Arpc2 3 2 1 2 1 2 4 2 2 1 1 2 3 2 6 4 2 1 1 . 2 1 4 11 .
.
Ptprn 13 17 . 6 12 7 20 6 5 4 8 19 6 19 10 6 8 5 7 3 16 2 9 10 1
4

Vxn 1 9 . 15 1 2 2 20 2 3 3 4 10 3 22 23 6 5 5 1 15 6 9 2
5
Ogfrl1 3 . 5 2 1 2 1 5 2 1 2 2 2 3 7 2 2 3 2 3 4 5 3 2
1
2010300C02Rik 9 3 2 3 3 2 2 5 . 3 . 8 10 5 12 2 2 6 10 14 3 7 4 4
11
Igfbp5 . 3 1 1 6 5 2 3 . . 3 3 2 25 3 5 9 . 2 5 3 4 . 3
5
Arpc2 3 . . 1 2 1 1 5 . 1 1 2 3 2 3 6 1 6 1 3 2 3 . 6
3
Ptprn 10 5 3 16 10 6 4 16 4 7 3 11 10 4 24 14 1 12 19 10 12 14 9 14
12

Vxn 1 8 4 5 5 2 3 1 7 1 13 15 3 4 . 21 3 42 8 2 4 20 1 . 5
5
Ogfrl1 6 1 7 3 2 . 4 2 3 8 11 3 2 9 1 2 1 5 3 1 2 5 3 8 2
7
2010300C02Rik . 13 7 3 . 3 4 4 14 1 52 3 5 2 1 8 3 4 1 3 8 6 9 . 6
3
Igfbp5 4 8 2 1 1 5 1 3 1 3 1 . 2 2 1 2 . 4 1 4 3 . . 8 2

1	
Arpc2	. 4 3 2 1 1 4 4 2 4 17 3 1 4 1 5 2 3 1 . 4 3 2 3 2
5	
Ptpn	4 17 28 2 7 5 10 11 10 10 18 12 8 7 8 17 6 17 12 7 3 23 4 5 8
11	
Vxn	2 4 5 1 2 19 1 7 1 . 5 20 2 8 . 1 29 5 . 10 2 . 4 1 12 2
6	
Ogfrl1	. 2 3 4 1 4 5 1 7 1 2 4 2 1 . . 5 1 1 2 2 3 2 1 1
5	
2010300C02Rik	1 4 14 . . 2 . 10 . 3 3 4 1 7 . 1 5 6 5 2 3 . 2 10 10
3	
Igfbp5	2 3 2 1 2 2 3 4 2 1 5 1 5 . . 4 2 2 8 1 3 2 2 1 4
.	
Arpc2	1 1 2 5 1 2 1 . 3 3 . 1 3 2 . . 3 1 1 . . 2 . 7 5
3	
Ptpn	. 2 10 2 4 15 8 6 7 5 8 10 5 12 8 3 18 6 11 9 5 13 6 21 10 1
0	
Vxn	5 17 2 . . 7 7 1 9 10 9 4 8 5 13 1 . . 4 2 . 8 10 2 1
2	
Ogfrl1	. 3 . . . 2 4 8 4 2 . 2 2 4 1 4 3 3 . . 2 3 . 4
1	
2010300C02Rik	. 4 2 4 . 8 3 1 21 4 1 3 6 5 6 5 1 2 2 . 2 18 5 . 1
4	
Igfbp5	4 . . 1 1 1 . 4 3 6 24 1 . . 1 1 4 11 3 . 1 1 2 1 2
.	
Arpc2	1 2 2 4 1 4 2 . 3 2 1 . 1 3 . 2 1 4 3 1 4 2 1 . 4
4	
Ptpn	10 13 4 6 2 8 6 4 11 18 11 4 13 12 10 6 12 17 7 3 4 18 12 2 6
13	
Vxn	4 . 24 1 4 1 1 12 2 6 7 9 6 4 . 5 3 1 22 3 3 . 3 2
1 .	
Ogfrl1	3 1 4 . . 2 3 5 . 3 . 7 3 5 3 . 8 1 1 3 2 1 2 9
1 2	
2010300C02Rik	3 . 10 7 4 9 . 1 3 12 3 4 17 8 . 6 1 1 40 2 6 1 3 1
5 1	
Igfbp5	4 . 6 2 3 4 2 2 2 1 3 8 2 6 1 . . 3 1 5 4 . 3 .
1 2	
Arpc2	3 3 4 4 5 2 1 2 4 5 1 4 3 1 2 1 4 . 15 . . 2 1 .
1 1	
Ptpn	10 18 24 12 15 6 6 15 10 14 5 15 5 17 6 6 4 8 20 6 2 9 10 14
4 1	
Vxn	3 7 5 1 . . 15 13 27 4 . . 2 16 7 5 19 5 9 1 . 4 27 5
6 7	
Ogfrl1	2 3 2 . 4 1 2 6 5 1 3 9 . 3 2 5 . 2 15 3 5 2 1 2 9
2 3	
2010300C02Rik	2 2 6 2 1 1 1 6 8 3 4 4 2 . 1 15 5 6 4 5 1 2 11 12 7
8 8	
Igfbp5	. 6 9 5 5 4 2 3 4 1 1 3 . 5 3 2 5 2 1 3 6 1 2 1 1
2 .	
Arpc2	2 4 2 . 2 . 4 4 4 1 2 4 . 2 1 6 4 5 3 3 3 1 3 2 3
. 1	
Ptpn	6 1 7 9 11 2 20 12 13 9 3 9 2 3 8 14 3 26 17 9 8 4 18 27 18 1

0 6

Vxn	2	27	1	8	3	2	10	3	1	21	1	2	7	.	19	28	3	4	.	10	8	1	4	4	
4																									
Ogfrl1	1	7	4	1	9	.	7	7	1	1	1	4	6	2	2	2	4	4	2	2	6	.	6	5	
5																									
2010300C02Rik	2	5	9	7	5	.	8	.	.	6	.	5	2	.	3	9	3	2	4	3	.	8	20	3	
5																									
Igfbp5	1	.	3	3	3	1	4	1	2	2	2	1	2	1	6	3	.	7	1	2	4	3	1	1	
2																									
Arpc2	.	7	6	2	3	1	6	.	.	1	.	4	2	.	2	4	3	2	.	3	2	3	4	1	
2																									
Ptpn	4	8	11	10	9	3	29	3	6	13	3	3	10	7	14	18	13	13	12	15	12	3	26	5	
6																									

Vxn	26	1	9	10	2	4	4	4	1	.	1	.	2	1	28	1	12	3	9	.	.	11	.	4	5
4																									
Ogfrl1	3	1	3	3	1	2	10	.	8	.	2	1	1	.	4	.	2	.	2	1	1	4	1	3	2
1																									
2010300C02Rik	2	.	8	4	7	11	6	12	1	.	2	2	1	4	5	1	9	4	1	2	.	26	.	8	3
9																									
Igfbp5	6	.	.	1	1	5	2	3	2	4	5	1	5	1	.	1	3	1	.	2	.	6	1	1	4
2																									
Arpc2	2	.	9	1	4	3	7	4	1	.	1	.	2	1	2	2	6	.	4	3	.	8	3	2	.
2																									
Ptpn	8	2	18	7	13	21	24	17	11	3	2	2	3	7	15	1	10	7	3	5	5	27	14	6	13
8																									

Vxn	20	12	2	5	7	.	1	15	3	.	5	.	14	5	3	1	8	5	1	2	.	2	2	4	.
1																									
Ogfrl1	5	2	.	.	5	1	2	4	8	4	2	3	2	3	1	13	3	4	8	1	1	.	2	4	
1																									
2010300C02Rik	7	7	.	2	30	2	2	4	9	1	5	1	8	6	3	2	16	3	.	4	.	4	2	11	.
2																									
Igfbp5	5	1	1	4	9	1	2	.	4	.	1	5	1	2	.	.	3	2	5	6	1	1	1	1	
1																									
Arpc2	2	1	1	3	7	3	1	2	2	.	2	1	2	4	.	2	.	.	4	1	1	1	4	2	
1																									
Ptpn	6	15	5	6	10	14	6	8	11	22	10	6	16	6	4	5	15	14	5	7	2	9	3	18	6
18																									

Vxn	5	4	14	3	3	.	.	2	.	2	3	5	1	.	3	3	6	.	23	1	1	8	14	7	2	4
9																										
Ogfrl1	1	1	3	8	3	2	1	10	1	1	4	1	2	.	1	3	5	4	4	4	2	2	5	.	2	
3																										
2010300C02Rik	9	1	4	2	3	.	.	2	.	2	1	5	2	9	2	1	2	1	3	4	4	4	8	7	5	
.																										
Igfbp5	1	1	.	2	1	1	3	3	.	4	4	2	1	.	3	3	5	1	2	1	4	9	5	3	.	
.																										
Arpc2	2	2	.	1	.	1	2	2	.	2	2	1	.	4	.	.	2	.	5	4	4	3	6	5	2	
1																										
Ptpn	12	9	12	5	5	5	1	4	.	5	7	3	14	5	4	2	10	5	11	12	16	7	20	5	5	
9																										

Vxn	1	16	2	2	.	10	1	.	1	7	5	1	4	15	11	1	1	7	11	1	2	11	6	1	.
2																									

singlecell

Ogfrl1	1 . 6 1 11 1 3 . 4 1 . 1 . 4 6 1 2 2 4 11 . 3 1 . 1
5	
2010300C02Rik	2 2 . 5 . . 1 2 1 12 2 . 2 7 2 2 2 . 9 1 2 1 3 6 6 1
4	
Igfbp5	5 2 3 2 2 . 7 3 2 . 2 3 4 1 4 3 2 2 5 1 1 6 3 1 1
1	
Arpc2	3 1 2 1 3 2 . 2 1 8 1 2 2 3 1 2 1 1 1 2 . 3 1 3 4
2	
Ptpnn	5 8 9 14 6 7 3 4 9 17 5 9 7 11 8 13 12 3 8 9 6 10 8 6 6
7	
Vxn	1 4 13 2 8 18 1 . 2 . 10 . 8 . 7 14 . . 4 . 3 4 2 1
6 .	
Ogfrl1	13 . 3 2 2 5 . 5 8 1 9 5 9 3 3 2 1 5 5 1 2 2 5
7 1	
2010300C02Rik	1 3 5 8 5 7 2 . 1 . 24 . 29 3 6 6 4 . 27 9 2 17 26
4 8	
Igfbp5	5 1 . . 1 3 3 1 . . . 3 . 3 . 2 2 5 2 1 2 4
1 .	
Arpc2	3 2 1 2 2 2 . 2 1 . 7 4 6 3 2 3 1 1 5 4 1 11 4
6 1	
Ptpnn	12 4 13 10 11 12 6 4 7 1 29 12 29 3 14 22 3 11 16 16 4 9 13 2
1 8	
Vxn	2 1 2 19 2 4 18 7 14 1 3 1 1 3 . 16 5 2 . 4 1 10 3 2 3
9	
Ogfrl1	3 2 1 4 . 1 3 2 2 7 . . 1 2 15 2 6 10 5 3 6 1 2 2 4
1	
2010300C02Rik	. 2 1 7 4 8 12 7 7 4 2 1 . 10 2 7 2 1 2 3 . 16 7 7 1
3	
Igfbp5	1 . 5 2 . 1 3 . 3 4 2 2 3 7 2 2 . . 1 3 2 3 9 1 2
. .	
Arpc2	2 1 . 4 1 4 4 2 2 1 1 2 . 1 1 4 1 5 3 2 3 1 2 3 2
2	
Ptpnn	8 4 5 27 4 13 14 16 20 . 2 5 15 8 14 17 12 15 9 9 5 14 3 5 7
15	
Vxn	3 6 . 5 4 4 8 4 4 6 2 2 1 3 1 15 9 5 4 13 3 3 2 7 16
12	
Ogfrl1	1 3 1 1 2 3 1 1 2 1 1 1 1 3 5 3 2 7 1 7 2 4 2 3 2
4	
2010300C02Rik	13 7 1 3 3 8 6 8 33 9 1 6 7 1 1 12 17 36 11 2 . 2 . 7 5
7	
Igfbp5	3 1 6 1 4 1 1 1 3 1 1 1 2 3 . 5 1 7 2 3 4 . 2 3 8
1	
Arpc2	4 2 2 3 2 6 1 1 8 3 3 2 1 1 1 5 2 4 4 1 3 4 2 2 4
3	
Ptpnn	9 29 2 2 8 9 15 7 32 17 7 21 5 4 4 34 11 10 3 8 3 8 5 14 13
12	
Vxn	1 6 3 1 5 9 8 2 4 5 2 1 19 3 . 4 1 1 9 3 1 6 15 15 4 1 4
1 2	
Ogfrl1	3 4 1 1 1 1 3 1 1 . 3 3 5 1 8 1 11 4 6 5 . 1 2 3 2 2 3
2 4	
2010300C02Rik	1 8 2 3 1 3 6 2 4 2 3 . 13 7 . 7 2 1 8 8 1 8 3 4 6 5 6
. 3	

Igfbp5	1 3 2 . . . 2 1 2 1 3 1 4 1 . . 2 1 4 8 3 1 2 2 2 . . 2
1 3	
Arpc2	1 3 . 1 2 1 5 1 1 2 2 3 4 1 4 1 3 2 2 2 3 4 3 . 1 3 1
. 4	
Ptpn	1 19 2 2 3 3 16 4 4 3 9 4 26 5 6 5 8 2 14 11 3 5 6 11 5 7 8
. 7	
Vxn	5 . 19 6 2 3 . 1 4 1 10 24 13 3 37 4 1 8 1 . . 2 . 1 3 9 1
2	
Ogfrl1	1 1 4 1 5 1 . 2 2 1 3 6 2 1 10 2 2 1 1 1 . 2 1 1 5 1 .
.	
2010300C02Rik	. 2 10 4 3 4 5 4 13 2 9 4 2 . 8 . 5 8 6 1 . 2 . 4 34 8 1
1	
Igfbp5	2 . 3 1 3 1 1 2 2 5 3 3 4 3 1 . 1 4 4 2 4 1 3 2 8 . 1
.	
Arpc2	. 1 2 4 2 2 . 2 2 . 3 2 4 2 6 . 1 3 3 . 1 3 . 1 8 1 .
.	
Ptpn	6 2 14 14 4 1 3 7 6 4 16 16 7 6 15 2 4 3 18 1 4 4 3 9 8 8 3
4	
Vxn	1 2 7 3 18 6 2 29 5 13 4 . 1 19 . 1 10 . 3 4 1 1 3 1 .
2	
Ogfrl1	1 1 . 10 4 3 5 4 1 4 5 2 . 3 2 5 2 2 3 6 2 2 2 6 4
4	
2010300C02Rik	1 6 7 . 3 1 2 6 5 21 25 . 7 2 . 2 8 4 10 9 1 9 1 3 1
7	
Igfbp5	. 3 . 6 3 4 1 1 1 . 1 1 2 2 2 1 . 5 3 6 2 6 3 2 1
4	
Arpc2	1 1 3 1 3 . 3 . 3 6 5 . . 6 2 2 3 1 2 4 1 2 2 4 2
3	
Ptpn	14 9 8 13 19 7 2 10 6 9 27 19 6 22 6 4 13 3 8 22 8 27 3 7 5
11	
Vxn	2 12 13 5 5 10 1 7 1 . 6 3 1 14 2 12 5 4 13 1 3 . . 2 1 12
4	
Ogfrl1	2 3 5 1 2 8 4 3 2 . 5 6 4 3 2 2 2 1 3 1 2 5 . 1 2 6
2	
2010300C02Rik	3 7 17 5 10 3 . 3 . 1 . 1 . 5 . 5 3 2 6 . 2 . 5 5 3 6
1	
Igfbp5	. 1 4 2 4 1 . 1 3 1 6 . 1 2 7 3 3 5 2 2 . 1 8 4 2 3
.	
Arpc2	1 9 5 4 2 4 2 4 2 . 1 4 4 1 1 4 . . 3 . 2 3 1 . . 2
5	
Ptpn	5 33 15 5 12 6 4 13 13 . 2 9 5 7 4 13 1 8 7 4 8 8 5 6 4 5
5	
Vxn	2 1 1 7 3 1 33 3 2 1 . 5 27 2 10 9 4 5 . 4 7 6 1 . 1
8	
Ogfrl1	10 3 8 2 1 5 5 1 1 . 9 4 3 10 6 3 2 3 3 4 . 3 5 6 7
2	
2010300C02Rik	1 3 . 14 1 5 5 2 1 6 1 22 7 . 5 8 6 8 9 4 2 14 3 1 2
3	
Igfbp5	3 5 2 . . . 2 . 7 4 . 4 3 2 8 2 2 3 1 1 1 5 3 2 . 3
13	
Arpc2	1 . 2 2 2 . . 2 . 1 2 3 6 3 7 6 4 1 1 1 1 4 4 1 2
1	

Ptpn6	11 3 8 15 . 2 8 9 12 2 8 21 18 6 22 8 10 8 12 10 6 15 7 9 7
Vxn1	36 4 3 . 4 10 1 3 1 2 . . 3 5 1 1 8 27 2 . 1 . 1 4 2
Ogfrl12	5 1 1 4 2 6 3 5 . 1 2 2 3 1 1 2 3 3 2 . . 1 2 6
2010300C02Rik6	9 11 4 . 12 7 9 34 9 1 5 1 9 1 3 11 18 1 1 1 . 1 10 5 2
Igfbp55	. 5 9 1 3 3 1 7 . 2 4 1 2 2 4 1 2 2 . 2 3 3 3 1 1
Arpc21	4 2 . 1 1 1 1 7 1 2 1 2 1 1 1 3 5 2 1 1 . 1 2 5 2
Ptpn17	31 5 6 3 12 6 9 21 5 3 12 6 6 2 7 14 11 13 10 6 4 . 40 17 8
Vxn6	1 6 4 1 11 6 . 4 16 29 19 29 19 . 17 11 6 1 14 . 8 3 2 5
Ogfrl11	. 4 2 10 1 2 4 3 3 1 2 8 4 4 2 6 1 8 4 7 16 1 4 1
2010300C02Rik3	. 1 7 . 5 5 1 28 7 1 8 5 5 2 24 7 11 2 11 1 9 1 8 4
Igfbp52	2 4 3 1 1 1 2 8 1 5 . 1 2 . 1 5 3 1 2 2 . . 1 1
Arpc22	2 1 5 4 1 2 3 7 2 1 2 2 5 4 7 1 1 3 2 3 3 1 3 3
Ptpn8	1 7 10 5 9 5 1 15 12 16 19 7 14 4 21 6 10 2 21 3 21 10 1 9
Vxn4	. 10 . 2 8 8 19 . . 13 2 3 1 9 1 2 2 2 . 9 3 3 8 1 1 3 6
Ogfrl13	1 2 1 . . 1 1 6 1 2 . 5 3 3 7 8 . 1 1 1 . 1 2 . 2 . 2
2010300C02Rik3	. 1 1 2 3 4 9 1 . 4 1 2 8 16 . 3 . 2 2 1 1 9 3 1 11 4 .
Igfbp53	5 2 1 . 4 2 1 2 2 3 1 1 1 5 4 . 3 1 2 . 4 . . 5 2 5 1
Arpc22	. 2 . . 1 4 5 1 . 2 1 3 1 5 4 . . 2 1 2 1 3 . . . 2 .
Ptpn3	12 8 3 5 5 6 16 3 3 9 3 20 10 12 6 6 1 8 4 6 4 8 13 4 12 6 7
Vxn2 2	4 4 2 9 9 . . 11 3 20 12 . 19 1 5 12 2 4 2 8 27 1 9 1 2
Ogfrl12 3	4 4 2 2 2 3 . 5 3 1 6 4 1 2 4 7 . 1 3 2 4 7 . 5 .
2010300C02Rik2 5	4 5 . 8 8 1 1 8 3 3 4 . 6 6 1 27 1 8 16 2 7 . 3 . 15
Igfbp53 1	. 2 1 4 2 4 1 4 1 4 2 3 1 1 1 3 1 1 3 . 6 . 5 3 3
Arpc22 5	. . . 4 2 3 . 3 2 2 1 1 9 1 2 5 1 4 1 . 3 2 1 1 1
Ptpn2 5	7 8 1 13 2 7 1 23 12 9 10 12 19 11 7 23 7 8 5 9 18 2 4 5 8
Vxn	10 . 4 . 4 2 5 10 3 . 2 1 8 4 . 2 8 5 2 1 2 7 1 8 5 2 19

17	
Ogfrl1	2 3 . . 2 6 5 2 3 4 3 4 2 3 . 1 8 2 . 5 3 3 5 2 . 5
4	
2010300C02Rik	. 1 3 1 9 1 5 6 11 . 2 . 6 7 . 7 19 5 . 4 . 13 3 2 11 3
5	
Igfbp5	2 4 1 3 1 6 5 4 1 1 1 3 1 4 3 2 3 1 3 3 2 6 . . 2 2
3	
Arpc2	3 . 1 2 3 2 3 2 2 . 1 2 6 3 . 2 8 2 1 1 1 1 3 1 1 2
1	
Ptprrn	5 23 4 5 9 13 4 11 15 6 4 4 9 20 . 2 31 8 2 7 9 16 8 5 5 15
13	
Vxn	2 2 8 2 2 2 10 1 6 3 1 2 5 10 3 2 . 3 5 . 4 9 6 6 1 10 2
14	
Ogfrl1	5 3 7 4 . 3 2 2 2 2 4 5 2 5 3 1 5 . . 2 3 3 . 1 4 3 1
2	
2010300C02Rik	6 3 6 4 1 1 10 1 4 3 3 31 1 22 5 2 . 4 2 4 5 7 1 5 6 7 12
2	
Igfbp5	4 1 4 2 . 2 2 2 2 . 2 5 4 1 2 2 2 1 . . 2 2 3 4 3 1 5
3	
Arpc2	3 1 4 1 2 1 2 . 3 2 3 3 2 6 3 . 2 1 . . 4 1 . 2 1 1 4
5	
Ptprrn	17 7 18 4 1 3 10 4 3 16 11 12 6 10 8 2 8 5 8 1 8 9 3 5 6 7 8
8	
Vxn	4 2 10 . 1 2 3 2 6 6 1 4 6 2 5 . 1 1 7 1 12 . . 4 7
4	
Ogfrl1	1 14 2 1 1 4 . . 5 6 . . 2 3 2 1 8 1 1 9 4 4 3 2 2
2	
2010300C02Rik	7 10 4 2 . 7 1 5 3 5 6 4 4 5 5 2 1 1 10 1 3 . 1 6 4
3	
Igfbp5	5 1 1 4 1 2 12 4 3 7 1 1 6 3 2 . 1 3 3 1 1 . 2 . 1
22	
Arpc2	. 4 3 3 2 2 2 . 1 1 5 1 1 1 4 . 1 3 3 . 3 5 4 4 5
3	
Ptprrn	3 16 15 13 . 6 6 5 8 11 2 10 7 20 11 . 13 4 11 9 12 5 5 10 8
6	
Vxn	5 13 1 2 . 1 1 2 4 4 3 3 . . 16 2 2 8 1 3 4 3 6 6 8
3	
Ogfrl1	2 2 3 10 4 2 6 1 2 4 2 3 1 5 4 1 3 4 10 10 1 2 4 4 2
3	
2010300C02Rik	9 7 13 . 3 . 4 4 5 25 1 14 3 1 8 3 1 10 . 2 4 1 4 1 4
6	
Igfbp5	1 3 3 1 1 2 4 13 2 3 2 5 . 2 1 5 3 3 2 2 2 2 1 1 3
2	
Arpc2	5 . 2 1 2 1 2 2 2 4 3 2 1 3 . . 1 2 3 2 2 3 2 2 1 3
2	
Ptprrn	2 12 8 6 9 5 13 4 4 23 1 15 5 8 15 2 3 7 8 13 8 4 11 8 5
10	
Vxn	31 5 4 6 1 4 1 . 21 . 1 18 2 3 8 9 3 6 3 10 4 3 2 8 7
1	
Ogfrl1	6 1 2 3 2 5 3 3 7 1 . 2 2 1 . 1 1 2 1 10 4 . 1 2 2
2	
2010300C02Rik	2 5 2 11 5 3 . 3 8 6 1 5 . 4 1 5 . 3 2 31 2 7 11 3 6

5	
Igfbp5	3 2 2 1 1 12 4 3 2 2 3 2 3 2 1 1 . 3 5 7 2 2 2 4 1
4	
Arpc2	1 3 . 2 2 4 3 1 4 5 . 5 5 . 4 . 2 5 . 5 4 3 3 1 .
1	
Ptpn	20 12 8 16 4 3 5 2 15 9 3 17 3 9 13 14 3 11 6 9 6 24 14 10 9
14	
Vxn	5 2 10 . . 1 6 . 3 6 14 2 . 13 2 7 3 5 9 1 14 8 8 4 .
4	
Ogfrl1	5 2 23 . 2 5 3 3 8 2 1 3 1 4 2 5 2 3 5 2 4 4 3 . 3
2	
2010300C02Rik	3 3 8 . 7 1 2 1 2 6 4 3 . 4 4 5 4 1 4 4 4 18 4 8 .
4	
Igfbp5	1 . 1 . 2 2 16 . 4 2 . 3 1 . 3 1 4 4 3 4 3 5 . . .
5	
Arpc2	3 2 5 1 . 1 . 3 1 . 6 . 1 1 2 2 1 1 3 3 4 8 4 5 .
4	
Ptpn	6 3 44 3 12 8 16 4 11 2 17 13 2 15 6 12 2 2 9 9 14 15 15 12 4
16	
Vxn	. 8 6 1 8 6 1 7 6 3 3 6 3 . 1 2 3 2 6 2 12 6 1 5 . 2
18	
Ogfrl1	4 2 2 5 1 7 9 4 4 2 1 5 1 . . 2 4 . 7 1 4 6 3 2 1 1
2	
2010300C02Rik	. 1 2 1 1 4 4 1 9 4 4 2 8 3 . 2 12 3 1 10 3 1 4 4 2 8 2
5	
Igfbp5	5 2 4 . 10 16 2 6 9 2 4 1 1 2 4 4 1 . 1 3 2 . 2 . 4 15
2	
Arpc2	1 . 3 . 1 14 3 . 3 1 . 5 . 3 6 1 . 4 . . 5 2 . 3 1
3	
Ptpn	10 3 7 6 2 20 5 8 6 8 1 17 10 3 7 23 3 1 15 4 10 11 5 11 7 2
9	
Vxn	4 . 2 4 15 6 3 1 1 8 10 11 4 5 . 2 8 19 3 6 7 3 1
2	
Ogfrl1	2 2 1 10 6 2 6 12 3 1 6 3 . 3 . . 17 4 . . 2 3 2
4	
2010300C02Rik	5 10 19 . 3 2 2 . 7 . 14 9 7 11 . 1 13 8 1 4 4 2 6
1	
Igfbp5	1 . 5 3 3 2 3 2 2 4 10 . 5 2 1 2 3 1 6 4 3 . 4
8	
Arpc2	2 2 6 . 2 2 . 2 2 . 5 2 2 . 2 1 8 1 . . 2 . 2
1	
Ptpn	7 5 21 8 11 10 7 6 16 4 28 18 21 8 10 6 30 10 5 3 16 8 11
13	
Vxn	. 9 3 8 2 17 3 12 6 . 2 . 6 1 1 4 4 1 18 1 3 1 7 19 32
7	
Ogfrl1	1 3 3 1 . 5 2 5 3 5 6 . 1 . 1 2 2 12 3 1 . 7 3 5 5
6	
2010300C02Rik	2 15 8 8 1 3 2 8 2 . . 1 4 . 1 9 3 . 4 2 2 2 6 5 3
9	
Igfbp5	3 2 . 3 4 4 1 1 . 2 2 5 2 3 4 4 1 1 4 . 5 1 1 1 4
3	
Arpc2	3 2 1 4 1 2 2 1 2 2 1 1 2 . . 7 2 . 1 2 3 1 5 5 3

1	
Ptprn	10 13 10 16 1 5 6 13 6 6 5 1 10 1 9 7 4 6 10 6 . 4 15 16 20
13	
Vxn	11 . 20 3 14 1 12 3 11 1 8 21 17 4 3 5 1 2 7 4 1 8 4 . 7
2	
Ogfrl1	2 5 3 2 3 6 2 1 3 1 1 3 1 . . 2 . 3 2 . 2 . 4 1
4	
2010300C02Rik	5 3 4 2 9 . 7 1 3 . 6 3 3 2 4 . 2 4 7 8 1 12 7 2 6
1	
Igfbp5	2 . 1 . 2 1 2 3 1 2 2 . 1 . . 1 2 1 2 1 2 5 . 2 1
1	
Arpc2	3 . 2 2 2 . 2 3 4 . 2 5 3 2 3 1 2 2 3 1 1 3 7 3 2
1	
Ptprn	9 8 6 4 18 9 13 10 25 5 8 7 13 8 6 6 14 2 12 11 1 13 6 8 10
6	
Vxn	2 2 2 10 25 7 15 3 12 3 2 15 9 7 6 5 1 7 6 13 11 3 5 15 10
3 .	
Ogfrl1	3 1 5 1 7 5 7 . 3 1 4 . 1 1 2 4 . . 4 4 4 4 2 5 .
2 2	
2010300C02Rik	6 1 2 5 6 9 18 . 6 2 1 13 10 2 2 14 3 4 4 4 26 2 10 3 4
4 1	
Igfbp5	5 . 3 1 1 1 1 3 2 . . 1 4 . . 1 . 4 1 1 1 2 4 5 .
2 3	
Arpc2	5 3 2 2 3 4 10 . 1 . . 7 2 . 2 6 1 5 1 3 9 4 6 3 3
1 2	
Ptprn	7 . 3 14 27 8 15 3 14 4 3 12 24 6 6 21 2 1 8 13 27 7 34 12 13
5 1	
Vxn	2 7 5 8 . 5 16 1 11 7 . 2 3 . . 3 2 8 . 2 2 7 3 1
15	
Ogfrl1	5 8 2 4 1 2 4 1 8 2 8 4 1 . 3 2 4 3 1 . 9 3 2 10
3	
2010300C02Rik	. 12 9 8 . 13 3 1 5 7 . 1 7 . . 6 1 10 6 1 1 3 11 1
5	
Igfbp5	. 1 1 4 1 . 1 . 2 2 2 1 3 1 5 7 1 4 1 1 4 2 6 .
.	
Arpc2	3 7 3 5 1 2 1 2 . 3 2 2 3 2 . 1 3 4 4 . . 3 7 2
2	
Ptprn	6 27 10 16 3 8 9 2 14 21 3 8 15 7 6 14 4 22 14 9 4 12 13 5
15	
Vxn	8 . 4 . 2 . 1 1 5 . . 7 1 . 10 14 . 24 9 4 3 13 . 15
4	
Ogfrl1	5 1 1 29 2 10 8 3 1 2 2 2 4 . 3 4 10 4 3 3 3 3 7 . 4
3	
2010300C02Rik	11 . 4 1 2 . . 1 3 1 1 9 2 2 6 4 3 10 9 . . 10 1 7
3	
Igfbp5	. 1 1 2 1 . 1 3 2 3 3 1 2 3 1 2 5 5 5 3 3 . 1 1
6	
Arpc2	1 1 6 1 2 1 2 4 1 4 3 2 . 2 2 4 3 . 6 1 1 8 . 4
.	
Ptprn	12 4 12 13 6 11 14 10 6 6 6 12 2 7 10 13 13 23 36 3 9 11 4 10
2	

singlecell

Vxn	1	2	1	1	10	1	3	1	27	1	4	4	3	14	6	3	8	6	20	3	2	8	11	6		
11																										
Ogfrl1	3	3	6	3	4	5	2	.	3	1	2	1	3	4	1	1	.	3	5	4	2	7	2	1		
1																										
2010300C02Rik	12	3	.	.	6	1	6	9	3	4	6	.	1	1	8	2	2	3	6	11	.	16	3	10		
5																										
Igfbp5	3	1	.	3	2	1	2	1	1	3	4	5	1	.	1	3	7	2	3	.	2	.	2	2		
2																										
Arpc2	5	2	5	2	1	1	6	6	2	2	1	1	.	1	4	2	3	5	3	4	3	5	3	3		
3																										
Ptprn	10	5	9	2	8	5	11	20	11	13	3	3	5	9	16	7	5	10	13	10	7	20	9	11		
8																										
Vxn	3	4	5	25	6	2	5	1	9	.	2	4	3	1	1	2	3	.	1	.	1	2	5	9	3	
19																										
Ogfrl1	1	.	2	3	3	.	4	1	4	6	3	7	1	2	3	2	1	1	1	.	4	.	4	2	2	
2																										
2010300C02Rik	1	2	9	10	5	.	15	4	1	1	3	10	4	5	2	3	9	.	8	.	1	.	2	11	14	
4																										
Igfbp5	.	1	2	5	.	.	1	2	6	1	2	.	5	2	1	6	.	.	3	1	5	3	2	.	.	
2																										
Arpc2	1	2	1	1	3	2	5	1	6	3	1	7	1	.	1	2	6	.	1	1	3	2	1	2	7	
1																										
Ptprn	3	8	18	10	8	1	11	2	19	11	13	18	5	4	6	7	10	5	7	3	7	1	10	10	8	2
15																										
Vxn	5	20	3	1	5	6	4	2	12	13	2	3	1	1	6	8	1	1	9	5	9	3	3	3		
9																										
Ogfrl1	4	9	1	2	3	1	2	1	4	3	7	1	9	3	5	3	10	3	4	3	1	2	10			
4																										
2010300C02Rik	9	7	3	.	4	7	5	1	3	4	3	7	.	8	17	6	4	1	4	5	9	6	.	1		
4																										
Igfbp5	2	3	1	6	2	1	2	1	2	1	3	1	3	4	2	.	4	8	2	1	3	1	2			
5																										
Arpc2	4	3	2	3	1	6	1	1	4	3	.	1	.	2	9	5	1	.	2	1	5	1	.			
3																										
Ptprn	10	12	3	10	5	7	12	4	6	7	6	3	8	15	20	14	12	13	15	12	7	17	12	2		
2																										
Vxn	3	14	.	2	9	7	4	3	3	7	11	16	10	1	25	2	25	3	2	38	4	.	5	3	3	
8																										
Ogfrl1	4	3	.	.	3	4	2	1	.	4	2	1	3	2	8	.	3	4	10	6	2	2	5	5	2	
2																										
2010300C02Rik	5	2	1	1	21	20	9	1	4	6	23	16	2	.	12	.	5	9	1	8	6	.	5	4	8	
1																										
Igfbp5	5	1	.	3	2	8	6	1	.	1	.	4	3	2	6	.	2	7	1	.	2	4	2	1	1	
.																										
Arpc2	4	6	.	2	4	.	3	.	4	7	3	3	2	3	.	3	1	2	6	1	5	3	2	1		
2																										
Ptprn	16	7	4	4	12	13	4	6	10	8	6	26	18	4	29	3	13	14	9	15	8	5	9	8	7	
13																										
Vxn	2	1	19	15	.	1	7	3	16	1	2	2	3	7	4	1	11	3	6	4	4	2	3	1	1	
2																										
Ogfrl1	1	.	5	1	4	1	18	.	3	8	1	3	3	1	.	14	4	2	6	3	3	2	.	3	1	
2																										

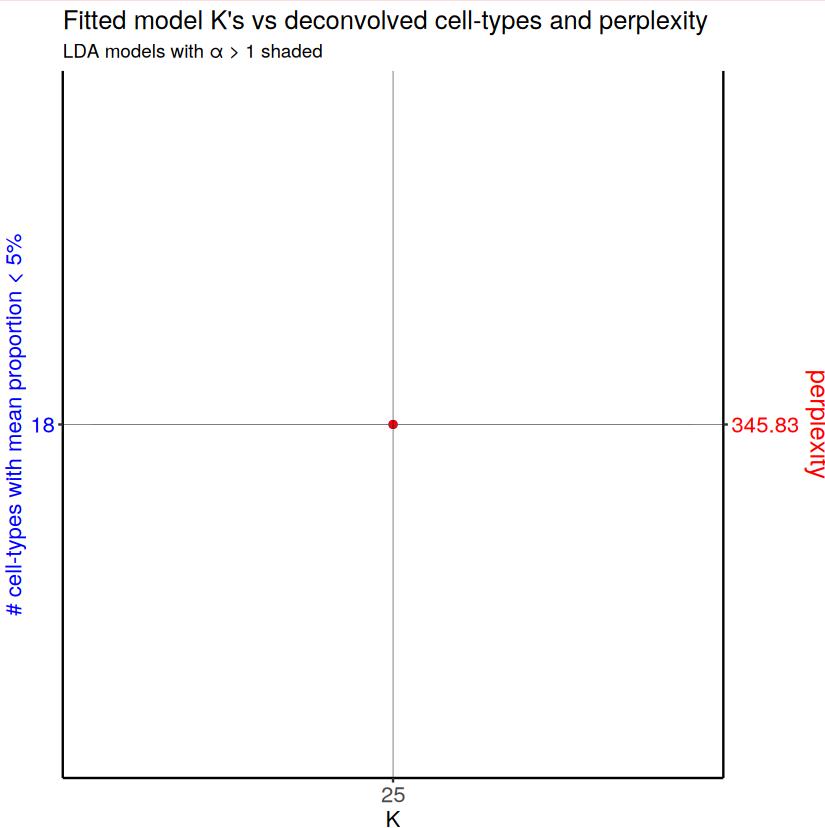
singlecell

2010300C02Rik	5	3	9	2	3	16	10	3	10	.	4	3	5	7	3	.	9	2	6	3	7	13	1	2	3		
4																											
Igfbp5	5	1	1	3	2	5	2	.	1	1	.	2	4	3	3	3	.	5	.	.	2	1	2	3			
1																											
Arpc2	2	.	4	4	1	2	7	1	2	3	3	3	4	.	3	2	5	5	4	1	4	3	3	2	2		
4																											
Ptpnn	16	2	15	16	16	14	23	3	18	5	9	9	17	7	6	5	11	16	7	7	4	10	1	10	9		
10																											
Vxn	.	1	8	.	8	13	.	.	2	10	11	1	3	23	4	7	11	5	.	22	13	9	.	5	17		
21																											
Ogfrl1	.	7	4	2	6	5	1	1	1	3	3	.	2	4	3	5	1	7	6	5	3	7	1	3	6		
1																											
2010300C02Rik	1	.	5	5	14	4	6	1	2	8	5	6	.	7	12	8	17	17	.	7	5	9	3	2	6		
5																											
Igfbp5	3	5	6	3	4	.	1	2	3	2	2	.	1	1	2	.	4	.	4	2	1	2	7	.	.		
2																											
Arpc2	1	1	2	4	4	3	.	.	1	3	6	2	.	.	3	8	6	11	.	2	4	4	4	.	2		
1																											
Ptpnn	1	9	5	2	13	14	6	7	1	17	16	9	2	12	13	20	19	15	7	18	13	7	8	3	8		
7																											
Vxn	.	2	.	5	4	1	2	1	.	19	4	17	1	3	4	1	.	1	7	8	1	3	5	5	5		
6																											
Ogfrl1	1	2	3	.	1	1	4	.	5	6	3	2	2	.	3	3	7	.	1	8	3	3	4	2	1	13	
4																											
2010300C02Rik	2	5	.	6	14	1	1	5	1	.	6	17	7	6	12	2	3	1	2	1	1	5	1	4	9	1	1
0																											
Igfbp5	1	2	5	.	2	.	2	2	3	2	2	4	2	4	.	3	.	2	2	1	3	1	.	1	2	1	
4																											
Arpc2	2	3	2	2	4	1	1	2	.	1	3	2	.	2	2	2	1	1	.	1	4	5	3	3	4	.	
4																											
Ptpnn	5	5	3	10	11	1	6	5	6	4	3	16	29	5	12	4	8	1	8	8	6	7	1	13	19	11	1
2																											
Vxn	16	3	9	3	2	9	3	8	44	2	8	4	2	.	1	16	5	2	23	1	1	4	11	2			
2	.																										
Ogfrl1	1	1	1	6	3	2	6	3	7	12	3	1	5	6	2	6	1	2	6	.	2	5	3	3			
2	6																										
2010300C02Rik	2	4	8	2	2	4	3	.	1	.	5	5	1	9	2	23	2	.	1	5	7	33	3	5			
2	.																										
Igfbp5	2	5	1	2	3	1	1	1	.	2	.	4	2	.	.	3	3	3	.	2	12	3	1				
1	4																										
Arpc2	2	4	3	1	2	2	.	.	8	3	5	1	1	2	2	8	3	.	1	2	2	8	1	3			
2	2																										
Ptpnn	8	6	10	11	2	12	5	14	22	5	11	2	4	6	6	15	3	8	15	4	23	14	9	7	1		
3	7																										
Vxn	13	1	2	7	4	10	.	.	3	8	3	3	9	1	20	8	1	3	2	2	7	3	1	1			
1																											
Ogfrl1	2	4	1	.	10	3	3	1	3	3	2	7	1	1	1	2	1	2	3	4	3	1	4	4			
9																											
2010300C02Rik	7	.	.	8	43	2	3	3	11	18	8	2	4	1	5	10	12	3	.	7	5	7	8	2			
1																											
Igfbp5	1	2	.	.	1	3	2	.	1	3	2	4	.	.	1	1	3	1	1	3	3	.	4	5			
.																											

Arpc2	3	1	1	2	9	5	.	2	2	5	7	1	1	.	3	3	2	3	.	5	5	4	1	3		
5																										
Ptpn	11	2	.	9	30	18	5	11	12	16	10	17	6	5	12	15	7	8	4	15	10	9	13	15		
4																										
Vxn	1	4	24	.	1	10	.	7	1	7	1	4	5	.	1	.	15	.	14	5	1	6	.	18	1	1
8																										
Ogfrl1	1	1	5	1	2	.	.	2	2	2	5	4	1	7	6	7	.	.	2	2	5	.	4	7	1	1
3																										
2010300C02Rik	.	5	8	2	1	2	1	2	7	6	3	10	3	1	.	.	3	2	2	5	.	1	.	5	4	3
15																										
Igfbp5	2	7	1	1	1	5	4	1	.	.	2	2	7	2	.	5	2	.	1	1	.	1	1	4	3	1
3																										
Arpc2	.	3	5	.	1	3	.	1	.	1	3	3	1	7	2	1	2	1	3	.	1	5	.	2	2	.
1																										
Ptpn	2	6	10	1	3	2	7	10	12	11	8	10	5	4	9	7	13	3	14	7	4	2	5	17	23	3
17																										
Vxn	4	1	2	19	.	13	6	4	23	4	13	.	11	13	11	6	4	2	18	4	8	3	2	8		
7																										
Ogfrl1	1	1	2	4	.	4	2	3	6	1	3	.	4	8	2	3	5	.	3	3	1	2	2	2		
2																										
2010300C02Rik	2	1	7	5	.	4	6	15	7	3	8	.	5	6	.	2	11	9	7	3	14	1	2	3		
6																										
Igfbp5	1	1	3	.	1	2	.	3	1	.	3	1	3	7	2	.	1	1	3	3	1	1	2	1		
1																										
Arpc2	1	.	.	3	.	.	.	4	3	1	.	3	4	4	.	.	4	3	6	2	1	.	6	1		
3																										
Ptpn	9	6	19	14	7	8	4	11	13	4	11	12	8	16	3	4	9	11	16	6	18	2	1	3		
15																										
Vxn	5	2	.	1	4	2	14	1	10	5	.	2	13	1	12	23	8	17	3	1	12	4	6	2	4	9
3																										
Ogfrl1	1	.	1	3	4	1	9	1	3	3	2	.	1	3	3	9	1	4	2	5	5	1	3	7	3	4
.																										
2010300C02Rik	4	1	.	5	2	2	7	.	21	19	2	4	3	1	2	8	5	5	7	8	29	3	3	1	2	7
4																										
Igfbp5	1	.	2	.	4	1	2	3	2	2	3	.	1	1	4	4	1	1	1	3	2	.	4	.	6	4
.																										
Arpc2	2	3	.	2	.	2	1	1	7	7	1	.	1	2	4	2	8	1	1	8	9	2	2	2	3	2
.																										
Ptpn	4	4	4	6	7	8	30	1	10	27	4	4	11	9	14	18	4	14	3	20	12	11	8	2	8	16
3																										

```
In [133]: ldas2 <- fitLDA(t(as.matrix(corpus2)), Ks = c(25))
```

```
Time to fit LDA models was 21.7 mins  
Computing perplexity for each fitted model...  
Time to compute perplexities was 0 mins  
Getting predicted cell-types at low proportions...  
Time to compute cell-types at low proportions was 0 mins  
Plotting...  
  
Warning message in ggplot2::geom_point(ggplot2::aes(y = rareCtsAdj, x = K),  
  col = "blue", :  
  "Ignoring unknown parameters: `linewidth`"  
Warning message in ggplot2::geom_point(ggplot2::aes(y = perplexAdj, x = K),  
  col = "red", :  
  "Ignoring unknown parameters: `linewidth`"  
  `geom_line()` : Each group consists of only one observation.  
  i Do you need to adjust the group aesthetic?  
  `geom_line()` : Each group consists of only one observation.  
  i Do you need to adjust the group aesthetic?
```



```
In [135]: optLDA <- optimalModel(models = ldas, opt = "25")
```

```
In [137]: class(optLDA)
```

'LDA_VEM'

```
In [139]: optimalModel
```

```

function (models, opt)
{
  if (opt == "kneed") {
    m <- models$models[[which(sapply(models$models, slot,
      "k") == models$kneedOptK)]]
  }
  else if (opt == "min") {
    m <- models$models[[which(sapply(models$models, slot,
      "k") == models$minOptK)]]
  }
  else if (opt == "proportion") {
    m <- models$models[[which(sapply(models$models, slot,
      "k") == models$ctPropOptK)]]
  }
  else if (opt %in% sapply(models$models, slot, "k")) {
    m <- models$models[[which(sapply(models$models, slot,
      "k") == opt)]]
  }
  else {
    stop("`opt` must be either 'kneed', 'min', 'proportion', or
integer of a fitted K")
  }
  return(m)
}

```

In [141... `results <- getBetaTheta(optLDA, perc.filt = 0.05, betaScale = 1000)`

Filtering out cell-types in pixels that contribute less than 0.05 of the pixel proportion.

In [143... `deconProp <- results$theta`
`deconGexp <- results$beta`

In [276... `dim(deconProp)`
`dim(deconGexp)`

2549 · 25

25 · 476

In [278... `dim(pos)`

4992 · 2

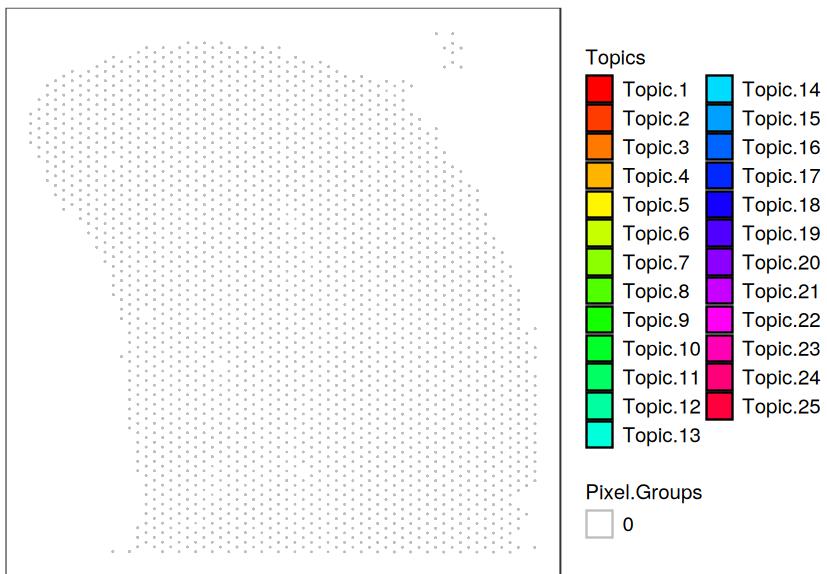
In [145... `head(deconProp)`

	1	2	3	4	5	6	7	8
AAACAGAGCGACTCCT- _1	0	0	0.0000000	0	0.3030455	0.00000000	0.0000000	0.00000000
AAACCACATACACAGAT- _1	0	0	0.0000000	0	0.3359897	0.06797027	0.0000000	0.00000000
AAACCCGAACGAAATC- _1	0	0	0.0000000	0	0.0000000	0.00000000	0.2242207	0.00000000
AAACCGGGTAGGTACC- _1	0	0	0.1759473	0	0.0000000	0.00000000	0.0000000	0.09463597
AAACCGTTCGTCCAGG- _1	0	0	0.0000000	0	0.0000000	0.05991100	0.0000000	0.00000000
AAACGAAGAACATACC- _1	0	0	0.0000000	0	0.1641802	0.00000000	0.0000000	0.15833095



In [147]: `## visualize deconvolved cell-type proportions
ppos <- pos[rownames(deconProp),]
colnames(ppos) <- c('x', 'y')
vizAllTopics(deconProp, ppos, r=0.4)`

Plotting scatterpies for 2549 pixels with 25 cell-types...this could take a while if the dataset is large.



In [322... [head\(ppos\)](#)

A data.frame: 6 × 2

	x	y
	<dbl>	<dbl>
AAACAGAGCGACTCCT-1	391.5173	104.7661
AAACCCGAACGAAATC-1	220.3323	38.3909
AAACCGGGTAGGTACC-1	237.2540	314.3201
AAACCGTTCGTCCAGG-1	182.0070	269.9825
AAACGAAGAACATACC-1	435.8111	199.8688
AAACGAGACGGTTGAT-1	275.6887	152.4923

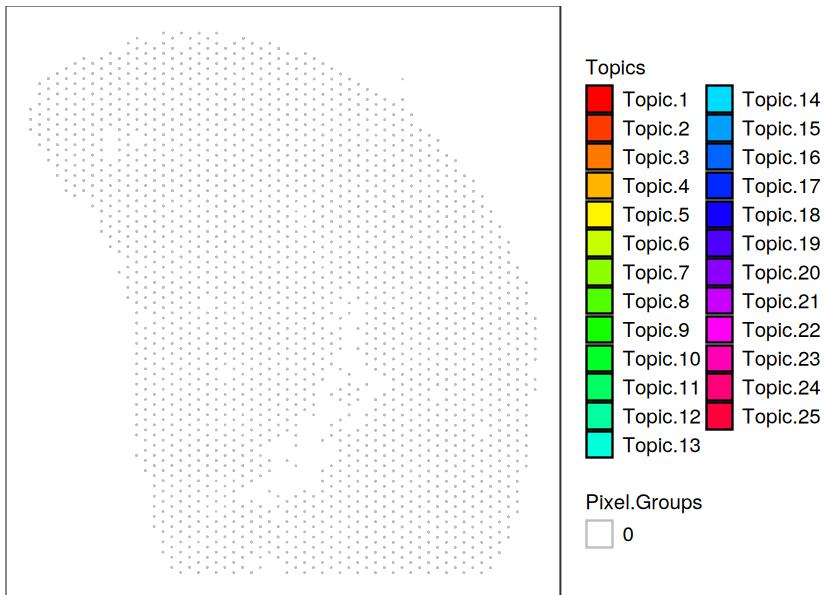
In []:

In [148... [## again choose optimal number of cell-types](#)

```
optLDA2 <- optimalModel(models = ldas2, opt = "25")
results2 <- getBetaTheta(optLDA2, perc.filt = 0.05, betaScale = 1000)
deconProp2 <- results2$theta
deconGexp2 <- results2$beta
ppos <- pos[rownames(deconProp2),]
colnames(ppos) <- c('x','y')
vizAllTopics(deconProp, ppos, r=0.4)
```

Filtering out cell-types in pixels that contribute less than 0.05 of the pixel proportion.

Plotting scatterpies for 2176 pixels with 25 cell-types...this could take a while if the dataset is large.



In [300]: `head(results2)`

\$beta

	Ttr	Pmch	Hcrt	Hbb-bs	I
1	3.902712e-02	2.819449e-03	1.000837e-03	5.054499e+02	2.25368
2	1.244657e-14	2.676688e-11	4.213838e-19	1.384619e-06	2.61496
3	2.133051e-15	3.795703e-09	2.108959e-18	7.214333e-07	5.80247
4	7.148231e-15	6.360135e-10	1.668895e-22	1.006983e-05	1.44099
5	1.715463e-05	1.613374e+02	4.347195e+01	6.366543e-11	4.57398
6	2.731705e-14	1.850255e-05	1.967573e-17	1.466463e-05	7.26299
7	5.590412e-14	1.936127e-06	5.524941e-02	6.964108e-07	1.27634
8	5.041032e-07	8.181025e-12	1.210214e-07	1.365319e-01	2.30049
9	1.083716e-07	1.253502e-09	5.016872e-10	1.522701e-01	6.73733
10	6.456811e-05	1.308629e-10	1.009077e-08	4.374852e+00	3.416379
11	6.825532e+02	1.129465e-11	1.700339e-43	1.684918e-17	1.550398
12	2.460338e-12	1.737596e-07	2.276692e-10	3.327359e-06	2.10202
13	8.819196e-09	3.675562e-10	1.286020e-30	2.869170e-14	4.24261
14	6.435092e-09	8.763221e-10	5.337554e-24	8.275187e-08	4.18643
15	3.089960e-18	5.671960e-08	2.938837e-09	4.423947e-08	2.18065
16	5.034813e-13	6.260360e-01	5.786160e-02	5.143746e-06	7.82610
17	7.167144e-17	6.830497e-09	1.748599e-13	1.713740e-05	9.45746
18	2.057320e-09	4.438441e-06	3.736984e-16	8.623372e-03	1.69913
19	1.078665e-14	2.119811e-06	2.118777e-10	4.076990e-10	1.78741
20	2.171499e-19	3.146257e-10	1.522422e-31	4.547911e-11	1.39627
21	2.479607e-13	1.476269e-07	6.555254e-20	1.185452e-07	4.37059
22	8.490483e-18	2.977837e-05	1.283425e-30	8.671931e-07	5.12820
23	3.968476e-21	6.861830e-17	5.614311e-26	2.834363e-19	5.63353
24	1.444921e-17	9.631959e-07	1.031895e-15	5.606208e-06	7.34494
25	7.789231e-18	1.530408e-08	5.319390e-07	6.421893e-07	1.48816

\$theta

1	2	3	4
---	---	---	---

	1	2	3	4	5
AAACAGAGCGACTCCT-1	0.00000000	0.00000000	0.0000000	0.09551323	0.00000000
AAACCCGAACGAAATC-1	0.00000000	0.00000000	0.0000000	0.00000000	0.26776705
AAACCGGGTAGGTACC-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAACCGTTCGTCCAGG-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAACGAAGAACATAACC-1	0.00000000	0.00000000	0.0000000	0.00000000	0.2
AAACGAGACGGTTGAT-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAACGTGTTGCCCTA-1	0.00000000	0.41294256	0.0000000	0.12033353	0.00000000
AAACTAACGTGGCGAC-1	0.00000000	0.00000000	0.0000000	0.00000000	0.4
AAACTCGTATATAAG-1	0.00000000	0.00000000	0.1082473	0.00000000	0.00000000
AAACTGCTGGCTCCA-1	0.37143451	0.00000000	0.0000000	0.00000000	0.00000000
AAAGCTTGCTACATA-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAAGGGATGTAGCAAG-1	0.00000000	0.00000000	0.0000000	0.07653232	0.00000000
AAAGGTAAGCTGTACC-1	0.00000000	0.28239845	0.0000000	0.00000000	0.00000000
AAAGTAGCATTGCTCA-1	0.00000000	0.14063836	0.0000000	0.00000000	0.00000000
AAAGTCACTGATGTAA-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAAGTGTGATTTATCT-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAAGTTGACTCCCCGTA-1	0.00000000	0.00000000	0.0000000	0.00000000	0.06600037
AAATAACCATACTGGGA-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAATAAGGTAGTGCCC-1	0.09702137	0.00000000	0.0000000	0.00000000	0.00000000
AAATACCTATAAGCAT-1	0.00000000	0.00000000	0.0000000	0.00000000	0.12367809
AAATAGCTTAGACTTT-1	0.00000000	0.00000000	0.0000000	0.00000000	0.10901068
AAATCGTGTACCAACAA-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000
AAATGATTGATCAGC-1	0.00000000	0.00000000	0.0000000	0.00000000	0.00000000

	1	2	3	4	5
AAATGGCATGTCTTGT-1	0.00000000	0.20699068	0.00000000	0.09844969	0.00000000
AAATGGTCAATGTGCC-1	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
AAATTAACGGGTAGCT-1	0.00000000	0.36300199	0.00000000	0.00000000	0.00000000
AAATTACACGACTCTG-1	0.00000000	0.08981150	0.00000000	0.00000000	0.00000000
AAATTCCAGGTCCAAA-1	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
AAATTGATAAGTCCTT-1	0.00000000	0.08699323	0.00000000	0.08265797	0.00000000
AAATTGGTGAGAAGCA-1	0.00000000	0.25878221	0.00000000	0.10726885	0.00000000
:	:	:	:	:	:
TTGCTGAAGGAACCAC-1	0.0000000	0.12255477	0.0000000	0.00000000	0 0.08
TTGCTGATCATGTTCG-1	0.0000000	0.00000000	0.1321808	0.00000000	0 0.00
TTGCTGGCCGGGCTTC-1	0.0000000	0.08195924	0.0000000	0.17359286	0 0.16
TTGGACATGTGGCTTA-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGGATATCGTCTACG-1	0.0000000	0.00000000	0.0000000	0.05544163	0 0.07
TTGGATCGACTTCTGG-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.10
TTGGATTGGTACCAAC-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.06
TTGGCCTAGAATTCG-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGGCGATCCGAATAT-1	0.1352593	0.00000000	0.0000000	0.00000000	0 0.00
TTGGCTCGCATGAGAC-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGGGACACTGCCGC-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGGGCGGCGGTTGCC-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGGGTTTATTCAGCG-1	0.0000000	0.16747293	0.0000000	0.22327635	0 0.13
TTGGTATGGCTTGTGT-1	0.1618544	0.00000000	0.0000000	0.00000000	0 0.00
TTGGTCACACTCGTAA-1	0.0000000	0.15169674	0.0000000	0.00000000	0 0.00
TTGGTTCGCTCAAAGG-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00

	1	2	3	4	5
TTGTAAGGACCTAAGT-1	0.0000000	0.07229089	0.0000000	0.47409251	0 0.00
TTGTAAGGCCAGTTGG-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGTAATCCGTACTCG-1	0.0000000	0.38690884	0.0000000	0.00000000	0 0.00
TTGTATCACACAGAAT-1	0.0000000	0.20879281	0.0000000	0.00000000	0 0.00
TTGTCGTTCAGTTACC-1	0.0000000	0.09686358	0.0000000	0.00000000	0 0.05
TTGTGCCCTGACAGT-1	0.0000000	0.10813932	0.0000000	0.00000000	0 0.00
TTGTGGTAGGAGGGAT-1	0.0000000	0.12189778	0.0000000	0.00000000	0 0.00
TTGTGGTATAGGTATG-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGTGTTCCCCGAAAG-1	0.0000000	0.06014470	0.0000000	0.00000000	0 0.00
TTGTTAGCAAATTGCA-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGTTCAGTGTGCTAC-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGTTGTGTCAAGA-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00
TTGTTTCACATCCAGG-1	0.0000000	0.00000000	0.0000000	0.06779123	0 0.00
TTGTTTCCATACAAC-1	0.0000000	0.00000000	0.0000000	0.00000000	0 0.00

In [350]:

```
## visualize deconvolved cell-type proportions
pos.info <- mbrain_slide_info$slide
pos <- pos.info[, c('imagerow', 'imagecol')]
rownames(pos) <- pos.info$barcode

pos <- pos[, c(2,1)]
pos[,2] <- -pos[,2]
pos[,2] <- pos[,2] - min(pos[,2])
head(pos)

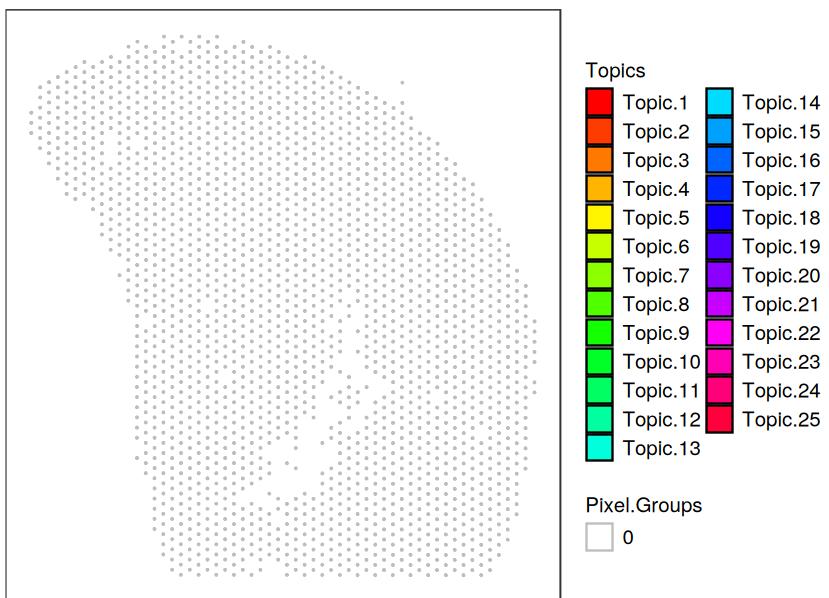
par(mfrow = c(1,1))
ppos <- pos[rownames(deconProp2),]
colnames(ppos) <- c('x', 'y')
par(mfrow = c(1,1))
```

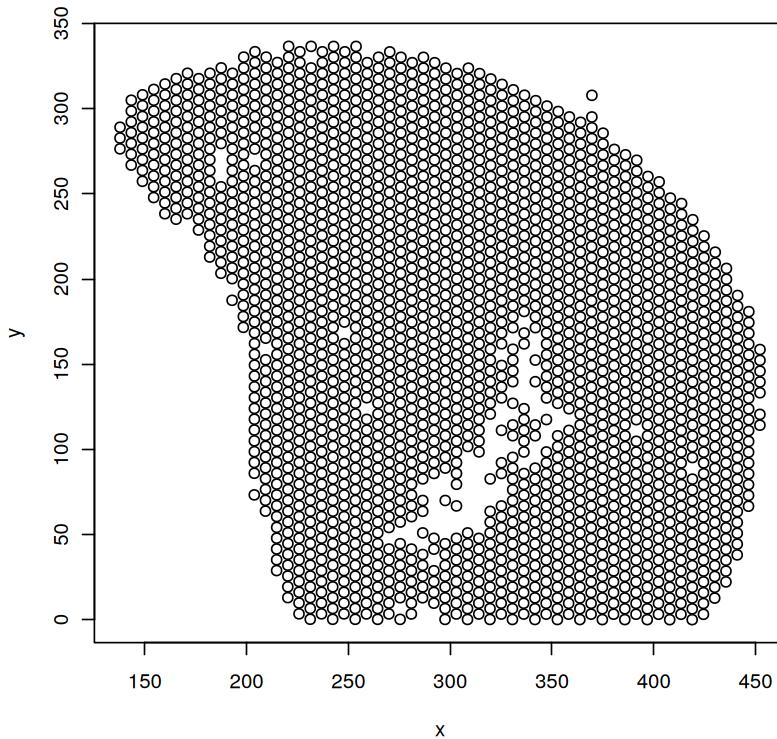
A data.frame: 6 × 2

	imagecol	imagerow
	<dbl>	<dbl>
ACGCCCTGACACCGCGCT-1	469.1954	402.8203
TACCGATCCAACACTT-1	463.6642	399.6721
ATTAAAGCGGACGAGC-1	469.1736	396.4801
GATAAGGGACGATTAG-1	463.6423	393.3100
GTGCAAATCACCAATA-1	469.1736	390.1399
TGTTGGCTGGCGGAAG-1	463.6423	386.9698

```
In [352]: vizAllTopics(deconProp, ppos, r=0.4)  
plot(ppos)
```

Plotting scatterpies for 2176 pixels with 25 cell-types...this could take a while if the dataset is large.





```
In [354]: dim(ppos)
```

```
2176 · 2
```

```
In [356]: colnames(ppos)
```

```
'x' · 'y'
```

```
In [360]: head(ppos)
```

A data.frame: 6 × 2

	x	y
	<dbl>	<dbl>
AAACAGAGCGACTCCT-1	391.5173	104.7661
AAACCCGAACGAAATC-1	220.3323	38.3909
AAACCGGGTAGGTACC-1	237.2540	314.3201
AAACCGTTCGTCCAGG-1	182.0070	269.9825
AAACGAAGAACATACC-1	435.8111	199.8688
AAACGAGACGGTTGAT-1	275.6887	152.4923

```
In [362]: head(pos)
```

A data.frame: 6 × 2

	imagecol	imagerow
	<dbl>	<dbl>
ACGCCCTGACACCGCGCT-1	469.1954	402.8203
TACCGATCCAACACTT-1	463.6642	399.6721
ATTAAAGCGGACGAGC-1	469.1736	396.4801
GATAAGGGACGATTAG-1	463.6423	393.3100
GTGCAAATCACCAATA-1	469.1736	390.1399
TGTTGGCTGGCGGAAG-1	463.6423	386.9698

In [364... `dim(deconProp2)`

2176 · 25

In [344... `dim(cd)`

11575 · 2264

In [366... `head(ppos)`

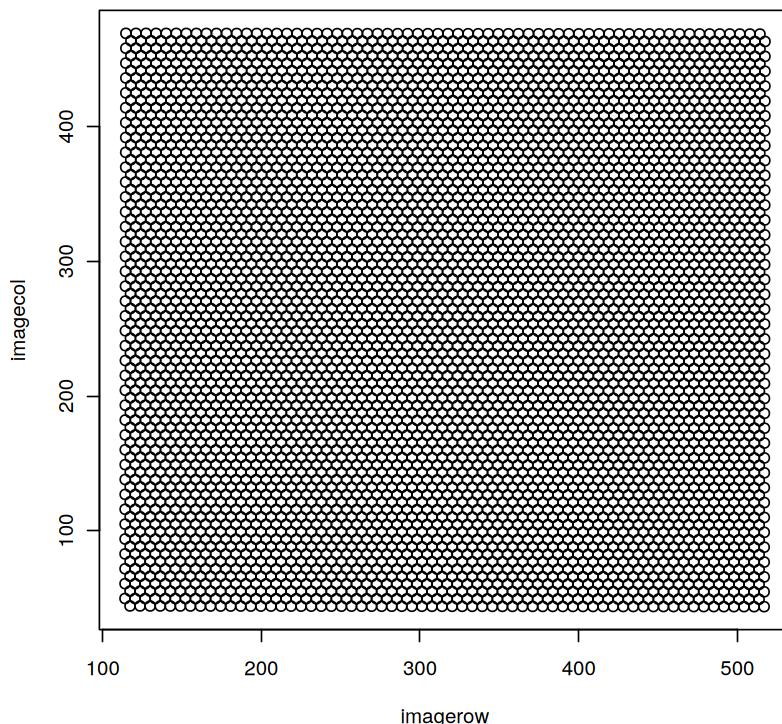
A data.frame: 6 × 2

	x	y
	<dbl>	<dbl>
AAACAGAGCGACTCCT-1	391.5173	104.7661
AAACCCGAACGAAATC-1	220.3323	38.3909
AAACCGGGTAGGTACC-1	237.2540	314.3201
AAACCGTTCGTCCAGG-1	182.0070	269.9825
AAACGAAGAACATACC-1	435.8111	199.8688
AAACGAGACGGTTGAT-1	275.6887	152.4923

In [378... `ppp <- ppos``colnames(ppp) <- c('x', 'y')`In [380... `head(ppp)`

A data.frame: 6 × 2

	x	y
	<dbl>	<dbl>
AAACAGAGCGACTCCT-1	391.5173	104.7661
AAACCCGAACGAAATC-1	220.3323	38.3909
AAACCGGGTAGGTACC-1	237.2540	314.3201
AAACCGTTCGTCCAGG-1	182.0070	269.9825
AAACGAAGAACATACC-1	435.8111	199.8688
AAACGAGACGGTTGAT-1	275.6887	152.4923

In [152... `plot(pos)`In [155... `head(ppos)`

A data.frame: 6 × 2

	x	y
	<dbl>	<dbl>
AAACAGAGCGACTCCT-1	412.7678	391.5173
AAACCCGAACGAAATC-1	479.1430	220.3323
AAACCGGGTAGGTACC-1	203.2138	237.2540
AAACCGTTCGTCCAGG-1	247.5514	182.0070
AAACGAAGAACATAACC-1	317.6651	435.8111
AAACGAGACGGTTGAT-1	365.0415	275.6887

In [156...]

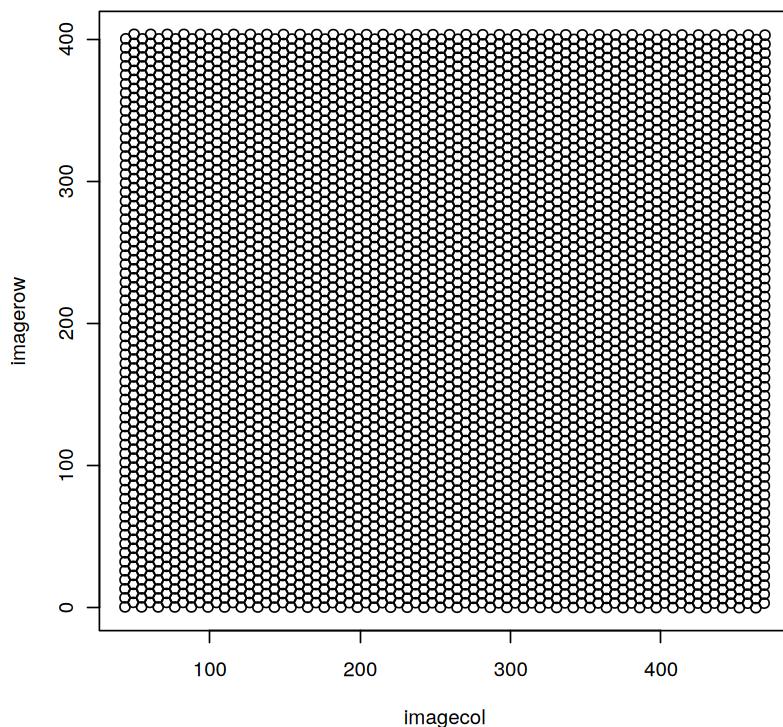
```
## fix position
pos <- pos[, c(2,1)]
pos[,2] <- -pos[,2]
pos[,2] <- pos[,2] - min(pos[,2])
head(pos)
par(mfrow=c(1,1))
plot(pos)
ppos2 <- pos[rownames(deconProp2),]
colnames(ppos2) <- c('x', 'y')
head(ppos2)
par(mfrow=c(1,1))
plot(ppos2)
```

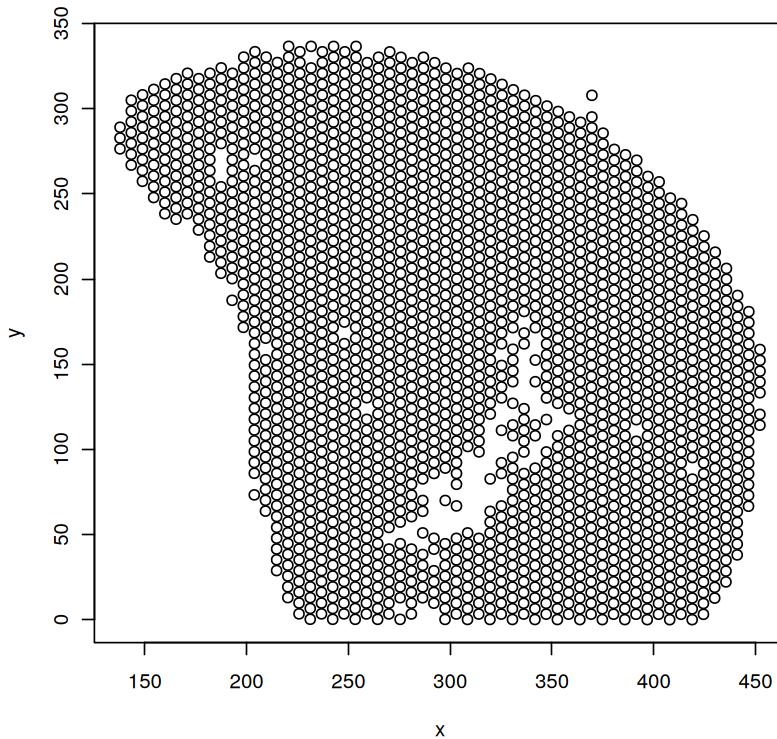
A data.frame: 6 × 2

	imagecol	imagerow
	<dbl>	<dbl>
ACGCCTGACACGCGCT-1	469.1954	402.8203
TACCGATCCAACACTT-1	463.6642	399.6721
ATTAAAGCGGACGAGC-1	469.1736	396.4801
GATAAGGGACGATTAG-1	463.6423	393.3100
GTGCAAATCACCAATA-1	469.1736	390.1399
TGTTGGCTGGCGGAAG-1	463.6423	386.9698

A data.frame: 6 × 2

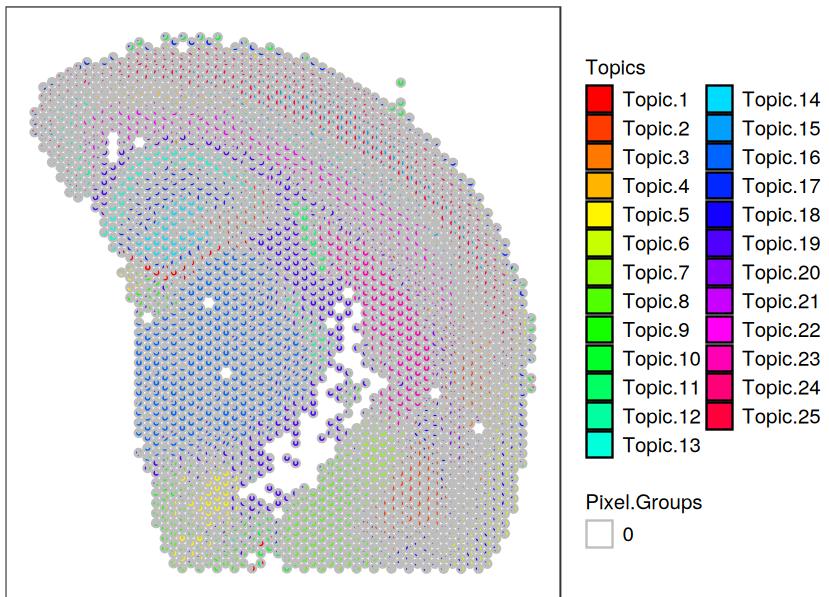
	x	y
	<dbl>	<dbl>
AAACAGAGCGACTCCT-1	391.5173	104.7661
AAACCCGAACGAAATC-1	220.3323	38.3909
AAACCGGGTAGGTACC-1	237.2540	314.3201
AAACCGTTCGTCCAGG-1	182.0070	269.9825
AAACGAAGAACATACC-1	435.8111	199.8688
AAACGAGACGGTTGAT-1	275.6887	152.4923





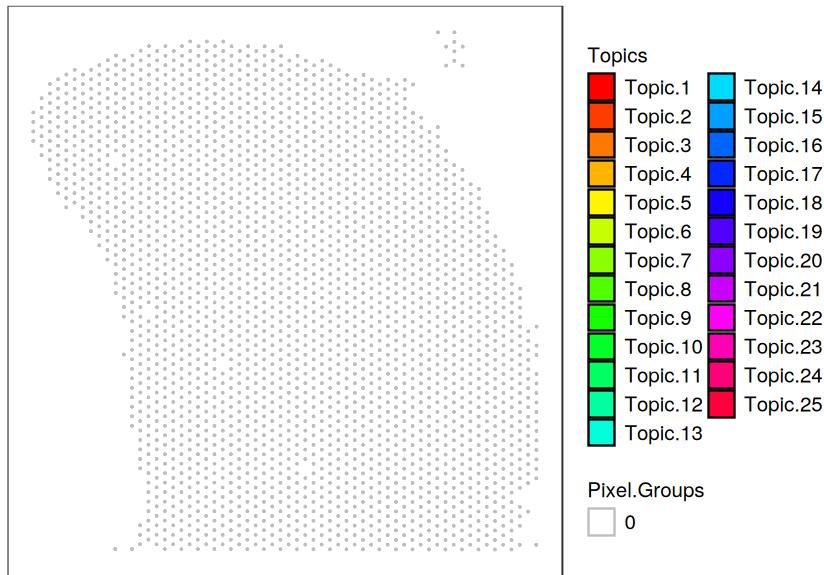
```
In [204]: ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x', 'y')  
vizAllTopics(deconProp2, ppos, r=2.5 )
```

Plotting scatterpies for 2176 pixels with 25 cell-types...this could take a while if the dataset is large.



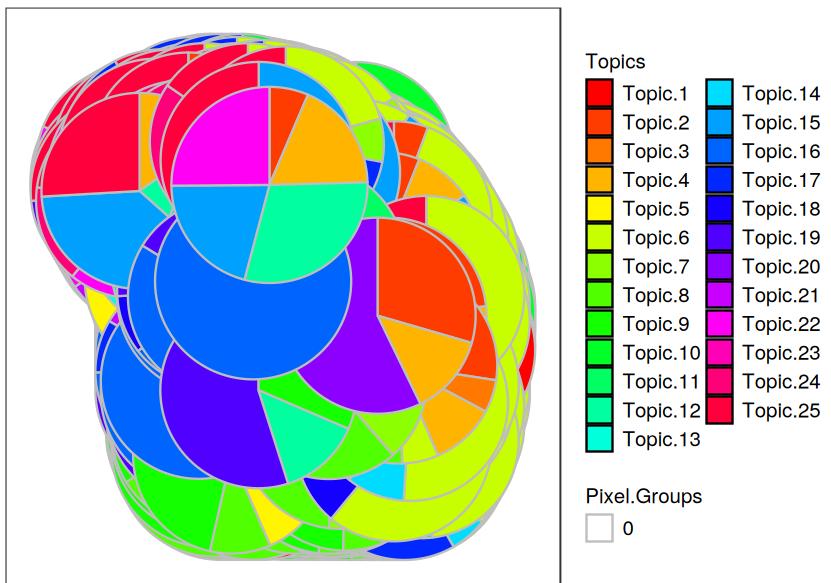
```
In [210]: ## visualize deconvolved cell-type proportions  
ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x', 'y')  
vizAllTopics(deconProp, ppos, r=0.4)
```

Plotting scatterpies for 2549 pixels with 25 cell-types...this could take a while if the dataset is large.



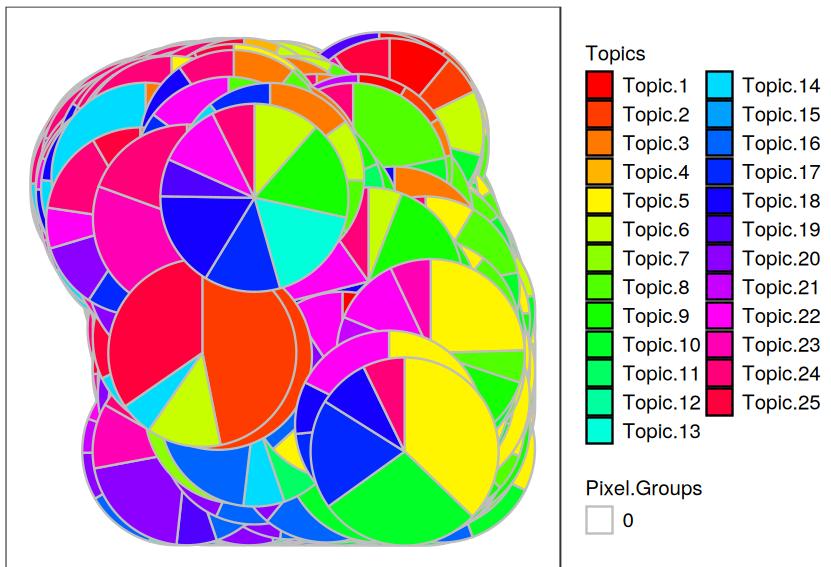
```
In [212]: ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x','y')  
vizAllTopics(deconProp2,ppos, r=100 )
```

Plotting scatterpies for 2176 pixels with 25 cell-types...this could take a while if the dataset is large.



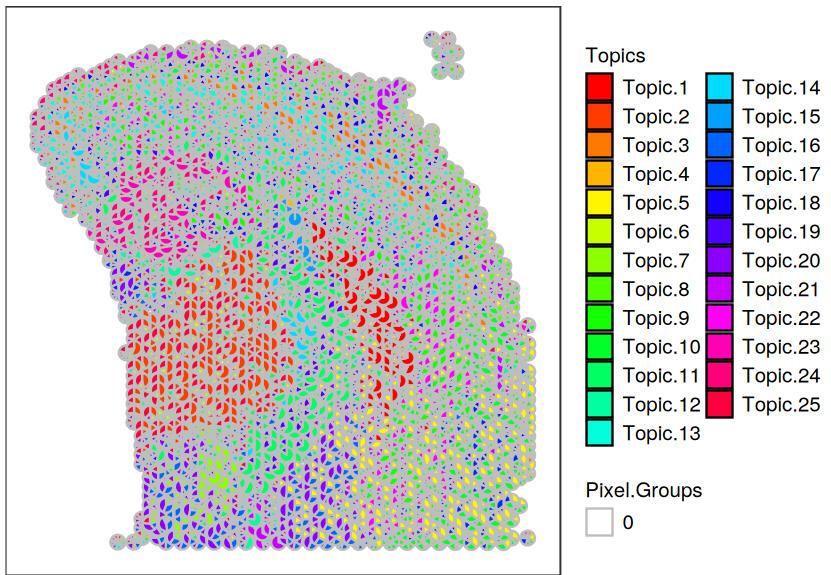
```
In [274]: vizAllTopics(deconProp, ppos, r=100 )
```

Plotting scatterpies for 2549 pixels with 25 cell-types...this could take a while if the dataset is large.



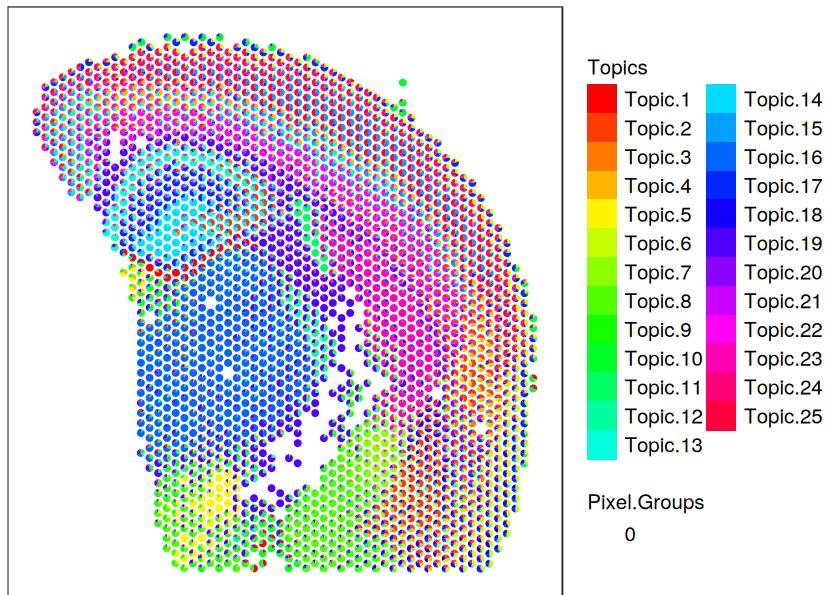
```
In [214]: ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x', 'y')  
vizAllTopics(deconProp, ppos, r=5 )
```

Plotting scatterpies for 2549 pixels with 25 cell-types...this could take a while if the dataset is large.



```
In [218]: ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x', 'y')  
vizAllTopics(deconProp2, ppos, r=2.5, lwd=0 )
```

Plotting scatterpies for 2176 pixels with 25 cell-types...this could take a while if the dataset is large.



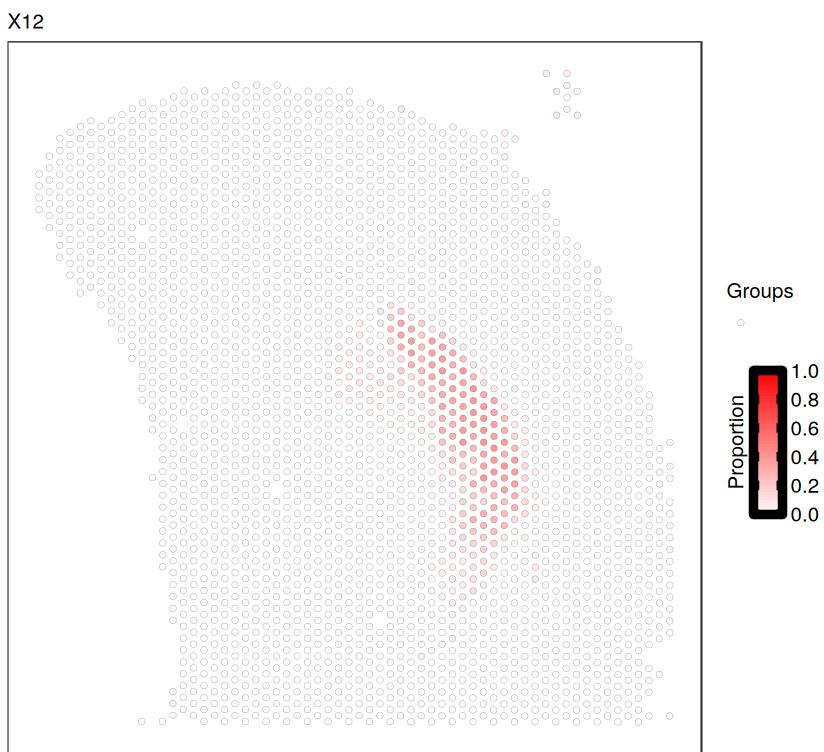
```
In [280]: dim(deconGexp)
```

25 · 476

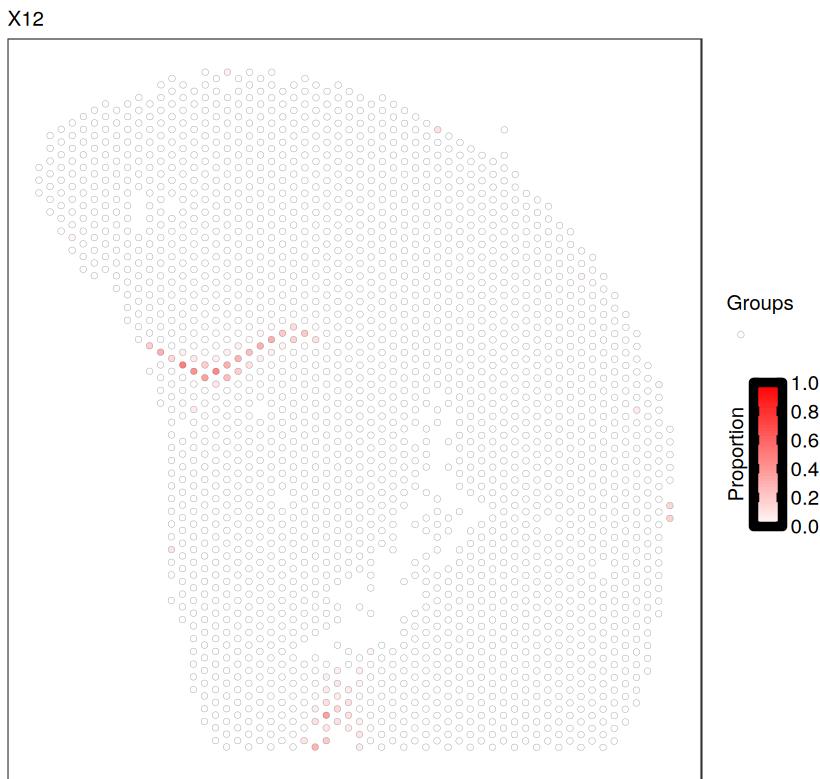
```
In [164]: dim(deconGexp2)
```

25 · 1000

```
In [250]: ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x', 'y')  
vizTopic(theta = deconProp, pos = ppos, topic = "1", plotTitle = "X12",  
size = 1.5, stroke = 0.1, alpha = 0.5,  
low = "white",  
high = "red")
```



```
In [252]: ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x', 'y')  
vizTopic(theta = deconProp2, pos = ppos2, topic = "1", plotTitle = "X12",  
         size = 1.5, stroke = 0.1, alpha = 0.5,  
         low = "white",  
         high = "red")
```



```
In [304]: optLDA2 <- optimalModel(models = ldas2, opt = "25")
results2 <- getBetaTheta(optLDA2, perc.filt = 0.05, betaScale = 1000)
deconProp2 <- results2$theta
deconGexp2 <- results2$beta
```

Filtering out cell-types in pixels that contribute less than 0.05 of the pixel proportion.

```
In [306]: genes.shared <- intersect(rownames(deconGexp), rownames(deconGexp2))
length(genes.shared)
```

25

```
In [308]: genes.shared <- intersect(colnames(deconGexp), colnames(deconGexp2))
length(genes.shared)
```

351

```
In [310]: cmat <- cor(deconGexp[, genes.shared], deconGexp2[, genes.shared])
```

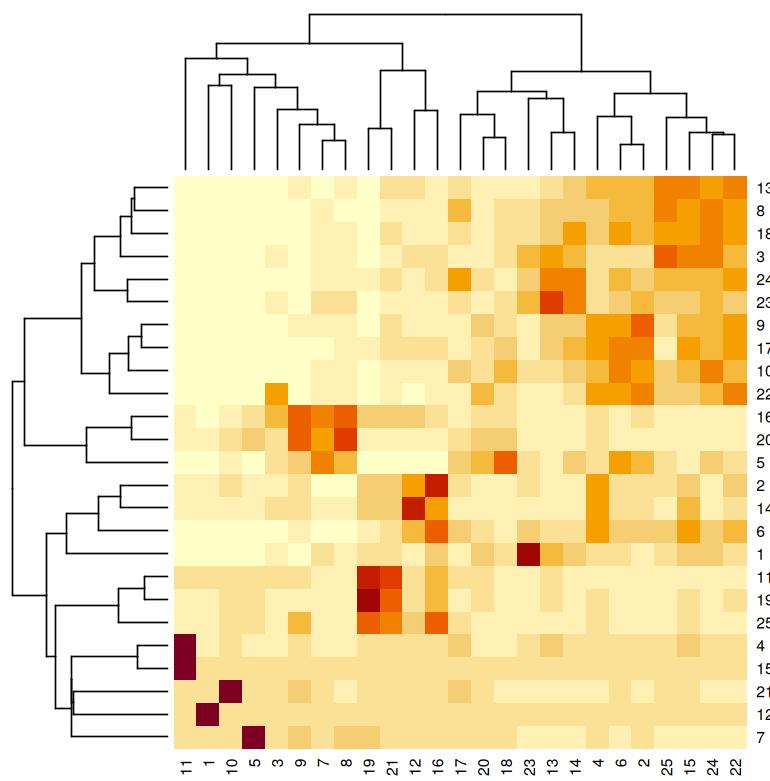
```
In [312]: dim(cmat)
```

351×351

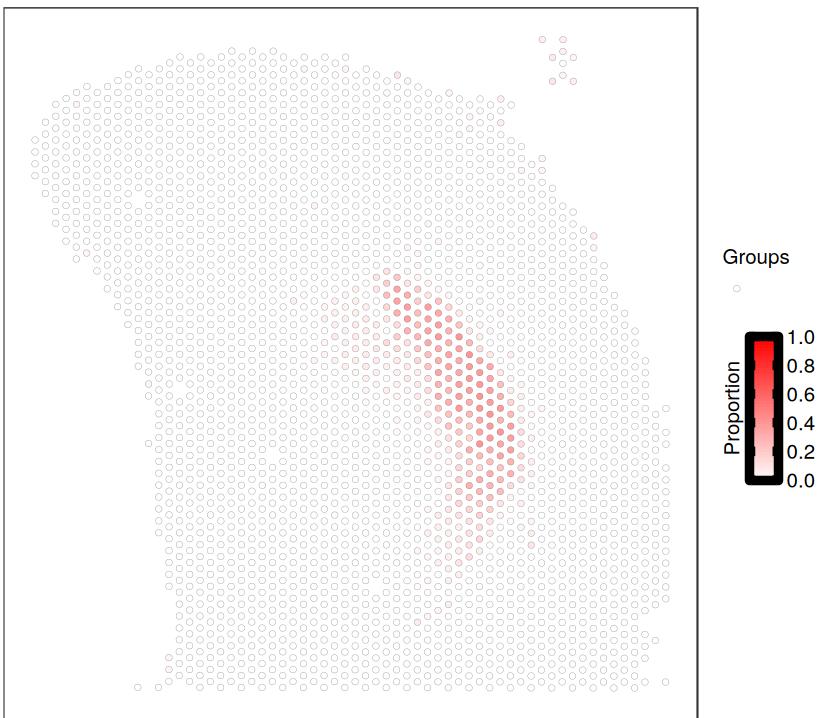
```
In [314]: cmat <- cor(t(deconGexp[, genes.shared]), t(deconGexp2[, genes.shared]))
```

```
In [316]: dim(cmat)
```

25 · 25

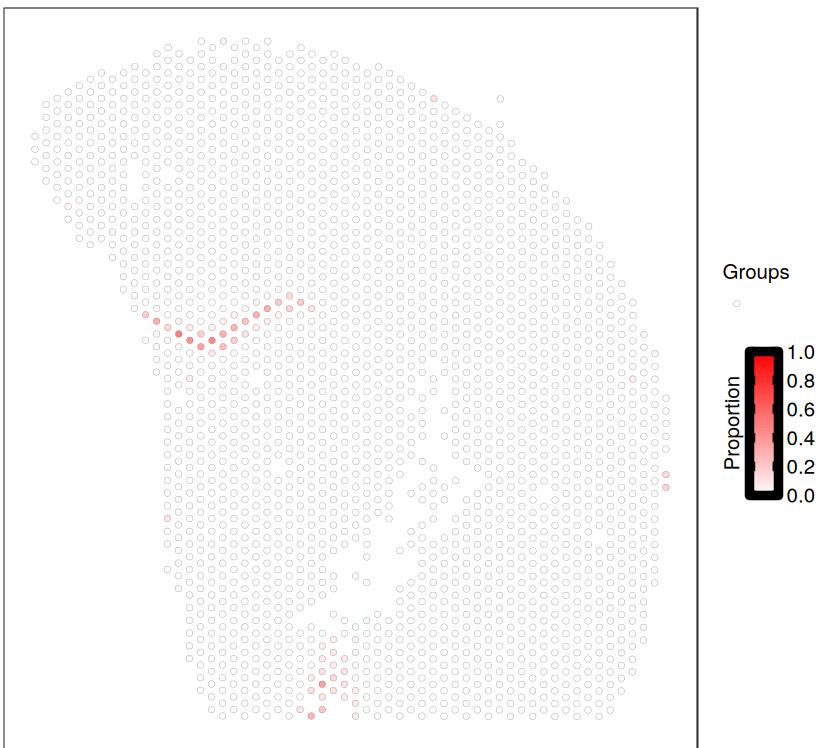
In [318]: `heatmap(cmat)`In [238]: `vizTopic(theta = deconProp, pos = ppos, topic = "1", plotTitle = "STdeconvol
size = 1.5, stroke = 0.1, alpha = 0.5,
low = "white",
high = "red")`

STdeconvolve vanilla: topic 1



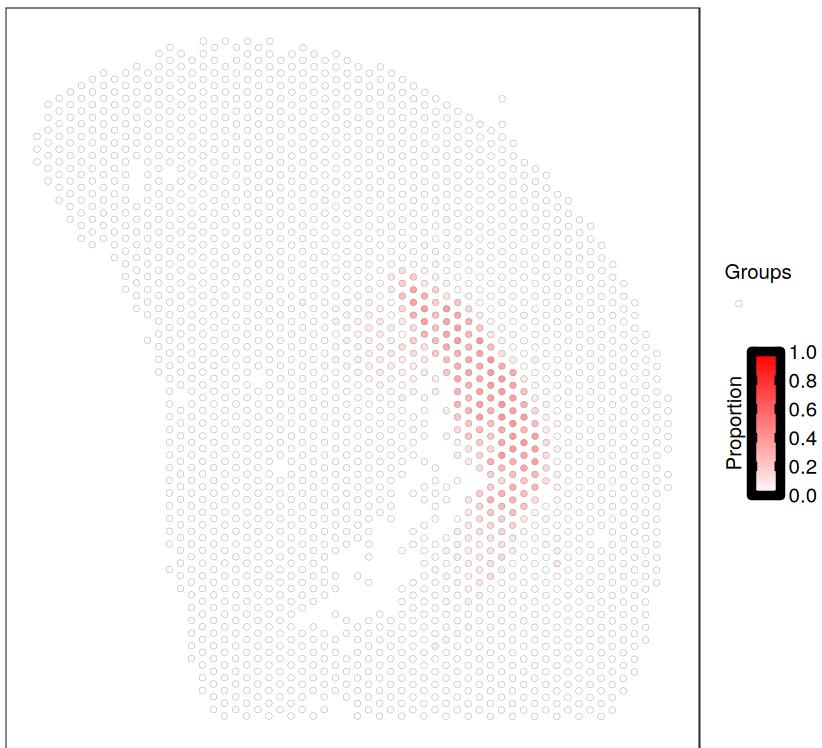
```
In [240]: ppos <- pos[rownames(deconProp),]  
colnames(ppos) <- c('x', 'y')  
vizTopic(theta = deconProp2, pos = ppos2, topic = "1", plotTitle = "STdeconv  
size = 1.5, stroke = 0.1, alpha = 0.5,  
low = "white",  
high = "red")
```

STdeconvolve Spotclean: topic 21

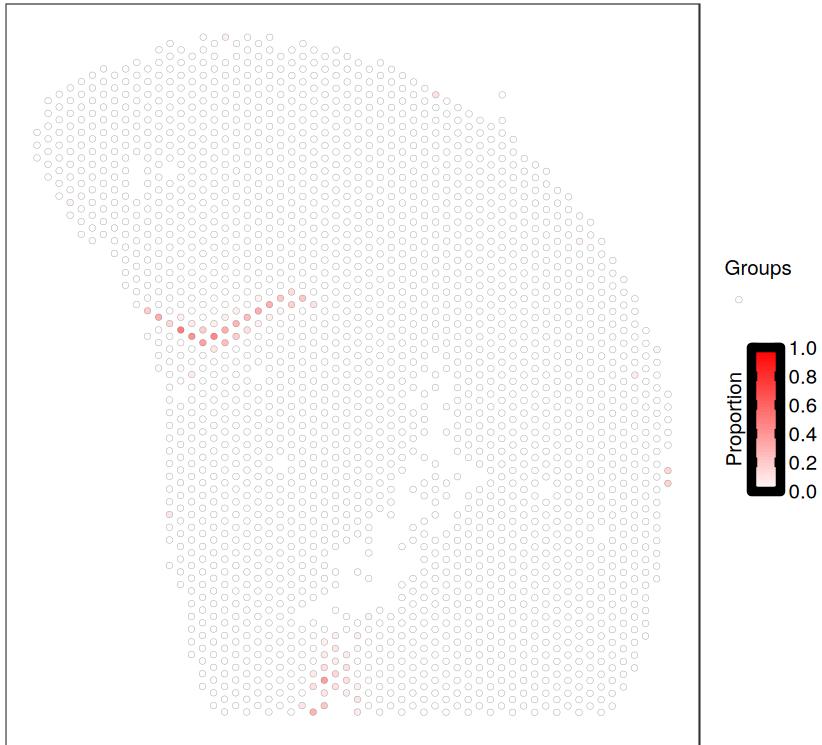


```
In [242]: spot.shared <- intersect(rownames(ppos), rownames(ppos2) )
vizTopic(theta = deconProp, pos = ppos[spot.shared,], topic = "1", plotTitle
         size = 1.5, stroke = 0.1, alpha = 0.5,
         low = "white",
         high = "red")
vizTopic(theta = deconProp2, pos = ppos2[spot.shared,], topic = "1", plotTit
         size = 1.5, stroke = 0.1, alpha = 0.5,
         low = "white",
         high = "red")
```

STdeconvolve vanilla: topic 1



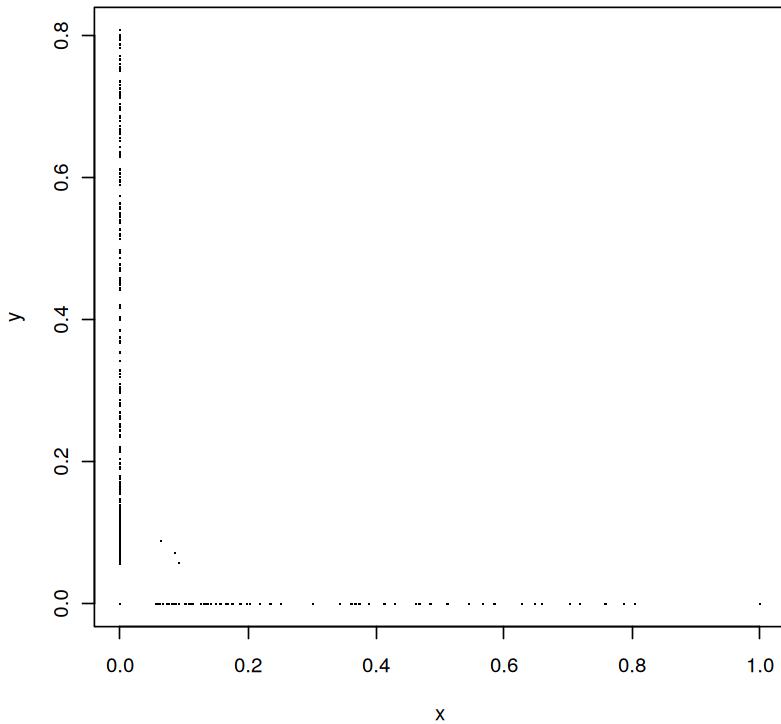
STdeconvolve Spotclean: topic 21



```
In [244...]: x <- deconProp[spot.shared, 21]
y <- deconProp[spot.shared, 1]
length(x)
length(y)
```

2176

2176

In [246... `plot(x,y, pch=".")`In [248... `cor.test(as.numeric(x),as.numeric(y))`

Pearson's product-moment correlation

```
data: as.numeric(x) and as.numeric(y)
t = -1.8258, df = 2174, p-value = 0.06802
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
-0.08101547  0.00289732
sample estimates:
cor
-0.03912806
```

In [382... `save.image(file='myEnvironment.RData')`

In []: