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# Alu Retrotransposons analysis

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Alu Retrotransposons analysis in AACES and NCOCS data

I focused on the Alu RE as a start as I never worked with methylation data.

```
load(paste0(here::here(), "/cleaned_07082022.rda"))
```

## I. Exploratory analysis

### Let's take a look at the data

The clean data was normalized (showing just several patient samples)

```
## 200357150046_R01C01 200357150046_R04C01 200357150046_R05C01
## Min. :0.0130      Min. :0.013      Min. :0.016
## 1st Qu.:0.1428      1st Qu.:0.126      1st Qu.:0.124
## Median :0.6700      Median :0.643      Median :0.740
## Mean   :0.5518      Mean   :0.542      Mean   :0.570
## 3rd Qu.:0.9008      3rd Qu.:0.911      3rd Qu.:0.908
## Max.  :0.9861      Max.  :0.987      Max.  :0.985
## NA's   :699         NA's  :3683       NA's  :10487
## 200357150046_R07C01 200357150047_R01C01 200357150047_R04C01
## Min. :0.0141      Min. :0.0186     Min. :0.0198
## 1st Qu.:0.1649      1st Qu.:0.1932     1st Qu.:0.1848
## Median :0.7584      Median :0.7076     Median :0.6684
## Mean   :0.5874      Mean   :0.5806     Mean   :0.5656
## 3rd Qu.:0.9262      3rd Qu.:0.8924     3rd Qu.:0.8830
## Max.  :0.9877      Max.  :0.9784     Max.  :0.9816
## NA's   :1132         NA's  :459        NA's  :1723
## 200357150047_R06C01 200357150047_R07C01 200357150047_R08C01
## Min. :0.018         Min. :0.018       Min. :0.014
## 1st Qu.:0.142        1st Qu.:0.133       1st Qu.:0.138
## Median :0.698        Median :0.643       Median :0.679
## Mean   :0.562        Mean   :0.542       Mean   :0.556
## 3rd Qu.:0.907        3rd Qu.:0.903       3rd Qu.:0.904
## Max.  :0.983        Max.  :0.981       Max.  :0.984
## NA's   :9158         NA's  :5249       NA's  :3691
```

Each row should represent CpG probe (601957) and each column should represent sample (202).

```
##  num [1:601957, 1:202] 0.939 0.947 0.959 0.812 0.928 ...
## - attr(*, "dimnames")=List of 2
##   ..$ : chr [1:601957] "cg00000109" "cg00000155" "cg00000158" "cg00000221" ...
##   ..$ : chr [1:202] "200357150046_R01C01" "200357150046_R04C01" "200357150046_R0
5C01" "200357150046_R07C01" ...
```

I assume that the sample name ends by \_R0 (red probe) because of a copy paste of previous cleaning.

Looking a little deeper.

```
betas_clean6 %>% skimr::skim()
```

## Data summary

Name	Piped data
Number of rows	601957
Number of columns	202

### Column type frequency:

numeric	202
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Group variables	None
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### Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
200357150046_R01C01	699		1.00	0.55	0.36	0.01	0.14	0.67	0.90	0.99
200357150046_R04C01	3683		0.99	0.54	0.36	0.01	0.13	0.64	0.91	0.99
200357150046_R05C01	10487		0.98	0.57	0.36	0.02	0.12	0.74	0.91	0.98
200357150046_R07C01	1132		1.00	0.59	0.36	0.01	0.16	0.76	0.93	0.99
200357150047_R01C01	459		1.00	0.58	0.34	0.02	0.19	0.71	0.89	0.98
200357150047_R04C01	1723		1.00	0.57	0.33	0.02	0.18	0.67	0.88	0.98
200357150047_R06C01	9158		0.98	0.56	0.36	0.02	0.14	0.70	0.91	0.98
200357150047_R07C01	5249		0.99	0.54	0.36	0.02	0.13	0.64	0.90	0.98
200357150047_R08C01	3691		0.99	0.56	0.36	0.01	0.14	0.68	0.90	0.98
200357150063_R01C01	9978		0.98	0.60	0.35	0.02	0.17	0.78	0.92	0.98
200357150063_R02C01	5237		0.99	0.58	0.35	0.02	0.18	0.73	0.90	0.98
200357150063_R03C01	831		1.00	0.62	0.34	0.02	0.24	0.80	0.92	0.98
200357150063_R06C01	4296		0.99	0.54	0.34	0.02	0.15	0.60	0.88	0.98
200357150063_R07C01	3994		0.99	0.57	0.36	0.01	0.15	0.71	0.91	0.98
200357980038_R01C01	340		1.00	0.58	0.33	0.02	0.21	0.68	0.89	0.99
200357980038_R04C01	907		1.00	0.57	0.34	0.02	0.19	0.67	0.91	0.98
200357980038_R05C01	6215		0.99	0.58	0.37	0.02	0.14	0.76	0.92	0.98
200357980038_R06C01	587		1.00	0.62	0.35	0.02	0.23	0.79	0.92	0.98
200357980038_R07C01	3111		0.99	0.61	0.35	0.02	0.19	0.80	0.92	0.98
200357980038_R08C01	4455		0.99	0.59	0.37	0.01	0.14	0.79	0.92	0.99
200360610122_R01C01	1160		1.00	0.58	0.35	0.02	0.19	0.72	0.91	0.99
200360610122_R02C01	1117		1.00	0.52	0.34	0.02	0.17	0.52	0.88	0.99
200360610122_R03C01	547		1.00	0.62	0.37	0.01	0.17	0.84	0.93	0.99

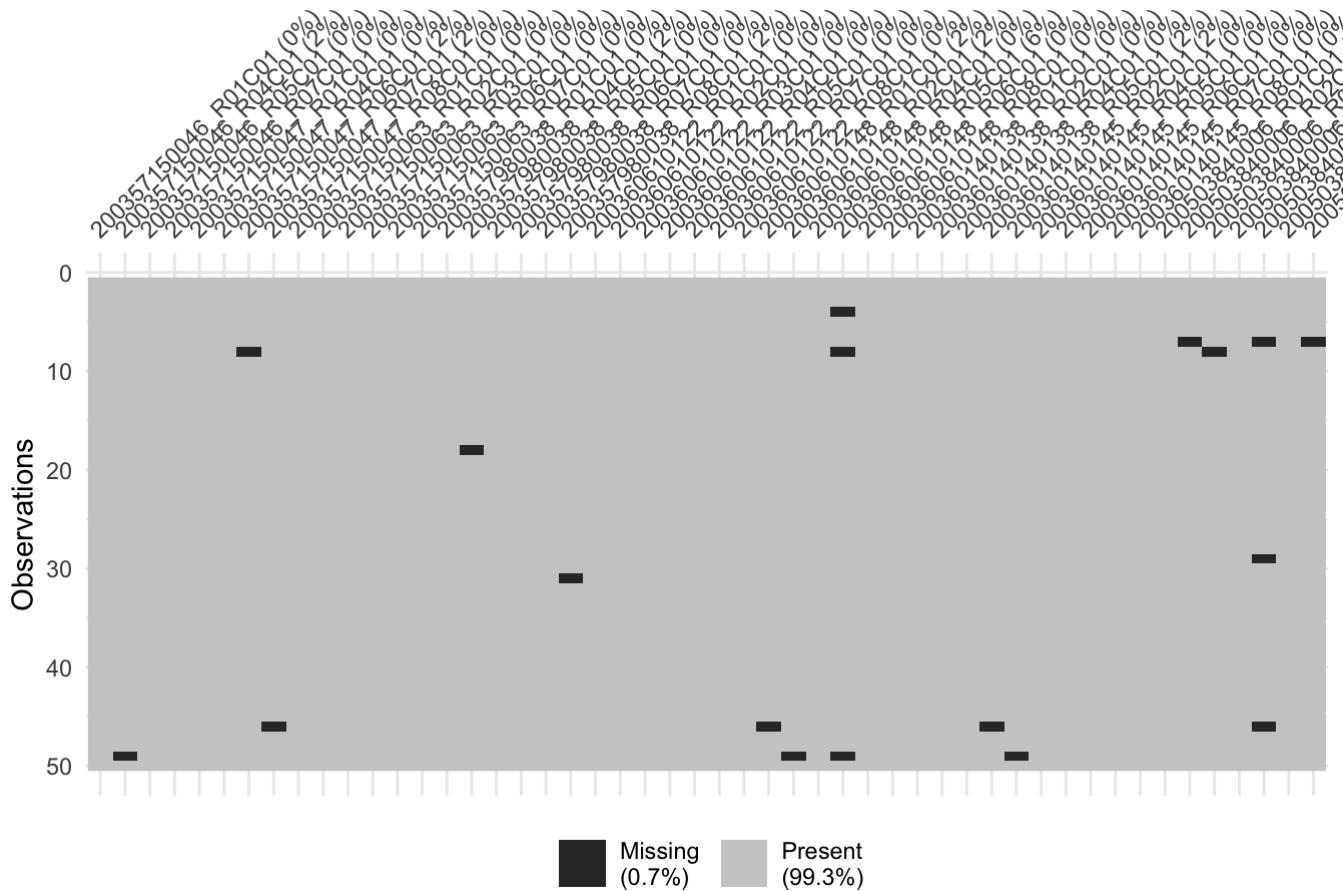
skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
200360610122_R04C01	545		1.00	0.58	0.34	0.02	0.20	0.70	0.90	0.98
200360610122_R05C01	3487		0.99	0.59	0.34	0.01	0.22	0.70	0.91	0.98
200360610122_R07C01	3282		0.99	0.62	0.36	0.02	0.18	0.82	0.93	0.98
200360610122_R08C01	1054		1.00	0.58	0.35	0.01	0.18	0.70	0.92	0.99
200360610148_R01C01	2126		1.00	0.60	0.37	0.02	0.14	0.82	0.93	0.98
200360610148_R02C01	3311		0.99	0.58	0.35	0.02	0.18	0.70	0.91	0.98
200360610148_R04C01	1000		1.00	0.58	0.35	0.02	0.18	0.70	0.91	0.98
200360610148_R05C01	21408		0.96	0.56	0.36	0.02	0.15	0.68	0.91	0.98
200360610148_R06C01	150		1.00	0.62	0.35	0.02	0.26	0.78	0.93	0.99
200360610148_R08C01	1358		1.00	0.57	0.35	0.02	0.17	0.69	0.90	0.99
200360140138_R01C01	5989		0.99	0.59	0.34	0.01	0.20	0.72	0.90	0.98
200360140138_R02C01	4562		0.99	0.59	0.36	0.02	0.15	0.78	0.91	0.98
200360140138_R04C01	804		1.00	0.58	0.36	0.02	0.15	0.75	0.93	0.98
200360140138_R05C01	1550		1.00	0.57	0.37	0.02	0.14	0.73	0.93	0.98
200360140145_R02C01	1781		1.00	0.54	0.36	0.01	0.15	0.58	0.91	0.98
200360140145_R04C01	1144		1.00	0.59	0.33	0.01	0.24	0.72	0.90	0.99
200360140145_R05C01	407		1.00	0.61	0.34	0.01	0.25	0.76	0.92	0.98
200360140145_R06C01	1947		1.00	0.59	0.34	0.01	0.21	0.70	0.91	0.99
200360140145_R07C01	806		1.00	0.61	0.34	0.01	0.28	0.75	0.92	0.99
200360140145_R08C01	1258		1.00	0.60	0.35	0.01	0.20	0.75	0.91	0.99
200503840006_R01C01	428		1.00	0.63	0.37	0.01	0.18	0.85	0.94	0.99
200503840006_R02C01	15003		0.98	0.58	0.36	0.01	0.16	0.74	0.92	0.99
200503840006_R04C01	15043		0.98	0.55	0.36	0.02	0.13	0.67	0.91	0.99
200503840006_R06C01	1324		1.00	0.61	0.38	0.01	0.13	0.85	0.94	0.99
200503840006_R07C01	32803		0.95	0.60	0.36	0.01	0.18	0.78	0.92	0.99
200503840006_R08C01	9467		0.98	0.62	0.36	0.01	0.20	0.82	0.93	0.99
200503840041_R01C01	17781		0.97	0.62	0.36	0.01	0.18	0.83	0.93	0.99
200503840041_R02C01	27149		0.95	0.61	0.36	0.01	0.15	0.82	0.92	0.99
200503840041_R03C01	9161		0.98	0.57	0.37	0.01	0.12	0.75	0.92	0.99
200503840041_R04C01	18797		0.97	0.57	0.37	0.01	0.13	0.75	0.93	0.99
200503840041_R05C01	9891		0.98	0.56	0.37	0.01	0.15	0.70	0.92	0.99
200503840041_R07C01	5525		0.99	0.60	0.37	0.02	0.16	0.80	0.93	0.99
200503840041_R08C01	16767		0.97	0.57	0.37	0.01	0.14	0.73	0.92	0.99
200503840042_R02C01	24396		0.96	0.54	0.36	0.01	0.14	0.63	0.91	0.99
200503840042_R03C01	22746		0.96	0.58	0.35	0.01	0.17	0.72	0.91	0.99
200503840042_R04C01	4776		0.99	0.58	0.35	0.01	0.18	0.70	0.92	0.99
200503840042_R05C01	11034		0.98	0.55	0.36	0.01	0.16	0.61	0.91	0.99
200503840042_R06C01	6428		0.99	0.57	0.36	0.01	0.18	0.69	0.92	0.99
200503840042_R07C01	1207		1.00	0.59	0.36	0.01	0.16	0.76	0.92	0.99
200503840042_R08C01	7810		0.99	0.62	0.36	0.01	0.19	0.84	0.93	0.99
200503840058_R01C01	19504		0.97	0.59	0.35	0.01	0.20	0.74	0.91	0.99
200503840058_R02C01	4147		0.99	0.59	0.36	0.01	0.18	0.75	0.92	0.99
200503840058_R06C01	19153		0.97	0.59	0.37	0.01	0.15	0.80	0.93	0.99
200503840058_R07C01	19382		0.97	0.56	0.36	0.01	0.14	0.70	0.91	0.99
200503840065_R01C01	25639		0.96	0.60	0.37	0.01	0.13	0.84	0.92	0.99
200503840065_R02C01	15004		0.98	0.52	0.35	0.02	0.13	0.57	0.89	0.99
200503840065_R04C01	2964		1.00	0.58	0.36	0.01	0.15	0.73	0.91	0.99
200503840065_R05C01	18163		0.97	0.57	0.37	0.01	0.12	0.75	0.92	0.99

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100hist	
200503840065_R06C01	1506		1.00	0.62	0.36	0.01	0.21	0.81	0.93	0.99
200503840065_R07C01	20184		0.97	0.61	0.36	0.01	0.17	0.80	0.93	0.99
200503840065_R08C01	5809		0.99	0.60	0.36	0.01	0.17	0.79	0.92	0.99
200503840077_R01C01	3419		0.99	0.61	0.37	0.01	0.16	0.83	0.93	0.99
200503840077_R02C01	9873		0.98	0.61	0.36	0.01	0.17	0.81	0.92	0.99
200503840077_R03C01	14638		0.98	0.56	0.37	0.01	0.13	0.73	0.92	0.99
200503840077_R04C01	5008		0.99	0.61	0.36	0.01	0.18	0.80	0.92	0.99
200503840077_R05C01	11800		0.98	0.51	0.36	0.01	0.13	0.49	0.90	0.99
200503840077_R06C01	11383		0.98	0.60	0.35	0.01	0.18	0.76	0.91	0.99
200503840077_R07C01	10960		0.98	0.58	0.37	0.01	0.14	0.75	0.92	0.99
200503840077_R08C01	12362		0.98	0.56	0.37	0.01	0.13	0.72	0.92	0.99
200503840080_R01C01	12372		0.98	0.62	0.36	0.02	0.19	0.84	0.93	0.99
200503840080_R03C01	5510		0.99	0.62	0.35	0.01	0.20	0.82	0.92	0.99
200503840080_R06C01	4132		0.99	0.62	0.35	0.01	0.21	0.81	0.92	0.99
200503840080_R07C01	4318		0.99	0.60	0.37	0.01	0.15	0.81	0.93	0.99
200503840080_R08C01	10279		0.98	0.61	0.36	0.01	0.19	0.81	0.93	0.99
200503840106_R01C01	57807		0.90	0.62	0.34	0.01	0.27	0.80	0.91	0.99
200503840106_R02C01	2642		1.00	0.62	0.36	0.02	0.20	0.82	0.93	0.99
200503840106_R06C01	21280		0.96	0.59	0.37	0.02	0.13	0.81	0.92	0.99
200503840106_R08C01	1802		1.00	0.53	0.37	0.01	0.13	0.57	0.91	0.99
203740800065_R01C01	1077		1.00	0.60	0.36	0.02	0.16	0.80	0.93	0.99
203740800065_R02C01	6785		0.99	0.60	0.35	0.02	0.20	0.75	0.92	0.99
203740800065_R03C01	1921		1.00	0.62	0.35	0.02	0.23	0.78	0.92	0.98
203740800065_R04C01	13486		0.98	0.56	0.36	0.02	0.16	0.68	0.92	0.99
203740800065_R05C01	5379		0.99	0.63	0.36	0.01	0.21	0.83	0.92	0.99
203740800065_R07C01	4816		0.99	0.59	0.34	0.02	0.24	0.71	0.90	0.99
203740800065_R08C01	33277		0.94	0.60	0.36	0.02	0.16	0.79	0.92	0.99
203740800066_R01C01	9457		0.98	0.55	0.35	0.02	0.16	0.64	0.90	0.98
203740800066_R02C01	17070		0.97	0.57	0.36	0.02	0.14	0.72	0.91	0.99
203740800066_R04C01	13428		0.98	0.61	0.37	0.02	0.15	0.83	0.93	0.99
203740800066_R06C01	558		1.00	0.59	0.34	0.02	0.21	0.71	0.90	0.98
203740800066_R08C01	46542		0.92	0.60	0.36	0.01	0.15	0.82	0.91	0.99
203717920047_R01C01	67915		0.89	0.61	0.36	0.01	0.16	0.82	0.92	0.99
203717920047_R02C01	5552		0.99	0.59	0.36	0.02	0.16	0.76	0.91	0.99
203717920047_R03C01	38781		0.94	0.55	0.37	0.02	0.12	0.70	0.91	0.98
203717920047_R04C01	35118		0.94	0.61	0.37	0.02	0.16	0.84	0.93	0.99
203717920047_R05C01	2424		1.00	0.62	0.35	0.02	0.24	0.80	0.93	0.99
203717920047_R06C01	711		1.00	0.59	0.36	0.02	0.18	0.74	0.92	0.98
203717920047_R07C01	30482		0.95	0.62	0.36	0.02	0.18	0.83	0.92	0.98
203711910042_R01C01	5479		0.99	0.61	0.36	0.02	0.18	0.81	0.92	0.98
203711910042_R02C01	788		1.00	0.54	0.35	0.02	0.14	0.61	0.90	0.98
203711910042_R06C01	29014		0.95	0.55	0.38	0.02	0.10	0.71	0.92	0.99
203711910042_R07C01	7577		0.99	0.60	0.38	0.02	0.13	0.85	0.94	0.99
203711910042_R08C01	35432		0.94	0.58	0.36	0.02	0.14	0.78	0.92	0.99
203711910007_R02C01	1476		1.00	0.57	0.35	0.02	0.18	0.70	0.91	0.98
203711910007_R03C01	6251		0.99	0.60	0.36	0.02	0.17	0.80	0.92	0.98
203711910007_R04C01	1679		1.00	0.57	0.35	0.02	0.18	0.69	0.91	0.98
203711910007_R05C01	6290		0.99	0.57	0.36	0.02	0.14	0.72	0.91	0.98

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100hist	
203711910007_R06C01	2650		1.00	0.58	0.35	0.02	0.16	0.71	0.91	0.98
203711910007_R07C01	7574		0.99	0.61	0.35	0.02	0.20	0.80	0.92	0.98
203711910007_R08C01	4499		0.99	0.59	0.36	0.02	0.18	0.77	0.92	0.98
203717920046_R01C01	1694		1.00	0.63	0.35	0.02	0.23	0.82	0.93	0.98
203717920046_R02C01	11327		0.98	0.62	0.36	0.02	0.18	0.84	0.93	0.99
203717920046_R03C01	979		1.00	0.58	0.33	0.02	0.23	0.67	0.88	0.98
203717920046_R04C01	2641		1.00	0.57	0.34	0.02	0.19	0.67	0.91	0.98
203717920046_R06C01	2806		1.00	0.58	0.37	0.02	0.16	0.73	0.93	0.99
203717920046_R07C01	6418		0.99	0.63	0.38	0.02	0.14	0.88	0.94	0.99
203717920046_R08C01	127586		0.79	0.64	0.36	0.01	0.25	0.85	0.93	0.99
203740800064_R01C01	30260		0.95	0.56	0.33	0.02	0.19	0.67	0.87	0.98
203740800064_R03C01	172		1.00	0.60	0.34	0.02	0.23	0.73	0.91	0.98
203740800064_R05C01	22469		0.96	0.59	0.35	0.01	0.17	0.74	0.90	0.98
203740800064_R06C01	8631		0.99	0.54	0.37	0.02	0.12	0.65	0.92	0.98
203740800064_R07C01	839		1.00	0.60	0.34	0.02	0.22	0.76	0.91	0.98
203717910108_R01C01	6110		0.99	0.61	0.36	0.02	0.17	0.80	0.93	0.98
203717910108_R02C01	13177		0.98	0.62	0.37	0.02	0.15	0.86	0.93	0.98
203717910108_R03C01	25972		0.96	0.57	0.36	0.02	0.15	0.71	0.91	0.98
203717910108_R04C01	2588		1.00	0.57	0.36	0.02	0.14	0.70	0.91	0.98
203717910108_R06C01	2813		1.00	0.62	0.37	0.01	0.17	0.83	0.93	0.98
203717910108_R07C01	2313		1.00	0.61	0.35	0.02	0.21	0.78	0.92	0.98
203717910108_R08C01	29106		0.95	0.58	0.37	0.02	0.13	0.77	0.93	0.99
203740800032_R01C01	9594		0.98	0.55	0.35	0.02	0.17	0.65	0.90	0.98
203740800032_R02C01	904		1.00	0.58	0.34	0.02	0.21	0.71	0.90	0.98
203740800032_R03C01	11951		0.98	0.62	0.34	0.02	0.24	0.78	0.91	0.98
203740800032_R04C01	12339		0.98	0.58	0.37	0.02	0.14	0.80	0.92	0.98
203740800032_R05C01	261		1.00	0.57	0.33	0.02	0.22	0.68	0.89	0.98
203740800032_R06C01	65560		0.89	0.59	0.35	0.01	0.14	0.77	0.90	0.99
203740800032_R07C01	1710		1.00	0.56	0.36	0.02	0.15	0.69	0.91	0.99
203740800032_R08C01	12175		0.98	0.58	0.36	0.02	0.16	0.73	0.92	0.99
203695310018_R04C01	61199		0.90	0.65	0.34	0.02	0.31	0.85	0.91	0.99
203695310018_R05C01	4412		0.99	0.60	0.35	0.02	0.21	0.75	0.91	0.98
203695310018_R06C01	2889		1.00	0.56	0.34	0.02	0.17	0.65	0.89	0.99
203695310018_R07C01	17637		0.97	0.64	0.37	0.02	0.18	0.87	0.94	0.99
203695310018_R08C01	3982		0.99	0.57	0.36	0.02	0.16	0.71	0.91	0.98
203717910048_R01C01	2084		1.00	0.58	0.35	0.02	0.17	0.71	0.91	0.98
203717910048_R02C01	23701		0.96	0.56	0.36	0.02	0.13	0.70	0.90	0.98
203717910048_R03C01	642		1.00	0.61	0.36	0.02	0.18	0.80	0.93	0.98
203717910048_R04C01	11696		0.98	0.60	0.35	0.01	0.20	0.77	0.92	0.99
203717910048_R05C01	80545		0.87	0.66	0.35	0.01	0.29	0.87	0.93	0.99
203717910048_R06C01	3804		0.99	0.57	0.35	0.02	0.17	0.69	0.90	0.98
203717910048_R07C01	6175		0.99	0.58	0.36	0.02	0.16	0.71	0.92	0.98
203717910032_R02C01	37992		0.94	0.63	0.35	0.01	0.26	0.82	0.91	0.99
203717910032_R03C01	17850		0.97	0.62	0.35	0.02	0.20	0.82	0.92	0.99
203717910032_R04C01	235513		0.61	0.62	0.35	0.01	0.21	0.83	0.90	0.99
203717910032_R05C01	285		1.00	0.62	0.36	0.02	0.19	0.84	0.93	0.98
203717910032_R06C01	7311		0.99	0.56	0.37	0.01	0.11	0.70	0.92	0.99
203717910032_R07C01	1319		1.00	0.62	0.36	0.01	0.19	0.81	0.93	0.99

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
203717910032_R08C01	46462		0.92	0.58	0.36	0.01	0.14	0.76	0.91	0.99
203717920012_R01C01	287877		0.52	0.58	0.30	0.00	0.32	0.65	0.86	0.99
203717920012_R02C01	65624		0.89	0.57	0.37	0.01	0.10	0.79	0.90	0.99
203717920012_R03C01	89033		0.85	0.56	0.37	0.01	0.10	0.74	0.89	0.99
203717920012_R04C01	6453		0.99	0.58	0.38	0.01	0.12	0.78	0.93	0.99
203717920012_R05C01	7079		0.99	0.61	0.37	0.01	0.15	0.82	0.92	0.99
203717920012_R07C01	7456		0.99	0.55	0.36	0.01	0.13	0.68	0.91	0.99
203717920012_R08C01	5771		0.99	0.57	0.36	0.01	0.13	0.71	0.91	0.99
203693970032_R01C01	8380		0.99	0.61	0.35	0.01	0.24	0.79	0.92	0.99
203693970032_R02C01	10065		0.98	0.58	0.37	0.01	0.14	0.74	0.92	0.99
203693970032_R03C01	717		1.00	0.57	0.34	0.02	0.23	0.65	0.91	0.98
203693970032_R04C01	2907		1.00	0.58	0.36	0.01	0.19	0.73	0.92	0.99
203693970032_R05C01	13887		0.98	0.59	0.36	0.01	0.15	0.75	0.91	0.99
203693970032_R06C01	79084		0.87	0.63	0.36	0.01	0.22	0.85	0.92	0.99
203693970032_R07C01	7701		0.99	0.59	0.35	0.01	0.21	0.71	0.91	0.99
203693970032_R08C01	3443		0.99	0.60	0.38	0.02	0.13	0.82	0.93	0.99
203693970034_R01C01	23170		0.96	0.59	0.37	0.01	0.11	0.82	0.92	0.99
203693970034_R02C01	20398		0.97	0.60	0.37	0.01	0.12	0.83	0.92	0.99
203693970034_R03C01	7767		0.99	0.60	0.35	0.01	0.19	0.76	0.91	0.99
203693970034_R04C01	9148		0.98	0.60	0.36	0.01	0.16	0.75	0.92	0.99
203693970034_R05C01	58731		0.90	0.59	0.35	0.01	0.18	0.75	0.90	0.99
203693970034_R06C01	5523		0.99	0.60	0.36	0.01	0.19	0.80	0.92	0.99
203693970034_R07C01	118398		0.80	0.64	0.34	0.01	0.35	0.83	0.91	0.99
203693970034_R08C01	1176		1.00	0.53	0.34	0.02	0.16	0.57	0.87	0.99
203695310017_R01C01	8803		0.99	0.58	0.37	0.01	0.14	0.74	0.92	0.99
203695310017_R02C01	1446		1.00	0.62	0.36	0.01	0.21	0.83	0.93	0.99
203695310017_R04C01	18360		0.97	0.55	0.37	0.01	0.11	0.69	0.91	0.99
203695310017_R06C01	5300		0.99	0.58	0.38	0.01	0.11	0.78	0.93	0.99
203695310017_R07C01	1609		1.00	0.55	0.35	0.02	0.17	0.61	0.90	0.99
203740810001_R01C01	17391		0.97	0.60	0.36	0.01	0.15	0.78	0.92	0.99
203740810001_R02C01	523		1.00	0.58	0.37	0.02	0.13	0.75	0.92	0.99
203740810001_R03C01	11638		0.98	0.60	0.37	0.02	0.12	0.81	0.92	0.99
203740810001_R04C01	485		1.00	0.57	0.36	0.01	0.16	0.69	0.92	0.99
203740810001_R05C01	3792		0.99	0.62	0.38	0.02	0.14	0.86	0.94	0.99
203740810001_R06C01	907		1.00	0.55	0.35	0.02	0.16	0.62	0.91	0.98

The data contain missing values (the heatmap below only shows 50 samples for 50 cpg)



The first step is to impute those missing value using the `grooMethy()` Function. Is that correct?

## II. Imputation with `grooMethy()`

From the intro of REMP pdf:

For zero beta values, grooMethy will replace them with smallest non-zero beta value. For one beta values, grooMethy will replace them with largest non-one beta value. For NA/Nan/Inf values, grooMethy will treat them as missing values and then apply KNN-imputation to complete the dataset. If the imputed value is out of the original range (which is possible when imputebyrow = FALSE), mean value will be used instead. Warning: imputed values for multimodal distributed CpGs (across samples) may not be correct. Please check package ENmix to identify the CpGs with multimodal distribution. I think you already eliminated multimodal samples For sequencing data, the users only need to prepare a methylation data matrix (row = CpGs, column = samples). The corresponding CpG location information (either in hg19 or hg38) should be prepared in a separate GRanges object and provide it to the Seq.GR argument in grooMethy.

From what I understood, I don't need to furnish the CpG location info. Correct?

```
library(REMP)
citation("REMP")
```

```

## 
## REMP R pacakge
##
##   Zheng Y, Joyce B, Liu L, Zhang Z, Kibbe W, Zhang W, Hou L (2017).
##   "Prediction of genome-wide DNA methylation in repetitive elements."
##   _Nucleic Acids Research_.
##
## A BibTeX entry for LaTeX users is
##
##   @Article{REMP,
##     title = {Prediction of genome-wide DNA methylation in repetitive elements},
##     author = {Yinan Zheng and Brian Joyce and Lei Liu and Zhou Zhang and Warren
## Kibbe and Wei Zhang and Lifang Hou},
##     year = {2017},
##     journal = {Nucleic Acids Research},
##     pubmed = {28911103},
##   }

```

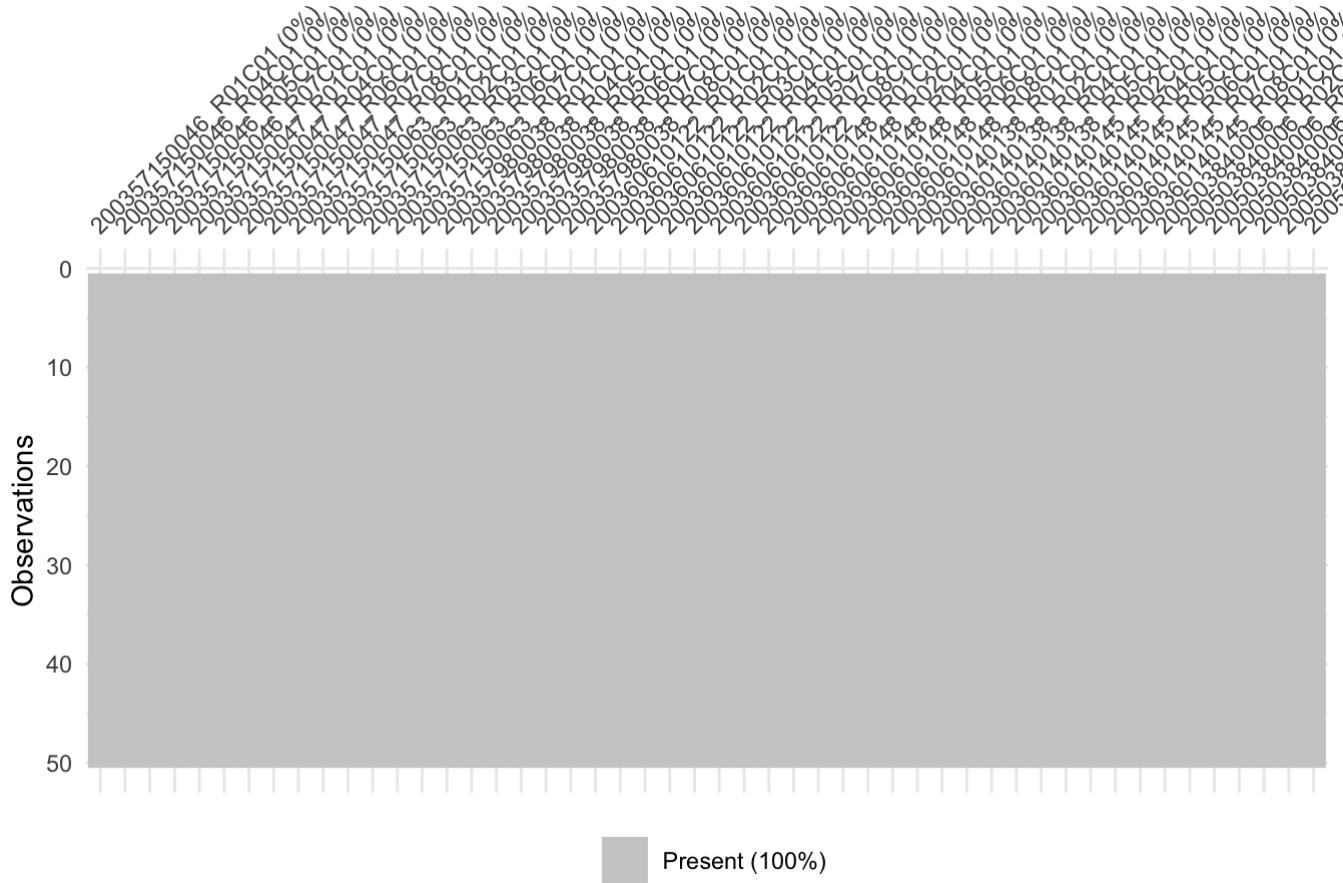
```

# getLocations(IlluminaHumanMethylationEPICanno.ilm10b4.hg19)      # NOT RUN
# genomic_location_matrix <- getLocations(IlluminaHumanMethylationEPICanno.ilm10b4.
#                                         hg19)      # NOT RUN
# groomed_data <- grooMethy(beta_data, Seq.GR = genomic_location_matrix)      # NOT
#                                         RUN

# groomed_data <- grooMethy(betas_clean6)
# write_rds(groomed_data, "groomed_data.rds")
groomed_data <- read_rds(paste0(here::here(), "/groomed_data.rds"))

```

The data is now imputed.



### III. Prepare annotation data

Need to prepare annotation for each RE type : "Alu", "L1", "ERV" (Human (hg19/hg38) Alu, LINE-1 (L1), and Long Terminal Repeat (LTR) (including endogenous retroviruses, ERV) repetitive element (RE) methylation)

```
library(IlluminaHumanMethylationEPICanno.ilm10b2.hg19)
citation("IlluminaHumanMethylationEPICanno.ilm10b2.hg19")
```

```

## 
## To cite package 'IlluminaHumanMethylationEPICanno ilm10b2.hg19' in
## publications use:
##
## Hansen KD (2016). _IlluminaHumanMethylationEPICanno ilm10b2.hg19:
## Annotation for Illumina's EPIC methylation arrays_. R package version
## 0.6.0, <https://bitbucket.com/kasperdanielhansen/Illumina_EPIC>.
##
## A BibTeX entry for LaTeX users is
##
## @Manual{,
##   title = {IlluminaHumanMethylationEPICanno ilm10b2.hg19: Annotation for Illumina's EPIC methylation arrays},
##   author = {Kasper Daniel Hansen},
##   year = {2016},
##   note = {R package version 0.6.0},
##   url = {https://bitbucket.com/kasperdanielhansen/Illumina_EPIC},
## }

```

```

# remparcel_Alu <- initREMP(arrayType = "EPIC",
#                               REType = "Alu", # "L1", "ERV"
#                               annotation.source = "AH", # "UCSC"
#                               genome = "hg19", # only option for "AH"
#                               ncore = 1)
# remparcel_Alu
# saveParcel(remparcel_Alu, work.dir = here::here())
# remparcel_L1 <- initREMP(arrayType = "EPIC",
#                           REType = "L1",
#                           annotation.source = "AH",
#                           genome = "hg19",
#                           ncore = 1)
# remparcel_L1
# saveParcel(remparcel_L1, work.dir = here::here())
# remparcel_ERV <- initREMP(arrayType = "EPIC",
#                            REType = "ERV",
#                            annotation.source = "AH",
#                            genome = "hg19",
#                            ncore = 1)
# remparcel_ERV
# saveParcel(remparcel_ERV, work.dir = here::here())

```

## IV. Run prediction

```
# remp_res_Alu <- remp(groomed_data, # Need to use BPPARAM = SnowParam(workers = 2)
#                               REtype = 'Alu',
#                               parcel = remparcel_Alu, ncore = 4, seed = 1234,
#                               work.dir = here::here())
# write_rds(remp_res_Alu, "remp_res_Alu.rds")
remp_res_Alu <- read_rds(paste0(here::here(), "/remp_res_Alu.rds"))
# remp_res_L1 <- remp(groomed_data,
#                       REtype = 'L1',
#                       parcel = remparcel_L1, ncore = 4, seed = 1234,
#                       work.dir = here::here())
# write_rds(remp_res_L1, "remp_res_L1.rds")
remp_res_L1 <- read_rds(paste0(here::here(), "/remp_res_L1.rds"))
# remp_res_ERV <- remp(groomed_data,
#                       REtype = 'ERV',
#                       parcel = remparcel_ERV, ncore = 4, seed = 1234,
#                       work.dir = here::here())
# write_rds(remp_res_ERV, "remp_res_ERV.rds")
remp_res_ERV <- read_rds(paste0(here::here(), "/remp_res_ERV.rds"))
```

## Explore results

remp\_res\_Alu

```
## class: REMProduct
## dim: 564589 202
## metadata(8): REannotation RECpG ... GeneStats Seed
## assays(3): rempB rempM rempQC
## rownames: NULL
## rowData names(1): RE.Index
## colnames(202): X200357150046_R01C01 X200357150046_R04C01 ...
##   X203740810001_R05C01 X203740810001_R06C01
## colData names(1): mtry
```

```
# Display more detailed information
details(remp_res_Alu)
```

```

## RE type: Alu
## Genome build: hg19
## Methylation profiling platform: EPIC
## Flanking window size: 1000
## Prediction model: Random Forest
## QC model: Quantile Regression Forest
## Seed: 1234
## Covered 564589 CpG sites in 84999 Alu
##
## Number of Alu-CpGs by chromosome:
## chr1 chr2 chr3 chr4 chr5 chr6 chr7 chr8
## 54329 32309 26257 14644 19623 27182 32718 19106
##
## chr9 chr10 chr11 chr12 chr13 chr14 chr15 chr16
## 18203 23008 29042 33247 8654 17946 16883 38232
##
## chr17 chr18 chr19 chr20 chr21 chr22
## 45014 6629 60267 17826 5948 17522
##
## Training information:
## 5855 profiled Alu are used for model training.
## 4536 Alu-CpGs that have at least 2 neighboring profiled CpGs are used for mode
l training.
##
## Coverage information:
## The data cover 84999 Alu (564589 Alu-CpG).
## Gene coverage by Alu (out of total # of RefSeq genes):
## 15556 (62.47%) total genes;
## 13430 (70.21%) protein-coding genes;
## 3219 (44.67%) non-coding RNA genes.
##
## Distribution of methylation value (beta value):
## Min. 1st Qu. Median Mean 3rd Qu. Max.
## 0.03258573 0.80946379 0.87220001 0.80804385 0.89711708 0.98046291
##
## Distribution of reliability score (lower score = higher reliability):
## Min. 1st Qu. Median Mean 3rd Qu. Max.
## 0.2502154 1.1143033 1.3285371 1.4546128 1.7250765 3.8360751

```

```

# Now have 564589 rows
remp_res_Alu@rowRanges@elementMetadata@nrows

```

```

## [1] 564589

```

```

# they are :
remp_res_Alu@rowRanges@elementMetadata

```

```
## DataFrame with 564589 rows and 1 column
##           RE.Index
## 1      Alu_0000163
## 2      Alu_0000163
## 3      Alu_0000163
## 4      Alu_0000163
## 5      Alu_0000163
## ...
## 564585 Alu_1118245
## 564586 Alu_1118245
## 564587 Alu_1118245
## 564588 Alu_1118245
## 564589 Alu_1118245
```

```
remp_res_Alu@metadata
```

```

## $REannotation
## GRanges object with 84999 ranges and 5 metadata columns:
##           seqnames      ranges strand |  swScore     repName    repClass
##           <Rle>      <IRanges>  <Rle> | <integer> <character> <character>
## [1]   chr1  837882-838168    + |    2147 AluSq2    SINE
## [2]   chr1  842551-842630    + |     509 AluSz6    SINE
## [3]   chr1  842633-842942    + |    2267 AluSz     SINE
## [4]   chr1  850046-850357    + |    2417 AluSp     SINE
## [5]   chr1  882157-882442    + |    2206 AluSx1    SINE
## ...
## [84995] ...       ...     ... |    ...
## [84996] ...       ...     ... |    ...
## [84997] ...       ...     ... |    ...
## [84998] ...       ...     ... |    ...
## [84999] ...       ...     ... |    ...
##           repFamily     Index
##           <character> <Rle>
## [1]   Alu Alu_0000163
## [2]   Alu Alu_0000164
## [3]   Alu Alu_0000165
## [4]   Alu Alu_0000166
## [5]   Alu Alu_0000168
## ...
## [84995] ...       ...
## [84996] ...       ...
## [84997] ...       ...
## [84998] ...       ...
## [84999] ...       ...
## -----
## seqinfo: 24 sequences from hg19 genome
##
## $RECpG
## GRanges object with 11099 ranges and 2 metadata columns:
##           seqnames      ranges strand |      Index     RE.Index
##           <Rle> <IRanges>  <Rle> | <character> <Rle>
## cg17693420   chr7  99157059    * | cg17693420 Alu_0447501
## cg02364651   chr3  53243724    * | cg02364651 Alu_0197765
## cg09639571   chr8  42911059    * | cg09639571 Alu_0529028
## cg26877022   chr4  57845825    * | cg26877022 Alu_0263141
## cg12914966   chr6  28830789    * | cg12914966 Alu_0372897
## ...
## [cg09038001] ...       ...     ... |    ...
## [cg26653677] ...       ...     ... |    ...
## [cg02077998] ...       ...     ... |    ...
## [cg02523014] ...       ...     ... |    ...
## [cg00693741] ...       ...     ... |    ...
## -----
## seqinfo: 24 sequences from hg19 genome; no seqlengths
##
## $regionCode
## DataFrame with 84999 rows and 7 columns
##           InNM        InNR        InTSS

```

```

## <character> <character> <character>
## 1 NA NA NA
## 2 NA NA NA
## 3 NA NA NA
## 4 NA NA NA
## 5 1337 NA NA
## ... ...
## 84995 47439 47443|47449|47448 47448|47449
## 84996 47450 NA 47450
## 84997 NA NA NA
## 84998 47458 NA 47458
## 84999 47451|47452|47453|47.. 47457|47455 47455
## In5UTR InCDS InExon In3UTR
## <character> <character> <character> <character>
## 1 NA NA NA NA
## 2 NA NA NA NA
## 3 NA NA NA NA
## 4 NA NA NA NA
## 5 NA 1337 NA NA
## ... ...
## 84995 NA 47439 NA NA
## 84996 NA NA NA NA
## 84997 NA NA NA NA
## 84998 NA NA NA NA
## 84999 47451|47452|47453|47.. NA 47454|47457 NA
## $refGene
## GRanges object with 47460 ranges and 5 metadata columns:
##   seqnames      ranges strand |      name      type
##   <Rle>      <IRanges> <Rle> | <character> <character>
## [1] chr1 66999825-67210768 + | NM_032291 NM
## [2] chr1 8378145-8404227 + | NM_001080397 NM
## [3] chr1 48998527-50489626 - | NM_032785 NM
## [4] chr1 16767167-16786584 + | NM_001145277 NM
## [5] chr1 16767167-16786584 + | NM_001145278 NM
## ... ...
## [47456] chr2 51205920-51222087 - | NM_007081 NM
## [47457] chr2 51195514-51238065 + | NR_026981 NR
## [47458] chr2 51176652-51183727 + | NM_001097 NM
## [47459] chr2 51205920-51222087 - | NM_001130923 NM
## [47460] chr2 51205920-51222087 - | NM_001003789 NM
##   index EntrezGene GeneSymbol
##   <character> <character> <character>
## [1] 1 84251 SGIP1
## [2] 2 50651 SLC45A1
## [3] 3 84871 AGBL4
## [4] 4 55707 NECAP2
## [5] 5 55707 NECAP2
## ... ...
## [47456] 47456 11158 RABL2B
## [47457] 47457 284942 RPL23AP82
## [47458] 47458 49 ACR

```

```

## [47459]      47459      11158      RABL2B
## [47460]      47460      11158      RABL2B
##
## -----
## seqinfo: 93 sequences from an unspecified genome; no seqlengths
##
## $varImp
## DataFrame with 18 rows and 202 columns
##          X200357150046_R01C01 X200357150046_R04C01 X200357150046_R05C01
##                               <numeric>           <numeric>           <numeric>
## RE.swScore            19.805674          19.91927          23.36058
## RE.Length             13.035081          13.73111          11.29548
## RE.CpG.density        26.648639          20.22481          28.82436
## RE.InTSS              11.209865          8.89509           9.08198
## RE.In5UTR             0.548917          4.78407           6.44783
## ...
## ...
## ...
## Methy.mean.mov1       27.5214           31.5534          34.1165
## Methy.mean.mov2       24.2980           24.1244          27.3758
## Methy.mean.mov3       17.4128           19.7408          22.6779
## Methy.mean.mov4       18.8856           21.9142          19.2288
## Methy.std              21.5069           19.2653          19.2740
##          X200357150046_R07C01 X200357150047_R01C01 X200357150047_R04C01
##                               <numeric>           <numeric>           <numeric>
## RE.swScore            16.22036          23.00750          21.5466
## RE.Length              11.99696          13.25230          12.8051
## RE.CpG.density        28.64930          25.95856          26.9216
## RE.InTSS              9.16378           11.12222          11.6811
## RE.In5UTR             2.73234           3.95797           8.4238
## ...
## ...
## ...
## Methy.mean.mov1       32.9882           29.7917          28.4617
## Methy.mean.mov2       26.1202           23.1263          26.3285
## Methy.mean.mov3       19.5534           18.1851          17.7539
## Methy.mean.mov4       15.6341           17.0249          17.5484
## Methy.std              16.4831           16.5697          15.9195
##          X200357150047_R06C01 X200357150047_R07C01 X200357150047_R08C01
##                               <numeric>           <numeric>           <numeric>
## RE.swScore            17.44943          16.59549          18.05030
## RE.Length              11.27390          8.34291           11.53274
## RE.CpG.density        30.69217          23.75420          28.98221
## RE.InTSS              11.70592          9.96659           10.52643
## RE.In5UTR             5.64342           3.19175           5.24698
## ...
## ...
## ...
## Methy.mean.mov1       33.6536           29.7021          31.6045
## Methy.mean.mov2       25.5212           26.6679          24.3129
## Methy.mean.mov3       20.0252           19.6732          21.0875
## Methy.mean.mov4       20.2171           19.8407          18.9117
## Methy.std              23.4705           19.7926          17.5917
##          X200357150063_R01C01 X200357150063_R02C01 X200357150063_R03C01
##                               <numeric>           <numeric>           <numeric>
## RE.swScore            19.79540          19.43590          18.09062
## RE.Length              15.08566          14.04932          13.05724
## RE.CpG.density        28.72627          25.59877          23.54814
## RE.InTSS              8.90569           12.89133          10.81111

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## RE.In5UTR	5.42028	2.40704	3.07968
## ...	...	...	...
## Methy.mean.mov1	29.9532	34.6720	30.8787
## Methy.mean.mov2	27.4643	24.5348	24.7243
## Methy.mean.mov3	19.9663	18.7175	18.7232
## Methy.mean.mov4	17.6275	17.2771	16.8925
## Methy.std	20.1684	19.3122	19.7883
## X200357150063_R06C01	X200357150063_R07C01	X200357980038_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.76293	21.12743	21.35453
## RE.Length	15.03212	14.69711	13.46384
## RE.CpG.density	24.18067	32.86051	22.54826
## RE.InTSS	7.04228	10.27062	9.87880
## RE.In5UTR	4.60618	5.84394	6.24101
## ...	...	...	...
## Methy.mean.mov1	33.2779	31.4492	28.4056
## Methy.mean.mov2	24.8166	26.2140	22.9244
## Methy.mean.mov3	18.3929	19.8991	18.9335
## Methy.mean.mov4	17.4087	18.7270	17.0896
## Methy.std	17.6590	17.0212	18.5147
## X200357980038_R04C01	X200357980038_R05C01	X200357980038_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	23.26690	20.69347	18.39826
## RE.Length	12.51413	15.95347	13.71857
## RE.CpG.density	23.63882	22.52901	24.81123
## RE.InTSS	9.19743	10.01378	10.99155
## RE.In5UTR	3.99477	8.27794	2.89933
## ...	...	...	...
## Methy.mean.mov1	30.6800	33.1554	29.6499
## Methy.mean.mov2	25.9852	26.8863	28.5171
## Methy.mean.mov3	17.6494	17.6259	18.8309
## Methy.mean.mov4	17.3912	16.3154	17.4465
## Methy.std	20.4248	20.6434	18.4812
## X200357980038_R07C01	X200357980038_R08C01	X200360610122_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.23698	22.94306	20.45606
## RE.Length	14.47269	15.19701	14.61744
## RE.CpG.density	32.72204	27.56709	25.62751
## RE.InTSS	7.90839	11.48865	11.34182
## RE.In5UTR	2.70753	4.62218	4.37917
## ...	...	...	...
## Methy.mean.mov1	35.5715	32.7604	32.2405
## Methy.mean.mov2	25.0544	27.7525	24.6650
## Methy.mean.mov3	18.8527	19.9271	19.4503
## Methy.mean.mov4	15.8953	18.7203	14.2321
## Methy.std	15.4599	19.8501	19.1589
## X200360610122_R02C01	X200360610122_R03C01	X200360610122_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	18.58396	21.32075	20.65098
## RE.Length	11.73109	12.61916	12.71319
## RE.CpG.density	24.39625	32.61683	25.98610
## RE.InTSS	11.39901	13.73461	9.05151

## RE.In5UTR	2.93886	5.58182	6.77743
## ...	...	...	...
## Methy.mean.mov1	29.2543	29.4082	26.6819
## Methy.mean.mov2	24.6903	27.3250	25.9308
## Methy.mean.mov3	19.8843	18.7712	17.4189
## Methy.mean.mov4	21.2091	16.2616	18.3326
## Methy.std	22.3279	22.5841	19.2794
##	X200360610122_R05C01	X200360610122_R07C01	X200360610122_R08C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	18.73272	20.36638	16.90977
## RE.Length	14.17932	16.42132	11.97781
## RE.CpG.density	24.70814	25.01916	26.62785
## RE.InTSS	9.34547	13.22575	11.21292
## RE.In5UTR	5.13252	5.30211	4.54484
## ...	...	...	...
## Methy.mean.mov1	28.2564	30.0035	30.3053
## Methy.mean.mov2	28.1130	24.7773	22.9269
## Methy.mean.mov3	17.3730	21.5316	20.5644
## Methy.mean.mov4	17.1633	20.9438	18.9863
## Methy.std	17.5147	20.0417	22.5167
##	X200360610148_R01C01	X200360610148_R02C01	X200360610148_R04C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	19.72969	18.86600	18.67858
## RE.Length	12.90251	15.07810	11.91971
## RE.CpG.density	24.41723	27.20933	23.63017
## RE.InTSS	7.99256	11.08146	11.97971
## RE.In5UTR	5.81346	3.24438	5.13434
## ...	...	...	...
## Methy.mean.mov1	30.9993	32.0123	30.2427
## Methy.mean.mov2	23.3639	25.2312	24.0780
## Methy.mean.mov3	18.8553	21.3699	18.5851
## Methy.mean.mov4	15.1688	18.0368	17.1371
## Methy.std	20.4636	18.3936	18.7415
##	X200360610148_R05C01	X200360610148_R06C01	X200360610148_R08C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	17.05197	20.68666	19.04717
## RE.Length	11.74586	12.89383	12.71845
## RE.CpG.density	26.99133	20.94083	27.96319
## RE.InTSS	14.23889	11.29586	10.02521
## RE.In5UTR	3.64042	5.91077	9.43973
## ...	...	...	...
## Methy.mean.mov1	31.8692	27.2240	32.1094
## Methy.mean.mov2	26.3885	23.9368	25.8679
## Methy.mean.mov3	21.9711	17.4639	18.8053
## Methy.mean.mov4	20.5111	14.0424	16.5263
## Methy.std	21.9638	17.4040	17.5893
##	X200360140138_R01C01	X200360140138_R02C01	X200360140138_R04C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	22.79149	17.7961	20.51962
## RE.Length	13.93720	12.1903	15.94878
## RE.CpG.density	26.20224	30.1046	27.79681
## RE.InTSS	13.89147	10.7716	9.49972

## RE.In5UTR	5.56203	5.9925	8.96444
## ...	...	...	...
## Methy.mean.mov1	28.8388	30.7601	30.0560
## Methy.mean.mov2	24.2768	24.8580	25.5795
## Methy.mean.mov3	23.2814	19.0893	17.6067
## Methy.mean.mov4	17.9428	16.1477	18.8793
## Methy.std	18.3908	17.6614	20.1900
## X200360140138_R05C01	X200360140145_R02C01	X200360140145_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	16.72538	16.33497	23.28204
## RE.Length	13.02252	12.38809	14.23031
## RE.CpG.density	31.65325	19.44257	25.23911
## RE.InTSS	10.76499	10.63209	12.82311
## RE.In5UTR	3.12234	5.31906	7.11115
## ...	...	...	...
## Methy.mean.mov1	31.5622	29.4818	30.6053
## Methy.mean.mov2	24.2610	24.1042	24.6811
## Methy.mean.mov3	17.8942	19.8236	17.6527
## Methy.mean.mov4	16.1515	17.9150	18.0627
## Methy.std	19.1209	22.4906	19.7651
## X200360140145_R05C01	X200360140145_R06C01	X200360140145_R07C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.46161	19.42694	21.16875
## RE.Length	14.32903	12.54469	12.31824
## RE.CpG.density	22.29784	27.17431	20.41161
## RE.InTSS	10.80394	11.76418	12.62720
## RE.In5UTR	4.02783	5.96283	4.43328
## ...	...	...	...
## Methy.mean.mov1	30.1139	29.9169	28.4408
## Methy.mean.mov2	25.3857	23.4793	27.0567
## Methy.mean.mov3	17.3888	18.9589	19.5191
## Methy.mean.mov4	15.0596	17.2913	15.9060
## Methy.std	18.9081	17.5547	18.0291
## X200360140145_R08C01	X200503840006_R01C01	X200503840006_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.78205	18.48518	20.37077
## RE.Length	13.79290	13.88435	14.84341
## RE.CpG.density	23.02490	23.76427	25.17580
## RE.InTSS	13.42088	10.64458	14.31678
## RE.In5UTR	5.50255	4.94871	8.00282
## ...	...	...	...
## Methy.mean.mov1	28.9557	32.7214	31.7378
## Methy.mean.mov2	26.1378	26.2244	26.9610
## Methy.mean.mov3	16.2858	19.9416	21.2395
## Methy.mean.mov4	16.2526	20.9920	20.1623
## Methy.std	19.3515	17.0177	23.3213
## X200503840006_R04C01	X200503840006_R06C01	X200503840006_R07C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	17.29196	17.87772	18.10746
## RE.Length	11.77418	13.43957	14.74167
## RE.CpG.density	25.96239	34.84642	29.20195
## RE.InTSS	8.57504	9.64829	9.69482

## RE.In5UTR	5.35326	4.58105	5.34880
## ...	...	...	...
## Methy.mean.mov1	32.4020	28.2580	30.2688
## Methy.mean.mov2	27.4692	22.7729	27.8042
## Methy.mean.mov3	19.4343	17.6009	17.8726
## Methy.mean.mov4	14.3905	17.7687	17.3321
## Methy.std	20.0793	19.6268	19.2179
##	X200503840006_R08C01	X200503840041_R01C01	X200503840041_R02C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	15.80033	18.42976	24.76481
## RE.Length	11.08438	12.18755	15.35496
## RE.CpG.density	28.77568	23.25006	30.26566
## RE.InTSS	11.24936	9.88052	11.12506
## RE.In5UTR	4.13754	1.41049	4.23118
## ...	...	...	...
## Methy.mean.mov1	31.0082	33.2313	30.6936
## Methy.mean.mov2	22.8050	26.2324	24.7350
## Methy.mean.mov3	20.7494	20.7828	19.9445
## Methy.mean.mov4	16.9409	17.2843	21.2792
## Methy.std	21.0736	18.6760	18.8742
##	X200503840041_R03C01	X200503840041_R04C01	X200503840041_R05C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	16.25650	17.01049	22.04525
## RE.Length	14.49018	12.59949	13.88873
## RE.CpG.density	34.67376	31.68695	35.10198
## RE.InTSS	9.51445	9.21427	10.32738
## RE.In5UTR	4.13568	1.13835	3.95254
## ...	...	...	...
## Methy.mean.mov1	31.1896	31.6585	30.3065
## Methy.mean.mov2	23.4806	29.1916	26.5562
## Methy.mean.mov3	18.8684	23.2424	19.7730
## Methy.mean.mov4	19.4852	17.0321	21.8818
## Methy.std	21.0262	18.4306	24.3593
##	X200503840041_R07C01	X200503840041_R08C01	X200503840042_R02C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	24.64049	18.67582	19.68983
## RE.Length	13.74539	14.84056	11.69683
## RE.CpG.density	28.89540	32.42270	23.84890
## RE.InTSS	11.30217	6.79765	11.71255
## RE.In5UTR	5.96197	0.40708	6.34065
## ...	...	...	...
## Methy.mean.mov1	29.8887	27.5399	33.3170
## Methy.mean.mov2	21.9576	25.4060	28.1625
## Methy.mean.mov3	20.8911	21.0840	18.0998
## Methy.mean.mov4	14.5243	22.0801	19.3708
## Methy.std	21.0423	21.4419	20.5812
##	X200503840042_R03C01	X200503840042_R04C01	X200503840042_R05C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	21.66864	18.69420	19.19526
## RE.Length	11.48634	13.83253	12.03566
## RE.CpG.density	26.83167	29.00648	31.10585
## RE.InTSS	9.74733	10.65319	6.10786

## RE.In5UTR	2.44689	8.22191	4.23962
## ...	...	...	...
## Methy.mean.mov1	32.7002	30.6881	31.6776
## Methy.mean.mov2	24.6591	24.8532	27.0940
## Methy.mean.mov3	22.5648	19.5386	18.8196
## Methy.mean.mov4	20.3477	19.1649	22.1246
## Methy.std	19.2671	20.1041	22.2928
##	X200503840042_R06C01	X200503840042_R07C01	X200503840042_R08C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	20.60553	20.99528	18.70739
## RE.Length	13.94399	13.63622	14.04806
## RE.CpG.density	27.06838	26.84765	25.85932
## RE.InTSS	11.12252	10.83829	11.93755
## RE.In5UTR	7.20224	7.44871	4.36087
## ...	...	...	...
## Methy.mean.mov1	31.6707	29.5957	33.9520
## Methy.mean.mov2	24.9036	24.7306	24.2000
## Methy.mean.mov3	22.3510	18.2136	20.8636
## Methy.mean.mov4	20.6422	17.1175	17.5937
## Methy.std	21.2228	19.6558	21.3233
##	X200503840058_R01C01	X200503840058_R02C01	X200503840058_R06C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	19.62480	19.59544	19.41554
## RE.Length	10.33640	14.01772	16.18709
## RE.CpG.density	28.02668	29.45971	31.11957
## RE.InTSS	10.27903	10.29434	7.97482
## RE.In5UTR	3.68887	5.79734	5.00331
## ...	...	...	...
## Methy.mean.mov1	32.2775	29.9963	33.1250
## Methy.mean.mov2	27.7917	26.7500	26.8495
## Methy.mean.mov3	21.8903	18.8903	20.7517
## Methy.mean.mov4	17.9428	19.3218	22.0801
## Methy.std	17.4096	18.9559	22.4734
##	X200503840058_R07C01	X200503840065_R01C01	X200503840065_R02C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	23.77533	22.2877	21.48603
## RE.Length	13.91632	15.3907	13.27568
## RE.CpG.density	25.20060	31.1888	28.16224
## RE.InTSS	9.41264	12.0458	13.14208
## RE.In5UTR	4.28284	4.8200	4.38549
## ...	...	...	...
## Methy.mean.mov1	33.3868	30.3540	29.8062
## Methy.mean.mov2	26.3223	25.4362	23.7175
## Methy.mean.mov3	19.1904	22.4051	19.3384
## Methy.mean.mov4	19.9981	17.6931	20.8051
## Methy.std	21.4829	20.4550	19.2690
##	X200503840065_R04C01	X200503840065_R05C01	X200503840065_R06C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	20.76940	21.33182	20.40947
## RE.Length	13.89082	13.48530	15.07819
## RE.CpG.density	22.14972	22.61521	25.05975
## RE.InTSS	8.90964	9.63259	11.79873

## RE.In5UTR	8.27733	8.61902	6.40226
## ...	...	...	...
## Methy.mean.mov1	32.0535	33.4489	30.3830
## Methy.mean.mov2	28.3208	26.1893	24.5396
## Methy.mean.mov3	17.4091	18.5843	21.5334
## Methy.mean.mov4	14.7525	17.1307	16.2716
## Methy.std	19.4355	18.4960	19.2666
##	X200503840065_R07C01	X200503840065_R08C01	X200503840077_R01C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	23.25267	21.06038	18.71212
## RE.Length	16.55035	16.04262	13.76596
## RE.CpG.density	31.52581	25.06443	21.49162
## RE.InTSS	10.31150	10.13915	11.10138
## RE.In5UTR	4.27363	3.97302	3.86387
## ...	...	...	...
## Methy.mean.mov1	30.2962	32.1335	32.5320
## Methy.mean.mov2	24.2143	23.7572	24.8767
## Methy.mean.mov3	20.9937	18.1593	20.5318
## Methy.mean.mov4	17.1300	16.4930	17.3149
## Methy.std	21.0002	19.9404	21.5490
##	X200503840077_R02C01	X200503840077_R03C01	X200503840077_R04C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	22.4095	18.8655	20.11155
## RE.Length	12.9459	15.8890	12.85585
## RE.CpG.density	30.6542	27.8005	30.62830
## RE.InTSS	11.1542	13.3390	9.98944
## RE.In5UTR	4.0897	3.3060	4.22299
## ...	...	...	...
## Methy.mean.mov1	31.8830	32.1885	33.3816
## Methy.mean.mov2	28.1212	27.2727	25.0071
## Methy.mean.mov3	19.2232	21.9181	20.9853
## Methy.mean.mov4	15.7002	17.5150	19.0267
## Methy.std	19.8196	19.8204	19.1898
##	X200503840077_R05C01	X200503840077_R06C01	X200503840077_R07C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	20.8417	18.70387	19.55467
## RE.Length	14.1475	13.91540	11.28586
## RE.CpG.density	21.6536	26.62999	26.08218
## RE.InTSS	11.9528	11.77258	9.10227
## RE.In5UTR	2.0971	4.89101	4.27037
## ...	...	...	...
## Methy.mean.mov1	28.5805	28.0100	29.3840
## Methy.mean.mov2	23.2451	23.9831	22.9619
## Methy.mean.mov3	20.8819	18.0513	19.3510
## Methy.mean.mov4	21.8012	16.3849	16.1273
## Methy.std	20.5158	20.3701	22.8489
##	X200503840077_R08C01	X200503840080_R01C01	X200503840080_R03C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	20.16663	20.50373	20.65848
## RE.Length	15.84739	13.37476	14.54288
## RE.CpG.density	35.88759	26.29140	27.53349
## RE.InTSS	8.90377	11.41707	10.58780

## RE.In5UTR	2.86900	3.22508	8.16717
## ...	...	...	...
## Methy.mean.mov1	29.9916	33.6534	31.2658
## Methy.mean.mov2	29.8056	29.3930	26.9669
## Methy.mean.mov3	21.5934	23.1209	21.7819
## Methy.mean.mov4	21.5595	16.7921	17.1476
## Methy.std	21.3104	21.5860	20.2524
## X200503840080_R06C01	X200503840080_R07C01	X200503840080_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.90208	17.43024	20.30177
## RE.Length	14.78764	13.49043	13.47688
## RE.CpG.density	27.95897	29.14075	21.87288
## RE.InTSS	9.66395	10.67856	11.53249
## RE.In5UTR	3.90369	5.97416	5.16263
## ...	...	...	...
## Methy.mean.mov1	30.2947	31.4287	32.5412
## Methy.mean.mov2	29.6609	24.5484	25.0330
## Methy.mean.mov3	21.7544	19.7049	23.1329
## Methy.mean.mov4	16.5668	15.3108	19.0619
## Methy.std	19.2125	21.4691	23.8471
## X200503840106_R01C01	X200503840106_R02C01	X200503840106_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	24.70541	18.38023	22.17548
## RE.Length	15.22512	13.46124	14.65902
## RE.CpG.density	26.65277	29.59525	24.71532
## RE.InTSS	11.74875	11.16237	10.68169
## RE.In5UTR	3.94241	4.24769	5.42769
## ...	...	...	...
## Methy.mean.mov1	34.0878	31.2162	35.7201
## Methy.mean.mov2	25.2483	25.6336	30.0200
## Methy.mean.mov3	20.2201	19.6452	24.6316
## Methy.mean.mov4	15.8123	15.5587	18.4258
## Methy.std	20.1528	20.4488	23.2971
## X200503840106_R08C01	X203740800065_R01C01	X203740800065_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	18.71579	18.36749	22.15680
## RE.Length	11.40335	14.96928	14.86755
## RE.CpG.density	29.23780	27.43052	26.24885
## RE.InTSS	8.84301	8.42196	12.83949
## RE.In5UTR	3.25390	4.37308	6.65813
## ...	...	...	...
## Methy.mean.mov1	29.2299	29.3075	29.3924
## Methy.mean.mov2	25.7129	23.8600	27.0828
## Methy.mean.mov3	21.0587	18.9484	18.6890
## Methy.mean.mov4	18.2629	15.6790	12.9331
## Methy.std	17.4117	18.2607	16.1249
## X203740800065_R03C01	X203740800065_R04C01	X203740800065_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.16644	20.57517	22.47627
## RE.Length	14.43595	15.18443	15.32201
## RE.CpG.density	31.11835	24.16061	25.55709
## RE.InTSS	12.26379	10.57454	13.01069

## RE.In5UTR	4.17418	6.04258	4.85694
## ...	...	...	...
## Methy.mean.mov1	28.6632	31.2201	31.1927
## Methy.mean.mov2	26.8253	26.5324	26.4491
## Methy.mean.mov3	16.4920	20.5794	19.8175
## Methy.mean.mov4	14.3872	16.1998	19.2671
## Methy.std	15.0101	18.0140	19.2905
## X203740800065_R07C01	X203740800065_R08C01	X203740800066_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.40846	20.65197	22.27360
## RE.Length	12.16193	12.75485	12.33903
## RE.CpG.density	24.81968	27.59139	28.81133
## RE.InTSS	12.06869	10.28912	9.89545
## RE.In5UTR	6.72687	5.54785	3.88698
## ...	...	...	...
## Methy.mean.mov1	30.2913	31.3973	30.7353
## Methy.mean.mov2	24.8698	28.2003	26.4969
## Methy.mean.mov3	18.3336	19.8832	18.9639
## Methy.mean.mov4	17.7661	20.4583	18.3662
## Methy.std	22.0935	19.8841	20.5301
## X203740800066_R02C01	X203740800066_R04C01	X203740800066_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	23.76076	25.43683	21.5386
## RE.Length	15.46368	17.56349	15.6713
## RE.CpG.density	28.99354	22.45241	24.5027
## RE.InTSS	10.77621	11.44878	12.1517
## RE.In5UTR	5.34513	4.73915	6.2995
## ...	...	...	...
## Methy.mean.mov1	29.1665	29.9406	29.2438
## Methy.mean.mov2	28.0984	28.6422	22.7915
## Methy.mean.mov3	20.2090	21.4485	19.0454
## Methy.mean.mov4	17.8552	15.7495	15.8974
## Methy.std	20.5267	18.8411	19.4881
## X203740800066_R08C01	X203717920047_R01C01	X203717920047_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	25.24937	22.86923	23.86686
## RE.Length	12.78707	15.12051	16.04719
## RE.CpG.density	22.59093	29.48275	26.81207
## RE.InTSS	12.39434	10.56415	11.27225
## RE.In5UTR	5.35495	3.71436	5.87739
## ...	...	...	...
## Methy.mean.mov1	32.0708	33.8684	30.7121
## Methy.mean.mov2	26.4415	27.4428	25.0061
## Methy.mean.mov3	21.1831	18.7390	20.1919
## Methy.mean.mov4	17.5367	20.3028	17.8721
## Methy.std	17.4697	20.5035	18.5523
## X203717920047_R03C01	X203717920047_R04C01	X203717920047_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.4637	25.04159	23.06658
## RE.Length	13.9821	16.91056	17.13953
## RE.CpG.density	28.4212	24.55550	23.23920
## RE.InTSS	10.1212	12.35631	12.39487

## RE.In5UTR	3.6541	3.53065	3.26892
## ...	...	...	...
## Methy.mean.mov1	30.0054	30.7376	31.4481
## Methy.mean.mov2	26.3503	26.7988	26.6686
## Methy.mean.mov3	22.0979	21.2585	16.8261
## Methy.mean.mov4	17.8998	16.8808	13.1142
## Methy.std	19.9616	18.7431	19.6160
## X203717920047_R06C01	X203717920047_R07C01	X203711910042_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.54240	19.76296	22.73163
## RE.Length	14.51875	14.85203	15.63447
## RE.CpG.density	30.00289	23.57563	27.16714
## RE.InTSS	12.11423	10.11747	8.66521
## RE.In5UTR	7.97005	4.97625	6.81034
## ...	...	...	...
## Methy.mean.mov1	31.2791	29.6558	30.6680
## Methy.mean.mov2	26.3981	25.9488	24.2430
## Methy.mean.mov3	19.1149	18.6184	17.5037
## Methy.mean.mov4	19.4144	14.5113	15.8879
## Methy.std	17.2145	20.9202	21.6281
## X203711910042_R02C01	X203711910042_R06C01	X203711910042_R07C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.01089	22.65704	23.75707
## RE.Length	12.97610	13.54667	10.91299
## RE.CpG.density	24.27973	26.68208	26.56457
## RE.InTSS	8.32473	8.64539	13.37685
## RE.In5UTR	7.90204	7.21399	6.60255
## ...	...	...	...
## Methy.mean.mov1	30.9415	30.8159	30.7909
## Methy.mean.mov2	24.4881	27.1425	27.7051
## Methy.mean.mov3	15.4447	17.4654	20.3786
## Methy.mean.mov4	21.4794	20.2783	17.1005
## Methy.std	15.9346	17.7293	19.4504
## X203711910042_R08C01	X203711910007_R02C01	X203711910007_R03C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.79765	21.62486	23.23433
## RE.Length	16.04597	14.39424	15.74444
## RE.CpG.density	24.51309	23.68942	24.70582
## RE.InTSS	9.80185	11.66525	7.17041
## RE.In5UTR	4.77304	8.43349	3.17108
## ...	...	...	...
## Methy.mean.mov1	32.2217	31.9664	29.8733
## Methy.mean.mov2	25.7869	27.5967	26.0752
## Methy.mean.mov3	22.2041	22.8745	19.2284
## Methy.mean.mov4	19.7121	19.7642	15.3961
## Methy.std	16.8706	18.9850	17.9725
## X203711910007_R04C01	X203711910007_R05C01	X203711910007_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.98361	22.0497	26.77179
## RE.Length	13.33691	14.7631	15.87855
## RE.CpG.density	30.74569	24.5121	28.33306
## RE.InTSS	7.36317	11.8236	9.79819

## RE.In5UTR	4.66123	2.3665	4.62495
## ...	...	...	...
## Methy.mean.mov1	28.9204	30.0333	30.8125
## Methy.mean.mov2	25.3626	23.7318	24.6032
## Methy.mean.mov3	19.2083	18.4718	19.6442
## Methy.mean.mov4	18.0372	15.2262	17.6436
## Methy.std	21.2657	16.5220	19.3710
## X203711910007_R07C01	X203711910007_R08C01	X203717920046_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	19.78992	17.40357	21.71027
## RE.Length	14.42153	13.85537	14.65861
## RE.CpG.density	25.18815	29.74585	22.26271
## RE.InTSS	10.52507	10.36354	10.51355
## RE.In5UTR	5.25899	5.12803	4.83839
## ...	...	...	...
## Methy.mean.mov1	28.9431	30.0265	29.1148
## Methy.mean.mov2	24.4958	25.4352	25.4352
## Methy.mean.mov3	19.0938	19.7335	17.8722
## Methy.mean.mov4	13.2871	17.5251	18.1239
## Methy.std	14.4210	17.0410	20.0370
## X203717920046_R02C01	X203717920046_R03C01	X203717920046_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	24.03318	21.68226	25.39170
## RE.Length	15.40732	12.33703	15.36018
## RE.CpG.density	21.13587	24.17913	21.00225
## RE.InTSS	11.38732	10.72691	9.80297
## RE.In5UTR	6.39763	3.31402	6.77378
## ...	...	...	...
## Methy.mean.mov1	31.0202	29.1518	29.3560
## Methy.mean.mov2	27.2313	24.2489	28.2500
## Methy.mean.mov3	21.4724	17.1911	17.3618
## Methy.mean.mov4	16.1493	14.1316	15.1913
## Methy.std	18.2602	15.9887	18.4315
## X203717920046_R06C01	X203717920046_R07C01	X203717920046_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.38494	22.09902	21.84013
## RE.Length	13.70736	12.79464	13.95513
## RE.CpG.density	25.77422	22.37428	24.58521
## RE.InTSS	8.74680	11.40135	10.62510
## RE.In5UTR	3.80955	6.15571	5.38514
## ...	...	...	...
## Methy.mean.mov1	33.6108	32.9034	30.8962
## Methy.mean.mov2	25.2784	24.6545	25.5926
## Methy.mean.mov3	19.5569	19.7845	25.1830
## Methy.mean.mov4	17.4126	14.2334	21.2230
## Methy.std	18.6731	20.9333	21.0485
## X203740800064_R01C01	X203740800064_R03C01	X203740800064_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	18.99259	23.5704	24.78237
## RE.Length	12.83788	13.8103	16.02547
## RE.CpG.density	31.28273	24.1303	21.21420
## RE.InTSS	9.38207	11.0925	10.74679

## RE.In5UTR	2.30266	6.3874	2.48558
## ...	...	...	...
## Methy.mean.mov1	28.6959	30.7715	31.3979
## Methy.mean.mov2	25.4500	23.3556	24.7390
## Methy.mean.mov3	21.3007	16.9470	23.1032
## Methy.mean.mov4	20.0833	12.5902	18.9576
## Methy.std	19.1070	19.0260	19.2810
## X203740800064_R06C01	X203740800064_R07C01	X203717910108_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	17.79078	21.53545	21.78954
## RE.Length	11.52226	14.53430	13.81767
## RE.CpG.density	32.22918	28.15922	26.97065
## RE.InTSS	10.39986	9.83172	10.00674
## RE.In5UTR	4.86396	3.30066	7.75334
## ...	...	...	...
## Methy.mean.mov1	32.8611	30.2092	30.7729
## Methy.mean.mov2	23.7014	25.3441	26.0340
## Methy.mean.mov3	24.1660	19.1844	21.0525
## Methy.mean.mov4	19.6711	17.4499	17.3805
## Methy.std	18.0769	18.2489	19.8711
## X203717910108_R02C01	X203717910108_R03C01	X203717910108_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	24.08365	21.22262	23.79961
## RE.Length	14.33672	15.73326	16.26227
## RE.CpG.density	30.46136	24.86859	27.24511
## RE.InTSS	10.18931	8.57759	8.32550
## RE.In5UTR	8.85592	5.55916	5.21003
## ...	...	...	...
## Methy.mean.mov1	29.7777	31.2912	28.6146
## Methy.mean.mov2	24.6109	24.6768	24.2468
## Methy.mean.mov3	18.8741	20.2595	19.4507
## Methy.mean.mov4	20.0114	20.1590	18.7411
## Methy.std	16.5509	19.6970	19.4985
## X203717910108_R06C01	X203717910108_R07C01	X203717910108_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.77218	22.68976	21.93219
## RE.Length	14.83699	14.17624	15.59751
## RE.CpG.density	22.46989	30.57630	28.71145
## RE.InTSS	10.96585	11.25956	8.82037
## RE.In5UTR	6.02314	7.01293	6.35464
## ...	...	...	...
## Methy.mean.mov1	34.2464	29.2684	31.2931
## Methy.mean.mov2	25.6610	23.5930	27.4108
## Methy.mean.mov3	18.8969	16.8571	22.2155
## Methy.mean.mov4	18.9786	15.2676	20.4292
## Methy.std	20.0699	18.6216	20.5560
## X203740800032_R01C01	X203740800032_R02C01	X203740800032_R03C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	19.94014	23.55373	21.03214
## RE.Length	12.33378	15.30137	13.24690
## RE.CpG.density	23.73363	22.85531	20.86358
## RE.InTSS	9.07897	8.75155	10.34583

## RE.In5UTR	6.33559	6.83182	4.57531
## ...	...	...	...
## Methy.mean.mov1	29.8293	30.7488	31.1730
## Methy.mean.mov2	26.6198	24.4908	26.5973
## Methy.mean.mov3	19.9809	20.4241	21.0899
## Methy.mean.mov4	15.9227	16.3915	14.9849
## Methy.std	15.0299	20.1948	19.7557
## X203740800032_R04C01	X203740800032_R05C01	X203740800032_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.85056	19.82449	24.24363
## RE.Length	13.16759	11.47443	16.39858
## RE.CpG.density	25.49349	30.39361	28.96580
## RE.InTSS	9.04500	10.50011	7.85569
## RE.In5UTR	6.23807	6.04448	6.05831
## ...	...	...	...
## Methy.mean.mov1	31.8218	28.1351	33.0597
## Methy.mean.mov2	30.2035	23.3131	28.6621
## Methy.mean.mov3	23.3558	17.6089	22.7593
## Methy.mean.mov4	19.8174	18.2436	19.5356
## Methy.std	22.8242	19.3476	19.9835
## X203740800032_R07C01	X203740800032_R08C01	X203695310018_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	18.88178	22.26454	22.64935
## RE.Length	11.87543	15.66547	12.65962
## RE.CpG.density	31.77589	21.85481	22.11022
## RE.InTSS	11.63474	9.23839	11.76108
## RE.In5UTR	3.92952	5.48014	6.13902
## ...	...	...	...
## Methy.mean.mov1	30.4060	32.4397	32.8221
## Methy.mean.mov2	22.1426	23.6987	27.6411
## Methy.mean.mov3	17.9565	19.4388	21.6507
## Methy.mean.mov4	15.7094	16.7672	17.7137
## Methy.std	17.5876	19.0750	21.2829
## X203695310018_R05C01	X203695310018_R06C01	X203695310018_R07C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.87442	24.05376	23.49826
## RE.Length	14.23312	13.92854	14.30498
## RE.CpG.density	30.82659	20.26339	28.00343
## RE.InTSS	9.89109	8.54913	10.34744
## RE.In5UTR	4.73297	6.09052	4.62365
## ...	...	...	...
## Methy.mean.mov1	30.0414	29.1684	30.7539
## Methy.mean.mov2	25.9160	27.5537	27.3347
## Methy.mean.mov3	17.9924	17.7594	21.0999
## Methy.mean.mov4	13.8908	20.5037	14.2950
## Methy.std	19.5624	19.6885	18.4306
## X203695310018_R08C01	X203717910048_R01C01	X203717910048_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	25.32208	18.9649	21.40515
## RE.Length	16.07181	14.0274	12.69143
## RE.CpG.density	30.88578	26.3166	28.01353
## RE.InTSS	10.26753	11.3824	10.78610

## RE.In5UTR	6.82257	7.6929	2.04671
## ...	...	...	...
## Methy.mean.mov1	29.0681	30.9146	30.9839
## Methy.mean.mov2	27.6488	24.1870	27.2375
## Methy.mean.mov3	20.3119	18.3652	20.3209
## Methy.mean.mov4	16.9330	14.9351	19.8636
## Methy.std	20.4842	15.6372	16.6198
## X203717910048_R03C01	X203717910048_R04C01	X203717910048_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.61240	21.77057	23.51039
## RE.Length	15.07010	13.63873	13.44079
## RE.CpG.density	21.58602	24.32499	32.33060
## RE.InTSS	12.30241	13.30660	9.71920
## RE.In5UTR	5.51824	4.44581	6.21125
## ...	...	...	...
## Methy.mean.mov1	32.1414	31.1219	31.0931
## Methy.mean.mov2	23.6443	25.9001	25.7060
## Methy.mean.mov3	18.5450	18.8936	23.1543
## Methy.mean.mov4	15.0508	19.3019	21.4395
## Methy.std	16.5663	16.4491	18.7874
## X203717910048_R06C01	X203717910048_R07C01	X203717910032_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	23.59704	21.87363	21.16583
## RE.Length	14.78600	12.69684	13.30203
## RE.CpG.density	25.51621	26.22222	21.07829
## RE.InTSS	10.88158	7.55786	10.20944
## RE.In5UTR	4.54423	3.75079	3.92117
## ...	...	...	...
## Methy.mean.mov1	30.0125	29.4944	31.7128
## Methy.mean.mov2	28.1287	23.7453	27.2897
## Methy.mean.mov3	18.4279	18.8468	21.0559
## Methy.mean.mov4	17.7751	13.5318	17.7696
## Methy.std	20.3112	21.5990	19.1964
## X203717910032_R03C01	X203717910032_R04C01	X203717910032_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.24071	22.04631	21.70970
## RE.Length	12.33031	14.42747	12.93030
## RE.CpG.density	21.67925	20.66613	25.15422
## RE.InTSS	10.98768	8.45635	10.88615
## RE.In5UTR	4.09436	3.85615	6.54698
## ...	...	...	...
## Methy.mean.mov1	29.0120	33.6671	32.5744
## Methy.mean.mov2	25.5261	27.9054	21.5514
## Methy.mean.mov3	19.0430	21.9376	18.8134
## Methy.mean.mov4	16.5443	18.5011	13.7208
## Methy.std	16.9559	19.3997	18.8416
## X203717910032_R06C01	X203717910032_R07C01	X203717910032_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.31752	24.80020	21.02672
## RE.Length	13.80668	15.54398	14.03618
## RE.CpG.density	25.77225	23.22323	24.38319
## RE.InTSS	10.71853	13.41852	9.62098

## RE.In5UTR	3.40747	4.17152	4.31232
## ...	...	...	...
## Methy.mean.mov1	31.1554	31.2919	32.4085
## Methy.mean.mov2	27.4673	25.6750	26.3862
## Methy.mean.mov3	17.7890	17.8884	22.3862
## Methy.mean.mov4	17.0718	17.3758	16.6810
## Methy.std	20.5389	16.5776	19.1822
##	X203717920012_R01C01	X203717920012_R02C01	X203717920012_R03C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	20.44879	24.64605	24.24354
## RE.Length	17.45616	16.08663	14.97000
## RE.CpG.density	22.25142	22.53766	28.82762
## RE.InTSS	10.41993	13.90210	10.96035
## RE.In5UTR	3.23166	5.70428	4.43703
## ...	...	...	...
## Methy.mean.mov1	28.0108	33.4433	28.7692
## Methy.mean.mov2	24.6456	28.4837	27.0644
## Methy.mean.mov3	27.5573	22.6874	23.4326
## Methy.mean.mov4	25.5836	20.1479	24.2839
## Methy.std	15.5780	20.6947	21.9460
##	X203717920012_R04C01	X203717920012_R05C01	X203717920012_R07C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	22.49838	21.56454	16.45030
## RE.Length	15.52888	13.98125	13.67791
## RE.CpG.density	21.63368	29.02864	30.79330
## RE.InTSS	9.21076	8.47265	7.92849
## RE.In5UTR	3.04347	6.90789	3.05782
## ...	...	...	...
## Methy.mean.mov1	35.9502	32.0224	30.2222
## Methy.mean.mov2	27.7615	25.4998	22.9623
## Methy.mean.mov3	19.2283	22.6368	19.3606
## Methy.mean.mov4	16.2554	17.4699	20.1035
## Methy.std	20.8918	20.6754	19.3010
##	X203717920012_R08C01	X203693970032_R01C01	X203693970032_R02C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	24.03675	24.12583	21.47533
## RE.Length	14.30596	17.34246	14.82928
## RE.CpG.density	26.00357	20.65578	26.88730
## RE.InTSS	11.52577	9.29151	11.42556
## RE.In5UTR	6.42269	6.28663	4.31569
## ...	...	...	...
## Methy.mean.mov1	32.4384	31.2293	30.4121
## Methy.mean.mov2	26.7483	24.4498	25.5588
## Methy.mean.mov3	17.8321	20.0685	20.7260
## Methy.mean.mov4	18.6258	15.4587	18.9733
## Methy.std	20.2082	20.7717	18.1883
##	X203693970032_R03C01	X203693970032_R04C01	X203693970032_R05C01
##	<numeric>	<numeric>	<numeric>
## RE.swScore	20.00173	18.45818	23.92608
## RE.Length	13.10202	14.36623	14.56856
## RE.CpG.density	19.18054	22.91823	23.68470
## RE.InTSS	9.99292	9.63367	11.98122

## RE.In5UTR	4.05888	6.22156	5.89521
## ...	...	...	...
## Methy.mean.mov1	29.2272	28.7003	31.3881
## Methy.mean.mov2	25.8612	25.6889	30.3391
## Methy.mean.mov3	19.4872	19.2085	20.6677
## Methy.mean.mov4	16.1714	18.2351	18.5202
## Methy.std	18.2362	20.9637	19.1361
## X203693970032_R06C01	X203693970032_R07C01	X203693970032_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.88655	25.7117	19.80595
## RE.Length	17.59375	13.3223	14.92484
## RE.CpG.density	24.34571	23.5822	29.32624
## RE.InTSS	11.57680	10.7856	9.31132
## RE.In5UTR	3.48209	5.7796	4.16482
## ...	...	...	...
## Methy.mean.mov1	31.2376	31.8632	31.7506
## Methy.mean.mov2	27.8670	26.3155	26.5713
## Methy.mean.mov3	22.0313	20.4901	19.7275
## Methy.mean.mov4	20.9072	16.6384	16.1478
## Methy.std	19.6235	19.2994	18.3939
## X203693970034_R01C01	X203693970034_R02C01	X203693970034_R03C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	19.89579	20.84216	21.82409
## RE.Length	12.05505	13.13929	13.50104
## RE.CpG.density	23.71551	22.79232	23.33310
## RE.InTSS	9.46935	10.35646	10.55545
## RE.In5UTR	3.06454	5.91361	5.12249
## ...	...	...	...
## Methy.mean.mov1	30.6329	31.7655	29.5223
## Methy.mean.mov2	25.1371	24.5918	28.0878
## Methy.mean.mov3	20.8986	20.3141	20.4229
## Methy.mean.mov4	16.1397	17.7022	19.1470
## Methy.std	18.9800	19.0509	19.5978
## X203693970034_R04C01	X203693970034_R05C01	X203693970034_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.22058	23.19694	21.91190
## RE.Length	14.34975	14.07364	14.08987
## RE.CpG.density	17.47102	22.91044	23.53341
## RE.InTSS	11.30117	10.69958	12.06447
## RE.In5UTR	4.36928	6.25065	7.17664
## ...	...	...	...
## Methy.mean.mov1	33.3683	30.9369	31.4747
## Methy.mean.mov2	29.5255	26.6303	24.5308
## Methy.mean.mov3	21.5541	23.3047	19.9610
## Methy.mean.mov4	17.5463	20.1110	14.7050
## Methy.std	20.2331	18.5530	19.4603
## X203693970034_R07C01	X203693970034_R08C01	X203695310017_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.91179	20.53996	24.44615
## RE.Length	13.94927	11.32743	16.00416
## RE.CpG.density	15.02859	23.69538	19.05132
## RE.InTSS	10.47196	11.31130	10.13658

## RE.In5UTR	4.44729	5.75572	5.46783
## ...	...	...	...
## Methy.mean.mov1	31.3098	30.2467	31.3156
## Methy.mean.mov2	25.8593	25.0381	26.7973
## Methy.mean.mov3	22.6924	19.3594	21.8451
## Methy.mean.mov4	19.3398	17.0436	17.0346
## Methy.std	18.8793	19.8674	18.6958
## X203695310017_R02C01	X203695310017_R04C01	X203695310017_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.26622	23.35044	20.91174
## RE.Length	12.80225	15.45395	12.41795
## RE.CpG.density	23.11430	27.50759	29.86875
## RE.InTSS	10.00112	9.88802	10.29039
## RE.In5UTR	6.97147	5.85816	5.74224
## ...	...	...	...
## Methy.mean.mov1	30.7933	32.9473	31.4497
## Methy.mean.mov2	24.6088	29.1265	25.4691
## Methy.mean.mov3	18.9970	20.1616	19.7294
## Methy.mean.mov4	16.5014	18.2412	17.9344
## Methy.std	17.6767	21.8004	20.2053
## X203695310017_R07C01	X203740810001_R01C01	X203740810001_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.68370	24.43097	20.92033
## RE.Length	12.36402	13.68626	15.25606
## RE.CpG.density	24.65683	24.12312	26.99174
## RE.InTSS	11.13823	11.43560	9.82933
## RE.In5UTR	3.88779	4.30346	6.12315
## ...	...	...	...
## Methy.mean.mov1	29.8761	30.5837	30.9002
## Methy.mean.mov2	24.1431	22.8573	24.0435
## Methy.mean.mov3	19.7573	21.7842	20.8188
## Methy.mean.mov4	18.2682	18.1543	16.2128
## Methy.std	23.6120	20.2081	14.0827
## X203740810001_R03C01	X203740810001_R04C01	X203740810001_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	25.13259	20.87961	15.68794
## RE.Length	16.51909	14.37241	13.33076
## RE.CpG.density	27.76298	22.46884	27.61646
## RE.InTSS	10.76287	11.27576	8.38531
## RE.In5UTR	4.91843	6.06874	2.60196
## ...	...	...	...
## Methy.mean.mov1	33.3732	30.3010	31.1901
## Methy.mean.mov2	26.7159	27.0339	22.5125
## Methy.mean.mov3	21.5536	18.1073	19.0849
## Methy.mean.mov4	19.6856	12.7914	16.2682
## Methy.std	19.3346	18.6086	18.7897
## X203740810001_R06C01			
## <numeric>			
## RE.swScore	21.86855		
## RE.Length	12.70184		
## RE.CpG.density	24.22278		
## RE.InTSS	11.09480		

```

## RE.In5UTR           7.07947
## ...                 ...
## Methy.mean.mov1    30.9454
## Methy.mean.mov2    23.3596
## Methy.mean.mov3    20.7121
## Methy.mean.mov4    16.1231
## Methy.std          17.7139
##
## $REStats
## DataFrame with 5 rows and 4 columns
##   Trained_RE Trained_RECpG Predict_RE Predict_RECpG
##   <integer>    <integer>  <integer>    <integer>
## Total        5855         4536     84999      564589
## NM          4519         3751     58884      402825
## NR          836          692      9859       69557
## Gene         4731         3908     61560      420537
## Intergenic   1124         566      23439      144052
##
## $GeneStats
## DataFrame with 2 rows and 3 columns
##   NM      NR      Gene
##   <integer> <integer> <integer>
## Total      19129     7206    24903
## Predicted RE 13430     3219    15556
##
## $Seed
## [1] 1234

```

## Plot var imp

What are the variables available?

```

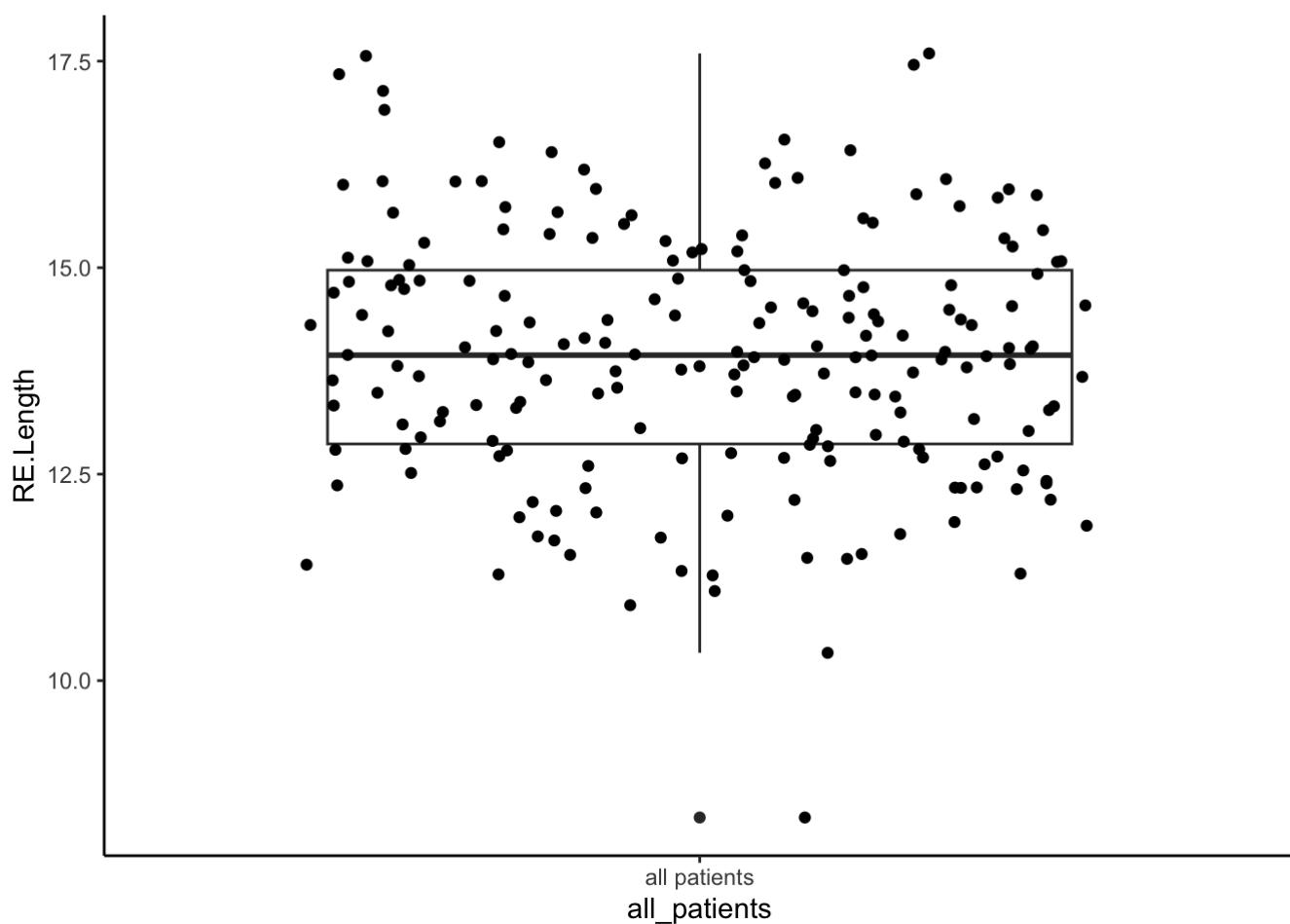
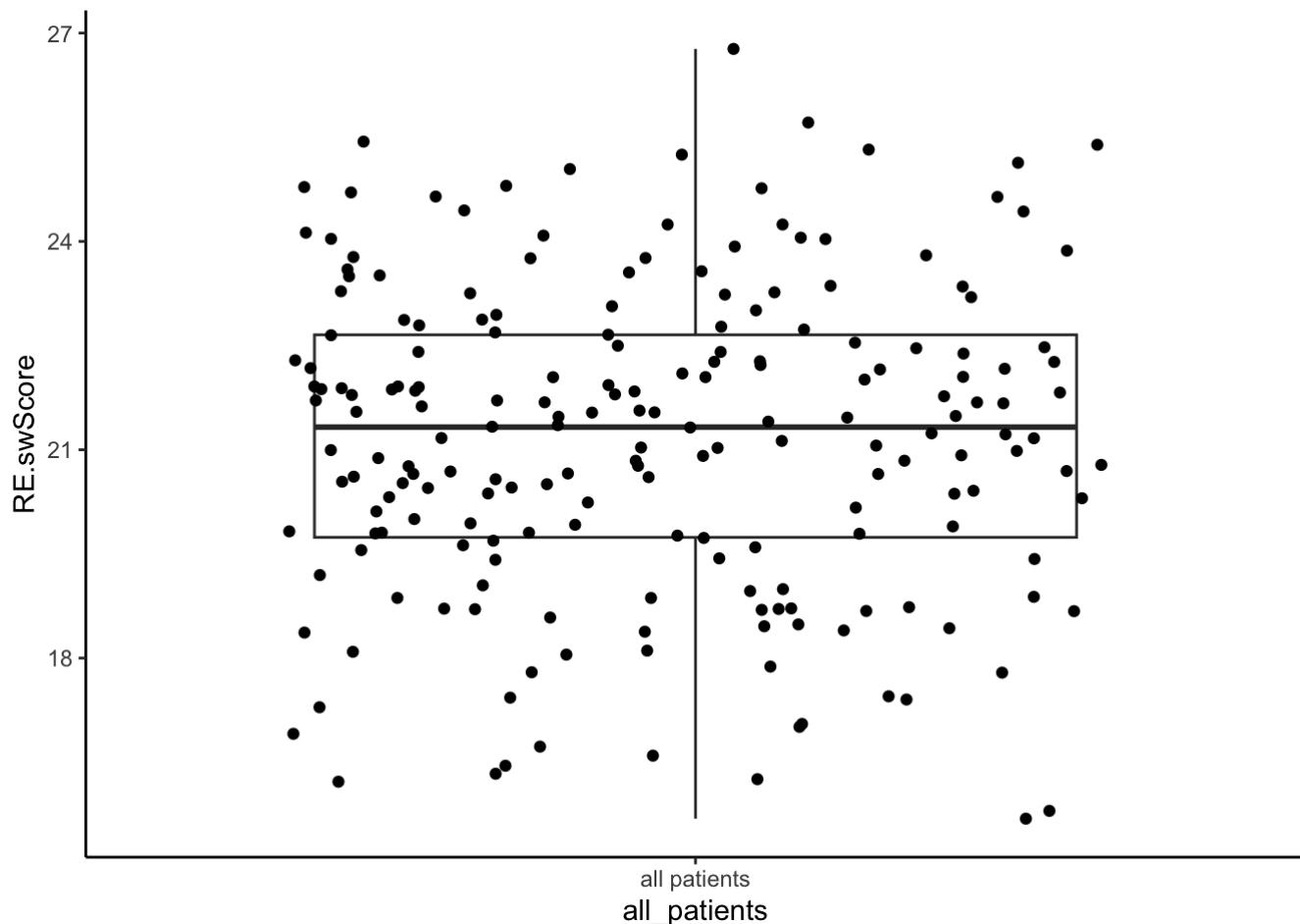
var_imp <- remp_res_Alu@metadata[ "varImp" ]
rownames(var_imp)

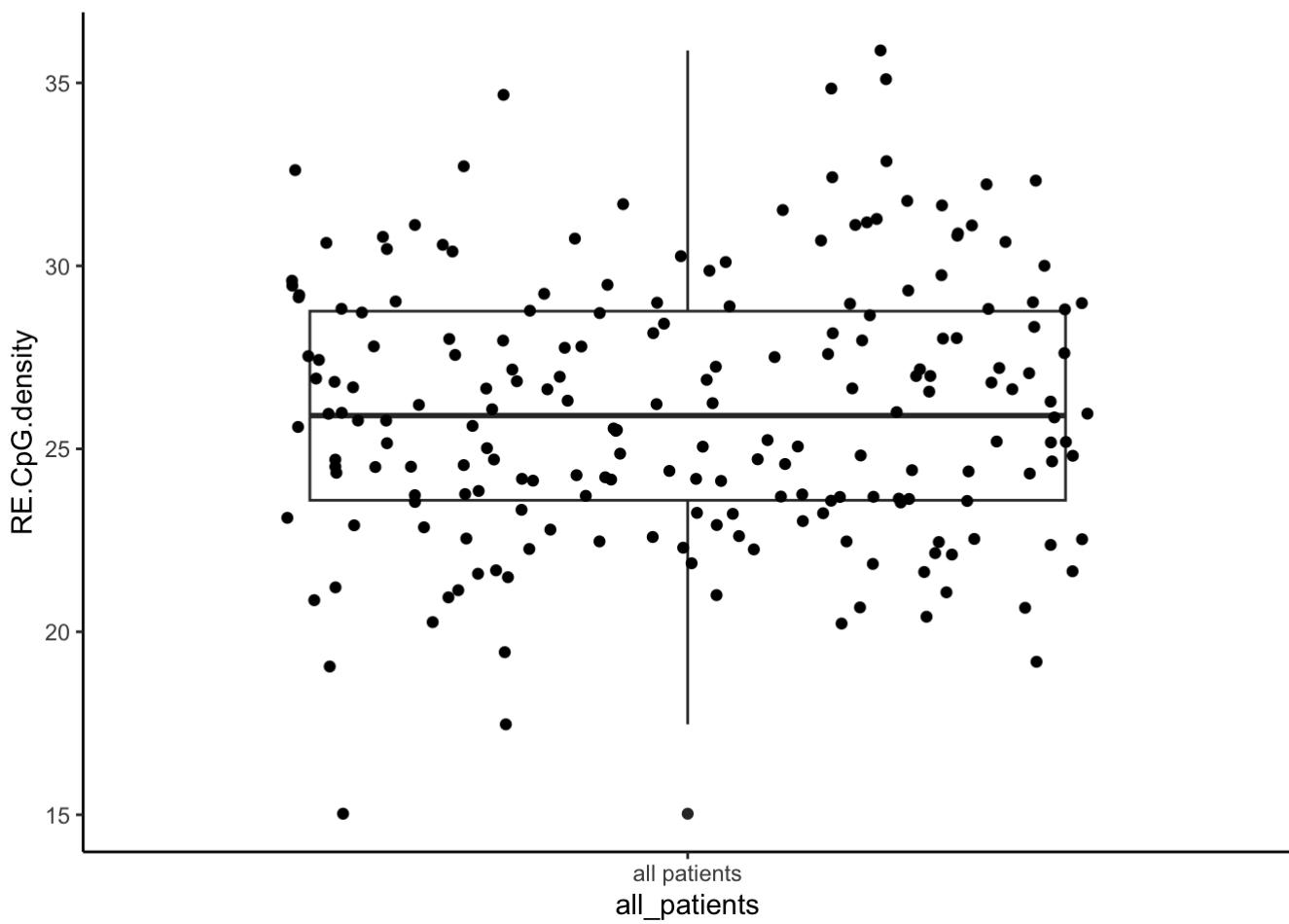
```

```

## [1] "RE.swScore"      "RE.Length"       "RE.CpG.density"  "RE.InTSS"
## [5] "RE.In5UTR"       "RE.InCDS"        "N.nbr"          "distance.mean"
## [9] "distance.std"    "distance.min"    "distance.min2"   "Methy.min"
## [13] "Methy.min2"      "Methy.mean.mov1" "Methy.mean.mov2" "Methy.mean.mov3"
## [17] "Methy.mean.mov4" "Methy.std"

```

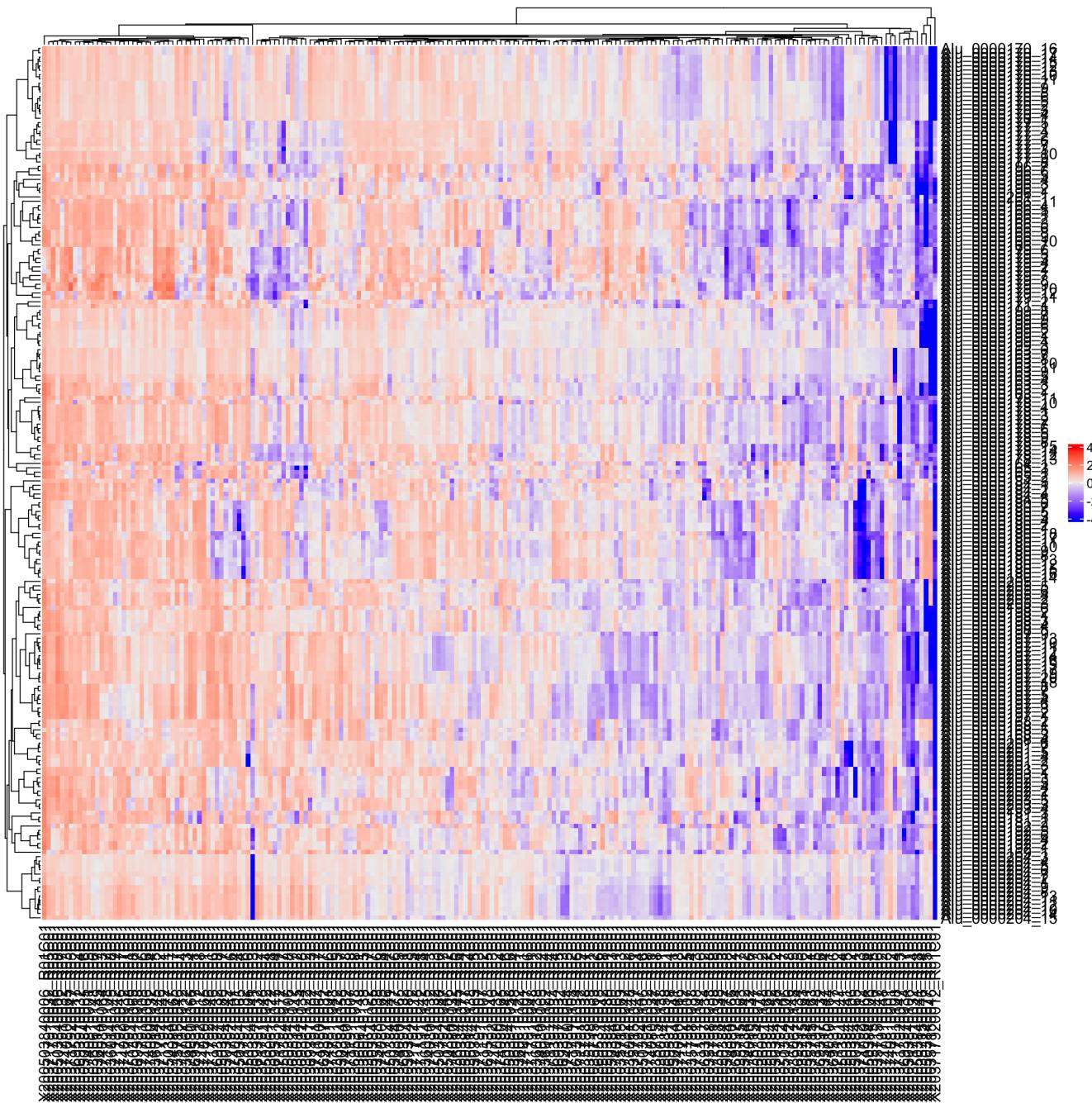




## B value

Let's take a quick look at the data (used only 200 Alu in the heatmaps - to fit html).

```
# Prediction results can be obtained by accessors:  
# Predicted RE-CpG methylation value (Beta value)  
Alu_beta_results <- rempB(remp_res_Alu)  
Alu_beta_results1 <- Alu_beta_results %>% as_tibble() %>%  
  cbind(Alu = remp_res_Alu$rowRanges$elementMetadata$RE.Index, .)
```



## M value

Which condition are we working more with M value instead of B value?

```
#Predicted RE-CpG methylation value (M value)
rempM(remp_res_Alu)
```

```

## DataFrame with 564589 rows and 202 columns
##           X200357150046_R01C01 X200357150046_R04C01 X200357150046_R05C01
## 1          <numeric>          <numeric>          <numeric>
## 2          1.477963          1.84523          2.76542
## 3          1.477782          1.86480          2.69278
## 4          1.455343          1.82641          2.66060
## 5          0.799629          2.63567          2.72693
## 6          0.661417          2.64451          2.60208
## ...
## ...
## 564585      -2.69471         -2.66106         -2.53975
## 564586      -2.93372         -2.76534         -2.56387
## 564587      -3.10961         -3.13119         -2.78915
## 564588      -3.20063         -3.31750         -2.86342
## 564589      -3.29652         -3.40811         -3.04488
##           X200357150046_R07C01 X200357150047_R01C01 X200357150047_R04C01
## 1          <numeric>          <numeric>          <numeric>
## 2          3.58177          2.85058          2.72022
## 3          3.57927          2.84765          2.70111
## 4          3.57367          2.86269          2.70033
## 5          3.43798          3.11128          2.75434
## 6          3.45008          3.07331          2.70196
## ...
## ...
## 564585      -2.10783         -2.30629         -2.55814
## 564586      -2.18813         -2.49768         -2.51155
## 564587      -2.59598         -2.80371         -2.90198
## 564588      -2.62055         -2.88603         -2.94336
## 564589      -2.77892         -2.98965         -3.02565
##           X200357150047_R06C01 X200357150047_R07C01 X200357150047_R08C01
## 1          <numeric>          <numeric>          <numeric>
## 2          3.03336          3.11432          2.70546
## 3          3.01930          3.10057          2.67318
## 4          2.97563          3.11813          2.73116
## 5          2.72477          3.22282          2.93954
## 6          2.86306          3.22390          3.00281
## ...
## ...
## 564585      -2.62594         -2.00282         -2.93402
## 564586      -2.60867         -2.26862         -2.99920
## 564587      -2.80932         -2.66830         -3.06455
## 564588      -2.81499         -2.78514         -3.18371
## 564589      -2.82465         -2.92216         -3.27187
##           X200357150063_R01C01 X200357150063_R02C01 X200357150063_R03C01
## 1          <numeric>          <numeric>          <numeric>
## 2          2.77314          2.94899          2.86932
## 3          2.76537          2.92788          2.85507
## 4          2.77288          2.90050          2.88294
## 5          2.58295          2.85923          3.00493
## 6          2.58977          2.82791          2.96505
## ...
## ...
## 564585      -2.30207         -1.54530         -1.72314
## 564586      -2.36724         -1.72717         -1.97043
## 564587      -2.59785         -2.09706         -2.33723
## 564588      -2.66459         -2.14958         -2.42553

```

```

## 564589      -2.72933      -2.21707      -2.48487
## X200357150063_R06C01 X200357150063_R07C01 X200357980038_R01C01
## <numeric>      <numeric>      <numeric>
## 1           2.93428       3.25954       2.94453
## 2           2.91681       3.26367       2.95838
## 3           2.89548       3.31847       2.94674
## 4           2.91390       3.14491       3.00302
## 5           3.06293       3.34146       2.95920
## ...          ...
## 564585      -2.22172      -2.12138      -2.25478
## 564586      -2.39425      -2.16353      -2.43076
## 564587      -2.54010      -2.37592      -2.58025
## 564588      -2.57045      -2.44627      -2.79455
## 564589      -2.70883      -2.56823      -2.90654
## X200357980038_R04C01 X200357980038_R05C01 X200357980038_R06C01
## <numeric>      <numeric>      <numeric>
## 1           2.87806       3.50353       3.48151
## 2           2.88910       3.50773       3.47164
## 3           2.91731       3.47429       3.52324
## 4           3.02748       3.45284       3.47338
## 5           2.99612       3.46981       3.50864
## ...          ...
## 564585      -2.16283      -2.30167      -1.59311
## 564586      -2.28828      -2.44227      -1.71926
## 564587      -2.44759      -2.63548      -2.18332
## 564588      -2.53292      -2.70794      -2.28067
## 564589      -2.63531      -2.75718      -2.37869
## X200357980038_R07C01 X200357980038_R08C01 X200360610122_R01C01
## <numeric>      <numeric>      <numeric>
## 1           3.05717       2.61607       3.00438
## 2           3.04178       2.63617       3.02616
## 3           3.07941       2.61261       2.98371
## 4           2.89589       3.06583       2.75637
## 5           2.84512       3.15528       2.77009
## ...          ...
## 564585      -2.08005      -2.71464      -2.53355
## 564586      -2.03034      -2.67346      -2.66366
## 564587      -2.36976      -3.02894      -2.82507
## 564588      -2.47127      -3.06482      -2.90415
## 564589      -2.59514      -3.11838      -3.05891
## X200360610122_R02C01 X200360610122_R03C01 X200360610122_R04C01
## <numeric>      <numeric>      <numeric>
## 1           2.90605       3.27665       3.30044
## 2           2.89651       3.27135       3.29637
## 3           2.89265       3.27652       3.34999
## 4           2.74045       3.22227       3.32628
## 5           2.74774       3.16273       3.28191
## ...          ...
## 564585      -2.25529      -2.50442      -2.09525
## 564586      -2.43601      -2.52322      -2.19435
## 564587      -2.51115      -2.85328      -2.47740
## 564588      -2.82779      -3.00296      -2.70070

```

## 564589	-3.01120	-3.12848	-2.78233
## X200360610122_R05C01	X200360610122_R07C01	X200360610122_R08C01	
## <numeric>	<numeric>	<numeric>	
## 1	2.76330	3.39190	3.45767
## 2	2.77188	3.38696	3.48726
## 3	2.80532	3.39346	3.43833
## 4	2.79220	3.23627	3.29920
## 5	2.75951	3.30253	3.21823
## ...	...	...	...
## 564585	-2.47954	-1.83059	-2.30919
## 564586	-2.55626	-1.99086	-2.41810
## 564587	-2.71684	-2.24025	-2.80167
## 564588	-2.79589	-2.27648	-2.88884
## 564589	-2.91074	-2.38357	-2.96785
## X200360610148_R01C01	X200360610148_R02C01	X200360610148_R04C01	
## <numeric>	<numeric>	<numeric>	
## 1	3.43317	3.04617	3.03215
## 2	3.44817	3.04730	3.05192
## 3	3.45673	3.00818	3.02842
## 4	3.33605	3.20818	2.87396
## 5	3.36354	3.17372	2.82919
## ...	...	...	...
## 564585	-2.11012	-2.36659	-2.14480
## 564586	-2.20057	-2.28291	-2.14523
## 564587	-2.57624	-2.55242	-2.32739
## 564588	-2.62020	-2.55994	-2.44933
## 564589	-2.69696	-2.61116	-2.50823
## X200360610148_R05C01	X200360610148_R06C01	X200360610148_R08C01	
## <numeric>	<numeric>	<numeric>	
## 1	2.85700	3.24510	2.89714
## 2	2.85072	3.24734	2.84957
## 3	2.85299	3.26920	2.92283
## 4	2.89202	3.26154	2.80608
## 5	2.91655	3.28484	2.81859
## ...	...	...	...
## 564585	-1.99990	-1.77298	-2.32485
## 564586	-2.17505	-1.91079	-2.50375
## 564587	-2.38354	-2.39606	-2.72836
## 564588	-2.41683	-2.42120	-2.83310
## 564589	-2.49107	-2.57370	-2.94048
## X200360140138_R01C01	X200360140138_R02C01	X200360140138_R04C01	
## <numeric>	<numeric>	<numeric>	
## 1	2.98312	2.90425	3.52809
## 2	2.97231	2.89943	3.49539
## 3	3.01448	2.88127	3.49015
## 4	2.96733	2.67308	3.46832
## 5	2.90802	2.70389	3.48337
## ...	...	...	...
## 564585	-1.85543	-2.82734	-2.74036
## 564586	-1.88200	-2.93546	-2.82099
## 564587	-2.29726	-3.18693	-3.02073
## 564588	-2.45685	-3.20669	-3.08380

```

## 564589      -2.51590      -3.35982      -3.18642
## X200360140138_R05C01 X200360140145_R02C01 X200360140145_R04C01
## <numeric>      <numeric>      <numeric>
## 1            3.48927      3.08107      3.22559
## 2            3.48190      3.08141      3.24072
## 3            3.42608      2.99721      3.24111
## 4            3.41238      3.13748      3.10714
## 5            3.41273      3.16034      3.17253
## ...          ...          ...          ...
## 564585      -2.15395      -2.11974      -2.15220
## 564586      -2.13987      -2.17926      -2.29670
## 564587      -2.57091      -2.53439      -2.53240
## 564588      -2.63057      -2.68347      -2.57612
## 564589      -2.76531      -2.78916      -2.73882
## X200360140145_R05C01 X200360140145_R06C01 X200360140145_R07C01
## <numeric>      <numeric>      <numeric>
## 1            3.46145      3.27807      3.31850
## 2            3.45308      3.25917      3.34808
## 3            3.45473      3.30571      3.37030
## 4            3.35662      3.21485      3.40981
## 5            3.28884      3.23324      3.39512
## ...          ...          ...          ...
## 564585      -1.39064      -1.99498      -1.94874
## 564586      -1.57153      -2.16740      -2.05464
## 564587      -1.96208      -2.39874      -2.34460
## 564588      -2.13224      -2.45855      -2.36475
## 564589      -2.25326      -2.62375      -2.52442
## X200360140145_R08C01 X200503840006_R01C01 X200503840006_R02C01
## <numeric>      <numeric>      <numeric>
## 1            3.30110      4.01442      2.81070
## 2            3.29747      4.01920      2.83622
## 3            3.28523      4.01146      2.87465
## 4            3.43329      3.90986      2.81159
## 5            3.42407      3.91803      2.90355
## ...          ...          ...          ...
## 564585      -2.49112      -2.56690      -2.23575
## 564586      -2.84531      -2.68179      -2.29304
## 564587      -2.98702      -3.08239      -2.69327
## 564588      -3.16801      -3.18034      -2.74203
## 564589      -3.36318      -3.23036      -2.86900
## X200503840006_R04C01 X200503840006_R06C01 X200503840006_R07C01
## <numeric>      <numeric>      <numeric>
## 1            2.45875      3.37632      2.80820
## 2            2.46776      3.35987      2.80471
## 3            2.55489      3.41456      2.93565
## 4            2.95398      3.54732      2.82257
## 5            2.84284      3.62138      2.63848
## ...          ...          ...          ...
## 564585      -2.23243      -1.99358      -2.39802
## 564586      -2.40309      -2.17601      -2.55217
## 564587      -2.57856      -2.29545      -2.94200
## 564588      -2.64034      -2.52655      -3.09594

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## 564589      -2.67220      -2.61633      -3.24227
## X200503840006_R08C01 X200503840041_R01C01 X200503840041_R02C01
## <numeric>      <numeric>      <numeric>
## 1            3.12865      2.66188      2.69100
## 2            3.14128      2.59584      2.68487
## 3            3.14456      2.67143      2.69121
## 4            3.14228      2.79078      2.73929
## 5            3.25166      2.79530      2.73256
## ...          ...          ...          ...
## 564585      -1.55593      -2.31096      -2.60918
## 564586      -1.74688      -2.37902      -2.88749
## 564587      -1.79316      -2.56679      -3.09638
## 564588      -1.78127      -2.55651      -3.13397
## 564589      -1.83164      -2.71846      -3.23755
## X200503840041_R03C01 X200503840041_R04C01 X200503840041_R05C01
## <numeric>      <numeric>      <numeric>
## 1            2.55445      3.04779      2.96202
## 2            2.56780      3.05229      3.00302
## 3            2.48642      3.09812      2.90576
## 4            2.31048      3.15003      2.75936
## 5            2.44164      3.17028      2.78647
## ...          ...          ...          ...
## 564585      -2.40707      -2.18013      -2.06244
## 564586      -2.57754      -2.30457      -2.29320
## 564587      -2.77131      -2.47978      -2.55483
## 564588      -2.80681      -2.61615      -2.76083
## 564589      -2.86798      -2.79831      -2.99018
## X200503840041_R07C01 X200503840041_R08C01 X200503840042_R02C01
## <numeric>      <numeric>      <numeric>
## 1            2.66316      2.74051      2.69879
## 2            2.63136      2.72532      2.72212
## 3            2.58233      2.77560      2.72367
## 4            2.40118      2.67594      2.40868
## 5            2.47845      2.80556      2.61298
## ...          ...          ...          ...
## 564585      -1.72264      -2.30237      -2.16684
## 564586      -1.79464      -2.37881      -2.08474
## 564587      -2.28789      -2.61542      -2.42441
## 564588      -2.36437      -2.78803      -2.40189
## 564589      -2.56783      -2.84558      -2.43310
## X200503840042_R03C01 X200503840042_R04C01 X200503840042_R05C01
## <numeric>      <numeric>      <numeric>
## 1            2.77033      3.21745      2.57422
## 2            2.76042      3.22068      2.54921
## 3            2.74168      3.24610      2.53483
## 4            3.06429      3.28199      2.76513
## 5            2.92991      3.26234      2.77630
## ...          ...          ...          ...
## 564585      -2.05192      -1.85931      -2.11449
## 564586      -2.14149      -1.86814      -2.12068
## 564587      -2.40035      -2.07898      -2.28442
## 564588      -2.47795      -2.12576      -2.36187

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## 564589      -2.66850      -2.15169      -2.43658
## X200503840042_R06C01 X200503840042_R07C01 X200503840042_R08C01
## <numeric>      <numeric>      <numeric>
## 1           3.10647      3.37287      3.17175
## 2           3.11824      3.37635      3.15251
## 3           3.17979      3.34177      3.12424
## 4           3.34542      3.30812      3.16592
## 5           3.24846      3.29291      3.10749
## ...         ...
## 564585      -2.09790      -2.11384      -2.60017
## 564586      -2.22904      -2.23510      -2.74266
## 564587      -2.39275      -2.73374      -2.90638
## 564588      -2.45241      -2.90464      -2.97921
## 564589      -2.51708      -3.13641      -3.04378
## X200503840058_R01C01 X200503840058_R02C01 X200503840058_R06C01
## <numeric>      <numeric>      <numeric>
## 1           2.74899      2.80625      2.89738
## 2           2.80989      2.82779      2.88217
## 3           2.82156      2.82930      2.83937
## 4           2.67084      3.23288      2.92584
## 5           2.70620      3.25756      3.07183
## ...         ...
## 564585      -1.92491      -2.02130      -2.23253
## 564586      -2.08886      -2.20442      -2.40178
## 564587      -2.30290      -2.37308      -2.59020
## 564588      -2.37833      -2.48462      -2.59391
## 564589      -2.56926      -2.57556      -2.77318
## X200503840058_R07C01 X200503840065_R01C01 X200503840065_R02C01
## <numeric>      <numeric>      <numeric>
## 1           3.13979      2.65781      3.02359
## 2           3.15193      2.64859      3.03694
## 3           3.15075      2.65527      3.05874
## 4           3.07631      2.88992      3.16052
## 5           3.27102      2.98515      3.19049
## ...         ...
## 564585      -2.38605      -2.39953      -2.62075
## 564586      -2.57896      -2.39704      -2.76304
## 564587      -2.90580      -2.68533      -3.10065
## 564588      -3.00949      -2.75290      -3.14568
## 564589      -3.13203      -2.89645      -3.25869
## X200503840065_R04C01 X200503840065_R05C01 X200503840065_R06C01
## <numeric>      <numeric>      <numeric>
## 1           3.48961      3.18944      3.35716
## 2           3.49054      3.18883      3.35565
## 3           3.46550      3.15675      3.39025
## 4           3.29914      3.17779      3.60437
## 5           3.31818      3.21563      3.63592
## ...         ...
## 564585      -2.25480      -2.24157      -2.37021
## 564586      -2.42340      -2.12958      -2.38071
## 564587      -2.81427      -2.42794      -2.65117
## 564588      -2.85929      -2.51458      -2.70444

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## 564589      -2.93026      -2.57271      -2.80770
## X200503840065_R07C01 X200503840065_R08C01 X200503840077_R01C01
## <numeric>      <numeric>      <numeric>
## 1           3.43250      3.23492      3.06372
## 2           3.43861      3.26930      3.06434
## 3           3.48792      3.29571      3.03447
## 4           3.37021      3.32848      2.88076
## 5           3.34841      3.36106      2.98540
## ...         ...          ...          ...
## 564585      -1.38740      -2.61985      -2.04798
## 564586      -1.38533      -2.85414      -2.28933
## 564587      -1.75060      -3.00588      -2.53317
## 564588      -1.78825      -3.01881      -2.62699
## 564589      -1.90295      -3.05287      -2.71020
## X200503840077_R02C01 X200503840077_R03C01 X200503840077_R04C01
## <numeric>      <numeric>      <numeric>
## 1           3.07283      3.00047      3.03696
## 2           3.06605      3.02249      3.05337
## 3           3.01303      3.07189      3.06269
## 4           2.99117      2.92796      3.19801
## 5           2.92915      2.90928      3.13080
## ...         ...          ...          ...
## 564585      -2.28848      -1.69383      -1.65229
## 564586      -2.39846      -1.69550      -1.77221
## 564587      -2.66848      -2.04566      -2.16670
## 564588      -2.83602      -2.34442      -2.34488
## 564589      -3.01441      -2.46825      -2.37144
## X200503840077_R05C01 X200503840077_R06C01 X200503840077_R07C01
## <numeric>      <numeric>      <numeric>
## 1           2.27508      3.15923      2.96594
## 2           2.28288      3.15838      2.98613
## 3           2.25948      3.13129      3.00425
## 4           2.81040      3.18395      3.04028
## 5           2.76182      3.21195      3.09264
## ...         ...          ...          ...
## 564585      -2.34912      -2.29658      -2.44640
## 564586      -2.43698      -2.47133      -2.55614
## 564587      -2.62065      -2.78048      -2.75621
## 564588      -2.82065      -2.87759      -2.85797
## 564589      -2.84888      -3.08093      -2.94349
## X200503840077_R08C01 X200503840080_R01C01 X200503840080_R03C01
## <numeric>      <numeric>      <numeric>
## 1           2.96808      2.92107      3.18182
## 2           2.95254      2.91323      3.17908
## 3           2.92449      2.96446      3.16567
## 4           2.90919      3.10910      3.13948
## 5           2.91391      3.19155      3.15600
## ...         ...          ...          ...
## 564585      -2.31475      -1.32832      -2.33231
## 564586      -2.37341      -1.53144      -2.42600
## 564587      -2.56382      -1.87106      -2.59587
## 564588      -2.72537      -1.86695      -2.66324

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## 564589      -2.80274      -1.97816      -2.86870
## X200503840080_R06C01 X200503840080_R07C01 X200503840080_R08C01
## <numeric>      <numeric>      <numeric>
## 1           2.91760       3.30503       3.05584
## 2           2.94126       3.29985       3.02076
## 3           2.91478       3.44083       2.96793
## 4           3.24817       3.47123       2.95464
## 5           3.06898       3.50917       3.02577
## ...          ...
## 564585      -1.83948      -2.48898      -1.99569
## 564586      -1.97783      -2.53950      -2.15927
## 564587      -2.25755      -2.76516      -2.43139
## 564588      -2.34131      -2.81936      -2.54235
## 564589      -2.40821      -2.84534      -2.63264
## X200503840106_R01C01 X200503840106_R02C01 X200503840106_R06C01
## <numeric>      <numeric>      <numeric>
## 1           2.35739       3.18931       2.94024
## 2           2.38721       3.17127       2.93866
## 3           2.45639       3.10039       2.98289
## 4           2.50545       3.21706       2.93741
## 5           2.45529       3.27961       2.97204
## ...          ...
## 564585      -2.23504      -2.21767      -1.96575
## 564586      -2.27659      -2.31702      -2.19534
## 564587      -2.48364      -2.41610      -2.59352
## 564588      -2.52655      -2.56990      -2.61582
## 564589      -2.56069      -2.67181      -2.65891
## X200503840106_R08C01 X203740800065_R01C01 X203740800065_R02C01
## <numeric>      <numeric>      <numeric>
## 1           3.16104       2.86210       2.93196
## 2           3.13481       2.84996       2.93049
## 3           3.04878       2.76728       2.93436
## 4           3.16484       3.03309       2.90777
## 5           3.31669       3.03910       2.95636
## ...          ...
## 564585      -2.38126      -2.35535      -1.79432
## 564586      -2.44682      -2.51868      -2.05994
## 564587      -2.71918      -2.72343      -2.30879
## 564588      -2.82919      -2.78003      -2.39973
## 564589      -3.01318      -2.84490      -2.47357
## X203740800065_R03C01 X203740800065_R04C01 X203740800065_R05C01
## <numeric>      <numeric>      <numeric>
## 1           3.35027       3.02928       3.10104
## 2           3.35163       3.01945       3.11044
## 3           3.36894       2.99608       3.16985
## 4           3.38532       2.95996       3.05083
## 5           3.46460       2.96821       3.07619
## ...          ...
## 564585      -2.03005      -2.07361      -2.56467
## 564586      -2.25465      -2.18822      -2.85170
## 564587      -2.41252      -2.26998      -3.03367
## 564588      -2.45738      -2.34572      -3.06135

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## 564589      -2.63112      -2.64841      -3.14997
## X203740800065_R07C01 X203740800065_R08C01 X203740800066_R01C01
## <numeric>      <numeric>      <numeric>
## 1            2.88549      3.06573      2.84364
## 2            2.88261      3.04480      2.87056
## 3            2.83919      3.00257      2.88035
## 4            3.12568      3.19103      3.07618
## 5            3.10783      3.34658      3.06895
## ...          ...          ...          ...
## 564585      -1.58588      -2.15831      -2.29931
## 564586      -1.63272      -2.17251      -2.41653
## 564587      -1.98732      -2.51973      -2.78378
## 564588      -2.03162      -2.47658      -2.77408
## 564589      -2.07050      -2.61096      -2.90741
## X203740800066_R02C01 X203740800066_R04C01 X203740800066_R06C01
## <numeric>      <numeric>      <numeric>
## 1            3.01714      3.33475      3.36892
## 2            3.04834      3.34941      3.37035
## 3            3.09708      3.38016      3.36446
## 4            3.03652      3.27036      3.19843
## 5            3.04827      3.30153      3.25887
## ...          ...          ...          ...
## 564585      -2.16705      -2.82066      -2.47985
## 564586      -2.36789      -2.81936      -2.72745
## 564587      -2.69336      -3.03340      -2.97320
## 564588      -2.68831      -3.03004      -3.03367
## 564589      -2.72337      -3.05303      -3.13907
## X203740800066_R08C01 X203717920047_R01C01 X203717920047_R02C01
## <numeric>      <numeric>      <numeric>
## 1            2.80128      2.89899      3.06902
## 2            2.78267      2.89827      3.08001
## 3            2.79711      2.90202      3.14569
## 4            2.73008      2.92216      2.94179
## 5            2.71684      2.94706      3.01191
## ...          ...          ...          ...
## 564585      -2.48344      -2.57126      -2.82995
## 564586      -2.59885      -2.46681      -3.02154
## 564587      -2.90949      -2.92877      -3.22061
## 564588      -2.91833      -2.95488      -3.20356
## 564589      -2.95921      -3.04861      -3.23716
## X203717920047_R03C01 X203717920047_R04C01 X203717920047_R05C01
## <numeric>      <numeric>      <numeric>
## 1            3.20305      2.72222      3.38907
## 2            3.18991      2.72986      3.37209
## 3            3.12225      2.72077      3.43562
## 4            2.87475      3.03338      3.42082
## 5            2.83092      3.16922      3.46075
## ...          ...          ...          ...
## 564585      -2.53937      -2.49943      -1.33151
## 564586      -2.58074      -2.69808      -1.38228
## 564587      -2.85368      -3.00172      -1.61799
## 564588      -2.89263      -3.04784      -1.77936

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## 564589          -2.97089          -3.07645          -1.89075
## X203717920047_R06C01 X203717920047_R07C01 X203711910042_R01C01
## <numeric>          <numeric>          <numeric>
## 1              3.24131          3.11201          3.19961
## 2              3.22462          3.07494          3.20828
## 3              3.19764          3.04055          3.24126
## 4              3.34370          2.89101          3.27235
## 5              3.40959          2.97693          3.28080
## ...           ...
## 564585          -1.95088          -2.18239          -1.67483
## 564586          -2.01098          -2.26238          -1.84529
## 564587          -2.05153          -2.55764          -1.95276
## 564588          -2.09101          -2.53282          -2.02322
## 564589          -2.09812          -2.55403          -2.09529
## X203711910042_R02C01 X203711910042_R06C01 X203711910042_R07C01
## <numeric>          <numeric>          <numeric>
## 1              2.80369          3.25483          3.42325
## 2              2.80407          3.25314          3.43252
## 3              2.78653          3.25638          3.42939
## 4              3.09424          3.04613          3.16348
## 5              3.12186          2.99563          3.21987
## ...           ...
## 564585          -2.26775          -2.59454          -2.18993
## 564586          -2.37659          -2.70884          -2.19469
## 564587          -2.61387          -2.82694          -2.38504
## 564588          -2.75525          -2.76189          -2.40605
## 564589          -2.82889          -2.82133          -2.52997
## X203711910042_R08C01 X203711910007_R02C01 X203711910007_R03C01
## <numeric>          <numeric>          <numeric>
## 1              3.11504          3.03266          3.01513
## 2              3.13178          3.04048          3.00304
## 3              3.14286          3.04171          3.04192
## 4              3.13843          3.19468          2.96594
## 5              3.14307          3.20144          3.00932
## ...           ...
## 564585          -2.58764          -1.82868          -2.68131
## 564586          -2.58951          -1.73894          -2.69138
## 564587          -2.69498          -2.06539          -3.00692
## 564588          -2.71010          -2.10000          -3.00599
## 564589          -2.76052          -2.15240          -3.05434
## X203711910007_R04C01 X203711910007_R05C01 X203711910007_R06C01
## <numeric>          <numeric>          <numeric>
## 1              2.99495          3.06949          3.06888
## 2              2.99802          3.09240          3.09384
## 3              3.00492          3.09141          3.13650
## 4              3.21467          3.14002          3.16980
## 5              3.23101          3.14312          3.19714
## ...           ...
## 564585          -2.29331          -2.54533          -2.01207
## 564586          -2.37683          -2.48447          -2.05170
## 564587          -2.49936          -2.86914          -2.15345
## 564588          -2.51426          -2.88865          -2.16556

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## 564589      -2.60105      -2.95920      -2.25157
## X203711910007_R07C01 X203711910007_R08C01 X203717920046_R01C01
## <numeric>      <numeric>      <numeric>
## 1            2.96025      3.23527      3.27635
## 2            2.97116      3.23319      3.28481
## 3            2.98191      3.20784      3.30810
## 4            3.29296      3.11432      3.51075
## 5            3.21563      3.34284      3.72623
## ...          ...
## 564585      -1.76012      -2.21993      -2.26996
## 564586      -1.94294      -2.40143      -2.25325
## 564587      -2.21629      -2.49493      -2.53572
## 564588      -2.27999      -2.61029      -2.56849
## 564589      -2.39827      -2.79482      -2.67523
## X203717920046_R02C01 X203717920046_R03C01 X203717920046_R04C01
## <numeric>      <numeric>      <numeric>
## 1            3.44530      3.08586      3.26037
## 2            3.43837      3.08247      3.24670
## 3            3.50007      3.08809      3.24416
## 4            3.26174      3.26934      2.93645
## 5            3.30823      3.24517      3.05760
## ...          ...
## 564585      -2.50657      -1.54490      -2.61339
## 564586      -2.63129      -1.84169      -2.62234
## 564587      -2.83608      -2.16529      -2.77522
## 564588      -2.85961      -2.27482      -2.82699
## 564589      -2.87752      -2.32867      -3.00154
## X203717920046_R06C01 X203717920046_R07C01 X203717920046_R08C01
## <numeric>      <numeric>      <numeric>
## 1            3.35372      3.35167      2.91716
## 2            3.34986      3.32133      2.94168
## 3            3.39475      3.30983      2.92285
## 4            3.46310      3.30120      2.95478
## 5            3.64617      3.36023      2.92329
## ...          ...
## 564585      -1.83914      -2.67814      -2.44657
## 564586      -1.98354      -2.83838      -2.60516
## 564587      -2.18197      -3.18893      -2.81462
## 564588      -2.27113      -3.26690      -2.84456
## 564589      -2.45724      -3.48929      -3.00096
## X203740800064_R01C01 X203740800064_R03C01 X203740800064_R05C01
## <numeric>      <numeric>      <numeric>
## 1            2.60187      3.22181      2.81550
## 2            2.60990      3.21019      2.77414
## 3            2.67684      3.20140      2.76076
## 4            2.59653      3.28853      2.82201
## 5            2.65371      3.28820      3.10202
## ...          ...
## 564585      -2.45939      -1.88965      -2.49091
## 564586      -2.66707      -2.04376      -2.58959
## 564587      -2.89725      -2.24839      -2.69188
## 564588      -2.87246      -2.32025      -2.68671

```

```

## 564589          -2.86500          -2.36124          -2.71997
## X203740800064_R06C01 X203740800064_R07C01 X203717910108_R01C01
## <numeric>          <numeric>          <numeric>
## 1              3.21569          3.10295          2.87980
## 2              3.19843          3.09232          2.85712
## 3              3.24583          3.02448          2.81094
## 4              3.09333          3.09234          3.17799
## 5              3.09197          3.11398          3.29430
## ...           ...
## 564585          -2.11432          -2.33232          -2.51249
## 564586          -2.14518          -2.36736          -2.55586
## 564587          -2.19403          -2.57754          -2.70792
## 564588          -2.09918          -2.60529          -2.71012
## 564589          -2.11407          -2.72476          -2.99381
## X203717910108_R02C01 X203717910108_R03C01 X203717910108_R04C01
## <numeric>          <numeric>          <numeric>
## 1              2.82831          2.72774          2.61057
## 2              2.82954          2.75386          2.59413
## 3              2.89340          2.76740          2.50945
## 4              3.07008          2.95791          1.91924
## 5              3.18834          2.88789          1.90566
## ...           ...
## 564585          -2.24728          -2.58969          -2.54536
## 564586          -2.28245          -2.76826          -2.70499
## 564587          -2.59597          -2.86049          -2.99103
## 564588          -2.71532          -2.83026          -3.09242
## 564589          -2.72071          -2.98033          -3.14077
## X203717910108_R06C01 X203717910108_R07C01 X203717910108_R08C01
## <numeric>          <numeric>          <numeric>
## 1              3.00352          3.27122          3.01235
## 2              3.00350          3.26834          3.01800
## 3              3.05926          3.17102          3.12226
## 4              3.21449          3.09398          3.41419
## 5              3.26762          3.14484          3.38657
## ...           ...
## 564585          -2.41208          -1.74079          -1.80329
## 564586          -2.46084          -1.98482          -1.97982
## 564587          -2.79124          -2.22667          -2.08131
## 564588          -2.96709          -2.33718          -2.10776
## 564589          -2.99483          -2.42068          -2.18483
## X203740800032_R01C01 X203740800032_R02C01 X203740800032_R03C01
## <numeric>          <numeric>          <numeric>
## 1              3.00550          2.82870          3.09717
## 2              2.98727          2.84257          3.13133
## 3              2.96997          2.84053          3.19920
## 4              2.93197          2.99504          3.18703
## 5              2.98320          2.99355          3.09208
## ...           ...
## 564585          -2.22582          -2.31306          -2.37223
## 564586          -2.27048          -2.51739          -2.51576
## 564587          -2.56585          -2.77029          -2.77373
## 564588          -2.53457          -2.82865          -2.86991

```

	-2.60919	-2.86901	-3.04737
## 564589			
## X203740800032_R04C01	X203740800032_R05C01	X203740800032_R06C01	
## <numeric>	<numeric>	<numeric>	
## 1	3.15731	3.16941	2.57393
## 2	3.13821	3.18080	2.57230
## 3	3.14106	3.16349	2.58909
## 4	3.12370	3.31059	2.70105
## 5	3.23494	3.30480	2.80420
## ...	...	...	...
## 564585	-2.73189	-1.97673	-2.07583
## 564586	-2.83211	-2.11256	-2.25729
## 564587	-3.09823	-2.34810	-2.78251
## 564588	-3.14546	-2.47415	-2.82238
## 564589	-3.19414	-2.51461	-2.87545
## X203740800032_R07C01	X203740800032_R08C01	X203695310018_R04C01	
## <numeric>	<numeric>	<numeric>	
## 1	2.86223	3.18775	2.73060
## 2	2.86609	3.16716	2.72015
## 3	2.83443	3.07239	2.70858
## 4	2.91484	3.08467	2.81514
## 5	2.96237	3.04256	2.76277
## ...	...	...	...
## 564585	-2.33622	-2.04758	-2.39754
## 564586	-2.40802	-2.13380	-2.34345
## 564587	-2.63405	-2.38410	-2.72282
## 564588	-2.61449	-2.55588	-2.77958
## 564589	-2.74351	-2.66243	-2.80000
## X203695310018_R05C01	X203695310018_R06C01	X203695310018_R07C01	
## <numeric>	<numeric>	<numeric>	
## 1	3.19582	3.16617	3.01824
## 2	3.21754	3.19208	3.02985
## 3	3.23582	3.17270	3.11326
## 4	3.22416	3.35336	3.20513
## 5	3.22275	3.36417	3.21576
## ...	...	...	...
## 564585	-2.03649	-2.24773	-2.32582
## 564586	-2.25037	-2.34022	-2.27982
## 564587	-2.60212	-2.40831	-2.46726
## 564588	-2.65410	-2.50590	-2.47324
## 564589	-2.80748	-2.62511	-2.40829
## X203695310018_R08C01	X203717910048_R01C01	X203717910048_R02C01	
## <numeric>	<numeric>	<numeric>	
## 1	3.29645	3.14107	2.68590
## 2	3.30228	3.15009	2.69807
## 3	3.37250	3.14312	2.73220
## 4	3.27164	2.95494	2.76104
## 5	3.28474	3.17416	2.85705
## ...	...	...	...
## 564585	-2.14384	-2.48689	-2.67785
## 564586	-2.21272	-2.57610	-2.81594
## 564587	-2.23379	-2.79100	-2.94929
## 564588	-2.26549	-2.83922	-3.06172

```

## 564589      -2.37895      -2.94820      -3.15159
## X203717910048_R03C01 X203717910048_R04C01 X203717910048_R05C01
## <numeric>      <numeric>      <numeric>
## 1           3.39637      2.86672      2.76813
## 2           3.40088      2.87781      2.75292
## 3           3.44756      2.89068      2.70942
## 4           3.54693      3.00650      2.46419
## 5           3.49663      3.08284      2.56329
## ...         ...
## 564585      -1.81466      -2.25523      -2.73755
## 564586      -1.87334      -2.36504      -2.77098
## 564587      -2.17395      -2.80994      -3.13528
## 564588      -2.22645      -2.92033      -3.13289
## 564589      -2.30983      -3.03942      -3.22291
## X203717910048_R06C01 X203717910048_R07C01 X203717910032_R02C01
## <numeric>      <numeric>      <numeric>
## 1           3.26367      3.32032      2.64025
## 2           3.25201      3.30726      2.63348
## 3           3.25267      3.24832      2.65933
## 4           3.20064      3.12780      3.14968
## 5           3.20434      3.18003      3.14510
## ...         ...
## 564585      -2.34337      -1.26387      -2.59088
## 564586      -2.23089      -1.37376      -2.69221
## 564587      -2.43345      -1.44640      -2.71847
## 564588      -2.42830      -1.58846      -2.76013
## 564589      -2.38151      -1.72491      -2.80258
## X203717910032_R03C01 X203717910032_R04C01 X203717910032_R05C01
## <numeric>      <numeric>      <numeric>
## 1           2.90855      2.32956      3.73673
## 2           2.89191      2.29688      3.73062
## 3           2.93066      2.27769      3.74810
## 4           2.70236      2.22489      3.62384
## 5           2.64376      2.28577      3.59460
## ...         ...
## 564585      -2.52347      -1.94509      -2.23163
## 564586      -2.73823      -2.14632      -2.29871
## 564587      -2.84192      -2.35060      -2.53065
## 564588      -2.92631      -2.40640      -2.62245
## 564589      -2.96123      -2.38839      -2.75226
## X203717910032_R06C01 X203717910032_R07C01 X203717910032_R08C01
## <numeric>      <numeric>      <numeric>
## 1           3.14552      3.51755      2.83522
## 2           3.15374      3.51925      2.85138
## 3           3.26655      3.51444      2.92589
## 4           3.21139      3.61844      2.77513
## 5           3.14966      3.53462      2.78191
## ...         ...
## 564585      -2.43472      -2.48991      -2.80854
## 564586      -2.71965      -2.54549      -2.71039
## 564587      -2.96958      -2.69314      -3.07531
## 564588      -3.04100      -2.77573      -3.13117

```

```

## 564589          -3.20145          -2.85620          -3.15497
## X203717920012_R01C01 X203717920012_R02C01 X203717920012_R03C01
## <numeric>          <numeric>          <numeric>
## 1              1.65015          2.84953          2.62765
## 2              1.65494          2.83644          2.60614
## 3              1.69262          2.87325          2.53553
## 4              1.48435          2.79409          2.90645
## 5              1.41947          2.83274          2.89134
## ...           ...
## 564585          -1.64862          -2.98314          -2.83231
## 564586          -1.76109          -3.18697          -3.02329
## 564587          -1.95055          -3.30559          -3.08554
## 564588          -2.06644          -3.28205          -3.11940
## 564589          -2.18901          -3.29312          -3.20752
## X203717920012_R04C01 X203717920012_R05C01 X203717920012_R07C01
## <numeric>          <numeric>          <numeric>
## 1              3.54567          3.06581          3.09181
## 2              3.54658          3.07079          3.09469
## 3              3.53542          3.05301          3.07377
## 4              3.51876          2.79495          3.23061
## 5              3.49582          2.88884          3.21106
## ...           ...
## 564585          -2.87035          -2.87440          -2.43991
## 564586          -3.00924          -2.92084          -2.49222
## 564587          -3.33436          -3.23146          -2.64162
## 564588          -3.40338          -3.19387          -2.62592
## 564589          -3.42037          -3.30297          -2.66997
## X203717920012_R08C01 X203693970032_R01C01 X203693970032_R02C01
## <numeric>          <numeric>          <numeric>
## 1              3.00978          3.11280          3.25576
## 2              3.03547          3.10614          3.26173
## 3              3.04824          3.08632          3.32705
## 4              3.15439          2.85598          3.29267
## 5              3.13887          2.89970          3.30188
## ...           ...
## 564585          -2.88415          -2.68646          -2.65134
## 564586          -3.03002          -2.92564          -2.93004
## 564587          -3.00115          -3.12853          -3.17562
## 564588          -3.06847          -3.17334          -3.25072
## 564589          -3.09406          -3.18471          -3.36155
## X203693970032_R03C01 X203693970032_R04C01 X203693970032_R05C01
## <numeric>          <numeric>          <numeric>
## 1              3.23880          3.39619          3.06160
## 2              3.23196          3.43886          3.06340
## 3              3.22922          3.43548          3.04836
## 4              3.44980          3.53801          2.72585
## 5              3.38216          3.54230          2.74324
## ...           ...
## 564585          -2.05567          -2.71732          -2.73029
## 564586          -2.25263          -2.94124          -2.77422
## 564587          -2.68136          -3.12394          -2.79538
## 564588          -2.80458          -3.22639          -2.79127

```

```

## 564589          -2.83077          -3.29132          -2.76883
## X203693970032_R06C01 X203693970032_R07C01 X203693970032_R08C01
## <numeric>          <numeric>          <numeric>
## 1              2.44013          3.27562          3.33056
## 2              2.42045          3.24980          3.34154
## 3              2.49367          3.21521          3.33089
## 4              2.65771          2.85506          3.39151
## 5              2.67539          2.96026          3.29915
## ...           ...
## 564585          -2.68355          -2.80589          -2.21475
## 564586          -2.84123          -2.80540          -2.33373
## 564587          -3.22654          -3.14787          -2.49930
## 564588          -3.27767          -3.23112          -2.57180
## 564589          -3.41676          -3.30206          -2.61618
## X203693970034_R01C01 X203693970034_R02C01 X203693970034_R03C01
## <numeric>          <numeric>          <numeric>
## 1              2.71806          3.12334          3.17125
## 2              2.69904          3.10760          3.15967
## 3              2.69267          3.09935          3.21501
## 4              2.76945          3.19830          2.88616
## 5              2.82486          3.20981          3.03445
## ...           ...
## 564585          -2.65627          -3.31678          -2.51861
## 564586          -2.86133          -3.45405          -2.71189
## 564587          -3.07426          -3.51952          -2.92560
## 564588          -3.16821          -3.49469          -2.95395
## 564589          -3.28786          -3.52005          -2.96042
## X203693970034_R04C01 X203693970034_R05C01 X203693970034_R06C01
## <numeric>          <numeric>          <numeric>
## 1              3.11249          2.20595          2.92607
## 2              3.11120          2.19202          2.96357
## 3              3.11983          2.25308          2.96117
## 4              3.12208          2.65621          2.50921
## 5              3.04670          2.67724          2.78487
## ...           ...
## 564585          -2.53137          -2.47553          -2.80175
## 564586          -2.72085          -2.54120          -2.72151
## 564587          -2.94244          -2.69054          -3.07276
## 564588          -3.00089          -2.81025          -3.13779
## 564589          -3.07339          -2.89193          -3.22854
## X203693970034_R07C01 X203693970034_R08C01 X203695310017_R01C01
## <numeric>          <numeric>          <numeric>
## 1              2.61897          2.63888          3.24067
## 2              2.64104          2.63560          3.20821
## 3              2.74191          2.66744          3.14981
## 4              2.68589          2.35227          3.08853
## 5              2.76430          2.40756          3.21641
## ...           ...
## 564585          -2.22302          -2.24256          -3.16660
## 564586          -2.36491          -2.37954          -3.17400
## 564587          -2.67828          -2.48126          -3.39631
## 564588          -2.72241          -2.59451          -3.48484

```

```

## 564589          -2.84083          -2.70110         -3.54612
## X203695310017_R02C01 X203695310017_R04C01 X203695310017_R06C01
## <numeric>          <numeric>          <numeric>
## 1              3.52222          2.63119          2.87066
## 2              3.51568          2.62365          2.87211
## 3              3.66355          2.66402          2.89974
## 4              3.36077          2.91497          3.07686
## 5              3.37091          2.98602          3.03002
## ...           ...
## 564585          -2.71389          -2.47935         -3.01615
## 564586          -2.78764          -2.56715         -3.15718
## 564587          -2.88626          -2.87251         -3.27403
## 564588          -2.83938          -2.90751         -3.34468
## 564589          -2.84362          -2.93248         -3.54761
## X203695310017_R07C01 X203740810001_R01C01 X203740810001_R02C01
## <numeric>          <numeric>          <numeric>
## 1              3.53032          2.99960          3.32872
## 2              3.54419          2.98937          3.34656
## 3              3.55633          3.08201          3.32280
## 4              3.56408          3.06401          3.37458
## 5              3.53875          3.28691          3.41148
## ...           ...
## 564585          -2.48845          -2.75999         -2.56835
## 564586          -2.71728          -2.79356         -2.78094
## 564587          -2.81278          -2.97645         -2.87552
## 564588          -2.84356          -2.97813         -2.93443
## 564589          -2.94705          -3.01316         -3.01902
## X203740810001_R03C01 X203740810001_R04C01 X203740810001_R05C01
## <numeric>          <numeric>          <numeric>
## 1              2.81623          3.34962          3.46790
## 2              2.82581          3.41644          3.45910
## 3              2.83525          3.47182          3.45062
## 4              2.66682          3.40318          3.25126
## 5              2.73811          3.46469          3.24287
## ...           ...
## 564585          -2.73331          -2.83290         -2.26974
## 564586          -2.83022          -2.98328         -2.46799
## 564587          -2.97420          -3.16826         -2.52121
## 564588          -2.95922          -3.25300         -2.57578
## 564589          -3.02460          -3.39423         -2.63224
## X203740810001_R06C01
## <numeric>
## 1              3.16369
## 2              3.13435
## 3              3.10159
## 4              3.26643
## 5              3.23124
## ...           ...
## 564585          -2.48773
## 564586          -2.62134
## 564587          -2.72169

```

```
## 564588      -2.75717
## 564589      -2.81483
```

```
# Genomic location information of the predicted RE-CpG
# Function inherit from class 'RangedSummarizedExperiment'
rowRanges(remp_res_Alu)
```

```
## GRanges object with 564589 ranges and 1 metadata column:
##           seqnames      ranges strand |  RE.Index
##           <Rle>        <IRanges>  <Rle> |   <Rle>
## [1]     chr1    837885-837886      + | Alu_0000163
## [2]     chr1    837891-837892      + | Alu_0000163
## [3]     chr1    837929-837930      + | Alu_0000163
## [4]     chr1    837992-837993      + | Alu_0000163
## [5]     chr1    838021-838022      + | Alu_0000163
## ...
## [564585] chr22 51221597-51221598      - | Alu_1118245
## [564586] chr22 51221631-51221632      - | Alu_1118245
## [564587] chr22 51221645-51221646      - | Alu_1118245
## [564588] chr22 51221665-51221666      - | Alu_1118245
## [564589] chr22 51221675-51221676      - | Alu_1118245
## -----
## seqinfo: 24 sequences from an unspecified genome; no seqlengths
```

```
# Standard error-scaled permutation importance of predictors
rempImp(remp_res_Alu)
```

```

## DataFrame with 18 rows and 202 columns
##          X200357150046_R01C01 X200357150046_R04C01 X200357150046_R05C01
##          <numeric>           <numeric>           <numeric>
## RE.swScore      19.805674      19.91927      23.36058
## RE.Length       13.035081      13.73111      11.29548
## RE.CpG.density   26.648639      20.22481      28.82436
## RE.InTSS        11.209865      8.89509       9.08198
## RE.In5UTR        0.548917      4.78407      6.44783
## ...
##          ...
##          ...
## Methy.mean.mov1    27.5214      31.5534      34.1165
## Methy.mean.mov2    24.2980      24.1244      27.3758
## Methy.mean.mov3    17.4128      19.7408      22.6779
## Methy.mean.mov4    18.8856      21.9142      19.2288
## Methy.std         21.5069      19.2653      19.2740
##          X200357150046_R07C01 X200357150047_R01C01 X200357150047_R04C01
##          <numeric>           <numeric>           <numeric>
## RE.swScore      16.22036      23.00750      21.5466
## RE.Length       11.99696      13.25230      12.8051
## RE.CpG.density   28.64930      25.95856      26.9216
## RE.InTSS        9.16378       11.12222      11.6811
## RE.In5UTR        2.73234      3.95797      8.4238
## ...
##          ...
##          ...
## Methy.mean.mov1    32.9882      29.7917      28.4617
## Methy.mean.mov2    26.1202      23.1263      26.3285
## Methy.mean.mov3    19.5534      18.1851      17.7539
## Methy.mean.mov4    15.6341      17.0249      17.5484
## Methy.std         16.4831      16.5697      15.9195
##          X200357150047_R06C01 X200357150047_R07C01 X200357150047_R08C01
##          <numeric>           <numeric>           <numeric>
## RE.swScore      17.44943      16.59549      18.05030
## RE.Length       11.27390      8.34291      11.53274
## RE.CpG.density   30.69217      23.75420      28.98221
## RE.InTSS        11.70592      9.96659      10.52643
## RE.In5UTR        5.64342      3.19175      5.24698
## ...
##          ...
##          ...
## Methy.mean.mov1    33.6536      29.7021      31.6045
## Methy.mean.mov2    25.5212      26.6679      24.3129
## Methy.mean.mov3    20.0252      19.6732      21.0875
## Methy.mean.mov4    20.2171      19.8407      18.9117
## Methy.std         23.4705      19.7926      17.5917
##          X200357150063_R01C01 X200357150063_R02C01 X200357150063_R03C01
##          <numeric>           <numeric>           <numeric>
## RE.swScore      19.79540      19.43590      18.09062
## RE.Length       15.08566      14.04932      13.05724
## RE.CpG.density   28.72627      25.59877      23.54814
## RE.InTSS        8.90569      12.89133      10.81111
## RE.In5UTR        5.42028      2.40704      3.07968
## ...
##          ...
##          ...
## Methy.mean.mov1    29.9532      34.6720      30.8787
## Methy.mean.mov2    27.4643      24.5348      24.7243
## Methy.mean.mov3    19.9663      18.7175      18.7232
## Methy.mean.mov4    17.6275      17.2771      16.8925

```

## Methy.std	20.1684	19.3122	19.7883
## X200357150063_R06C01	X200357150063_R07C01	X200357980038_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.76293	21.12743	21.35453
## RE.Length	15.03212	14.69711	13.46384
## RE.CpG.density	24.18067	32.86051	22.54826
## RE.InTSS	7.04228	10.27062	9.87880
## RE.In5UTR	4.60618	5.84394	6.24101
## ...	...	...	...
## Methy.mean.mov1	33.2779	31.4492	28.4056
## Methy.mean.mov2	24.8166	26.2140	22.9244
## Methy.mean.mov3	18.3929	19.8991	18.9335
## Methy.mean.mov4	17.4087	18.7270	17.0896
## Methy.std	17.6590	17.0212	18.5147
## X200357980038_R04C01	X200357980038_R05C01	X200357980038_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	23.26690	20.69347	18.39826
## RE.Length	12.51413	15.95347	13.71857
## RE.CpG.density	23.63882	22.52901	24.81123
## RE.InTSS	9.19743	10.01378	10.99155
## RE.In5UTR	3.99477	8.27794	2.89933
## ...	...	...	...
## Methy.mean.mov1	30.6800	33.1554	29.6499
## Methy.mean.mov2	25.9852	26.8863	28.5171
## Methy.mean.mov3	17.6494	17.6259	18.8309
## Methy.mean.mov4	17.3912	16.3154	17.4465
## Methy.std	20.4248	20.6434	18.4812
## X200357980038_R07C01	X200357980038_R08C01	X200360610122_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.23698	22.94306	20.45606
## RE.Length	14.47269	15.19701	14.61744
## RE.CpG.density	32.72204	27.56709	25.62751
## RE.InTSS	7.90839	11.48865	11.34182
## RE.In5UTR	2.70753	4.62218	4.37917
## ...	...	...	...
## Methy.mean.mov1	35.5715	32.7604	32.2405
## Methy.mean.mov2	25.0544	27.7525	24.6650
## Methy.mean.mov3	18.8527	19.9271	19.4503
## Methy.mean.mov4	15.8953	18.7203	14.2321
## Methy.std	15.4599	19.8501	19.1589
## X200360610122_R02C01	X200360610122_R03C01	X200360610122_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	18.58396	21.32075	20.65098
## RE.Length	11.73109	12.61916	12.71319
## RE.CpG.density	24.39625	32.61683	25.98610
## RE.InTSS	11.39901	13.73461	9.05151
## RE.In5UTR	2.93886	5.58182	6.77743
## ...	...	...	...
## Methy.mean.mov1	29.2543	29.4082	26.6819
## Methy.mean.mov2	24.6903	27.3250	25.9308
## Methy.mean.mov3	19.8843	18.7712	17.4189
## Methy.mean.mov4	21.2091	16.2616	18.3326

## Methy.std	22.3279	22.5841	19.2794
## X200360610122_R05C01	X200360610122_R07C01	X200360610122_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	18.73272	20.36638	16.90977
## RE.Length	14.17932	16.42132	11.97781
## RE.CpG.density	24.70814	25.01916	26.62785
## RE.InTSS	9.34547	13.22575	11.21292
## RE.In5UTR	5.13252	5.30211	4.54484
## ...	...	...	...
## Methy.mean.mov1	28.2564	30.0035	30.3053
## Methy.mean.mov2	28.1130	24.7773	22.9269
## Methy.mean.mov3	17.3730	21.5316	20.5644
## Methy.mean.mov4	17.1633	20.9438	18.9863
## Methy.std	17.5147	20.0417	22.5167
## X200360610148_R01C01	X200360610148_R02C01	X200360610148_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	19.72969	18.86600	18.67858
## RE.Length	12.90251	15.07810	11.91971
## RE.CpG.density	24.41723	27.20933	23.63017
## RE.InTSS	7.99256	11.08146	11.97971
## RE.In5UTR	5.81346	3.24438	5.13434
## ...	...	...	...
## Methy.mean.mov1	30.9993	32.0123	30.2427
## Methy.mean.mov2	23.3639	25.2312	24.0780
## Methy.mean.mov3	18.8553	21.3699	18.5851
## Methy.mean.mov4	15.1688	18.0368	17.1371
## Methy.std	20.4636	18.3936	18.7415
## X200360610148_R05C01	X200360610148_R06C01	X200360610148_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	17.05197	20.68666	19.04717
## RE.Length	11.74586	12.89383	12.71845
## RE.CpG.density	26.99133	20.94083	27.96319
## RE.InTSS	14.23889	11.29586	10.02521
## RE.In5UTR	3.64042	5.91077	9.43973
## ...	...	...	...
## Methy.mean.mov1	31.8692	27.2240	32.1094
## Methy.mean.mov2	26.3885	23.9368	25.8679
## Methy.mean.mov3	21.9711	17.4639	18.8053
## Methy.mean.mov4	20.5111	14.0424	16.5263
## Methy.std	21.9638	17.4040	17.5893
## X200360140138_R01C01	X200360140138_R02C01	X200360140138_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.79149	17.7961	20.51962
## RE.Length	13.93720	12.1903	15.94878
## RE.CpG.density	26.20224	30.1046	27.79681
## RE.InTSS	13.89147	10.7716	9.49972
## RE.In5UTR	5.56203	5.9925	8.96444
## ...	...	...	...
## Methy.mean.mov1	28.8388	30.7601	30.0560
## Methy.mean.mov2	24.2768	24.8580	25.5795
## Methy.mean.mov3	23.2814	19.0893	17.6067
## Methy.mean.mov4	17.9428	16.1477	18.8793

## Methy.std	18.3908	17.6614	20.1900
## X200360140138_R05C01	X200360140145_R02C01	X200360140145_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	16.72538	16.33497	23.28204
## RE.Length	13.02252	12.38809	14.23031
## RE.CpG.density	31.65325	19.44257	25.23911
## RE.InTSS	10.76499	10.63209	12.82311
## RE.In5UTR	3.12234	5.31906	7.11115
## ...	...	...	...
## Methy.mean.mov1	31.5622	29.4818	30.6053
## Methy.mean.mov2	24.2610	24.1042	24.6811
## Methy.mean.mov3	17.8942	19.8236	17.6527
## Methy.mean.mov4	16.1515	17.9150	18.0627
## Methy.std	19.1209	22.4906	19.7651
## X200360140145_R05C01	X200360140145_R06C01	X200360140145_R07C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.46161	19.42694	21.16875
## RE.Length	14.32903	12.54469	12.31824
## RE.CpG.density	22.29784	27.17431	20.41161
## RE.InTSS	10.80394	11.76418	12.62720
## RE.In5UTR	4.02783	5.96283	4.43328
## ...	...	...	...
## Methy.mean.mov1	30.1139	29.9169	28.4408
## Methy.mean.mov2	25.3857	23.4793	27.0567
## Methy.mean.mov3	17.3888	18.9589	19.5191
## Methy.mean.mov4	15.0596	17.2913	15.9060
## Methy.std	18.9081	17.5547	18.0291
## X200360140145_R08C01	X200503840006_R01C01	X200503840006_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.78205	18.48518	20.37077
## RE.Length	13.79290	13.88435	14.84341
## RE.CpG.density	23.02490	23.76427	25.17580
## RE.InTSS	13.42088	10.64458	14.31678
## RE.In5UTR	5.50255	4.94871	8.00282
## ...	...	...	...
## Methy.mean.mov1	28.9557	32.7214	31.7378
## Methy.mean.mov2	26.1378	26.2244	26.9610
## Methy.mean.mov3	16.2858	19.9416	21.2395
## Methy.mean.mov4	16.2526	20.9920	20.1623
## Methy.std	19.3515	17.0177	23.3213
## X200503840006_R04C01	X200503840006_R06C01	X200503840006_R07C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	17.29196	17.87772	18.10746
## RE.Length	11.77418	13.43957	14.74167
## RE.CpG.density	25.96239	34.84642	29.20195
## RE.InTSS	8.57504	9.64829	9.69482
## RE.In5UTR	5.35326	4.58105	5.34880
## ...	...	...	...
## Methy.mean.mov1	32.4020	28.2580	30.2688
## Methy.mean.mov2	27.4692	22.7729	27.8042
## Methy.mean.mov3	19.4343	17.6009	17.8726
## Methy.mean.mov4	14.3905	17.7687	17.3321

## Methy.std	20.0793	19.6268	19.2179
## X200503840006_R08C01	<numeric>	<numeric>	<numeric>
## RE.swScore	15.80033	18.42976	24.76481
## RE.Length	11.08438	12.18755	15.35496
## RE.CpG.density	28.77568	23.25006	30.26566
## RE.InTSS	11.24936	9.88052	11.12506
## RE.In5UTR	4.13754	1.41049	4.23118
## ...	...	...	...
## Methy.mean.mov1	31.0082	33.2313	30.6936
## Methy.mean.mov2	22.8050	26.2324	24.7350
## Methy.mean.mov3	20.7494	20.7828	19.9445
## Methy.mean.mov4	16.9409	17.2843	21.2792
## Methy.std	21.0736	18.6760	18.8742
## X200503840041_R03C01	<numeric>	<numeric>	<numeric>
## RE.swScore	16.25650	17.01049	22.04525
## RE.Length	14.49018	12.59949	13.88873
## RE.CpG.density	34.67376	31.68695	35.10198
## RE.InTSS	9.51445	9.21427	10.32738
## RE.In5UTR	4.13568	1.13835	3.95254
## ...	...	...	...
## Methy.mean.mov1	31.1896	31.6585	30.3065
## Methy.mean.mov2	23.4806	29.1916	26.5562
## Methy.mean.mov3	18.8684	23.2424	19.7730
## Methy.mean.mov4	19.4852	17.0321	21.8818
## Methy.std	21.0262	18.4306	24.3593
## X200503840041_R07C01	<numeric>	<numeric>	<numeric>
## RE.swScore	24.64049	18.67582	19.68983
## RE.Length	13.74539	14.84056	11.69683
## RE.CpG.density	28.89540	32.42270	23.84890
## RE.InTSS	11.30217	6.79765	11.71255
## RE.In5UTR	5.96197	0.40708	6.34065
## ...	...	...	...
## Methy.mean.mov1	29.8887	27.5399	33.3170
## Methy.mean.mov2	21.9576	25.4060	28.1625
## Methy.mean.mov3	20.8911	21.0840	18.0998
## Methy.mean.mov4	14.5243	22.0801	19.3708
## Methy.std	21.0423	21.4419	20.5812
## X200503840042_R03C01	<numeric>	<numeric>	<numeric>
## RE.swScore	21.66864	18.69420	19.19526
## RE.Length	11.48634	13.83253	12.03566
## RE.CpG.density	26.83167	29.00648	31.10585
## RE.InTSS	9.74733	10.65319	6.10786
## RE.In5UTR	2.44689	8.22191	4.23962
## ...	...	...	...
## Methy.mean.mov1	32.7002	30.6881	31.6776
## Methy.mean.mov2	24.6591	24.8532	27.0940
## Methy.mean.mov3	22.5648	19.5386	18.8196
## Methy.mean.mov4	20.3477	19.1649	22.1246

## Methy.std	19.2671	20.1041	22.2928
## X200503840042_R06C01	<numeric>	<numeric>	<numeric>
## RE.swScore	20.60553	20.99528	18.70739
## RE.Length	13.94399	13.63622	14.04806
## RE.CpG.density	27.06838	26.84765	25.85932
## RE.InTSS	11.12252	10.83829	11.93755
## RE.In5UTR	7.20224	7.44871	4.36087
## ...	...	...	...
## Methy.mean.mov1	31.6707	29.5957	33.9520
## Methy.mean.mov2	24.9036	24.7306	24.2000
## Methy.mean.mov3	22.3510	18.2136	20.8636
## Methy.mean.mov4	20.6422	17.1175	17.5937
## Methy.std	21.2228	19.6558	21.3233
## X200503840058_R01C01	<numeric>	<numeric>	<numeric>
## RE.swScore	19.62480	19.59544	19.41554
## RE.Length	10.33640	14.01772	16.18709
## RE.CpG.density	28.02668	29.45971	31.11957
## RE.InTSS	10.27903	10.29434	7.97482
## RE.In5UTR	3.68887	5.79734	5.00331
## ...	...	...	...
## Methy.mean.mov1	32.2775	29.9963	33.1250
## Methy.mean.mov2	27.7917	26.7500	26.8495
## Methy.mean.mov3	21.8903	18.8903	20.7517
## Methy.mean.mov4	17.9428	19.3218	22.0801
## Methy.std	17.4096	18.9559	22.4734
## X200503840058_R07C01	<numeric>	<numeric>	<numeric>
## RE.swScore	23.77533	22.2877	21.48603
## RE.Length	13.91632	15.3907	13.27568
## RE.CpG.density	25.20060	31.1888	28.16224
## RE.InTSS	9.41264	12.0458	13.14208
## RE.In5UTR	4.28284	4.8200	4.38549
## ...	...	...	...
## Methy.mean.mov1	33.3868	30.3540	29.8062
## Methy.mean.mov2	26.3223	25.4362	23.7175
## Methy.mean.mov3	19.1904	22.4051	19.3384
## Methy.mean.mov4	19.9981	17.6931	20.8051
## Methy.std	21.4829	20.4550	19.2690
## X200503840065_R04C01	<numeric>	<numeric>	<numeric>
## RE.swScore	20.76940	21.33182	20.40947
## RE.Length	13.89082	13.48530	15.07819
## RE.CpG.density	22.14972	22.61521	25.05975
## RE.InTSS	8.90964	9.63259	11.79873
## RE.In5UTR	8.27733	8.61902	6.40226
## ...	...	...	...
## Methy.mean.mov1	32.0535	33.4489	30.3830
## Methy.mean.mov2	28.3208	26.1893	24.5396
## Methy.mean.mov3	17.4091	18.5843	21.5334
## Methy.mean.mov4	14.7525	17.1307	16.2716

## Methy.std	19.4355	18.4960	19.2666
## X200503840065_R07C01	X200503840065_R08C01	X200503840077_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	23.25267	21.06038	18.71212
## RE.Length	16.55035	16.04262	13.76596
## RE.CpG.density	31.52581	25.06443	21.49162
## RE.InTSS	10.31150	10.13915	11.10138
## RE.In5UTR	4.27363	3.97302	3.86387
## ...	...	...	...
## Methy.mean.mov1	30.2962	32.1335	32.5320
## Methy.mean.mov2	24.2143	23.7572	24.8767
## Methy.mean.mov3	20.9937	18.1593	20.5318
## Methy.mean.mov4	17.1300	16.4930	17.3149
## Methy.std	21.0002	19.9404	21.5490
## X200503840077_R02C01	X200503840077_R03C01	X200503840077_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.4095	18.8655	20.11155
## RE.Length	12.9459	15.8890	12.85585
## RE.CpG.density	30.6542	27.8005	30.62830
## RE.InTSS	11.1542	13.3390	9.98944
## RE.In5UTR	4.0897	3.3060	4.22299
## ...	...	...	...
## Methy.mean.mov1	31.8830	32.1885	33.3816
## Methy.mean.mov2	28.1212	27.2727	25.0071
## Methy.mean.mov3	19.2232	21.9181	20.9853
## Methy.mean.mov4	15.7002	17.5150	19.0267
## Methy.std	19.8196	19.8204	19.1898
## X200503840077_R05C01	X200503840077_R06C01	X200503840077_R07C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.8417	18.70387	19.55467
## RE.Length	14.1475	13.91540	11.28586
## RE.CpG.density	21.6536	26.62999	26.08218
## RE.InTSS	11.9528	11.77258	9.10227
## RE.In5UTR	2.0971	4.89101	4.27037
## ...	...	...	...
## Methy.mean.mov1	28.5805	28.0100	29.3840
## Methy.mean.mov2	23.2451	23.9831	22.9619
## Methy.mean.mov3	20.8819	18.0513	19.3510
## Methy.mean.mov4	21.8012	16.3849	16.1273
## Methy.std	20.5158	20.3701	22.8489
## X200503840077_R08C01	X200503840080_R01C01	X200503840080_R03C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	20.16663	20.50373	20.65848
## RE.Length	15.84739	13.37476	14.54288
## RE.CpG.density	35.88759	26.29140	27.53349
## RE.InTSS	8.90377	11.41707	10.58780
## RE.In5UTR	2.86900	3.22508	8.16717
## ...	...	...	...
## Methy.mean.mov1	29.9916	33.6534	31.2658
## Methy.mean.mov2	29.8056	29.3930	26.9669
## Methy.mean.mov3	21.5934	23.1209	21.7819
## Methy.mean.mov4	21.5595	16.7921	17.1476

## Methy.std	21.3104	21.5860	20.2524
## X200503840080_R06C01	X200503840080_R07C01	X200503840080_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.90208	17.43024	20.30177
## RE.Length	14.78764	13.49043	13.47688
## RE.CpG.density	27.95897	29.14075	21.87288
## RE.InTSS	9.66395	10.67856	11.53249
## RE.In5UTR	3.90369	5.97416	5.16263
## ...	...	...	...
## Methy.mean.mov1	30.2947	31.4287	32.5412
## Methy.mean.mov2	29.6609	24.5484	25.0330
## Methy.mean.mov3	21.7544	19.7049	23.1329
## Methy.mean.mov4	16.5668	15.3108	19.0619
## Methy.std	19.2125	21.4691	23.8471
## X200503840106_R01C01	X200503840106_R02C01	X200503840106_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	24.70541	18.38023	22.17548
## RE.Length	15.22512	13.46124	14.65902
## RE.CpG.density	26.65277	29.59525	24.71532
## RE.InTSS	11.74875	11.16237	10.68169
## RE.In5UTR	3.94241	4.24769	5.42769
## ...	...	...	...
## Methy.mean.mov1	34.0878	31.2162	35.7201
## Methy.mean.mov2	25.2483	25.6336	30.0200
## Methy.mean.mov3	20.2201	19.6452	24.6316
## Methy.mean.mov4	15.8123	15.5587	18.4258
## Methy.std	20.1528	20.4488	23.2971
## X200503840106_R08C01	X203740800065_R01C01	X203740800065_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	18.71579	18.36749	22.15680
## RE.Length	11.40335	14.96928	14.86755
## RE.CpG.density	29.23780	27.43052	26.24885
## RE.InTSS	8.84301	8.42196	12.83949
## RE.In5UTR	3.25390	4.37308	6.65813
## ...	...	...	...
## Methy.mean.mov1	29.2299	29.3075	29.3924
## Methy.mean.mov2	25.7129	23.8600	27.0828
## Methy.mean.mov3	21.0587	18.9484	18.6890
## Methy.mean.mov4	18.2629	15.6790	12.9331
## Methy.std	17.4117	18.2607	16.1249
## X203740800065_R03C01	X203740800065_R04C01	X203740800065_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.16644	20.57517	22.47627
## RE.Length	14.43595	15.18443	15.32201
## RE.CpG.density	31.11835	24.16061	25.55709
## RE.InTSS	12.26379	10.57454	13.01069
## RE.In5UTR	4.17418	6.04258	4.85694
## ...	...	...	...
## Methy.mean.mov1	28.6632	31.2201	31.1927
## Methy.mean.mov2	26.8253	26.5324	26.4491
## Methy.mean.mov3	16.4920	20.5794	19.8175
## Methy.mean.mov4	14.3872	16.1998	19.2671

## Methy.std	15.0101	18.0140	19.2905
## X203740800065_R07C01	X203740800065_R08C01	X203740800066_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.40846	20.65197	22.27360
## RE.Length	12.16193	12.75485	12.33903
## RE.CpG.density	24.81968	27.59139	28.81133
## RE.InTSS	12.06869	10.28912	9.89545
## RE.In5UTR	6.72687	5.54785	3.88698
## ...	...	...	...
## Methy.mean.mov1	30.2913	31.3973	30.7353
## Methy.mean.mov2	24.8698	28.2003	26.4969
## Methy.mean.mov3	18.3336	19.8832	18.9639
## Methy.mean.mov4	17.7661	20.4583	18.3662
## Methy.std	22.0935	19.8841	20.5301
## X203740800066_R02C01	X203740800066_R04C01	X203740800066_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	23.76076	25.43683	21.5386
## RE.Length	15.46368	17.56349	15.6713
## RE.CpG.density	28.99354	22.45241	24.5027
## RE.InTSS	10.77621	11.44878	12.1517
## RE.In5UTR	5.34513	4.73915	6.2995
## ...	...	...	...
## Methy.mean.mov1	29.1665	29.9406	29.2438
## Methy.mean.mov2	28.0984	28.6422	22.7915
## Methy.mean.mov3	20.2090	21.4485	19.0454
## Methy.mean.mov4	17.8552	15.7495	15.8974
## Methy.std	20.5267	18.8411	19.4881
## X203740800066_R08C01	X203717920047_R01C01	X203717920047_R02C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	25.24937	22.86923	23.86686
## RE.Length	12.78707	15.12051	16.04719
## RE.CpG.density	22.59093	29.48275	26.81207
## RE.InTSS	12.39434	10.56415	11.27225
## RE.In5UTR	5.35495	3.71436	5.87739
## ...	...	...	...
## Methy.mean.mov1	32.0708	33.8684	30.7121
## Methy.mean.mov2	26.4415	27.4428	25.0061
## Methy.mean.mov3	21.1831	18.7390	20.1919
## Methy.mean.mov4	17.5367	20.3028	17.8721
## Methy.std	17.4697	20.5035	18.5523
## X203717920047_R03C01	X203717920047_R04C01	X203717920047_R05C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.4637	25.04159	23.06658
## RE.Length	13.9821	16.91056	17.13953
## RE.CpG.density	28.4212	24.55550	23.23920
## RE.InTSS	10.1212	12.35631	12.39487
## RE.In5UTR	3.6541	3.53065	3.26892
## ...	...	...	...
## Methy.mean.mov1	30.0054	30.7376	31.4481
## Methy.mean.mov2	26.3503	26.7988	26.6686
## Methy.mean.mov3	22.0979	21.2585	16.8261
## Methy.mean.mov4	17.8998	16.8808	13.1142

## Methy.std	19.9616	18.7431	19.6160
## X203717920047_R06C01	<numeric>	<numeric>	<numeric>
## RE.swScore	22.54240	19.76296	22.73163
## RE.Length	14.51875	14.85203	15.63447
## RE.CpG.density	30.00289	23.57563	27.16714
## RE.InTSS	12.11423	10.11747	8.66521
## RE.In5UTR	7.97005	4.97625	6.81034
## ...	...	...	...
## Methy.mean.mov1	31.2791	29.6558	30.6680
## Methy.mean.mov2	26.3981	25.9488	24.2430
## Methy.mean.mov3	19.1149	18.6184	17.5037
## Methy.mean.mov4	19.4144	14.5113	15.8879
## Methy.std	17.2145	20.9202	21.6281
## X203711910042_R02C01	<numeric>	<numeric>	<numeric>
## RE.swScore	22.01089	22.65704	23.75707
## RE.Length	12.97610	13.54667	10.91299
## RE.CpG.density	24.27973	26.68208	26.56457
## RE.InTSS	8.32473	8.64539	13.37685
## RE.In5UTR	7.90204	7.21399	6.60255
## ...	...	...	...
## Methy.mean.mov1	30.9415	30.8159	30.7909
## Methy.mean.mov2	24.4881	27.1425	27.7051
## Methy.mean.mov3	15.4447	17.4654	20.3786
## Methy.mean.mov4	21.4794	20.2783	17.1005
## Methy.std	15.9346	17.7293	19.4504
## X203711910042_R08C01	<numeric>	<numeric>	<numeric>
## RE.swScore	21.79765	21.62486	23.23433
## RE.Length	16.04597	14.39424	15.74444
## RE.CpG.density	24.51309	23.68942	24.70582
## RE.InTSS	9.80185	11.66525	7.17041
## RE.In5UTR	4.77304	8.43349	3.17108
## ...	...	...	...
## Methy.mean.mov1	32.2217	31.9664	29.8733
## Methy.mean.mov2	25.7869	27.5967	26.0752
## Methy.mean.mov3	22.2041	22.8745	19.2284
## Methy.mean.mov4	19.7121	19.7642	15.3961
## Methy.std	16.8706	18.9850	17.9725
## X203711910007_R04C01	<numeric>	<numeric>	<numeric>
## RE.swScore	20.98361	22.0497	26.77179
## RE.Length	13.33691	14.7631	15.87855
## RE.CpG.density	30.74569	24.5121	28.33306
## RE.InTSS	7.36317	11.8236	9.79819
## RE.In5UTR	4.66123	2.3665	4.62495
## ...	...	...	...
## Methy.mean.mov1	28.9204	30.0333	30.8125
## Methy.mean.mov2	25.3626	23.7318	24.6032
## Methy.mean.mov3	19.2083	18.4718	19.6442
## Methy.mean.mov4	18.0372	15.2262	17.6436

## Methy.std	21.2657	16.5220	19.3710
## X203711910007_R07C01	<numeric>	<numeric>	<numeric>
##	19.78992	17.40357	21.71027
## RE.swScore	14.42153	13.85537	14.65861
## RE.Length	25.18815	29.74585	22.26271
## RE.CpG.density	10.52507	10.36354	10.51355
## RE.InTSS	5.25899	5.12803	4.83839
## RE.In5UTR	...	...	...
## ...	28.9431	30.0265	29.1148
## Methy.mean.mov1	24.4958	25.4352	25.4352
## Methy.mean.mov2	19.0938	19.7335	17.8722
## Methy.mean.mov3	13.2871	17.5251	18.1239
## Methy.mean.mov4	14.4210	17.0410	20.0370
## X203717920046_R02C01	<numeric>	<numeric>	<numeric>
##	24.03318	21.68226	25.39170
## RE.swScore	15.40732	12.33703	15.36018
## RE.Length	21.13587	24.17913	21.00225
## RE.CpG.density	11.38732	10.72691	9.80297
## RE.InTSS	6.39763	3.31402	6.77378
## RE.In5UTR	...	...	...
## ...	31.0202	29.1518	29.3560
## Methy.mean.mov1	27.2313	24.2489	28.2500
## Methy.mean.mov2	21.4724	17.1911	17.3618
## Methy.mean.mov3	16.1493	14.1316	15.1913
## Methy.mean.mov4	18.2602	15.9887	18.4315
## X203717920046_R06C01	<numeric>	<numeric>	<numeric>
##	22.38494	22.09902	21.84013
## RE.swScore	13.70736	12.79464	13.95513
## RE.Length	25.77422	22.37428	24.58521
## RE.CpG.density	8.74680	11.40135	10.62510
## RE.InTSS	3.80955	6.15571	5.38514
## RE.In5UTR	...	...	...
## ...	33.6108	32.9034	30.8962
## Methy.mean.mov1	25.2784	24.6545	25.5926
## Methy.mean.mov2	19.5569	19.7845	25.1830
## Methy.mean.mov3	17.4126	14.2334	21.2230
## Methy.mean.mov4	18.6731	20.9333	21.0485
## X203740800064_R01C01	<numeric>	<numeric>	<numeric>
##	18.99259	23.5704	24.78237
## RE.swScore	12.83788	13.8103	16.02547
## RE.Length	31.28273	24.1303	21.21420
## RE.CpG.density	9.38207	11.0925	10.74679
## RE.InTSS	2.30266	6.3874	2.48558
## RE.In5UTR	...	...	...
## ...	28.6959	30.7715	31.3979
## Methy.mean.mov1	25.4500	23.3556	24.7390
## Methy.mean.mov2	21.3007	16.9470	23.1032
## Methy.mean.mov3	20.0833	12.5902	18.9576

## Methy.std	19.1070	19.0260	19.2810
## X203740800064_R06C01	X203740800064_R07C01	X203717910108_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	17.79078	21.53545	21.78954
## RE.Length	11.52226	14.53430	13.81767
## RE.CpG.density	32.22918	28.15922	26.97065
## RE.InTSS	10.39986	9.83172	10.00674
## RE.In5UTR	4.86396	3.30066	7.75334
## ...	...	...	...
## Methy.mean.mov1	32.8611	30.2092	30.7729
## Methy.mean.mov2	23.7014	25.3441	26.0340
## Methy.mean.mov3	24.1660	19.1844	21.0525
## Methy.mean.mov4	19.6711	17.4499	17.3805
## Methy.std	18.0769	18.2489	19.8711
## X203717910108_R02C01	X203717910108_R03C01	X203717910108_R04C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	24.08365	21.22262	23.79961
## RE.Length	14.33672	15.73326	16.26227
## RE.CpG.density	30.46136	24.86859	27.24511
## RE.InTSS	10.18931	8.57759	8.32550
## RE.In5UTR	8.85592	5.55916	5.21003
## ...	...	...	...
## Methy.mean.mov1	29.7777	31.2912	28.6146
## Methy.mean.mov2	24.6109	24.6768	24.2468
## Methy.mean.mov3	18.8741	20.2595	19.4507
## Methy.mean.mov4	20.0114	20.1590	18.7411
## Methy.std	16.5509	19.6970	19.4985
## X203717910108_R06C01	X203717910108_R07C01	X203717910108_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.77218	22.68976	21.93219
## RE.Length	14.83699	14.17624	15.59751
## RE.CpG.density	22.46989	30.57630	28.71145
## RE.InTSS	10.96585	11.25956	8.82037
## RE.In5UTR	6.02314	7.01293	6.35464
## ...	...	...	...
## Methy.mean.mov1	34.2464	29.2684	31.2931
## Methy.mean.mov2	25.6610	23.5930	27.4108
## Methy.mean.mov3	18.8969	16.8571	22.2155
## Methy.mean.mov4	18.9786	15.2676	20.4292
## Methy.std	20.0699	18.6216	20.5560
## X203740800032_R01C01	X203740800032_R02C01	X203740800032_R03C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	19.94014	23.55373	21.03214
## RE.Length	12.33378	15.30137	13.24690
## RE.CpG.density	23.73363	22.85531	20.86358
## RE.InTSS	9.07897	8.75155	10.34583
## RE.In5UTR	6.33559	6.83182	4.57531
## ...	...	...	...
## Methy.mean.mov1	29.8293	30.7488	31.1730
## Methy.mean.mov2	26.6198	24.4908	26.5973
## Methy.mean.mov3	19.9809	20.4241	21.0899
## Methy.mean.mov4	15.9227	16.3915	14.9849

## Methy.std	15.0299	20.1948	19.7557
## X203740800032_R04C01	<numeric>	<numeric>	<numeric>
##	21.85056	19.82449	24.24363
## RE.Length	13.16759	11.47443	16.39858
## RE.CpG.density	25.49349	30.39361	28.96580
## RE.InTSS	9.04500	10.50011	7.85569
## RE.In5UTR	6.23807	6.04448	6.05831
## ...	...	...	...
## Methy.mean.mov1	31.8218	28.1351	33.0597
## Methy.mean.mov2	30.2035	23.3131	28.6621
## Methy.mean.mov3	23.3558	17.6089	22.7593
## Methy.mean.mov4	19.8174	18.2436	19.5356
## Methy.std	22.8242	19.3476	19.9835
## X203740800032_R07C01	<numeric>	<numeric>	<numeric>
##	18.88178	22.26454	22.64935
## RE.Length	11.87543	15.66547	12.65962
## RE.CpG.density	31.77589	21.85481	22.11022
## RE.InTSS	11.63474	9.23839	11.76108
## RE.In5UTR	3.92952	5.48014	6.13902
## ...	...	...	...
## Methy.mean.mov1	30.4060	32.4397	32.8221
## Methy.mean.mov2	22.1426	23.6987	27.6411
## Methy.mean.mov3	17.9565	19.4388	21.6507
## Methy.mean.mov4	15.7094	16.7672	17.7137
## Methy.std	17.5876	19.0750	21.2829
## X203695310018_R05C01	<numeric>	<numeric>	<numeric>
##	22.87442	24.05376	23.49826
## RE.Length	14.23312	13.92854	14.30498
## RE.CpG.density	30.82659	20.26339	28.00343
## RE.InTSS	9.89109	8.54913	10.34744
## RE.In5UTR	4.73297	6.09052	4.62365
## ...	...	...	...
## Methy.mean.mov1	30.0414	29.1684	30.7539
## Methy.mean.mov2	25.9160	27.5537	27.3347
## Methy.mean.mov3	17.9924	17.7594	21.0999
## Methy.mean.mov4	13.8908	20.5037	14.2950
## Methy.std	19.5624	19.6885	18.4306
## X203695310018_R08C01	<numeric>	<numeric>	<numeric>
##	25.32208	18.9649	21.40515
## RE.Length	16.07181	14.0274	12.69143
## RE.CpG.density	30.88578	26.3166	28.01353
## RE.InTSS	10.26753	11.3824	10.78610
## RE.In5UTR	6.82257	7.6929	2.04671
## ...	...	...	...
## Methy.mean.mov1	29.0681	30.9146	30.9839
## Methy.mean.mov2	27.6488	24.1870	27.2375
## Methy.mean.mov3	20.3119	18.3652	20.3209
## Methy.mean.mov4	16.9330	14.9351	19.8636

## Methy.std	20.4842	15.6372	16.6198
## X203717910048_R03C01	<numeric>	<numeric>	<numeric>
## RE.swScore	20.61240	21.77057	23.51039
## RE.Length	15.07010	13.63873	13.44079
## RE.CpG.density	21.58602	24.32499	32.33060
## RE.InTSS	12.30241	13.30660	9.71920
## RE.In5UTR	5.51824	4.44581	6.21125
## ...	...	...	...
## Methy.mean.mov1	32.1414	31.1219	31.0931
## Methy.mean.mov2	23.6443	25.9001	25.7060
## Methy.mean.mov3	18.5450	18.8936	23.1543
## Methy.mean.mov4	15.0508	19.3019	21.4395
## Methy.std	16.5663	16.4491	18.7874
## X203717910048_R06C01	<numeric>	<numeric>	<numeric>
## RE.swScore	23.59704	21.87363	21.16583
## RE.Length	14.78600	12.69684	13.30203
## RE.CpG.density	25.51621	26.22222	21.07829
## RE.InTSS	10.88158	7.55786	10.20944
## RE.In5UTR	4.54423	3.75079	3.92117
## ...	...	...	...
## Methy.mean.mov1	30.0125	29.4944	31.7128
## Methy.mean.mov2	28.1287	23.7453	27.2897
## Methy.mean.mov3	18.4279	18.8468	21.0559
## Methy.mean.mov4	17.7751	13.5318	17.7696
## Methy.std	20.3112	21.5990	19.1964
## X203717910032_R03C01	<numeric>	<numeric>	<numeric>
## RE.swScore	20.24071	22.04631	21.70970
## RE.Length	12.33031	14.42747	12.93030
## RE.CpG.density	21.67925	20.66613	25.15422
## RE.InTSS	10.98768	8.45635	10.88615
## RE.In5UTR	4.09436	3.85615	6.54698
## ...	...	...	...
## Methy.mean.mov1	29.0120	33.6671	32.5744
## Methy.mean.mov2	25.5261	27.9054	21.5514
## Methy.mean.mov3	19.0430	21.9376	18.8134
## Methy.mean.mov4	16.5443	18.5011	13.7208
## Methy.std	16.9559	19.3997	18.8416
## X203717910032_R06C01	<numeric>	<numeric>	<numeric>
## RE.swScore	20.31752	24.80020	21.02672
## RE.Length	13.80668	15.54398	14.03618
## RE.CpG.density	25.77225	23.22323	24.38319
## RE.InTSS	10.71853	13.41852	9.62098
## RE.In5UTR	3.40747	4.17152	4.31232
## ...	...	...	...
## Methy.mean.mov1	31.1554	31.2919	32.4085
## Methy.mean.mov2	27.4673	25.6750	26.3862
## Methy.mean.mov3	17.7890	17.8884	22.3862
## Methy.mean.mov4	17.0718	17.3758	16.6810

## Methy.std	20.5389	16.5776	19.1822
## X203717920012_R01C01	<numeric>	<numeric>	<numeric>
##			
## RE.swScore	20.44879	24.64605	24.24354
## RE.Length	17.45616	16.08663	14.97000
## RE.CpG.density	22.25142	22.53766	28.82762
## RE.InTSS	10.41993	13.90210	10.96035
## RE.In5UTR	3.23166	5.70428	4.43703
## ...	...	...	...
## Methy.mean.mov1	28.0108	33.4433	28.7692
## Methy.mean.mov2	24.6456	28.4837	27.0644
## Methy.mean.mov3	27.5573	22.6874	23.4326
## Methy.mean.mov4	25.5836	20.1479	24.2839
## Methy.std	15.5780	20.6947	21.9460
## X203717920012_R04C01	<numeric>	<numeric>	<numeric>
##			
## RE.swScore	22.49838	21.56454	16.45030
## RE.Length	15.52888	13.98125	13.67791
## RE.CpG.density	21.63368	29.02864	30.79330
## RE.InTSS	9.21076	8.47265	7.92849
## RE.In5UTR	3.04347	6.90789	3.05782
## ...	...	...	...
## Methy.mean.mov1	35.9502	32.0224	30.2222
## Methy.mean.mov2	27.7615	25.4998	22.9623
## Methy.mean.mov3	19.2283	22.6368	19.3606
## Methy.mean.mov4	16.2554	17.4699	20.1035
## Methy.std	20.8918	20.6754	19.3010
## X203717920012_R08C01	<numeric>	<numeric>	<numeric>
##			
## RE.swScore	24.03675	24.12583	21.47533
## RE.Length	14.30596	17.34246	14.82928
## RE.CpG.density	26.00357	20.65578	26.88730
## RE.InTSS	11.52577	9.29151	11.42556
## RE.In5UTR	6.42269	6.28663	4.31569
## ...	...	...	...
## Methy.mean.mov1	32.4384	31.2293	30.4121
## Methy.mean.mov2	26.7483	24.4498	25.5588
## Methy.mean.mov3	17.8321	20.0685	20.7260
## Methy.mean.mov4	18.6258	15.4587	18.9733
## Methy.std	20.2082	20.7717	18.1883
## X203693970032_R03C01	<numeric>	<numeric>	<numeric>
##			
## RE.swScore	20.00173	18.45818	23.92608
## RE.Length	13.10202	14.36623	14.56856
## RE.CpG.density	19.18054	22.91823	23.68470
## RE.InTSS	9.99292	9.63367	11.98122
## RE.In5UTR	4.05888	6.22156	5.89521
## ...	...	...	...
## Methy.mean.mov1	29.2272	28.7003	31.3881
## Methy.mean.mov2	25.8612	25.6889	30.3391
## Methy.mean.mov3	19.4872	19.2085	20.6677
## Methy.mean.mov4	16.1714	18.2351	18.5202

## Methy.std	18.2362	20.9637	19.1361
## X203693970032_R06C01	X203693970032_R07C01	X203693970032_R08C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.88655	25.7117	19.80595
## RE.Length	17.59375	13.3223	14.92484
## RE.CpG.density	24.34571	23.5822	29.32624
## RE.InTSS	11.57680	10.7856	9.31132
## RE.In5UTR	3.48209	5.7796	4.16482
## ...	...	...	...
## Methy.mean.mov1	31.2376	31.8632	31.7506
## Methy.mean.mov2	27.8670	26.3155	26.5713
## Methy.mean.mov3	22.0313	20.4901	19.7275
## Methy.mean.mov4	20.9072	16.6384	16.1478
## Methy.std	19.6235	19.2994	18.3939
## X203693970034_R01C01	X203693970034_R02C01	X203693970034_R03C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	19.89579	20.84216	21.82409
## RE.Length	12.05505	13.13929	13.50104
## RE.CpG.density	23.71551	22.79232	23.33310
## RE.InTSS	9.46935	10.35646	10.55545
## RE.In5UTR	3.06454	5.91361	5.12249
## ...	...	...	...
## Methy.mean.mov1	30.6329	31.7655	29.5223
## Methy.mean.mov2	25.1371	24.5918	28.0878
## Methy.mean.mov3	20.8986	20.3141	20.4229
## Methy.mean.mov4	16.1397	17.7022	19.1470
## Methy.std	18.9800	19.0509	19.5978
## X203693970034_R04C01	X203693970034_R05C01	X203693970034_R06C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	22.22058	23.19694	21.91190
## RE.Length	14.34975	14.07364	14.08987
## RE.CpG.density	17.47102	22.91044	23.53341
## RE.InTSS	11.30117	10.69958	12.06447
## RE.In5UTR	4.36928	6.25065	7.17664
## ...	...	...	...
## Methy.mean.mov1	33.3683	30.9369	31.4747
## Methy.mean.mov2	29.5255	26.6303	24.5308
## Methy.mean.mov3	21.5541	23.3047	19.9610
## Methy.mean.mov4	17.5463	20.1110	14.7050
## Methy.std	20.2331	18.5530	19.4603
## X203693970034_R07C01	X203693970034_R08C01	X203695310017_R01C01	
## <numeric>	<numeric>	<numeric>	
## RE.swScore	21.91179	20.53996	24.44615
## RE.Length	13.94927	11.32743	16.00416
## RE.CpG.density	15.02859	23.69538	19.05132
## RE.InTSS	10.47196	11.31130	10.13658
## RE.In5UTR	4.44729	5.75572	5.46783
## ...	...	...	...
## Methy.mean.mov1	31.3098	30.2467	31.3156
## Methy.mean.mov2	25.8593	25.0381	26.7973
## Methy.mean.mov3	22.6924	19.3594	21.8451
## Methy.mean.mov4	19.3398	17.0436	17.0346

## Methy.std	18.8793	19.8674	18.6958
## X203695310017_R02C01	<numeric>	<numeric>	<numeric>
## RE.swScore	22.26622	23.35044	20.91174
## RE.Length	12.80225	15.45395	12.41795
## RE.CpG.density	23.11430	27.50759	29.86875
## RE.InTSS	10.00112	9.88802	10.29039
## RE.In5UTR	6.97147	5.85816	5.74224
## ...	...	...	...
## Methy.mean.mov1	30.7933	32.9473	31.4497
## Methy.mean.mov2	24.6088	29.1265	25.4691
## Methy.mean.mov3	18.9970	20.1616	19.7294
## Methy.mean.mov4	16.5014	18.2412	17.9344
## Methy.std	17.6767	21.8004	20.2053
## X203695310017_R07C01	<numeric>	<numeric>	<numeric>
## RE.swScore	21.68370	24.43097	20.92033
## RE.Length	12.36402	13.68626	15.25606
## RE.CpG.density	24.65683	24.12312	26.99174
## RE.InTSS	11.13823	11.43560	9.82933
## RE.In5UTR	3.88779	4.30346	6.12315
## ...	...	...	...
## Methy.mean.mov1	29.8761	30.5837	30.9002
## Methy.mean.mov2	24.1431	22.8573	24.0435
## Methy.mean.mov3	19.7573	21.7842	20.8188
## Methy.mean.mov4	18.2682	18.1543	16.2128
## Methy.std	23.6120	20.2081	14.0827
## X203740810001_R03C01	<numeric>	<numeric>	<numeric>
## RE.swScore	25.13259	20.87961	15.68794
## RE.Length	16.51909	14.37241	13.33076
## RE.CpG.density	27.76298	22.46884	27.61646
## RE.InTSS	10.76287	11.27576	8.38531
## RE.In5UTR	4.91843	6.06874	2.60196
## ...	...	...	...
## Methy.mean.mov1	33.3732	30.3010	31.1901
## Methy.mean.mov2	26.7159	27.0339	22.5125
## Methy.mean.mov3	21.5536	18.1073	19.0849
## Methy.mean.mov4	19.6856	12.7914	16.2682
## Methy.std	19.3346	18.6086	18.7897
## X203740810001_R06C01	<numeric>		
## RE.swScore	21.86855		
## RE.Length	12.70184		
## RE.CpG.density	24.22278		
## RE.InTSS	11.09480		
## RE.In5UTR	7.07947		
## ...	...		
## Methy.mean.mov1	30.9454		
## Methy.mean.mov2	23.3596		
## Methy.mean.mov3	20.7121		

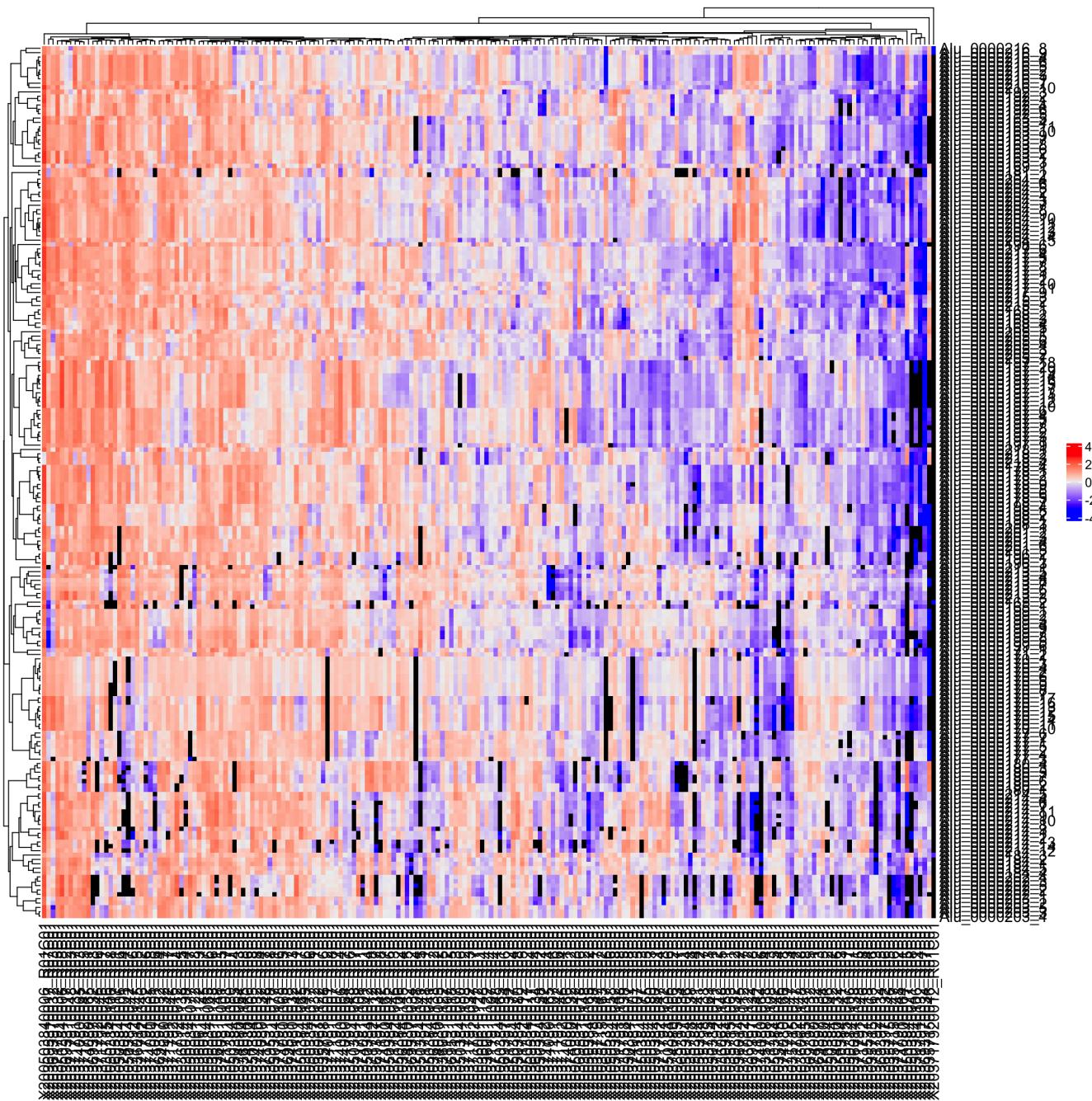
```
## Methy.mean.mov4          16.1231
## Methy.std               17.7139
```

## V. Trimming

```
# Trim off less reliable predicted results:
# Any predicted CpG values with quality score less than
# threshold (default=1.7) will be replaced with NA.
# CpGs contain more than missing Rate*100% (default=20%)
# missing rate across samples will be discarded.
rmp_res_Alu <- rmpTrim(rmp_res_Alu,threshold=1.7,missingRate=0.2)
details(rmp_res_Alu)
```

```
## RE type: Alu
## Genome build: hg19
## Methylation profiling platform: EPIC
## Flanking window size: 1000
## Prediction model: Random Forest - trimmed (1.7)
## QC model: Quantile Regression Forest
## Seed: 1234
## Covered 369424 CpG sites in 62750 Alu
##
## Number of Alu-CpGs by chromosome:
## chr1  chr2  chr3  chr4  chr5  chr6  chr7  chr8
## 35777 21971 17597 10010 12525 18055 20827 12768
##
## chr9  chr10  chr11  chr12  chr13  chr14  chr15  chr16
## 12035 15141 19547 22130 5770 12585 11187 25976
##
## chr17  chr18  chr19  chr20  chr21  chr22
## 29455 4280 33909 11659 4302 11918
##
## Coverage information:
## The data cover 62750 Alu (369424 Alu-CpG).
## Gene coverage by Alu (out of total # of RefSeq genes):
## 13295 (53.39%) total genes;
## 11622 (60.76%) protein-coding genes;
## 2595 (36.01%) non-coding RNA genes.
##
## Distribution of methylation value (beta value):
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
## 0.0326 0.8707 0.8901 0.8818 0.9049 0.9805 2882193
##
## Distribution of reliability score (lower score = higher reliability):
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
## 0.2502 1.0379 1.1721 1.1854 1.3238 1.7000 2882193
```

```
trimmed_Alu_beta_results <- rempB(remp_res_Alu)
```



## VI. Aggregating RE

```
# (Optional) Aggregate the predicted methylation of CpGs in RE by averaging them to
# obtain the RE-specific methylation level:
# remp_res_Alu <- rempAggregate(remp_res_Alu, NCpG = 2, ncore = 4)
# write_rds(remp_res_Alu, "rmp_res_Alu_aggregate.rds")
rmp_res_Alu <- read_rds(paste0(here::here(), "/rmp_res_Alu_aggregate.rds"))
details(rmp_res_Alu)
```

```

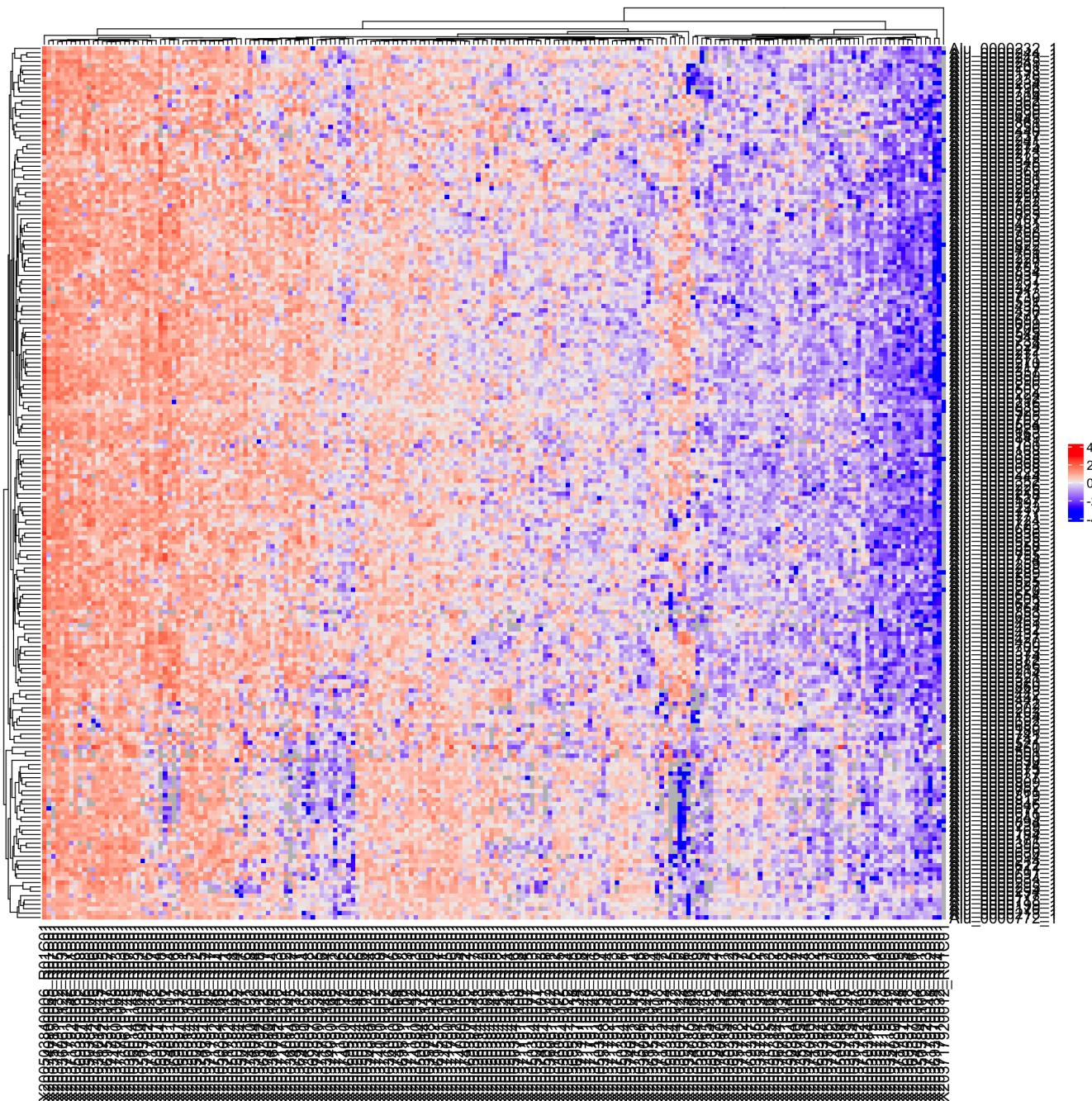
## RE type: Alu (aggregated by mean: min # of CpGs: 2)
## Genome build: hg19
## Methylation profiling platform: EPIC
## Flanking window size: 1000
## Prediction model: Random Forest - trimmed (1.7)
## QC model: Quantile Regression Forest
## Seed: 1234
## Covered 55132 Alu (aggregated by mean: min # of CpGs: 2)
##
## Number of Alu (aggregated by mean: min # of CpGs: 2) by chromosome:
## chr1 chr2 chr3 chr4 chr5 chr6 chr7 chr8
## 5310 3319 2637 1454 1833 2612 3218 1984
##
## chr9 chr10 chr11 chr12 chr13 chr14 chr15 chr16
## 1745 2322 2873 3298 846 1877 1684 3992
##
## chr17 chr18 chr19 chr20 chr21 chr22
## 4236 654 5088 1783 620 1747
##
## Coverage information:
## The data cover 55132 Alu (aggregated by mean: min # of CpGs: 2)
## Gene coverage by Alu (aggregated by mean: min # of CpGs: 2) (out of total # of RefSeq genes):
## 12758 (51.23%) total genes;
## 11185 (58.47%) protein-coding genes;
## 2453 (34.04%) non-coding RNA genes.
##
## Distribution of methylation value (beta value):
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
## 0.03922 0.86887 0.88836 0.87887 0.90326 0.97880 283627
##
## Distribution of reliability score (lower score = higher reliability):
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
## 0.41619 1.05586 1.18704 1.19999 1.33511 1.70000 283627

```

```

# Aggregating CpGs in the same RE for RE-level methylation data is beneficial because 1) it greatly reduces the
# data dimension for downstream analysis and 2) it may produce more robust RE methylation estimation. Note that
# by default, RE with 2 or more predicted CpG sites will be aggregated. Therefore,
# the downside of doing this is the
# reduced coverage of RE. The assumption of doing this is the CpG methylation level
# within each RE are similar.
aggr_Alu_beta_results <- rempB(remp_res_Alu)

```



## VII. Annotation

```
# To add genomic regions annotation of the predicted RES:  
# By default gene symbol annotation will be added  
# remp_res_Alu <- decodeAnnot(remp_res_Alu, ncore = 4)  
# write_rds(remp_res_Alu, "rmp_res_Alu_annotation.rds")  
rmp_res_Alu <- read_rds(paste0(here::here(), "/rmp_res_Alu_annotation.rds"))  
rmpAnnot(rmp_res_Alu)
```

```

## GRanges object with 55132 ranges and 5 metadata columns:
##           seqnames      ranges strand |  swScore   repName repClass
##           <Rle>        <IRanges>  <Rle> | <integer> <character> <character>
## [1]     chr1    837882-838168    + |    2147 AluSq2    SINE
## [2]     chr1    842633-842942    + |    2267 AluSz     SINE
## [3]     chr1    882157-882442    + |    2206 AluSx1    SINE
## [4]     chr1    907864-908157    + |    2143 AluSz     SINE
## [5]     chr1    922488-922621    + |    1035 AluSz     SINE
## ...
## ...
## ...
## [55128] chr2  51013427-51013737    - |    2397 AluY      SINE
## [55129] chr2  51019211-51019509    - |    2221 AluSx     SINE
## [55130] chr2  51019520-51019691    - |     850 AluJb     SINE
## [55131] chr2  51173301-51173583    - |    1576 AluJo     SINE
## [55132] chr2  51174537-51174832    - |    1927 AluSq2    SINE
##           repFamily      Index
##           <character> <Rle>
## [1]       Alu Alu_0000163
## [2]       Alu Alu_0000165
## [3]       Alu Alu_0000168
## [4]       Alu Alu_0000170
## [5]       Alu Alu_0000171
## ...
## ...
## [55128]     Alu Alu_1118181
## [55129]     Alu Alu_1118182
## [55130]     Alu Alu_1118183
## [55131]     Alu Alu_1118227
## [55132]     Alu Alu_1118228
## -----
## seqinfo: 24 sequences from hg19 genome

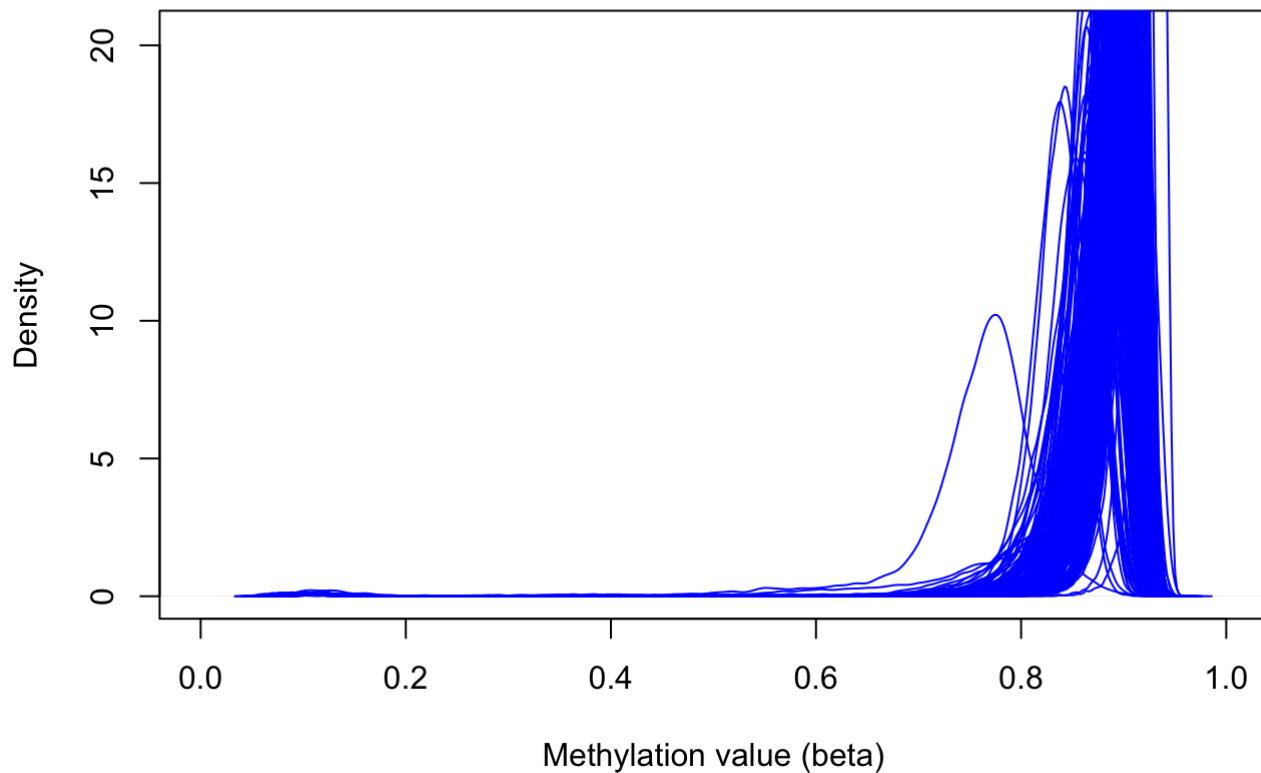
```

```

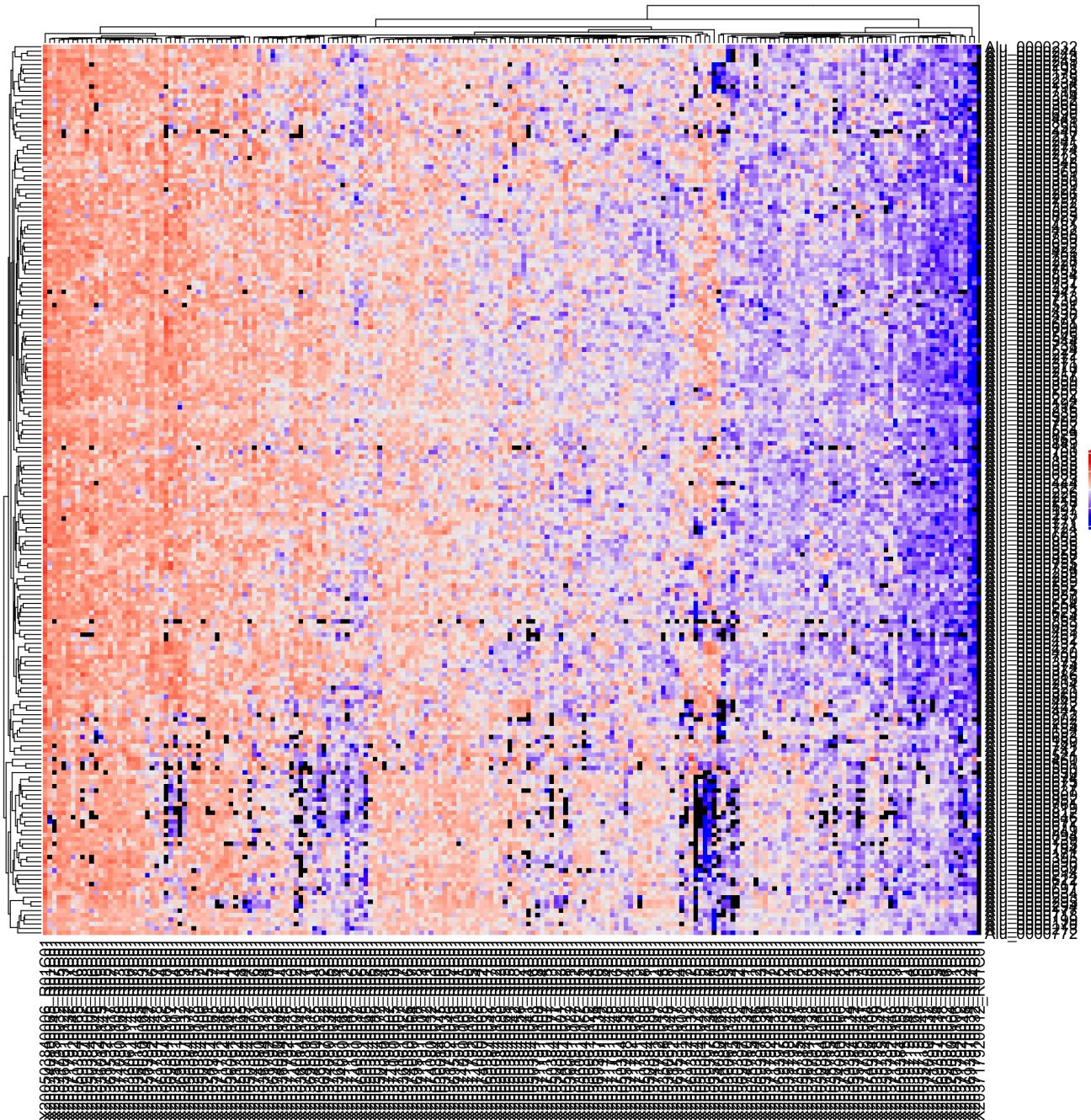
# 4. Plot prediction
remplot(remp_res_Alu, main = "Alu methylation", col = "blue")

```

## Alu methylation



```
annot_Alu_beta_results <- rempB(remp_res_Alu)
```



```

# Need to bind Alu with chr and symbol
# Data results with the B value and RE.Index
Alu_beta_results <-
  annot_Alus_beta_results %>%
  # Merge with annotation, get #chr, start, end
  left_join(., as_tibble(remp_res_Alus$metadata$REannotation), by = c("Index" = "Index"))

# Merge with refgene, get gene symbol
chr_vec <- paste0("chr", c(seq(1, 22, 1)))
data <- data.frame(matrix(nrow=0, ncol=0))
# data <- data.frame(matrix(nrow=1, ncol=0))
for (i in chr_vec){

  data_chr <- Alu_beta_results %>%
    filter(seqnames == i) %>%
    # Merge with refgene, get gene symbol
    left_join(., as_tibble(remp_res_Alus$metadata$refGene), by = c("seqnames", "strand"),
              suffix = c("_RE", "_gene")) %>%
    # select RE position within the gene
    mutate(correct_position = case_when(
      start_RE > start_gene &
        end_RE < end_gene ~ "correct"
    )) %>%
    filter(correct_position == "correct")

  data <- bind_rows(data, data_chr)

}
Alu_beta_results <- data
rm(chr_vec, n, i, data, data_chr)

```

## VIII. Results analysis

### RE Summary

Sorry for the long table!

Characteristic	N = 34,619 <sup>1</sup>
seqnames	
chr1	3,265 (9.4%)
chr2	1,851 (5.3%)
chr3	1,691 (4.9%)
chr4	969 (2.8%)
chr5	906 (2.6%)
chr6	1,585 (4.6%)
<sup>1</sup> n (%)	

Characteristic	N = 34,619 <sup>1</sup>
chr7	2,294 (6.6%)
chr8	1,285 (3.7%)
chr9	992 (2.9%)
chr10	1,540 (4.4%)
chr11	1,629 (4.7%)
chr12	2,059 (5.9%)
chr13	476 (1.4%)
chr14	1,231 (3.6%)
chr15	979 (2.8%)
chr16	2,607 (7.5%)
chr17	2,718 (7.9%)
chr18	398 (1.1%)
chr19	3,316 (9.6%)
chr20	1,049 (3.0%)
chr21	571 (1.6%)
chr22	1,208 (3.5%)
GeneSymbol	
A3GALT2	1 (<0.1%)
A4GALT	1 (<0.1%)
AACS	5 (<0.1%)
AADACL2-AS1	2 (<0.1%)
AAK1	2 (<0.1%)
AAMDC	2 (<0.1%)
AAR2	2 (<0.1%)
AARD	1 (<0.1%)
AARS1	2 (<0.1%)
AARS2	1 (<0.1%)
AARSD1	3 (<0.1%)
AATK	6 (<0.1%)
ABAT	12 (<0.1%)
ABCA1	2 (<0.1%)
ABCA2	2 (<0.1%)
ABCA3	14 (<0.1%)
ABCA7	8 (<0.1%)
ABCB10	1 (<0.1%)
ABCB6	2 (<0.1%)
ABCB8	16 (<0.1%)
ABCB9	41 (0.1%)
ABCC1	14 (<0.1%)
ABCC10	2 (<0.1%)
ABCC11	3 (<0.1%)
ABCC12	1 (<0.1%)
ABCC2	3 (<0.1%)
<sup>1</sup> n (%)	

Characteristic	N = 34,619 <sup>1</sup>
ABCC3	3 (<0.1%)
ABCC4	8 (<0.1%)
ABCC5	3 (<0.1%)
ABCC6	4 (<0.1%)
ABCC8	2 (<0.1%)
ABCD4	4 (<0.1%)
ABCF1	4 (<0.1%)
ABCG1	18 (<0.1%)
ABCG2	2 (<0.1%)
ABCG4	4 (<0.1%)
ABCG5	1 (<0.1%)
ABHD1	3 (<0.1%)
ABHD11	4 (<0.1%)
ABHD12	6 (<0.1%)
ABHD14A	1 (<0.1%)
ABHD14A-ACY1	1 (<0.1%)
ABHD15	1 (<0.1%)
ABHD16A	8 (<0.1%)
ABHD18	4 (<0.1%)
ABHD2	2 (<0.1%)
ABHD3	1 (<0.1%)
ABHD5	1 (<0.1%)
ABHD8	10 (<0.1%)
ABI2	8 (<0.1%)
ABI3	4 (<0.1%)
ABL1	5 (<0.1%)
ABL2	7 (<0.1%)
ABLIM1	12 (<0.1%)
ABLIM2	69 (0.2%)
ABLIM3	1 (<0.1%)
ABO	1 (<0.1%)
ABR	65 (0.2%)
ABTB2	5 (<0.1%)
ACACA	3 (<0.1%)
ACACB	3 (<0.1%)
ACAD10	10 (<0.1%)
ACAD11	1 (<0.1%)
ACAD8	1 (<0.1%)
ACAP1	3 (<0.1%)
ACAT1	3 (<0.1%)
ACAT2	1 (<0.1%)
ACBD3	3 (<0.1%)
ACBD4	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ACE	3 (<0.1%)
ACER1	2 (<0.1%)
ACHE	3 (<0.1%)
ACIN1	18 (<0.1%)
ACKR2	1 (<0.1%)
ACKR4	1 (<0.1%)
ACLY	2 (<0.1%)
ACMSD	1 (<0.1%)
ACOD1	1 (<0.1%)
ACOT11	5 (<0.1%)
ACOT2	1 (<0.1%)
ACOT7	26 (<0.1%)
ACOT8	2 (<0.1%)
ACOX1	9 (<0.1%)
ACOX2	3 (<0.1%)
ACOX3	4 (<0.1%)
ACP3	2 (<0.1%)
ACP6	1 (<0.1%)
ACRV1	4 (<0.1%)
ACSBG1	8 (<0.1%)
ACSF2	7 (<0.1%)
ACSF3	31 (<0.1%)
ACSL1	14 (<0.1%)
ACSL3	4 (<0.1%)
ACSL5	6 (<0.1%)
ACSS1	13 (<0.1%)
ACSS2	4 (<0.1%)
ACSS3	1 (<0.1%)
ACTG1P20	1 (<0.1%)
ACTL6B	2 (<0.1%)
ACTL8	1 (<0.1%)
ACTN1	12 (<0.1%)
ACTN1-DT	2 (<0.1%)
ACTN2	9 (<0.1%)
ACTN4	5 (<0.1%)
ACTR3-AS1	3 (<0.1%)
ACTR5	1 (<0.1%)
ACVR1B	6 (<0.1%)
ACVR1C	3 (<0.1%)
ACVR2B	1 (<0.1%)
ACVR2B-AS1	1 (<0.1%)
ACVRL1	2 (<0.1%)
ACYP2	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ADA	2 (<0.1%)
ADA2	21 (<0.1%)
ADAM11	3 (<0.1%)
ADAM2	3 (<0.1%)
ADAM33	3 (<0.1%)
ADAMTS10	9 (<0.1%)
ADAMTS12	1 (<0.1%)
ADAMTS13	13 (<0.1%)
ADAMTS16	2 (<0.1%)
ADAMTS16-DT	1 (<0.1%)
ADAMTS17	4 (<0.1%)
ADAMTS2	8 (<0.1%)
ADAMTS20	1 (<0.1%)
ADAMTS7	4 (<0.1%)
ADAMTS8	2 (<0.1%)
ADAMTSL2	2 (<0.1%)
ADAMTSL3	2 (<0.1%)
ADAMTSL4	4 (<0.1%)
ADAP1	20 (<0.1%)
ADAP2	2 (<0.1%)
ADAR	15 (<0.1%)
ADARB1	16 (<0.1%)
ADARB2	7 (<0.1%)
ADAT2	1 (<0.1%)
ADCK1	2 (<0.1%)
ADCK2	1 (<0.1%)
ADCY10	4 (<0.1%)
ADCY10P1	1 (<0.1%)
ADCY2	1 (<0.1%)
ADCY3	4 (<0.1%)
ADCY5	2 (<0.1%)
ADCY6	3 (<0.1%)
ADCY7	3 (<0.1%)
ADCY9	16 (<0.1%)
ADD1	40 (0.1%)
ADD3	6 (<0.1%)
ADD3-AS1	2 (<0.1%)
ADGRA2	2 (<0.1%)
ADGRD1	3 (<0.1%)
ADGRE5	15 (<0.1%)
ADGRF1	2 (<0.1%)
ADGRF3	2 (<0.1%)
ADGRF5	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ADGRG1	9 (<0.1%)
ADI1	1 (<0.1%)
ADIPOQ	2 (<0.1%)
ADIPOR1	15 (<0.1%)
ADIPOR2	2 (<0.1%)
ADK	4 (<0.1%)
ADM2	2 (<0.1%)
ADNP	7 (<0.1%)
ADORA1	4 (<0.1%)
ADORA2A-AS1	6 (<0.1%)
ADPGK	1 (<0.1%)
ADPGK-AS1	1 (<0.1%)
ADPRHL1	10 (<0.1%)
ADSL	6 (<0.1%)
ADSS1	2 (<0.1%)
ADTRP	2 (<0.1%)
AEBP2	6 (<0.1%)
AEN	2 (<0.1%)
AFAP1	8 (<0.1%)
AFAP1-AS1	1 (<0.1%)
AFAP1L2	3 (<0.1%)
AFF1	6 (<0.1%)
AFF3	4 (<0.1%)
AFG3L2	1 (<0.1%)
AFMID	2 (<0.1%)
AGAP1	45 (0.1%)
AGBL2	2 (<0.1%)
AGBL4	2 (<0.1%)
AGBL5	2 (<0.1%)
AGER	10 (<0.1%)
AGFG2	1 (<0.1%)
AGK	1 (<0.1%)
AGMAT	1 (<0.1%)
AGO2	22 (<0.1%)
AGPAT1	2 (<0.1%)
AGPAT3	8 (<0.1%)
AGPAT4	3 (<0.1%)
AGRN	1 (<0.1%)
AGTPBP1	3 (<0.1%)
AHCY	4 (<0.1%)
AHCYL1	5 (<0.1%)
AHCYL2	15 (<0.1%)
AHDC1	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
AHI1	4 (<0.1%)
AHNAK	11 (<0.1%)
AHRR	2 (<0.1%)
AIF1L	8 (<0.1%)
AIFM2	6 (<0.1%)
AIFM3	8 (<0.1%)
AIMP2	3 (<0.1%)
AIPL1	15 (<0.1%)
AJAP1	2 (<0.1%)
AK1	1 (<0.1%)
AK5	4 (<0.1%)
AK6	2 (<0.1%)
AK7	3 (<0.1%)
AK8	1 (<0.1%)
AKAP1	3 (<0.1%)
AKAP12	5 (<0.1%)
AKAP13	27 (<0.1%)
AKAP3	2 (<0.1%)
AKAP9	4 (<0.1%)
AKIRIN1	2 (<0.1%)
AKNA	1 (<0.1%)
AKR1A1	4 (<0.1%)
AKR1D1	6 (<0.1%)
AKR7A2	1 (<0.1%)
AKT1	3 (<0.1%)
AKT2	6 (<0.1%)
AKT3	4 (<0.1%)
AKTIP	6 (<0.1%)
ALAD	2 (<0.1%)
ALAS1	4 (<0.1%)
ALDH16A1	2 (<0.1%)
ALDH1L1-AS2	1 (<0.1%)
ALDH1L2	10 (<0.1%)
ALDH2	6 (<0.1%)
ALDH3A2	6 (<0.1%)
ALDH6A1	6 (<0.1%)
ALDH8A1	3 (<0.1%)
ALDOA	7 (<0.1%)
ALG11	6 (<0.1%)
ALG12	1 (<0.1%)
ALG6	1 (<0.1%)
ALG8	6 (<0.1%)
ALG9	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ALK	3 (<0.1%)
ALKBH2	5 (<0.1%)
ALKBH4	4 (<0.1%)
ALKBH5	1 (<0.1%)
ALLC	1 (<0.1%)
ALOX12	2 (<0.1%)
ALOX12-AS1	3 (<0.1%)
ALPK2	3 (<0.1%)
ALPK3	1 (<0.1%)
ALPL	9 (<0.1%)
ALPP	1 (<0.1%)
AMACR	6 (<0.1%)
AMBRA1	2 (<0.1%)
AMD1	2 (<0.1%)
AMDHD1	1 (<0.1%)
AMDHD2	2 (<0.1%)
AMFR	1 (<0.1%)
AMN1	5 (<0.1%)
AMOTL1	1 (<0.1%)
AMT	5 (<0.1%)
AMZ1	4 (<0.1%)
ANAPC11	28 (<0.1%)
ANAPC5	7 (<0.1%)
ANAPC7	6 (<0.1%)
ANG	1 (<0.1%)
ANGPT1	4 (<0.1%)
ANGPT2	6 (<0.1%)
ANGPTL2	1 (<0.1%)
ANGPTL4	9 (<0.1%)
ANGPTL6	1 (<0.1%)
ANGPTL7	2 (<0.1%)
ANK1	53 (0.2%)
ANK2	3 (<0.1%)
ANK3	10 (<0.1%)
ANKDD1A	1 (<0.1%)
ANKFY1	27 (<0.1%)
ANKH	3 (<0.1%)
ANKHD1	1 (<0.1%)
ANKHD1-EIF4EBP3	1 (<0.1%)
ANKIB1	1 (<0.1%)
ANKLE1	5 (<0.1%)
ANKLE2	9 (<0.1%)
ANKMY1	5 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ANKRA2	1 (<0.1%)
ANKRD10	8 (<0.1%)
ANKRD11	101 (0.3%)
ANKRD12	3 (<0.1%)
ANKRD13A	5 (<0.1%)
ANKRD13D	1 (<0.1%)
ANKRD16	5 (<0.1%)
ANKRD17	3 (<0.1%)
ANKRD2	2 (<0.1%)
ANKRD24	2 (<0.1%)
ANKRD26	2 (<0.1%)
ANKRD27	2 (<0.1%)
ANKRD29	2 (<0.1%)
ANKRD30BP3	1 (<0.1%)
ANKRD33B	3 (<0.1%)
ANKRD35	2 (<0.1%)
ANKRD39	1 (<0.1%)
ANKRD44	8 (<0.1%)
ANKRD46	8 (<0.1%)
ANKRD52	3 (<0.1%)
ANKRD53	2 (<0.1%)
ANKRD54	8 (<0.1%)
ANKRD55	1 (<0.1%)
ANKRD6	8 (<0.1%)
ANKRD61	1 (<0.1%)
ANKRD7	1 (<0.1%)
ANKS1B	12 (<0.1%)
ANKS3	9 (<0.1%)
ANKS6	3 (<0.1%)
ANKUB1	1 (<0.1%)
ANO1	25 (<0.1%)
ANO10	10 (<0.1%)
ANO4	6 (<0.1%)
ANO6	3 (<0.1%)
ANO8	4 (<0.1%)
ANO9	1 (<0.1%)
ANP32A	1 (<0.1%)
ANTXR1	3 (<0.1%)
ANXA11	6 (<0.1%)
ANXA13	2 (<0.1%)
ANXA2R-OT1	1 (<0.1%)
ANXA4	1 (<0.1%)
AOAH	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
AOPEP	8 (<0.1%)
AP1AR	2 (<0.1%)
AP1B1	3 (<0.1%)
AP1G2-AS1	1 (<0.1%)
AP1M2	1 (<0.1%)
AP1S1	1 (<0.1%)
AP2A2	18 (<0.1%)
AP2B1	2 (<0.1%)
AP2S1	4 (<0.1%)
AP3B1	2 (<0.1%)
AP3B2	9 (<0.1%)
AP3D1	4 (<0.1%)
AP3S2	18 (<0.1%)
AP4B1-AS1	4 (<0.1%)
AP4M1	3 (<0.1%)
AP4S1	6 (<0.1%)
AP5S1	3 (<0.1%)
AP5Z1	3 (<0.1%)
APAF1	5 (<0.1%)
APBA1	1 (<0.1%)
APBA2	8 (<0.1%)
APBA3	2 (<0.1%)
APBB1	6 (<0.1%)
APBB2	67 (0.2%)
APC	3 (<0.1%)
APC2	2 (<0.1%)
APOBEC3H	4 (<0.1%)
APOBR	1 (<0.1%)
APOC2	4 (<0.1%)
APOC4	2 (<0.1%)
APOC4-APOC2	6 (<0.1%)
APOF	1 (<0.1%)
APOH	4 (<0.1%)
APOL3	2 (<0.1%)
APOLD1	2 (<0.1%)
APOM	7 (<0.1%)
APP	59 (0.2%)
APPL2	6 (<0.1%)
APTX	9 (<0.1%)
AQR	2 (<0.1%)
ARAP1	2 (<0.1%)
ARAP3	5 (<0.1%)
AREL1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ARFGAP2	2 (<0.1%)
ARFGEF1	2 (<0.1%)
ARFGEF2	3 (<0.1%)
ARFGEF3	1 (<0.1%)
ARFIP2	4 (<0.1%)
ARHGAP1	3 (<0.1%)
ARHGAP10	3 (<0.1%)
ARHGAP17	4 (<0.1%)
ARHGAP21	1 (<0.1%)
ARHGAP25	2 (<0.1%)
ARHGAP26	2 (<0.1%)
ARHGAP31	3 (<0.1%)
ARHGAP39	3 (<0.1%)
ARHGAP40	2 (<0.1%)
ARHGAP42	1 (<0.1%)
ARHGAP44	4 (<0.1%)
ARHGAP45	4 (<0.1%)
ARHGDIB	1 (<0.1%)
ARHGEF1	6 (<0.1%)
ARHGEF10	8 (<0.1%)
ARHGEF10L	8 (<0.1%)
ARHGEF12	4 (<0.1%)
ARHGEF15	2 (<0.1%)
ARHGEF17	2 (<0.1%)
ARHGEF18	19 (<0.1%)
ARHGEF2	12 (<0.1%)
ARHGEF28	5 (<0.1%)
ARHGEF3	3 (<0.1%)
ARHGEF37	1 (<0.1%)
ARID1A	10 (<0.1%)
ARID1B	4 (<0.1%)
ARID2	1 (<0.1%)
ARID3A	4 (<0.1%)
ARID3B	2 (<0.1%)
ARID5B	1 (<0.1%)
ARIH2	2 (<0.1%)
ARL10	1 (<0.1%)
ARL11	1 (<0.1%)
ARL2	6 (<0.1%)
ARL2-SNX15	3 (<0.1%)
ARL2BP	1 (<0.1%)
ARL3	2 (<0.1%)
ARL8A	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ARL8B	1 (<0.1%)
ARMC2	2 (<0.1%)
ARMC3	8 (<0.1%)
ARMC5	3 (<0.1%)
ARMC6	2 (<0.1%)
ARMC7	2 (<0.1%)
ARMC9	15 (<0.1%)
ARMH1	2 (<0.1%)
ARMH2	1 (<0.1%)
ARMH3	3 (<0.1%)
ARNT	5 (<0.1%)
ARNTL	6 (<0.1%)
ARNTL2-AS1	1 (<0.1%)
ARPC1A	2 (<0.1%)
ARPC1B	6 (<0.1%)
ARPC2	8 (<0.1%)
ARPC4	8 (<0.1%)
ARPC4-TTLL3	10 (<0.1%)
ARPC5L	1 (<0.1%)
ARPIN-AP3S2	6 (<0.1%)
ARRB1	2 (<0.1%)
ARRDC2	2 (<0.1%)
ARRDC5	2 (<0.1%)
ARSB	2 (<0.1%)
ARSG	11 (<0.1%)
ART4	1 (<0.1%)
ART5	4 (<0.1%)
ASAHI	3 (<0.1%)
ASAP1	18 (<0.1%)
ASAP2	10 (<0.1%)
ASAP3	10 (<0.1%)
ASB10	6 (<0.1%)
ASB13	9 (<0.1%)
ASB14	1 (<0.1%)
ASB15	4 (<0.1%)
ASB16	1 (<0.1%)
ASB16-AS1	4 (<0.1%)
ASB18	4 (<0.1%)
ASB2	3 (<0.1%)
ASB4	2 (<0.1%)
ASB7	2 (<0.1%)
ASCC1	12 (<0.1%)
ASCL3	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ASH1L	3 (<0.1%)
ASH2L	12 (<0.1%)
ASIC1	4 (<0.1%)
ASIC2	1 (<0.1%)
ASIP	2 (<0.1%)
ASL	24 (<0.1%)
ASPG	1 (<0.1%)
ASPH	11 (<0.1%)
ASPHD1	2 (<0.1%)
ASPSCR1	15 (<0.1%)
ASTN2-AS1	1 (<0.1%)
ASXL1	2 (<0.1%)
ATAD3B	3 (<0.1%)
ATAD3C	1 (<0.1%)
ATAD5	1 (<0.1%)
ATAT1	6 (<0.1%)
ATCAY	8 (<0.1%)
ATE1	12 (<0.1%)
ATF3	6 (<0.1%)
ATF5	6 (<0.1%)
ATF6B	4 (<0.1%)
ATF7	12 (<0.1%)
ATF7IP	4 (<0.1%)
ATG10	2 (<0.1%)
ATG12	5 (<0.1%)
ATG13	24 (<0.1%)
ATG14	1 (<0.1%)
ATG2A	4 (<0.1%)
ATG4B	10 (<0.1%)
ATG4D	8 (<0.1%)
ATG5	7 (<0.1%)
ATG7	12 (<0.1%)
ATG9A	3 (<0.1%)
ATG9B	1 (<0.1%)
ATL1	1 (<0.1%)
ATM	2 (<0.1%)
ATN1	4 (<0.1%)
ATOH8	3 (<0.1%)
ATP10A	3 (<0.1%)
ATP10B	1 (<0.1%)
ATP10D	2 (<0.1%)
ATP11A	22 (<0.1%)
ATP11A-AS1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ATP11AUN	1 (<0.1%)
ATP13A2	30 (<0.1%)
ATP13A3	1 (<0.1%)
ATP13A4	1 (<0.1%)
ATP1A1	2 (<0.1%)
ATP1A2	2 (<0.1%)
ATP1A3	21 (<0.1%)
ATP1A4	1 (<0.1%)
ATP1B3	2 (<0.1%)
ATP2A1	27 (<0.1%)
ATP2A2	8 (<0.1%)
ATP2A3	49 (0.1%)
ATP2B1	4 (<0.1%)
ATP2B4	14 (<0.1%)
ATP2C1	11 (<0.1%)
ATP2C2	8 (<0.1%)
ATP5F1C	2 (<0.1%)
ATP5MC2	2 (<0.1%)
ATP5ME	4 (<0.1%)
ATP5MF	4 (<0.1%)
ATP5MF-PTCD1	7 (<0.1%)
ATP5MJ	4 (<0.1%)
ATP6V0A1	6 (<0.1%)
ATP6V0A2	2 (<0.1%)
ATP6V0A4	10 (<0.1%)
ATP6V0E1	1 (<0.1%)
ATP6V0E2-AS1	1 (<0.1%)
ATP6V1A	1 (<0.1%)
ATP6V1C2	10 (<0.1%)
ATP6V1D	1 (<0.1%)
ATP6V1G2-DDX39B	4 (<0.1%)
ATP7B	3 (<0.1%)
ATP8A2	2 (<0.1%)
ATP8B1	9 (<0.1%)
ATP8B3	3 (<0.1%)
ATP9A	6 (<0.1%)
ATP9B	3 (<0.1%)
ATPAF1	4 (<0.1%)
ATPSCKMT	12 (<0.1%)
ATR	3 (<0.1%)
ATXN1	12 (<0.1%)
ATXN10	4 (<0.1%)
ATXN2L	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ATXN3	62 (0.2%)
ATXN7	1 (<0.1%)
ATXN7L1	7 (<0.1%)
AUNIP	2 (<0.1%)
AURKB	6 (<0.1%)
AUTS2	16 (<0.1%)
AVEN	2 (<0.1%)
AVIL	4 (<0.1%)
AXIN1	18 (<0.1%)
AZIN1	4 (<0.1%)
B2M	1 (<0.1%)
B3GALNT2	2 (<0.1%)
B3GAT1-DT	1 (<0.1%)
B3GNT3	3 (<0.1%)
B3GNT6	1 (<0.1%)
B3GNTL1	6 (<0.1%)
B4GALNT2	3 (<0.1%)
B4GALNT3	2 (<0.1%)
B4GALT1	1 (<0.1%)
B4GALT1-AS1	3 (<0.1%)
B4GALT4	2 (<0.1%)
B9D1	1 (<0.1%)
BAALC	4 (<0.1%)
BABAM2	24 (<0.1%)
BACE1	16 (<0.1%)
BACE2	12 (<0.1%)
BACH1	3 (<0.1%)
BACH2	2 (<0.1%)
BAD	4 (<0.1%)
BAG3	1 (<0.1%)
BAG5	3 (<0.1%)
BAG6	30 (<0.1%)
BAHD1	2 (<0.1%)
BAIAP2	11 (<0.1%)
BAIAP2-DT	1 (<0.1%)
BAIAP2L1	7 (<0.1%)
BAIAP2L2	3 (<0.1%)
BANF2	10 (<0.1%)
BANP	32 (<0.1%)
BARX2	1 (<0.1%)
BASP1	6 (<0.1%)
BASP1-AS1	4 (<0.1%)
BATF	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
BATF2	2 (<0.1%)
BATF3	1 (<0.1%)
BAZ1A	8 (<0.1%)
BAZ1B	1 (<0.1%)
BAZ2A	3 (<0.1%)
BBC3	16 (<0.1%)
BBOF1	1 (<0.1%)
BBS1	1 (<0.1%)
BBX	6 (<0.1%)
BCAM	12 (<0.1%)
BCAR1	14 (<0.1%)
BCAR3	1 (<0.1%)
BCAS3	10 (<0.1%)
BCAS4	18 (<0.1%)
BCAT1	9 (<0.1%)
BCAT2	3 (<0.1%)
BCKDHA	2 (<0.1%)
BCL11B	4 (<0.1%)
BCL2	1 (<0.1%)
BCL2L1	8 (<0.1%)
BCL2L12	39 (0.1%)
BCL2L13	12 (<0.1%)
BCL2L2-PABPN1	1 (<0.1%)
BCL3	1 (<0.1%)
BCL6	3 (<0.1%)
BCL6B	1 (<0.1%)
BCL7A	8 (<0.1%)
BCL7B	6 (<0.1%)
BCL7C	1 (<0.1%)
BCL9	1 (<0.1%)
BCO2	5 (<0.1%)
BCR	6 (<0.1%)
BDH1	6 (<0.1%)
BDKRB2	2 (<0.1%)
BDP1	1 (<0.1%)
BEAN1	12 (<0.1%)
BECN1	1 (<0.1%)
BEND7	2 (<0.1%)
BEST1	9 (<0.1%)
BEST4	1 (<0.1%)
BFAR	3 (<0.1%)
BFSP2	2 (<0.1%)
BHMT2	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
BICC1	1 (<0.1%)
BICD1	4 (<0.1%)
BICDL2	2 (<0.1%)
BICRA	1 (<0.1%)
BICRAL	1 (<0.1%)
BID	42 (0.1%)
BIK	4 (<0.1%)
BIN1	10 (<0.1%)
BIN3	2 (<0.1%)
BIRC5	6 (<0.1%)
BIRC6	2 (<0.1%)
BIVM	2 (<0.1%)
BIVM-ERCC5	2 (<0.1%)
BLK	1 (<0.1%)
BLNK	27 (<0.1%)
BLVRB	2 (<0.1%)
BMERB1	6 (<0.1%)
BMP1	20 (<0.1%)
BMP6	1 (<0.1%)
BMP7	2 (<0.1%)
BMPR1A	2 (<0.1%)
BMPR2	1 (<0.1%)
BMT2	1 (<0.1%)
BNC2	1 (<0.1%)
BNIP2	3 (<0.1%)
BNIP3	1 (<0.1%)
BNIP5	1 (<0.1%)
BNIPL	8 (<0.1%)
BOK-AS1	3 (<0.1%)
BOLA3	2 (<0.1%)
BOLL	5 (<0.1%)
BORCS5	1 (<0.1%)
BORCS7	2 (<0.1%)
BORCS7-ASMT	2 (<0.1%)
BORCS8-MEF2B	12 (<0.1%)
BPHL	3 (<0.1%)
BPI	1 (<0.1%)
BPIFA4P	1 (<0.1%)
BPIFB1	1 (<0.1%)
BPTF	2 (<0.1%)
BRAF	1 (<0.1%)
BRAP	3 (<0.1%)
BRAT1	7 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
BRD3	1 (<0.1%)
BRD8	1 (<0.1%)
BRD9	2 (<0.1%)
BRDT	24 (<0.1%)
BRF1	24 (<0.1%)
BRI3BP	3 (<0.1%)
BRINP3	1 (<0.1%)
BRIX1	1 (<0.1%)
BRMS1	2 (<0.1%)
BRPF1	2 (<0.1%)
BRSK1	2 (<0.1%)
BRSK2	6 (<0.1%)
BRWD1-AS1	1 (<0.1%)
BSN	1 (<0.1%)
BST1	1 (<0.1%)
BTAF1	1 (<0.1%)
BTBD1	4 (<0.1%)
BTBD17	1 (<0.1%)
BTBD19	1 (<0.1%)
BTBD2	8 (<0.1%)
BTBD7	4 (<0.1%)
BTBD9	22 (<0.1%)
BTG2-DT	2 (<0.1%)
BTNL8	6 (<0.1%)
BTNL9	1 (<0.1%)
BUB1B-PAK6	4 (<0.1%)
BUD23	4 (<0.1%)
BZW2	4 (<0.1%)
C10orf126	1 (<0.1%)
C10orf143	1 (<0.1%)
C10orf99	1 (<0.1%)
C11orf52	1 (<0.1%)
C11orf80	3 (<0.1%)
C11orf91	1 (<0.1%)
C12orf43	16 (<0.1%)
C12orf56	2 (<0.1%)
C12orf76	1 (<0.1%)
C14orf132	4 (<0.1%)
C15orf39	1 (<0.1%)
C15orf48	2 (<0.1%)
C16orf46	9 (<0.1%)
C16orf72	1 (<0.1%)
C16orf74	1 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
C16orf89	2 (<0.1%)
C16orf95	3 (<0.1%)
C16orf96	4 (<0.1%)
C17orf67	1 (<0.1%)
C17orf78	1 (<0.1%)
C17orf99	4 (<0.1%)
C19orf12	7 (<0.1%)
C19orf25	2 (<0.1%)
C19orf47	9 (<0.1%)
C19orf48	20 (<0.1%)
C19orf54	2 (<0.1%)
C1orf100	6 (<0.1%)
C1orf109	2 (<0.1%)
C1orf127	2 (<0.1%)
C1orf141	3 (<0.1%)
C1orf146	2 (<0.1%)
C1orf159	6 (<0.1%)
C1orf21	2 (<0.1%)
C1orf43	21 (<0.1%)
C1orf54	1 (<0.1%)
C1QBP	1 (<0.1%)
C1QTNF1	13 (<0.1%)
C1QTNF3-AMACR	2 (<0.1%)
C1QTNF4	2 (<0.1%)
C1R	1 (<0.1%)
C1RL	3 (<0.1%)
C1RL-AS1	2 (<0.1%)
C1S	2 (<0.1%)
C2	12 (<0.1%)
C2-AS1	2 (<0.1%)
C20orf144	1 (<0.1%)
C20orf173	2 (<0.1%)
C21orf58	19 (<0.1%)
C22orf23	4 (<0.1%)
C22orf31	2 (<0.1%)
C2CD2	6 (<0.1%)
C2CD2L	4 (<0.1%)
C2CD5	6 (<0.1%)
C2orf42	2 (<0.1%)
C2orf74-DT	1 (<0.1%)
C2orf78	2 (<0.1%)
C2orf80	1 (<0.1%)
C2orf83	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
C2orf88	2 (<0.1%)
C2orf92	3 (<0.1%)
C3	1 (<0.1%)
C3orf18	4 (<0.1%)
C3orf52	2 (<0.1%)
C3orf62	3 (<0.1%)
C3orf84	4 (<0.1%)
C4BPB	5 (<0.1%)
C4orf17	1 (<0.1%)
C4orf45	1 (<0.1%)
C5AR1	1 (<0.1%)
C5orf22	4 (<0.1%)
C5orf34	1 (<0.1%)
C5orf49	1 (<0.1%)
C6	2 (<0.1%)
C6orf136	15 (<0.1%)
C6orf201	3 (<0.1%)
C6orf89	1 (<0.1%)
C7orf31	2 (<0.1%)
C7orf50	27 (<0.1%)
C8orf34	1 (<0.1%)
C8orf44	1 (<0.1%)
C8orf44-SGK3	1 (<0.1%)
C8orf74	2 (<0.1%)
C9orf129	2 (<0.1%)
C9orf131	2 (<0.1%)
C9orf40	1 (<0.1%)
C9orf50	2 (<0.1%)
C9orf57	1 (<0.1%)
CA13	1 (<0.1%)
CA5A	2 (<0.1%)
CA9	1 (<0.1%)
CAB39	6 (<0.1%)
CABCOCO1	1 (<0.1%)
CABIN1	12 (<0.1%)
CABLES1	15 (<0.1%)
CABP1	9 (<0.1%)
CABP4	3 (<0.1%)
CACHD1	1 (<0.1%)
CACNA1A	55 (0.2%)
CACNA1B	8 (<0.1%)
CACNA1C	69 (0.2%)
CACNA1C-AS1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CACNA1D	6 (<0.1%)
CACNA2D2	4 (<0.1%)
CACNA2D3	2 (<0.1%)
CACNA2D4	2 (<0.1%)
CACNB2	18 (<0.1%)
CACNB3	8 (<0.1%)
CACNB4	6 (<0.1%)
CACNG2	1 (<0.1%)
CACNG3	1 (<0.1%)
CACNG4	4 (<0.1%)
CACNG7	2 (<0.1%)
CACNG8	1 (<0.1%)
CACTIN	2 (<0.1%)
CAD	1 (<0.1%)
CADM4	2 (<0.1%)
CALCOCO1	3 (<0.1%)
CALD1	8 (<0.1%)
CALHM2	3 (<0.1%)
CALR3	1 (<0.1%)
CAMK1	1 (<0.1%)
CAMK1D	10 (<0.1%)
CAMK2A	2 (<0.1%)
CAMK2B	24 (<0.1%)
CAMK2G	24 (<0.1%)
CAMKK1	15 (<0.1%)
CAMKK2	49 (0.1%)
CAMKMT	4 (<0.1%)
CAMSAP1	1 (<0.1%)
CAMSAP3	8 (<0.1%)
CAMTA1	9 (<0.1%)
CAMTA2	12 (<0.1%)
CAND1.11	1 (<0.1%)
CAND2	6 (<0.1%)
CANX	8 (<0.1%)
CAPG	7 (<0.1%)
CAPN1	4 (<0.1%)
CAPN10-DT	1 (<0.1%)
CAPN11	3 (<0.1%)
CAPN12	1 (<0.1%)
CAPN15	3 (<0.1%)
CAPN2	5 (<0.1%)
CAPN3	6 (<0.1%)
CAPN5	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CAPN7	1 (<0.1%)
CAPN8	1 (<0.1%)
CAPN9	4 (<0.1%)
CAPS2	3 (<0.1%)
CAPZA2	1 (<0.1%)
CAPZB	24 (<0.1%)
CARD11	19 (<0.1%)
CARD14	24 (<0.1%)
CARD8	7 (<0.1%)
CARD8-AS1	1 (<0.1%)
CARD9	4 (<0.1%)
CARHSP1	21 (<0.1%)
CARM1	3 (<0.1%)
CARMIL1	8 (<0.1%)
CARMIL2	1 (<0.1%)
CARMN	2 (<0.1%)
CARS1	20 (<0.1%)
CARS2	4 (<0.1%)
CASC15	5 (<0.1%)
CASC3	2 (<0.1%)
CASKIN1	6 (<0.1%)
CASKIN2	2 (<0.1%)
CASP2	3 (<0.1%)
CASP6	2 (<0.1%)
CASP8	10 (<0.1%)
CASP8AP2	6 (<0.1%)
CASR	2 (<0.1%)
CASS4	20 (<0.1%)
CASZ1	4 (<0.1%)
CAT	1 (<0.1%)
CATIP	4 (<0.1%)
CATSPER1	1 (<0.1%)
CATSPER3	1 (<0.1%)
CATSPERD	9 (<0.1%)
CATSPERG	1 (<0.1%)
CAV1	4 (<0.1%)
CAVIN1	3 (<0.1%)
CBFA2T2	27 (<0.1%)
CBFA2T3	4 (<0.1%)
CBLB	1 (<0.1%)
CBLC	8 (<0.1%)
CBR1-AS1	1 (<0.1%)
CBR3-AS1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CBX1	4 (<0.1%)
CBX5	2 (<0.1%)
CBY1	6 (<0.1%)
CBY3	2 (<0.1%)
CC2D1A	2 (<0.1%)
CCAR1	4 (<0.1%)
CCAR2	1 (<0.1%)
CCBE1	1 (<0.1%)
CCDC102A	4 (<0.1%)
CCDC102B	2 (<0.1%)
CCDC110	2 (<0.1%)
CCDC12	3 (<0.1%)
CCDC124	1 (<0.1%)
CCDC125	2 (<0.1%)
CCDC136	4 (<0.1%)
CCDC137	2 (<0.1%)
CCDC142	3 (<0.1%)
CCDC144NL-AS1	1 (<0.1%)
CCDC146	1 (<0.1%)
CCDC149	2 (<0.1%)
CCDC153	1 (<0.1%)
CCDC154	3 (<0.1%)
CCDC159	2 (<0.1%)
CCDC170	1 (<0.1%)
CCDC174	1 (<0.1%)
CCDC180	1 (<0.1%)
CCDC191	1 (<0.1%)
CCDC200	2 (<0.1%)
CCDC25	1 (<0.1%)
CCDC27	2 (<0.1%)
CCDC3	6 (<0.1%)
CCDC30	1 (<0.1%)
CCDC32	2 (<0.1%)
CCDC33	2 (<0.1%)
CCDC34	2 (<0.1%)
CCDC38	1 (<0.1%)
CCDC39	1 (<0.1%)
CCDC40	18 (<0.1%)
CCDC42	2 (<0.1%)
CCDC43	2 (<0.1%)
CCDC57	10 (<0.1%)
CCDC62	6 (<0.1%)
CCDC73	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CCDC80	2 (<0.1%)
CCDC88A	6 (<0.1%)
CCDC88B	2 (<0.1%)
CCDC88C	10 (<0.1%)
CCDC91	1 (<0.1%)
CCDC92	1 (<0.1%)
CCER2	2 (<0.1%)
CCHCR1	9 (<0.1%)
CCL18	1 (<0.1%)
CCL26	1 (<0.1%)
CCM2	4 (<0.1%)
CCN5	1 (<0.1%)
CCNB1	1 (<0.1%)
CCNB1IP1	6 (<0.1%)
CCNB2	2 (<0.1%)
CCND2	2 (<0.1%)
CCND3	12 (<0.1%)
CCNF	7 (<0.1%)
CCNG1	2 (<0.1%)
CCNI2	3 (<0.1%)
CCNY	23 (<0.1%)
CCNYL1	4 (<0.1%)
CCPG1	4 (<0.1%)
CCR1	1 (<0.1%)
CCR2	2 (<0.1%)
CCR6	2 (<0.1%)
CCR7	1 (<0.1%)
CCSER1	2 (<0.1%)
CCSER2	2 (<0.1%)
CCT3	4 (<0.1%)
CCT6A	2 (<0.1%)
CD160	4 (<0.1%)
CD180	1 (<0.1%)
CD22	5 (<0.1%)
CD247	6 (<0.1%)
CD274	3 (<0.1%)
CD300E	1 (<0.1%)
CD300LB	1 (<0.1%)
CD300LG	4 (<0.1%)
CD320	6 (<0.1%)
CD36	4 (<0.1%)
CD37	2 (<0.1%)
CD3D	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CD4	5 (<0.1%)
CD44	16 (<0.1%)
CD5	1 (<0.1%)
CD52	4 (<0.1%)
CD55	2 (<0.1%)
CD58	2 (<0.1%)
CD6	8 (<0.1%)
CD63	8 (<0.1%)
CD74	3 (<0.1%)
CD80	1 (<0.1%)
CD82	6 (<0.1%)
CD8A	1 (<0.1%)
CD8B	8 (<0.1%)
CD96	2 (<0.1%)
CDAN1	2 (<0.1%)
CDC123	7 (<0.1%)
CDC14A	2 (<0.1%)
CDC14B	3 (<0.1%)
CDC20B	3 (<0.1%)
CDC25A	2 (<0.1%)
CDC25B	3 (<0.1%)
CDC25C	2 (<0.1%)
CDC37	2 (<0.1%)
CDC37L1	2 (<0.1%)
CDC42	3 (<0.1%)
CDC42BPB	8 (<0.1%)
CDC42EP2	1 (<0.1%)
CDC42EP4	2 (<0.1%)
CDC42EP5	2 (<0.1%)
CDC42SE2	2 (<0.1%)
CDC73	1 (<0.1%)
CDCA2	2 (<0.1%)
CDCA3	1 (<0.1%)
CDCA5	1 (<0.1%)
CDCA7	4 (<0.1%)
CDCA8	2 (<0.1%)
CDH1	2 (<0.1%)
CDH13	4 (<0.1%)
CDH22	3 (<0.1%)
CDH23	29 (<0.1%)
CDH26	1 (<0.1%)
CDH3	8 (<0.1%)
CDH4	17 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CDH5	2 (<0.1%)
CDHR2	3 (<0.1%)
CDHR5	3 (<0.1%)
CDIP1	4 (<0.1%)
CDIPT	3 (<0.1%)
CDK10	12 (<0.1%)
CDK11B	36 (0.1%)
CDK14	1 (<0.1%)
CDK15	3 (<0.1%)
CDK18	9 (<0.1%)
CDK19	2 (<0.1%)
CDK2	3 (<0.1%)
CDK2AP1	5 (<0.1%)
CDK5RAP1	5 (<0.1%)
CDK6	6 (<0.1%)
CDKAL1	5 (<0.1%)
CDKL1	2 (<0.1%)
CDKL4	2 (<0.1%)
CDR2L	1 (<0.1%)
CDS2	3 (<0.1%)
CDT1	1 (<0.1%)
CDYL	9 (<0.1%)
CEACAM16	2 (<0.1%)
CEBPE	1 (<0.1%)
CECR2	2 (<0.1%)
CEL	1 (<0.1%)
CELA1	2 (<0.1%)
CELA2A	1 (<0.1%)
CELF1	18 (<0.1%)
CELF2	8 (<0.1%)
CELF4	8 (<0.1%)
CELF5	3 (<0.1%)
CELF6	8 (<0.1%)
CELSR1	6 (<0.1%)
CEMIP	2 (<0.1%)
CENATAC	8 (<0.1%)
CENPBD1P	1 (<0.1%)
CENPBD2P	4 (<0.1%)
CENPN	18 (<0.1%)
CENPO	4 (<0.1%)
CENPP	2 (<0.1%)
CENPS	2 (<0.1%)
CENPS-CORT	25 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CENPT	1 (<0.1%)
CEP104	3 (<0.1%)
CEP131	2 (<0.1%)
CEP152	2 (<0.1%)
CEP162	2 (<0.1%)
CEP164	2 (<0.1%)
CEP192	1 (<0.1%)
CEP250	2 (<0.1%)
CEP295	1 (<0.1%)
CEP295NL	2 (<0.1%)
CEP350	1 (<0.1%)
CEP57L1	3 (<0.1%)
CEP68	4 (<0.1%)
CEP72	1 (<0.1%)
CEP85L	3 (<0.1%)
CEP95	1 (<0.1%)
CERCAM	4 (<0.1%)
CERK	3 (<0.1%)
CERNA1	2 (<0.1%)
CERS2	2 (<0.1%)
CERS3	4 (<0.1%)
CERS4	3 (<0.1%)
CERS6	4 (<0.1%)
CERT1	3 (<0.1%)
CES2	2 (<0.1%)
CES3	5 (<0.1%)
CES4A	11 (<0.1%)
CFAP100	1 (<0.1%)
CFAP119	1 (<0.1%)
CFAP126	1 (<0.1%)
CFAP20	1 (<0.1%)
CFAP20DC	1 (<0.1%)
CFAP221	3 (<0.1%)
CFAP251	3 (<0.1%)
CFAP43	1 (<0.1%)
CFAP45	1 (<0.1%)
CFAP46	1 (<0.1%)
CFAP57	6 (<0.1%)
CFAP61	2 (<0.1%)
CFAP70	1 (<0.1%)
CFAP74	4 (<0.1%)
CFAP77	6 (<0.1%)
CFAP91	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CFAP92	2 (<0.1%)
CFAP99	2 (<0.1%)
CFDP1	1 (<0.1%)
CFL1P1	2 (<0.1%)
CFLAR	15 (<0.1%)
CFLAR-AS1	2 (<0.1%)
CGN	2 (<0.1%)
CGREF1	11 (<0.1%)
CHADL	4 (<0.1%)
CHAF1A	2 (<0.1%)
CHCHD2	2 (<0.1%)
CHCHD5	1 (<0.1%)
CHD2	1 (<0.1%)
CHD4	3 (<0.1%)
CHD5	4 (<0.1%)
CHD7	3 (<0.1%)
CHD8	8 (<0.1%)
CHEK1	1 (<0.1%)
CHERP	3 (<0.1%)
CHFR	40 (0.1%)
CHI3L2	2 (<0.1%)
CHID1	35 (0.1%)
CHKA	2 (<0.1%)
CHKB	2 (<0.1%)
CHKB-CPT1B	5 (<0.1%)
CHMP1A	9 (<0.1%)
CHMP5	2 (<0.1%)
CHMP6	2 (<0.1%)
CHN2	1 (<0.1%)
CHODL-AS1	1 (<0.1%)
CHRD	1 (<0.1%)
CHRM3	1 (<0.1%)
CHRM5	2 (<0.1%)
CHRNA3	3 (<0.1%)
CHRNA6	4 (<0.1%)
CHRN1B1	1 (<0.1%)
CHRN1B3	4 (<0.1%)
CHRN1B4	4 (<0.1%)
CHRND	2 (<0.1%)
CHST11	6 (<0.1%)
CHST12	15 (<0.1%)
CHST3	2 (<0.1%)
CHST5	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CHST6	2 (<0.1%)
CHTF8	10 (<0.1%)
CHTOP	6 (<0.1%)
CHUK	2 (<0.1%)
CHURC1-FNTB	14 (<0.1%)
CIAO1	1 (<0.1%)
CIAO2A	4 (<0.1%)
CIAO2B	3 (<0.1%)
CIAO3	6 (<0.1%)
CIAPIN1	1 (<0.1%)
CIB1	3 (<0.1%)
CIB2	6 (<0.1%)
CIB3	1 (<0.1%)
CIBAR1	4 (<0.1%)
CIBAR1P2	1 (<0.1%)
CIBAR2	2 (<0.1%)
CIDEC	2 (<0.1%)
CIITA	8 (<0.1%)
CILP2	1 (<0.1%)
CISD1	1 (<0.1%)
CISD3	1 (<0.1%)
CIT	14 (<0.1%)
CIZ1	7 (<0.1%)
CKAP5	4 (<0.1%)
CLASRP	15 (<0.1%)
CLCA3P	1 (<0.1%)
CLCA4	2 (<0.1%)
CLCC1	6 (<0.1%)
CLCN1	4 (<0.1%)
CLCN6	3 (<0.1%)
CLCN7	6 (<0.1%)
CLDN1	1 (<0.1%)
CLDN10-AS1	1 (<0.1%)
CLDN11	2 (<0.1%)
CLDN14	2 (<0.1%)
CLDN18	2 (<0.1%)
CLDN19	3 (<0.1%)
CLDN6	2 (<0.1%)
CLEC16A	16 (<0.1%)
CLEC19A	1 (<0.1%)
CLEC4C	6 (<0.1%)
CLECL1	3 (<0.1%)
CLIC1	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CLIC4	1 (<0.1%)
CLIC5	3 (<0.1%)
CLINT1	6 (<0.1%)
CLIP1	15 (<0.1%)
CLIP1-AS1	1 (<0.1%)
CLIP2	50 (0.1%)
CLIP3	4 (<0.1%)
CLK2	1 (<0.1%)
CLMN	2 (<0.1%)
CLMP	4 (<0.1%)
CLN3	6 (<0.1%)
CLN8	2 (<0.1%)
CLP1	2 (<0.1%)
CLPTM1	6 (<0.1%)
CLPTM1L	2 (<0.1%)
CLSPN	2 (<0.1%)
CLSTN1	10 (<0.1%)
CLSTN2	2 (<0.1%)
CLSTN3	1 (<0.1%)
CLTA	6 (<0.1%)
CLTB	18 (<0.1%)
CLTC	2 (<0.1%)
CLTCL1	2 (<0.1%)
CLU	9 (<0.1%)
CLUAP1	4 (<0.1%)
CLUH	3 (<0.1%)
CLVS1	1 (<0.1%)
CLYBL	4 (<0.1%)
CMAHP	1 (<0.1%)
CMAS	1 (<0.1%)
CMBL	2 (<0.1%)
CMC2	1 (<0.1%)
CMIP	30 (<0.1%)
CMKLR2	12 (<0.1%)
CMKLR2-AS	2 (<0.1%)
CMSS1	8 (<0.1%)
CMTM7	2 (<0.1%)
CMTR1	1 (<0.1%)
CNBD2	4 (<0.1%)
CNDP2	4 (<0.1%)
CNFN	1 (<0.1%)
CNGB1	10 (<0.1%)
CNIH3	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CNKS1	4 (<0.1%)
CNKS3	3 (<0.1%)
CNN1	2 (<0.1%)
CNNM1	2 (<0.1%)
CNNM3	2 (<0.1%)
CNNM4	4 (<0.1%)
CNOT1	4 (<0.1%)
CNOT10	4 (<0.1%)
CNR1	4 (<0.1%)
CNR2	2 (<0.1%)
CNST	6 (<0.1%)
CNTD1	2 (<0.1%)
CNTN2	1 (<0.1%)
CNTN4	4 (<0.1%)
CNTNAP1	1 (<0.1%)
CNTRL	1 (<0.1%)
CNTROB	6 (<0.1%)
COBL	5 (<0.1%)
COCH	2 (<0.1%)
COG1	5 (<0.1%)
COG2	2 (<0.1%)
COG3	1 (<0.1%)
COG5	9 (<0.1%)
COG7	4 (<0.1%)
COG8	2 (<0.1%)
COIL	1 (<0.1%)
COL11A2	3 (<0.1%)
COL12A1	2 (<0.1%)
COL13A1	6 (<0.1%)
COL16A1	2 (<0.1%)
COL17A1	1 (<0.1%)
COL1A1	1 (<0.1%)
COL21A1	2 (<0.1%)
COL23A1	8 (<0.1%)
COL26A1	12 (<0.1%)
COL27A1	7 (<0.1%)
COL2A1	2 (<0.1%)
COL4A1	4 (<0.1%)
COL4A2	7 (<0.1%)
COL4A4	3 (<0.1%)
COL5A1	6 (<0.1%)
COL6A3	5 (<0.1%)
COL6A6	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
COL9A1	1 (<0.1%)
COL9A2	2 (<0.1%)
COL9A3	4 (<0.1%)
COLEC11	17 (<0.1%)
COLGALT2	1 (<0.1%)
COLQ	2 (<0.1%)
COMMD1	1 (<0.1%)
COMMD6	1 (<0.1%)
COMMD9	4 (<0.1%)
COMP	1 (<0.1%)
COMT	11 (<0.1%)
COP1	3 (<0.1%)
COPB1	9 (<0.1%)
COPE	15 (<0.1%)
COPS3	8 (<0.1%)
COPS7B	5 (<0.1%)
COPS9	1 (<0.1%)
COPZ1	25 (<0.1%)
COQ10A	2 (<0.1%)
COQ5	4 (<0.1%)
COQ6	6 (<0.1%)
COQ8A	1 (<0.1%)
COQ9	1 (<0.1%)
CORO1C	6 (<0.1%)
CORO2A	3 (<0.1%)
CORO2B	5 (<0.1%)
CORO7	18 (<0.1%)
CORO7-PAM16	9 (<0.1%)
COTL1	4 (<0.1%)
COX10	1 (<0.1%)
COX14	3 (<0.1%)
COX16	2 (<0.1%)
COX19	2 (<0.1%)
COX5A	1 (<0.1%)
CP	2 (<0.1%)
CPE	1 (<0.1%)
CPEB1	2 (<0.1%)
CPEB3	6 (<0.1%)
CPLANE1	1 (<0.1%)
CPLX1	1 (<0.1%)
CPLX4	1 (<0.1%)
CPM	3 (<0.1%)
CPN1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CPN2	1 (<0.1%)
CPNE1	7 (<0.1%)
CPNE2	3 (<0.1%)
CPNE5	3 (<0.1%)
CPNE7	2 (<0.1%)
CPPED1	2 (<0.1%)
CPQ	2 (<0.1%)
CPSF1	1 (<0.1%)
CPSF3	2 (<0.1%)
CPSF4	10 (<0.1%)
CPSF4L	1 (<0.1%)
CPSF7	3 (<0.1%)
CPT1A	12 (<0.1%)
CPT1B	21 (<0.1%)
CPT1C	30 (<0.1%)
CPT2	1 (<0.1%)
CPVL	2 (<0.1%)
CPXM2	1 (<0.1%)
CRABP1	1 (<0.1%)
CRACD	6 (<0.1%)
CRACDL	2 (<0.1%)
CRAMP1	5 (<0.1%)
CRB1	12 (<0.1%)
CRB2	1 (<0.1%)
CRBN	2 (<0.1%)
CRCP	20 (<0.1%)
CREB1	2 (<0.1%)
CREB3L1	3 (<0.1%)
CREB3L2	2 (<0.1%)
CREB3L4	6 (<0.1%)
CREB5	3 (<0.1%)
CREBBP	18 (<0.1%)
CRELD1	6 (<0.1%)
CRELD2	5 (<0.1%)
CREM	42 (0.1%)
CRIP3	1 (<0.1%)
CRISPLD2	5 (<0.1%)
CRK	8 (<0.1%)
CRLF1	1 (<0.1%)
CROCC	1 (<0.1%)
CRPPA	4 (<0.1%)
CRTAC1	4 (<0.1%)
CRTC1	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CRTC3	8 (<0.1%)
CRY2	2 (<0.1%)
CRYBA4	1 (<0.1%)
CRYBB2	1 (<0.1%)
CRYBG1	1 (<0.1%)
CRYBG2	3 (<0.1%)
CRYGB	1 (<0.1%)
CRYL1	2 (<0.1%)
CRYZL1	1 (<0.1%)
CSAD	7 (<0.1%)
CSDC2	3 (<0.1%)
CSDE1	6 (<0.1%)
CSE1L	12 (<0.1%)
CSF1R	3 (<0.1%)
CSF3R	6 (<0.1%)
CSGALNACT1	7 (<0.1%)
CSK	2 (<0.1%)
CSMD1	1 (<0.1%)
CSMD3	3 (<0.1%)
CSNK1A1	8 (<0.1%)
CSNK1D	3 (<0.1%)
CSNK1E	4 (<0.1%)
CSNK1G1	2 (<0.1%)
CSNK1G2	7 (<0.1%)
CSNK2A1	3 (<0.1%)
CSPG4	2 (<0.1%)
CSPP1	1 (<0.1%)
CSRP3	1 (<0.1%)
CSTF1	6 (<0.1%)
CSTF3-DT	3 (<0.1%)
CTBP1	4 (<0.1%)
CTBP2	21 (<0.1%)
CTC1	2 (<0.1%)
CTCF	6 (<0.1%)
CTCFL	10 (<0.1%)
CTD-2350J17.1	1 (<0.1%)
CTDNEP1	2 (<0.1%)
CTDP1	3 (<0.1%)
CTDSP1	3 (<0.1%)
CTDSP2	1 (<0.1%)
CTIF	6 (<0.1%)
CTNNA1	10 (<0.1%)
CTNNA2	8 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CTNNBIP1	8 (<0.1%)
CTNND2	13 (<0.1%)
CTNS	10 (<0.1%)
CTPS1	3 (<0.1%)
CTRC	2 (<0.1%)
CTSB	25 (<0.1%)
CTSF	2 (<0.1%)
CTSS	4 (<0.1%)
CTTN	6 (<0.1%)
CTTNBP2	1 (<0.1%)
CTTNBP2NL	1 (<0.1%)
CTU2	2 (<0.1%)
CUBN	1 (<0.1%)
CUEDC1	4 (<0.1%)
CUEDC2	1 (<0.1%)
CUL2	10 (<0.1%)
CUL4A	12 (<0.1%)
CUL7	4 (<0.1%)
CUL9	3 (<0.1%)
CUTC	2 (<0.1%)
CUX1	271 (0.8%)
CUX2	9 (<0.1%)
CWC25	2 (<0.1%)
CWF19L1	4 (<0.1%)
CX3CR1	4 (<0.1%)
CXADR	6 (<0.1%)
CXCL16	2 (<0.1%)
CXCL17	3 (<0.1%)
CYB561	5 (<0.1%)
CYB5A	3 (<0.1%)
CYB5B	1 (<0.1%)
CYB5D2	12 (<0.1%)
CYB5R1	1 (<0.1%)
CYB5R3	10 (<0.1%)
CYB5RL	2 (<0.1%)
CYFIP1	17 (<0.1%)
CYFIP2	3 (<0.1%)
CYLD	3 (<0.1%)
CYP11A1	1 (<0.1%)
CYP17A1	2 (<0.1%)
CYP19A1	2 (<0.1%)
CYP1A2	1 (<0.1%)
CYP24A1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
CYP27A1	2 (<0.1%)
CYP27C1	1 (<0.1%)
CYP2B7P	1 (<0.1%)
CYP2R1	1 (<0.1%)
CYP4F22	1 (<0.1%)
CYRB1	6 (<0.1%)
CYS1	1 (<0.1%)
CYSTM1	1 (<0.1%)
CYTH1	2 (<0.1%)
CYTH3	3 (<0.1%)
CYTH4	1 (<0.1%)
D2HGDH	15 (<0.1%)
DAAM2	2 (<0.1%)
DAB1	1 (<0.1%)
DAB2IP	3 (<0.1%)
DACT2	1 (<0.1%)
DACT3	2 (<0.1%)
DACT3-AS1	1 (<0.1%)
DAD1	2 (<0.1%)
DAGLA	2 (<0.1%)
DAGLB	20 (<0.1%)
DAP	1 (<0.1%)
DAPK1	4 (<0.1%)
DAPK2	2 (<0.1%)
DAPK3	1 (<0.1%)
DARS1	1 (<0.1%)
DARS2	1 (<0.1%)
DAZL	2 (<0.1%)
DBF4B	3 (<0.1%)
DBI	11 (<0.1%)
DBN1	4 (<0.1%)
DBNDD1	6 (<0.1%)
DBP	1 (<0.1%)
DCAF10	2 (<0.1%)
DCAF11	20 (<0.1%)
DCAF15	2 (<0.1%)
DCAF4	20 (<0.1%)
DCAF5	6 (<0.1%)
DCAF7	2 (<0.1%)
DCAF8	5 (<0.1%)
DCAKD	20 (<0.1%)
DCBLD1	3 (<0.1%)
DCDC2	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
DCLK1	1 (<0.1%)
DCLK2	9 (<0.1%)
DCLRE1A	2 (<0.1%)
DCN	6 (<0.1%)
DCP1A	10 (<0.1%)
DCPS	4 (<0.1%)
DCST1-AS1	6 (<0.1%)
DCST2	4 (<0.1%)
DCTD	4 (<0.1%)
DCTN2	6 (<0.1%)
DCTN4	3 (<0.1%)
DCTN5	3 (<0.1%)
DCTN6	1 (<0.1%)
DCUN1D2	1 (<0.1%)
DDB1	2 (<0.1%)
DDC	14 (<0.1%)
DDHD2	9 (<0.1%)
DDI2	2 (<0.1%)
DDOST	2 (<0.1%)
DDR1	6 (<0.1%)
DDR2	2 (<0.1%)
DDRGK1	1 (<0.1%)
DDX17	2 (<0.1%)
DDX19A	3 (<0.1%)
DDX19B	5 (<0.1%)
DDX20	1 (<0.1%)
DDX21	2 (<0.1%)
DDX23	3 (<0.1%)
DDX24	1 (<0.1%)
DDX25	2 (<0.1%)
DDX27	1 (<0.1%)
DDX31	1 (<0.1%)
DDX39B	9 (<0.1%)
DDX42	2 (<0.1%)
DDX43	1 (<0.1%)
DDX46	4 (<0.1%)
DDX49	4 (<0.1%)
DDX51	2 (<0.1%)
DDX54	8 (<0.1%)
DDX55	4 (<0.1%)
DDX59	1 (<0.1%)
DDX6	4 (<0.1%)
DEAF1	8 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
DEF6	2 (<0.1%)
DEF8	9 (<0.1%)
DEFB121	1 (<0.1%)
DEFB135	1 (<0.1%)
DEGS1	1 (<0.1%)
DENND1A	4 (<0.1%)
DENND1B	3 (<0.1%)
DENND1C	6 (<0.1%)
DENND2A	1 (<0.1%)
DENND2B	18 (<0.1%)
DENND2C	4 (<0.1%)
DENND3	4 (<0.1%)
DENND4A	4 (<0.1%)
DENND4B	1 (<0.1%)
DENND5A	4 (<0.1%)
DENND5B	3 (<0.1%)
DENND5B-AS1	4 (<0.1%)
DENND6A	1 (<0.1%)
DENND6B	1 (<0.1%)
DEPDC4	1 (<0.1%)
DEPDC5	15 (<0.1%)
DEPTOR	4 (<0.1%)
DERA	1 (<0.1%)
DESI1	2 (<0.1%)
DFFA	6 (<0.1%)
DFFB	9 (<0.1%)
DGAT2	2 (<0.1%)
DGAT2-DT	1 (<0.1%)
DGCR5	4 (<0.1%)
DGCR8	2 (<0.1%)
DGKD	2 (<0.1%)
DGKE	2 (<0.1%)
DGKG	9 (<0.1%)
DGKH	9 (<0.1%)
DGKI	1 (<0.1%)
DGKQ	1 (<0.1%)
DGKZ	23 (<0.1%)
DGLUCY	50 (0.1%)
DGUOK-AS1	4 (<0.1%)
DHCR24	1 (<0.1%)
DHDH	2 (<0.1%)
DHFR2	2 (<0.1%)
DHODH	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
DHRS3	2 (<0.1%)
DHRS7B	3 (<0.1%)
DHRS9	3 (<0.1%)
DHTKD1	6 (<0.1%)
DHX16	6 (<0.1%)
DHX32	1 (<0.1%)
DHX33	2 (<0.1%)
DHX37	5 (<0.1%)
DHX38	3 (<0.1%)
DHX57	4 (<0.1%)
DIAPH1	4 (<0.1%)
DIAPH3	5 (<0.1%)
DIAPH3-AS2	1 (<0.1%)
DICER1	12 (<0.1%)
DIDO1	15 (<0.1%)
DIO1	4 (<0.1%)
DIP2A	16 (<0.1%)
DIP2B	8 (<0.1%)
DIP2C	16 (<0.1%)
DIPK1A	4 (<0.1%)
DIRAS1	1 (<0.1%)
DIS3L	6 (<0.1%)
DISC1	23 (<0.1%)
DISP1	1 (<0.1%)
DISP3	1 (<0.1%)
DKK3	6 (<0.1%)
DLAT	1 (<0.1%)
DLEC1	2 (<0.1%)
DLEU1	1 (<0.1%)
DLEU2	2 (<0.1%)
DLEU7-AS1	1 (<0.1%)
DLG1	6 (<0.1%)
DLG1-AS1	1 (<0.1%)
DLG4	2 (<0.1%)
DLG5	5 (<0.1%)
DLGAP1	52 (0.2%)
DLGAP1-AS3	1 (<0.1%)
DLGAP2	8 (<0.1%)
DLGAP3	2 (<0.1%)
DLGAP4	15 (<0.1%)
DLGAP4-AS1	1 (<0.1%)
DLL3	4 (<0.1%)
DMKN	16 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
DMPK	35 (0.1%)
DMRTB1	1 (<0.1%)
DMRTC2	2 (<0.1%)
DMTF1	5 (<0.1%)
DMXL1	3 (<0.1%)
DNA2	8 (<0.1%)
DNAAF1	2 (<0.1%)
DNAAF3	12 (<0.1%)
DNAAF4-CCPG1	1 (<0.1%)
DNAAF5	18 (<0.1%)
DNAAF8	2 (<0.1%)
DNAAF9	6 (<0.1%)
DNAH1	2 (<0.1%)
DNAH10	7 (<0.1%)
DNAH11	1 (<0.1%)
DNAH12	6 (<0.1%)
DNAH17	21 (<0.1%)
DNAH2	9 (<0.1%)
DNAH3	8 (<0.1%)
DNAH5	1 (<0.1%)
DNAH7	1 (<0.1%)
DNAH8	3 (<0.1%)
DNAH9	1 (<0.1%)
DNAI2	6 (<0.1%)
DNAI4	1 (<0.1%)
DNAJA3	6 (<0.1%)
DNAJB13	2 (<0.1%)
DNAJB14	3 (<0.1%)
DNAJB5-DT	1 (<0.1%)
DNAJB6	2 (<0.1%)
DNAJC1	1 (<0.1%)
DNAJC11	3 (<0.1%)
DNAJC13	1 (<0.1%)
DNAJC14	1 (<0.1%)
DNAJC16	9 (<0.1%)
DNAJC17	2 (<0.1%)
DNAJC18	2 (<0.1%)
DNAJC27	2 (<0.1%)
DNAJC27-AS1	2 (<0.1%)
DNAJC28	2 (<0.1%)
DNAJC3	1 (<0.1%)
DNAJC5	2 (<0.1%)
DNAJC5G	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
DNAL1	4 (<0.1%)
DNASE1	2 (<0.1%)
DNASE1L3	2 (<0.1%)
DNASE2	2 (<0.1%)
DNM1	10 (<0.1%)
DNM1P35	1 (<0.1%)
DNM2	40 (0.1%)
DNMBP	3 (<0.1%)
DNMT1	12 (<0.1%)
DNMT3A	14 (<0.1%)
DNMT3L	4 (<0.1%)
DNTTIP1	2 (<0.1%)
DOC2A	7 (<0.1%)
DOC2B	1 (<0.1%)
DOCK1	12 (<0.1%)
DOCK10	4 (<0.1%)
DOCK2	1 (<0.1%)
DOCK3	1 (<0.1%)
DOCK4	3 (<0.1%)
DOCK5	4 (<0.1%)
DOCK6	5 (<0.1%)
DOCK7	9 (<0.1%)
DOCK8-AS1	1 (<0.1%)
DOCK9	2 (<0.1%)
DOHH	4 (<0.1%)
DOK3	3 (<0.1%)
DOK4	3 (<0.1%)
DOK5	2 (<0.1%)
DOK6	1 (<0.1%)
DOK7	2 (<0.1%)
DOP1B	4 (<0.1%)
DOT1L	8 (<0.1%)
DPCD	3 (<0.1%)
DPEP1	7 (<0.1%)
DPEP2	4 (<0.1%)
DPF1	4 (<0.1%)
DPF2	2 (<0.1%)
DPF3	4 (<0.1%)
DPH1	3 (<0.1%)
DPH5	3 (<0.1%)
DPP3	3 (<0.1%)
DPP6	4 (<0.1%)
DPP8	12 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
DPP9	10 (<0.1%)
DPPA2	1 (<0.1%)
DPPA3	4 (<0.1%)
DPPA4	1 (<0.1%)
DPYSL2	3 (<0.1%)
DPYSL3	1 (<0.1%)
DQX1	1 (<0.1%)
DRAXIN	2 (<0.1%)
DRC1	1 (<0.1%)
DRC7	6 (<0.1%)
DRD4	1 (<0.1%)
DRG1	1 (<0.1%)
DROSHA	4 (<0.1%)
DSCAML1	2 (<0.1%)
DSE	2 (<0.1%)
DSG1-AS1	1 (<0.1%)
DSN1	10 (<0.1%)
DST	5 (<0.1%)
DSTN	2 (<0.1%)
DTHD1	4 (<0.1%)
DTNB	16 (<0.1%)
DTNBP1	12 (<0.1%)
DTX1	3 (<0.1%)
DTX3L	1 (<0.1%)
DUOX1	2 (<0.1%)
DUOXA1	16 (<0.1%)
DUS2	9 (<0.1%)
DUS3L	4 (<0.1%)
DUSP13	4 (<0.1%)
DUSP15	3 (<0.1%)
DUXA	1 (<0.1%)
DVL2	1 (<0.1%)
DVL3	2 (<0.1%)
DYDC2	5 (<0.1%)
DYM	1 (<0.1%)
DYNC1H1	16 (<0.1%)
DYNC1LI2	6 (<0.1%)
DYNC2I1	6 (<0.1%)
DYNLL1	2 (<0.1%)
DYNLRB1	4 (<0.1%)
DYNLT1	1 (<0.1%)
DYNLT2B	1 (<0.1%)
DYRK1B	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
DYSF	28 (<0.1%)
DYTN	1 (<0.1%)
DZIP3	1 (<0.1%)
E2F3	2 (<0.1%)
E2F8	3 (<0.1%)
EAF1	1 (<0.1%)
EARS2	8 (<0.1%)
EBF1	3 (<0.1%)
EBF4	4 (<0.1%)
EBI3	1 (<0.1%)
ECE1	54 (0.2%)
ECHDC1	5 (<0.1%)
ECHDC2	9 (<0.1%)
ECHDC3	1 (<0.1%)
ECI1	8 (<0.1%)
ECT2L	2 (<0.1%)
EDAR	3 (<0.1%)
EDARADD	2 (<0.1%)
EDC4	1 (<0.1%)
EDEM3	2 (<0.1%)
EDNRA	4 (<0.1%)
EEA1	2 (<0.1%)
EEF1AKMT2	2 (<0.1%)
EEF1AKMT3	4 (<0.1%)
EEF1AKMT4	1 (<0.1%)
EEF1AKMT4-ECE2	1 (<0.1%)
EEF1B2	3 (<0.1%)
EEF1D	32 (<0.1%)
EEF1E1	4 (<0.1%)
EEF1E1-BLOC1S5	2 (<0.1%)
EEF2K	6 (<0.1%)
EEPD1	1 (<0.1%)
EFCAB12	1 (<0.1%)
EFCAB14	2 (<0.1%)
EFCAB2	10 (<0.1%)
EFCAB5	1 (<0.1%)
EFCC1	1 (<0.1%)
EFHD2	2 (<0.1%)
EFNA2	2 (<0.1%)
EFNA5	1 (<0.1%)
EFR3B	2 (<0.1%)
EGF	3 (<0.1%)
EGFL8	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
EGFLAM	13 (<0.1%)
EGFR	12 (<0.1%)
EHBP1	4 (<0.1%)
EHBP1L1	3 (<0.1%)
EHD1	6 (<0.1%)
EHD2	7 (<0.1%)
EHD4	4 (<0.1%)
EHHADH-AS1	1 (<0.1%)
EHMT1	13 (<0.1%)
EHMT2	24 (<0.1%)
EI24	4 (<0.1%)
EIF2A	1 (<0.1%)
EIF2AK1	4 (<0.1%)
EIF2AK3	2 (<0.1%)
EIF2AK4	2 (<0.1%)
EIF2B2	1 (<0.1%)
EIF2B3	8 (<0.1%)
EIF2B5	2 (<0.1%)
EIF3A	2 (<0.1%)
EIF3B	2 (<0.1%)
EIF3D	3 (<0.1%)
EIF3F	1 (<0.1%)
EIF3J	3 (<0.1%)
EIF3L	2 (<0.1%)
EIF4A1	2 (<0.1%)
EIF4A3	3 (<0.1%)
EIF4B	4 (<0.1%)
EIF4E1B	2 (<0.1%)
EIF4ENIF1	18 (<0.1%)
EIF4G1	13 (<0.1%)
EIF4G3	4 (<0.1%)
EIF5	4 (<0.1%)
EIF6	7 (<0.1%)
EIPR1	2 (<0.1%)
ELAVL1	3 (<0.1%)
ELAVL3	6 (<0.1%)
ELF1	3 (<0.1%)
ELF2	1 (<0.1%)
ELK3	5 (<0.1%)
ELL	2 (<0.1%)
ELL2	1 (<0.1%)
ELMO1	12 (<0.1%)
ELMOD3	4 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
ELN	91 (0.3%)
ELOA	1 (<0.1%)
ELOVL2-AS1	3 (<0.1%)
ELOVL6	2 (<0.1%)
ELP1	1 (<0.1%)
ELP5	8 (<0.1%)
ELP6	1 (<0.1%)
EMC3	1 (<0.1%)
EMID1	2 (<0.1%)
EML1	6 (<0.1%)
EML2	8 (<0.1%)
EML3	2 (<0.1%)
EML4	4 (<0.1%)
EML6	1 (<0.1%)
EMP2	6 (<0.1%)
EMSY	1 (<0.1%)
EMX2OS	1 (<0.1%)
ENAH	2 (<0.1%)
ENDOV	6 (<0.1%)
ENG	27 (<0.1%)
ENGASE	1 (<0.1%)
ENKD1	1 (<0.1%)
ENO1	1 (<0.1%)
ENO2	1 (<0.1%)
ENO4	1 (<0.1%)
ENOSF1	6 (<0.1%)
ENOX1	3 (<0.1%)
ENPP2	4 (<0.1%)
ENTPD1-AS1	1 (<0.1%)
ENTPD4	2 (<0.1%)
ENTPD6	2 (<0.1%)
EOGT	3 (<0.1%)
EP300	3 (<0.1%)
EP400	4 (<0.1%)
EP400P1	2 (<0.1%)
EPAS1	1 (<0.1%)
EPB41	15 (<0.1%)
EPB41L1	30 (<0.1%)
EPB41L2	5 (<0.1%)
EPB41L4A	1 (<0.1%)
EPB41L4B	1 (<0.1%)
EPB41L5	2 (<0.1%)
EPB42	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
EPC1	10 (<0.1%)
EPC1-AS1	1 (<0.1%)
EPCAM	1 (<0.1%)
EPCAM-DT	2 (<0.1%)
EPHA1-AS1	1 (<0.1%)
EPHA10	1 (<0.1%)
EPHA2	4 (<0.1%)
EPHB2	14 (<0.1%)
EPHB4	10 (<0.1%)
EPHX1	4 (<0.1%)
EPN1	3 (<0.1%)
EPN2	6 (<0.1%)
EPS15L1	20 (<0.1%)
ERBB2	6 (<0.1%)
ERBB3	11 (<0.1%)
ERBB4	2 (<0.1%)
ERC1	10 (<0.1%)
ERC2	4 (<0.1%)
ERCC1	4 (<0.1%)
ERCC3	1 (<0.1%)
ERCC4	1 (<0.1%)
ERCC6	4 (<0.1%)
ERCC8	4 (<0.1%)
ERG	7 (<0.1%)
ERGIC1	3 (<0.1%)
ERGIC2	1 (<0.1%)
ERGIC3	6 (<0.1%)
ERI2	1 (<0.1%)
ERI3	2 (<0.1%)
ERI3-IT1	1 (<0.1%)
ERICH1	3 (<0.1%)
ERICH2	3 (<0.1%)
ERICH2-DT	3 (<0.1%)
ERICH6	1 (<0.1%)
ERLIN1	2 (<0.1%)
ERMAP	1 (<0.1%)
ERMP1	2 (<0.1%)
ERN1	3 (<0.1%)
ERN2	1 (<0.1%)
ERO1A	2 (<0.1%)
ERRFI1	1 (<0.1%)
ERVMER34-1	2 (<0.1%)
ESD	1 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
ESPL1	2 (<0.1%)
ESPN	1 (<0.1%)
ESPNL	1 (<0.1%)
ESR1	4 (<0.1%)
ESR2	5 (<0.1%)
ESRP1	5 (<0.1%)
ESRRB	4 (<0.1%)
ESYT1	2 (<0.1%)
ESYT2	4 (<0.1%)
ESYT3	1 (<0.1%)
ETF1	12 (<0.1%)
ETFBKMT	1 (<0.1%)
ETFDH	2 (<0.1%)
ETFRF1	1 (<0.1%)
ETNK2	1 (<0.1%)
ETV3	1 (<0.1%)
ETV6	2 (<0.1%)
EVA1C	6 (<0.1%)
EVC2	6 (<0.1%)
EVI5L	10 (<0.1%)
EVL	1 (<0.1%)
EWSAT1	1 (<0.1%)
EXD3	14 (<0.1%)
EXO1	6 (<0.1%)
EXO5	1 (<0.1%)
EXOC2	4 (<0.1%)
EXOC3	3 (<0.1%)
EXOC3L1	1 (<0.1%)
EXOC4	1 (<0.1%)
EXOC5	1 (<0.1%)
EXOC6B	2 (<0.1%)
EXOC7	24 (<0.1%)
EXOG	4 (<0.1%)
EXOSC10	10 (<0.1%)
EXOSC2	4 (<0.1%)
EXOSC7	2 (<0.1%)
EXOSC9	2 (<0.1%)
EXPH5	1 (<0.1%)
EXT1	6 (<0.1%)
EXT2	3 (<0.1%)
EXTL3	6 (<0.1%)
EYA2	2 (<0.1%)
EYA4	9 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
EZH2	5 (<0.1%)
EZR	2 (<0.1%)
F10	3 (<0.1%)
F11-AS1	1 (<0.1%)
F2	3 (<0.1%)
F2RL3	3 (<0.1%)
FA2H	6 (<0.1%)
FAAHP1	1 (<0.1%)
FAAP20	16 (<0.1%)
FABP6	13 (<0.1%)
FADS1	4 (<0.1%)
FADS2	3 (<0.1%)
FADS3	3 (<0.1%)
FADS6	2 (<0.1%)
FAF2	1 (<0.1%)
FAH	4 (<0.1%)
FAHD1	2 (<0.1%)
FAIM2	1 (<0.1%)
FALEC	1 (<0.1%)
FAM102A	1 (<0.1%)
FAM107A	1 (<0.1%)
FAM107B	20 (<0.1%)
FAM110B	1 (<0.1%)
FAM114A1	4 (<0.1%)
FAM114A2	1 (<0.1%)
FAM117A	1 (<0.1%)
FAM118A	2 (<0.1%)
FAM118B	4 (<0.1%)
FAM120B	8 (<0.1%)
FAM135A	8 (<0.1%)
FAM136A	1 (<0.1%)
FAM149A	3 (<0.1%)
FAM149B1	1 (<0.1%)
FAM161A	3 (<0.1%)
FAM161B	4 (<0.1%)
FAM167A	1 (<0.1%)
FAM167A-AS1	1 (<0.1%)
FAM168A	3 (<0.1%)
FAM169B	1 (<0.1%)
FAM171A1	2 (<0.1%)
FAM177A1	3 (<0.1%)
FAM178B	6 (<0.1%)
FAM184B	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
FAM187B	1 (<0.1%)
FAM189A1	1 (<0.1%)
FAM189B	9 (<0.1%)
FAM193A	24 (<0.1%)
FAM193B	2 (<0.1%)
FAM20A	4 (<0.1%)
FAM20C	3 (<0.1%)
FAM210B	1 (<0.1%)
FAM217A	1 (<0.1%)
FAM219B	1 (<0.1%)
FAM222A	1 (<0.1%)
FAM222B	33 (<0.1%)
FAM227A	4 (<0.1%)
FAM228B	1 (<0.1%)
FAM234A	3 (<0.1%)
FAM241B	1 (<0.1%)
FAM3D	1 (<0.1%)
FAM47E	2 (<0.1%)
FAM47E-STBD1	1 (<0.1%)
FAM53A	12 (<0.1%)
FAM53B	1 (<0.1%)
FAM53C	2 (<0.1%)
FAM78A	2 (<0.1%)
FAM83A	12 (<0.1%)
FAM83C	1 (<0.1%)
FAM83E	8 (<0.1%)
FAM83G	1 (<0.1%)
FAM98C	1 (<0.1%)
FANCA	14 (<0.1%)
FANCC	6 (<0.1%)
FANCD2	6 (<0.1%)
FANCD2OS	3 (<0.1%)
FANCI	2 (<0.1%)
FANCL	2 (<0.1%)
FANCM	1 (<0.1%)
FANK1	2 (<0.1%)
FARP1	16 (<0.1%)
FARP2	3 (<0.1%)
FARSA	1 (<0.1%)
FASN	1 (<0.1%)
FAT1	2 (<0.1%)
FAXC	1 (<0.1%)
FAXDC2	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
FBF1	4 (<0.1%)
FBH1	7 (<0.1%)
FBLIM1	9 (<0.1%)
FBLN1	13 (<0.1%)
FBLN2	7 (<0.1%)
FBLN7	8 (<0.1%)
FBN3	7 (<0.1%)
FBRSL1	2 (<0.1%)
FBXL13	12 (<0.1%)
FBXL18	7 (<0.1%)
FBXL20	4 (<0.1%)
FBXL3	1 (<0.1%)
FBXL7	2 (<0.1%)
FBXO10	3 (<0.1%)
FBXO11	5 (<0.1%)
FBXO15	2 (<0.1%)
FBXO16	6 (<0.1%)
FBXO17	11 (<0.1%)
FBXO22	3 (<0.1%)
FBXO27	2 (<0.1%)
FBXO28	3 (<0.1%)
FBXO31	8 (<0.1%)
FBXO32	5 (<0.1%)
FBXO34	2 (<0.1%)
FBXO36	5 (<0.1%)
FBXO44	4 (<0.1%)
FBXO46	2 (<0.1%)
FBXO48	1 (<0.1%)
FBXO6	1 (<0.1%)
FBXO7	3 (<0.1%)
FBXW11	3 (<0.1%)
FBXW2	1 (<0.1%)
FBXW8	4 (<0.1%)
FCAR	9 (<0.1%)
FCER2	2 (<0.1%)
FCF1	1 (<0.1%)
FCGBP	2 (<0.1%)
FCGRT	2 (<0.1%)
FCHO1	4 (<0.1%)
FCHSD2	5 (<0.1%)
FCN1	1 (<0.1%)
FCN3	2 (<0.1%)
FCRL2	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
FCRLB	10 (<0.1%)
FCSK	3 (<0.1%)
FDPS	10 (<0.1%)
FDXACB1	2 (<0.1%)
FER	1 (<0.1%)
FER1L5	1 (<0.1%)
FER1L6	2 (<0.1%)
FER1L6-AS2	1 (<0.1%)
FERMT3	8 (<0.1%)
FEZ1	1 (<0.1%)
FGB	2 (<0.1%)
FGD3	2 (<0.1%)
FGD4	2 (<0.1%)
FGD5	1 (<0.1%)
FGD5-AS1	5 (<0.1%)
FGD6	2 (<0.1%)
FGF1	27 (<0.1%)
FGF22	1 (<0.1%)
FGFR1	63 (0.2%)
FGFR2	22 (<0.1%)
FGFR4	3 (<0.1%)
FGGY	3 (<0.1%)
FGL1	8 (<0.1%)
FGR	1 (<0.1%)
FHAD1	3 (<0.1%)
FHDC1	1 (<0.1%)
FHIP2A	4 (<0.1%)
FHIP2B	1 (<0.1%)
FHL2	20 (<0.1%)
FHOD1	3 (<0.1%)
FIBCD1	2 (<0.1%)
FILIP1	8 (<0.1%)
FILIP1L	9 (<0.1%)
FIS1	3 (<0.1%)
FITM2	1 (<0.1%)
FIZ1	1 (<0.1%)
FKBP10	1 (<0.1%)
FKBP1A-SDCBP2	1 (<0.1%)
FKBP1B	4 (<0.1%)
FKBP6	3 (<0.1%)
FKRP	8 (<0.1%)
FKTN	3 (<0.1%)
FLAD1	7 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
FLCN	5 (<0.1%)
FLJ12825	1 (<0.1%)
FLNB	12 (<0.1%)
FLOT1	7 (<0.1%)
FLOT2	3 (<0.1%)
FLRT1	1 (<0.1%)
FLT1	11 (<0.1%)
FLT3	1 (<0.1%)
FLT4	2 (<0.1%)
FLVCR1	1 (<0.1%)
FLVCR1-DT	2 (<0.1%)
FLVCR2	8 (<0.1%)
FLYWCH1	11 (<0.1%)
FLYWCH2	9 (<0.1%)
FMC1-LUC7L2	1 (<0.1%)
FMN1	6 (<0.1%)
FMN2	2 (<0.1%)
FMNL1	2 (<0.1%)
FMNL2	5 (<0.1%)
FMO1	3 (<0.1%)
FMO3	2 (<0.1%)
FMO4	1 (<0.1%)
FN1	15 (<0.1%)
FN3K	3 (<0.1%)
FN3KRP	4 (<0.1%)
FNBP1	7 (<0.1%)
FNBP4	5 (<0.1%)
FNDC3B	12 (<0.1%)
FNDC4	1 (<0.1%)
FNDC7	1 (<0.1%)
FNDC8	1 (<0.1%)
FNTB	3 (<0.1%)
FOXA3	1 (<0.1%)
FOXK1	22 (<0.1%)
FOXK2	11 (<0.1%)
FOXM1	15 (<0.1%)
FOXN3	10 (<0.1%)
FOXO3	2 (<0.1%)
FOXP1	50 (0.1%)
FOXP4	3 (<0.1%)
FOXRED1	3 (<0.1%)
FOXRED2	6 (<0.1%)
FPGS	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
FRAS1	2 (<0.1%)
FREM1	1 (<0.1%)
FRMD3	6 (<0.1%)
FRMD4A	14 (<0.1%)
FRMD4B	2 (<0.1%)
FRMD5	4 (<0.1%)
FRMD6	1 (<0.1%)
FRMD8	2 (<0.1%)
FRMPD1	2 (<0.1%)
FRRS1	1 (<0.1%)
FRRS1L	1 (<0.1%)
FRS2	16 (<0.1%)
FRS3	1 (<0.1%)
FRY	2 (<0.1%)
FRYL	1 (<0.1%)
FSCN3	1 (<0.1%)
FSD1	1 (<0.1%)
FTCD	2 (<0.1%)
FUBP3	2 (<0.1%)
FUCA1	1 (<0.1%)
FUCA2	2 (<0.1%)
FUT2	4 (<0.1%)
FXN	3 (<0.1%)
FXYD2	3 (<0.1%)
FXYD4	2 (<0.1%)
FXYD6	5 (<0.1%)
FXYD6-FXYD2	8 (<0.1%)
FYCO1	1 (<0.1%)
FYN	5 (<0.1%)
FZR1	5 (<0.1%)
G6PC1	2 (<0.1%)
GAB1	2 (<0.1%)
GAB2	9 (<0.1%)
GABARAPL1	1 (<0.1%)
GABARAPL2	1 (<0.1%)
GABBR1	3 (<0.1%)
GABBR2	1 (<0.1%)
GABRA5	2 (<0.1%)
GABRD	2 (<0.1%)
GABRG3	2 (<0.1%)
GAD1	1 (<0.1%)
GAK	14 (<0.1%)
GAL3ST1	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
GALC	3 (<0.1%)
GALE	3 (<0.1%)
GALK2	1 (<0.1%)
GALM	6 (<0.1%)
GALNS	2 (<0.1%)
GALNT10	2 (<0.1%)
GALNT11	3 (<0.1%)
GALNT12	1 (<0.1%)
GALNT13	1 (<0.1%)
GALNT14	3 (<0.1%)
GALNT15	2 (<0.1%)
GALNT17	1 (<0.1%)
GALNT18	1 (<0.1%)
GALNT2	6 (<0.1%)
GALNT3	2 (<0.1%)
GALNT5	1 (<0.1%)
GALNT6	1 (<0.1%)
GALNT9	1 (<0.1%)
GALNTL5	2 (<0.1%)
GALNTL6	1 (<0.1%)
GALT	2 (<0.1%)
GAMT	4 (<0.1%)
GAN	1 (<0.1%)
GAPDHS	1 (<0.1%)
GAPLINC	2 (<0.1%)
GAREM2	2 (<0.1%)
GARIN1B	12 (<0.1%)
GARIN5A	3 (<0.1%)
GARNL3	3 (<0.1%)
GARRE1	7 (<0.1%)
GART	8 (<0.1%)
GAS2L1	3 (<0.1%)
GAS7	10 (<0.1%)
GAS8	1 (<0.1%)
GATA6	1 (<0.1%)
GATAD2A	7 (<0.1%)
GAU1	1 (<0.1%)
GBA	6 (<0.1%)
GBF1	3 (<0.1%)
GCH1	4 (<0.1%)
GCN1	2 (<0.1%)
GCNT1	4 (<0.1%)
GCNT2	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
GCNT7	1 (<0.1%)
GCOM1	8 (<0.1%)
GCSAML	6 (<0.1%)
GCSH	2 (<0.1%)
GCSIR	1 (<0.1%)
GDA	5 (<0.1%)
GDAP1L1	6 (<0.1%)
GDI2	2 (<0.1%)
GDNF-AS1	2 (<0.1%)
GDPD3	3 (<0.1%)
GDPD5	4 (<0.1%)
GEN1	4 (<0.1%)
GET1	6 (<0.1%)
GET4	1 (<0.1%)
GFAP	3 (<0.1%)
GFI1	3 (<0.1%)
GFOD1	5 (<0.1%)
GFOD2	2 (<0.1%)
GFPT2	5 (<0.1%)
GFRA3	1 (<0.1%)
GGA1	4 (<0.1%)
GGA2	4 (<0.1%)
GGCX	2 (<0.1%)
GGH	2 (<0.1%)
GGNBP2	1 (<0.1%)
GGPS1	2 (<0.1%)
GGT1	2 (<0.1%)
GGT7	7 (<0.1%)
GIGYF2	15 (<0.1%)
GIHCG	1 (<0.1%)
GIMAP1	1 (<0.1%)
GIMAP1-GIMAP5	1 (<0.1%)
GINM1	1 (<0.1%)
GIPC1	15 (<0.1%)
GIPR	3 (<0.1%)
GIT1	2 (<0.1%)
GIT2	15 (<0.1%)
GJA1	1 (<0.1%)
GJA9	2 (<0.1%)
GJA9-MYCBP	10 (<0.1%)
GJB3	2 (<0.1%)
GJC1	2 (<0.1%)
GK5	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
GLB1	9 (<0.1%)
GLB1L	3 (<0.1%)
GLB1L2	1 (<0.1%)
GLCCI1-DT	1 (<0.1%)
GLDN	1 (<0.1%)
GLE1	4 (<0.1%)
GLG1	30 (<0.1%)
GLI1	6 (<0.1%)
GLI2	4 (<0.1%)
GLI3	1 (<0.1%)
GLIS2-AS1	2 (<0.1%)
GLOD4	2 (<0.1%)
GLP2R	1 (<0.1%)
GLT1D1	4 (<0.1%)
GLT8D1	5 (<0.1%)
GLTP	1 (<0.1%)
GLYR1	2 (<0.1%)
GMDS	3 (<0.1%)
GMEB1	6 (<0.1%)
GMEB2	5 (<0.1%)
GMIP	9 (<0.1%)
GMPPA	2 (<0.1%)
GMPR	1 (<0.1%)
GNA11	2 (<0.1%)
GNA12	9 (<0.1%)
GNA15	2 (<0.1%)
GNAI2	6 (<0.1%)
GNAL	26 (<0.1%)
GNAO1	1 (<0.1%)
GNAQ	2 (<0.1%)
GNAS-AS1	1 (<0.1%)
GNB1	18 (<0.1%)
GNB1L	1 (<0.1%)
GNB2	1 (<0.1%)
GNB4	1 (<0.1%)
GNB5	11 (<0.1%)
GNE	2 (<0.1%)
GNG12	1 (<0.1%)
GNG12-AS1	2 (<0.1%)
GNG2	3 (<0.1%)
GNG4	24 (<0.1%)
GNG7	30 (<0.1%)
GNL1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
GNL2	1 (<0.1%)
GNL3	3 (<0.1%)
GNPNAT1	1 (<0.1%)
GNPTAB	1 (<0.1%)
GNPTG	1 (<0.1%)
GNS	1 (<0.1%)
GOLGA1	2 (<0.1%)
GOLGA3	11 (<0.1%)
GOLGA7B-DT	1 (<0.1%)
GOLGB1	8 (<0.1%)
GOLPH3	1 (<0.1%)
GORASP2	2 (<0.1%)
GOT1L1	1 (<0.1%)
GP6	6 (<0.1%)
GPANK1	5 (<0.1%)
GPAT3	3 (<0.1%)
GPATCH1	7 (<0.1%)
GPATCH11	2 (<0.1%)
GPATCH2L	6 (<0.1%)
GPATCH3	5 (<0.1%)
GPATCH4	2 (<0.1%)
GPBP1L1	4 (<0.1%)
GPC2	3 (<0.1%)
GPHN	2 (<0.1%)
GPN2	3 (<0.1%)
GPN3	3 (<0.1%)
GPNMB	2 (<0.1%)
GPR107	4 (<0.1%)
GPR132	12 (<0.1%)
GPR137B	4 (<0.1%)
GPR142	1 (<0.1%)
GPR153	1 (<0.1%)
GPR156	2 (<0.1%)
GPR157	1 (<0.1%)
GPR160	5 (<0.1%)
GPR161	7 (<0.1%)
GPR17	4 (<0.1%)
GPR179	1 (<0.1%)
GPR183	1 (<0.1%)
GPR33	2 (<0.1%)
GPR35	2 (<0.1%)
GPR37L1	1 (<0.1%)
GPRC5B	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
GPRC5C	4 (<0.1%)
GPRC5D	3 (<0.1%)
GPRIN1	2 (<0.1%)
GPRIN2	1 (<0.1%)
GPRIN3	1 (<0.1%)
GPSM1	2 (<0.1%)
GPT2	10 (<0.1%)
GPX5	4 (<0.1%)
GPX7	1 (<0.1%)
GRAMD1A	10 (<0.1%)
GRAMD1C	2 (<0.1%)
GRAMD2A	1 (<0.1%)
GRAMD2B	4 (<0.1%)
GRAP2	1 (<0.1%)
GRB2	12 (<0.1%)
GRB7	8 (<0.1%)
GREB1	5 (<0.1%)
GREB1L	1 (<0.1%)
GREM2	1 (<0.1%)
GRHL1	1 (<0.1%)
GRHL2	4 (<0.1%)
GRHPR	2 (<0.1%)
GRID1	2 (<0.1%)
GRID2IP	10 (<0.1%)
GRIK1	2 (<0.1%)
GRIK4	7 (<0.1%)
GRIK5	6 (<0.1%)
GRIN2A	3 (<0.1%)
GRIN2D	3 (<0.1%)
GRIP1	2 (<0.1%)
GRIP2	1 (<0.1%)
GRK2	1 (<0.1%)
GRK4	12 (<0.1%)
GRK5	7 (<0.1%)
GRK7	2 (<0.1%)
GRM4	16 (<0.1%)
GRM5	2 (<0.1%)
GRM6	3 (<0.1%)
GRN	2 (<0.1%)
GRSF1	2 (<0.1%)
GRTP1	26 (<0.1%)
GRWD1	1 (<0.1%)
GS1-24F4.2	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
GSAP	2 (<0.1%)
GSDMA	1 (<0.1%)
GSDMB	4 (<0.1%)
GSDME	3 (<0.1%)
GSE1	12 (<0.1%)
GSG1	7 (<0.1%)
GSG1L	8 (<0.1%)
GSK3A	1 (<0.1%)
GSKIP	8 (<0.1%)
GSN	20 (<0.1%)
GSN-AS1	1 (<0.1%)
GSS	1 (<0.1%)
GSTO2	4 (<0.1%)
GSTZ1	3 (<0.1%)
GTDC1	4 (<0.1%)
GTF2A1	3 (<0.1%)
GTF2A1L	2 (<0.1%)
GTF2E2	2 (<0.1%)
GTF2F1	1 (<0.1%)
GTF2F2	3 (<0.1%)
GTF2H1	4 (<0.1%)
GTF2H3	8 (<0.1%)
GTF2I-AS1	1 (<0.1%)
GTF2IRD1	75 (0.2%)
GTF3C1	2 (<0.1%)
GTF3C2	10 (<0.1%)
GTF3C3	4 (<0.1%)
GTF3C5	3 (<0.1%)
GTPBP10	2 (<0.1%)
GTPBP3	1 (<0.1%)
GTSE1	1 (<0.1%)
GUCA1B	1 (<0.1%)
GUCD1	9 (<0.1%)
GUCY2C	1 (<0.1%)
GUCY2EP	1 (<0.1%)
GUCY2GP	1 (<0.1%)
GUSB	2 (<0.1%)
GUSBP11	1 (<0.1%)
GYG1	3 (<0.1%)
GYS1	15 (<0.1%)
H1-10-AS1	1 (<0.1%)
H1-8	1 (<0.1%)
H6PD	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
HACD3	2 (<0.1%)
HAGH	6 (<0.1%)
HAL	3 (<0.1%)
HAMP	1 (<0.1%)
HAPLN1	1 (<0.1%)
HAPLN3	2 (<0.1%)
HARBI1	1 (<0.1%)
HARS1	7 (<0.1%)
HARS2	6 (<0.1%)
HAS1	2 (<0.1%)
HAS3	3 (<0.1%)
HASPIN	1 (<0.1%)
HAUS2	2 (<0.1%)
HAUS6	4 (<0.1%)
HAVCR2	1 (<0.1%)
HBP1	2 (<0.1%)
HCFC2	1 (<0.1%)
HCG22	3 (<0.1%)
HCG25	3 (<0.1%)
HCG27	3 (<0.1%)
HCG9	1 (<0.1%)
HCK	6 (<0.1%)
HCLS1	1 (<0.1%)
HCN4	1 (<0.1%)
HCRTR1	1 (<0.1%)
HDAC1	2 (<0.1%)
HDAC4	12 (<0.1%)
HDAC5	6 (<0.1%)
HDAC7	4 (<0.1%)
HDC	2 (<0.1%)
HDGFL2	4 (<0.1%)
HDGFL3	2 (<0.1%)
HDHD2	1 (<0.1%)
HDHD3	1 (<0.1%)
HDHD5	4 (<0.1%)
HDHD5-AS1	2 (<0.1%)
HDLBP	9 (<0.1%)
HEATR1	4 (<0.1%)
HEATR3	4 (<0.1%)
HEATR4	4 (<0.1%)
HEATR9	1 (<0.1%)
HEBP1	2 (<0.1%)
HECTD1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
HECTD2	4 (<0.1%)
HECTD2-AS1	2 (<0.1%)
HECTD3	1 (<0.1%)
HECTD4	7 (<0.1%)
HECW1	4 (<0.1%)
HECW2	3 (<0.1%)
HEG1	3 (<0.1%)
HELB	1 (<0.1%)
HELZ	1 (<0.1%)
HELZ2	1 (<0.1%)
HERC1	3 (<0.1%)
HERC2	2 (<0.1%)
HERC4	4 (<0.1%)
HERC5	1 (<0.1%)
HERPUD1	3 (<0.1%)
HES2	2 (<0.1%)
HEXB	2 (<0.1%)
HEXD	5 (<0.1%)
HEYL	1 (<0.1%)
HFE	9 (<0.1%)
HGS	4 (<0.1%)
HGSNAT	1 (<0.1%)
HHIPL1	5 (<0.1%)
HHIPL2	1 (<0.1%)
HHLA2	4 (<0.1%)
HHLA3	4 (<0.1%)
HID1	1 (<0.1%)
HID1-AS1	1 (<0.1%)
HIF1A	6 (<0.1%)
HIF3A	17 (<0.1%)
HIGD1B	2 (<0.1%)
HIGD1C	1 (<0.1%)
HILPDA	2 (<0.1%)
HINFP	6 (<0.1%)
HIP1	20 (<0.1%)
HIP1R	1 (<0.1%)
HIPK2	16 (<0.1%)
HIPK4	8 (<0.1%)
HIVEP3	12 (<0.1%)
HK1	14 (<0.1%)
HK3	1 (<0.1%)
HKDC1	1 (<0.1%)
HLA-DOA	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
HLA-DPB2	1 (<0.1%)
HLA-DRA	1 (<0.1%)
HLA-E	1 (<0.1%)
HLCS	9 (<0.1%)
HTLF-AS1	2 (<0.1%)
HM13	15 (<0.1%)
HMBS	9 (<0.1%)
HMG20A	1 (<0.1%)
HMG20B	1 (<0.1%)
HMGA1P7	1 (<0.1%)
HMGCL	2 (<0.1%)
HMGCS2	2 (<0.1%)
HMGN2P46	2 (<0.1%)
HMGN4	1 (<0.1%)
HMGXB3	1 (<0.1%)
HMOX2	23 (<0.1%)
HNF1B	2 (<0.1%)
HNRNPC	8 (<0.1%)
HNRNPD	4 (<0.1%)
HNRNPF	3 (<0.1%)
HNRNPLL	2 (<0.1%)
HNRNPM	8 (<0.1%)
HNRNPU	2 (<0.1%)
HNRNPUL1	6 (<0.1%)
HOGA1	2 (<0.1%)
HOMER3	10 (<0.1%)
HOOK2	8 (<0.1%)
HOOK3	2 (<0.1%)
HORMAD1	6 (<0.1%)
HORMAD2-AS1	3 (<0.1%)
HPCAL1	10 (<0.1%)
HPD	16 (<0.1%)
HPN	10 (<0.1%)
HPS4	6 (<0.1%)
HPX	1 (<0.1%)
HRG	1 (<0.1%)
HRH1	6 (<0.1%)
HRK	2 (<0.1%)
HS1BP3-IT1	1 (<0.1%)
HS2ST1	2 (<0.1%)
HS3ST3A1	1 (<0.1%)
HS3ST6	1 (<0.1%)
HS6ST1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
HSPB1L1	3 (<0.1%)
HSCB	1 (<0.1%)
HSD11B1L	10 (<0.1%)
HSD17B12	1 (<0.1%)
HSD17B14	1 (<0.1%)
HSD17B2	1 (<0.1%)
HSD3B7	3 (<0.1%)
HSDL1	2 (<0.1%)
HSF1	1 (<0.1%)
HSF2BP	2 (<0.1%)
HSF4	2 (<0.1%)
HSF5	1 (<0.1%)
HSH2D	3 (<0.1%)
HSP90AA1	1 (<0.1%)
HSP90AB1	5 (<0.1%)
HSPA12B	2 (<0.1%)
HSPA1L	5 (<0.1%)
HSPA4	1 (<0.1%)
HSPA9	4 (<0.1%)
HSPB1	1 (<0.1%)
HSPB11	1 (<0.1%)
HSPB2-C11orf52	2 (<0.1%)
HSPBAP1	2 (<0.1%)
HSPG2	9 (<0.1%)
HTATSF1P2	1 (<0.1%)
HTR3A	4 (<0.1%)
HTR3E	6 (<0.1%)
HTRA4	1 (<0.1%)
HTT	3 (<0.1%)
HTT-AS	1 (<0.1%)
HVCN1	6 (<0.1%)
HYAL4	1 (<0.1%)
IAH1	1 (<0.1%)
IAPP	1 (<0.1%)
IARS1	6 (<0.1%)
IARS2	2 (<0.1%)
IBTK	1 (<0.1%)
ICAM1	3 (<0.1%)
ICAM2	4 (<0.1%)
ICE1	1 (<0.1%)
ICMT	3 (<0.1%)
ICMT-DT	1 (<0.1%)
IDH2	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
IDH3B	3 (<0.1%)
IDI1	2 (<0.1%)
IDI2-AS1	8 (<0.1%)
IDO1	2 (<0.1%)
IDO2	1 (<0.1%)
IDUA	6 (<0.1%)
IFFO2	2 (<0.1%)
IFI27L1	2 (<0.1%)
IFI35	3 (<0.1%)
IFIT3	2 (<0.1%)
IFNAR2	12 (<0.1%)
IFNGR2	2 (<0.1%)
IFRD1	4 (<0.1%)
IFRD2	1 (<0.1%)
IFT140	17 (<0.1%)
IFT172	2 (<0.1%)
IFT22	18 (<0.1%)
IFT27	2 (<0.1%)
IFT81	6 (<0.1%)
IGDCC3	3 (<0.1%)
IGDCC4	4 (<0.1%)
IGF1R	4 (<0.1%)
IGF2BP2	6 (<0.1%)
IGF2BP3	4 (<0.1%)
IGF2R	1 (<0.1%)
IGFBP4	2 (<0.1%)
IGFBP5	1 (<0.1%)
IGFBP6	1 (<0.1%)
IGFBP7	4 (<0.1%)
IGFBP7-AS1	1 (<0.1%)
IGHMBP2	2 (<0.1%)
IGSF10	5 (<0.1%)
IGSF11	2 (<0.1%)
IGSF22	3 (<0.1%)
IGSF6	1 (<0.1%)
IGSF9B	1 (<0.1%)
IHO1	2 (<0.1%)
IKBIP	3 (<0.1%)
IKBKB	42 (0.1%)
IKBKE	3 (<0.1%)
IKZF1	13 (<0.1%)
IKZF3	31 (<0.1%)
IKZF4	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
IL10	1 (<0.1%)
IL11	2 (<0.1%)
IL12A-AS1	5 (<0.1%)
IL12RB1	6 (<0.1%)
IL12RB2	12 (<0.1%)
IL15RA	25 (<0.1%)
IL17D	2 (<0.1%)
IL17F	2 (<0.1%)
IL17RA	4 (<0.1%)
IL17RB	1 (<0.1%)
IL17RC	35 (0.1%)
IL17RD	1 (<0.1%)
IL17RE	5 (<0.1%)
IL1R1	3 (<0.1%)
IL1R2	3 (<0.1%)
IL1RL2	1 (<0.1%)
IL1RN	3 (<0.1%)
IL21R	3 (<0.1%)
IL24	4 (<0.1%)
IL25	2 (<0.1%)
IL2RA	2 (<0.1%)
IL31RA	5 (<0.1%)
IL34	3 (<0.1%)
IL36B	2 (<0.1%)
IL4I1	12 (<0.1%)
IL4R	16 (<0.1%)
IL6R	9 (<0.1%)
ILDR1	3 (<0.1%)
ILF3	15 (<0.1%)
ILKAP	2 (<0.1%)
ILRUN	14 (<0.1%)
ILVBL	1 (<0.1%)
IMMT	9 (<0.1%)
IMPA2	1 (<0.1%)
IMPG1	2 (<0.1%)
IMPG2	1 (<0.1%)
INCENP	2 (<0.1%)
INF2	2 (<0.1%)
ING1	5 (<0.1%)
ING4	12 (<0.1%)
ING5	1 (<0.1%)
INKA2	1 (<0.1%)
INKA2-AS1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
INO80	6 (<0.1%)
INO80E	2 (<0.1%)
INPP1	4 (<0.1%)
INPP4A	4 (<0.1%)
INPP4B	2 (<0.1%)
INPP5A	5 (<0.1%)
INPP5B	4 (<0.1%)
INPP5D	18 (<0.1%)
INPP5E	1 (<0.1%)
INPP5F	5 (<0.1%)
INPP5K	12 (<0.1%)
INSL3	2 (<0.1%)
INSR	4 (<0.1%)
INSRR	1 (<0.1%)
INTS1	1 (<0.1%)
INTS11	5 (<0.1%)
INTS15	2 (<0.1%)
INTS3	2 (<0.1%)
INTS7	5 (<0.1%)
INTS8	6 (<0.1%)
INTS9	8 (<0.1%)
INVS	2 (<0.1%)
IP6K1	3 (<0.1%)
IP6K2	12 (<0.1%)
IPCEF1	7 (<0.1%)
IPO5	3 (<0.1%)
IPO7	3 (<0.1%)
IPO9	2 (<0.1%)
IPO9-AS1	4 (<0.1%)
IPPK	1 (<0.1%)
IQCC	2 (<0.1%)
IQCE	30 (<0.1%)
IQCF2	1 (<0.1%)
IQCJ-SCHIP1	6 (<0.1%)
IQCK	5 (<0.1%)
IQCN	6 (<0.1%)
IQGAP1	2 (<0.1%)
IQGAP2	10 (<0.1%)
IQGAP3	1 (<0.1%)
IQSEC1	2 (<0.1%)
IQSEC3	2 (<0.1%)
IRAG1	6 (<0.1%)
IRAG1-AS1	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
IRAK2	5 (<0.1%)
IRAK4	5 (<0.1%)
IRF2	3 (<0.1%)
IRF3	9 (<0.1%)
IRGC	1 (<0.1%)
ISM1	1 (<0.1%)
IST1	6 (<0.1%)
ISY1	2 (<0.1%)
ISY1-RAB43	2 (<0.1%)
ITCH	9 (<0.1%)
ITFG2	2 (<0.1%)
ITGA1	1 (<0.1%)
ITGA10	2 (<0.1%)
ITGA11	3 (<0.1%)
ITGA2B	5 (<0.1%)
ITGA3	2 (<0.1%)
ITGA5	1 (<0.1%)
ITGA6	4 (<0.1%)
ITGA7	3 (<0.1%)
ITGA9	1 (<0.1%)
ITGA9-AS1	2 (<0.1%)
ITGAD	4 (<0.1%)
ITGAE	19 (<0.1%)
ITGAL	12 (<0.1%)
ITGAM	2 (<0.1%)
ITGAV	3 (<0.1%)
ITGAX	2 (<0.1%)
ITGB1BP1	6 (<0.1%)
ITGB2	3 (<0.1%)
ITGB2-AS1	6 (<0.1%)
ITGB3	2 (<0.1%)
ITGB4	27 (<0.1%)
ITGB5	2 (<0.1%)
ITGB6	7 (<0.1%)
ITGB7	2 (<0.1%)
ITGBL1	4 (<0.1%)
ITIH2	2 (<0.1%)
ITIH5	11 (<0.1%)
ITK	2 (<0.1%)
ITPK1	15 (<0.1%)
ITPKA	1 (<0.1%)
ITPKB	4 (<0.1%)
ITPKB-IT1	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ITPKC	1 (<0.1%)
ITPR1	6 (<0.1%)
ITPR2	1 (<0.1%)
ITPR3	2 (<0.1%)
ITSN1	8 (<0.1%)
ITSN2	3 (<0.1%)
IWS1	3 (<0.1%)
IZUMO2	2 (<0.1%)
JADE2	3 (<0.1%)
JAK1	1 (<0.1%)
JAK3	5 (<0.1%)
JAKMIP1	2 (<0.1%)
JAKMIP3	1 (<0.1%)
JAML	2 (<0.1%)
JARID2	10 (<0.1%)
JAZF1-AS1	1 (<0.1%)
JCAD	1 (<0.1%)
JDP2	8 (<0.1%)
JHY	1 (<0.1%)
JMJD1C	3 (<0.1%)
JPH2	1 (<0.1%)
JPH3	4 (<0.1%)
JPH4	4 (<0.1%)
JPT2	2 (<0.1%)
JUP	8 (<0.1%)
KALRN	6 (<0.1%)
KANK1	12 (<0.1%)
KANK2	29 (<0.1%)
KANK3	2 (<0.1%)
KANK4	2 (<0.1%)
KANSL2	3 (<0.1%)
KARS1	2 (<0.1%)
KAT2B	1 (<0.1%)
KAT5	4 (<0.1%)
KAT6A	3 (<0.1%)
KAT6B	18 (<0.1%)
KATNA1	2 (<0.1%)
KATNAL1	2 (<0.1%)
KATNB1	1 (<0.1%)
KATNIP	7 (<0.1%)
KAZN	20 (<0.1%)
KBTBD11	1 (<0.1%)
KBTBD12	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
KBTBD4	3 (<0.1%)
KCMF1	1 (<0.1%)
KCNA7	1 (<0.1%)
KCNAB2	40 (0.1%)
KCNB2	1 (<0.1%)
KCNE2	1 (<0.1%)
KCNE3	1 (<0.1%)
KCNG1	1 (<0.1%)
KCNG2	1 (<0.1%)
KCNG4	1 (<0.1%)
KCNH2	2 (<0.1%)
KCNH4	4 (<0.1%)
KCNH6	8 (<0.1%)
KCNIP1	2 (<0.1%)
KCNIP1-OT1	1 (<0.1%)
KCNIP2-AS1	2 (<0.1%)
KCNIP3	4 (<0.1%)
KCNIP4	4 (<0.1%)
KCNJ14	3 (<0.1%)
KCNJ15	8 (<0.1%)
KCNJ4	1 (<0.1%)
KCNJ6	1 (<0.1%)
KCNK1	1 (<0.1%)
KCNK13	2 (<0.1%)
KCNK17	2 (<0.1%)
KCNK3	1 (<0.1%)
KCNK6	3 (<0.1%)
KCNMA1	30 (<0.1%)
KCNMB3	8 (<0.1%)
KCNN1	2 (<0.1%)
KCNN3	11 (<0.1%)
KCNQ1	4 (<0.1%)
KCNQ1OT1	1 (<0.1%)
KCNQ3	2 (<0.1%)
KCNQ4	2 (<0.1%)
KCNQ5	10 (<0.1%)
KCNT1	4 (<0.1%)
KCNV1	1 (<0.1%)
KCP	1 (<0.1%)
KCTD1	5 (<0.1%)
KCTD10	1 (<0.1%)
KCTD14	2 (<0.1%)
KCTD15	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
KCTD19	6 (<0.1%)
KCTD2	3 (<0.1%)
KCTD4	1 (<0.1%)
KCTD7	4 (<0.1%)
KDELR3	8 (<0.1%)
KDF1	1 (<0.1%)
KDM1A	2 (<0.1%)
KDM1B	2 (<0.1%)
KDM2A	12 (<0.1%)
KDM2B	24 (<0.1%)
KDM3B	1 (<0.1%)
KDM4B	25 (<0.1%)
KDM4C	1 (<0.1%)
KDM5A	1 (<0.1%)
KDM5B	1 (<0.1%)
KDM8	4 (<0.1%)
KEAP1	2 (<0.1%)
KHDC1	14 (<0.1%)
KHDC4	5 (<0.1%)
KHDRBS3	1 (<0.1%)
KIAA0319L	3 (<0.1%)
KIAA0513	6 (<0.1%)
KIAA0895	5 (<0.1%)
KIAA0930	7 (<0.1%)
KIAA1217	37 (0.1%)
KIAA1522	7 (<0.1%)
KIAA1549	18 (<0.1%)
KIAA1549L	3 (<0.1%)
KIAA1614	3 (<0.1%)
KIAA1656	1 (<0.1%)
KIAA1671	3 (<0.1%)
KIAA1755	1 (<0.1%)
KIAA1958	3 (<0.1%)
KIAA2012	5 (<0.1%)
KIF13A	29 (<0.1%)
KIF13B	3 (<0.1%)
KIF15	1 (<0.1%)
KIF16B	3 (<0.1%)
KIF17	9 (<0.1%)
KIF18B	6 (<0.1%)
KIF19	1 (<0.1%)
KIF1B	16 (<0.1%)
KIF1C	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
KIF21B	8 (<0.1%)
KIF22	3 (<0.1%)
KIF23	6 (<0.1%)
KIF24	1 (<0.1%)
KIF25	10 (<0.1%)
KIF25-AS1	1 (<0.1%)
KIF26B	16 (<0.1%)
KIF2C	1 (<0.1%)
KIF3B	1 (<0.1%)
KIF5C	3 (<0.1%)
KIF6	3 (<0.1%)
KIF9	6 (<0.1%)
KIFC1	3 (<0.1%)
KIFC3	9 (<0.1%)
KIRREL3	6 (<0.1%)
KLB	1 (<0.1%)
KLC1	16 (<0.1%)
KLC2	8 (<0.1%)
KLC3	1 (<0.1%)
KLF11	9 (<0.1%)
KLF15	1 (<0.1%)
KLF3-AS1	1 (<0.1%)
KLHDC10	1 (<0.1%)
KLHDC3	2 (<0.1%)
KLHDC4	15 (<0.1%)
KLHL18	1 (<0.1%)
KLHL22	12 (<0.1%)
KLHL24	1 (<0.1%)
KLHL25	1 (<0.1%)
KLHL26	1 (<0.1%)
KLHL29	6 (<0.1%)
KLHL3	1 (<0.1%)
KLHL30	1 (<0.1%)
KLHL35	1 (<0.1%)
KLHL36	1 (<0.1%)
KLHL6	3 (<0.1%)
KLHL8	1 (<0.1%)
KLK12	3 (<0.1%)
KLK15	4 (<0.1%)
KLK3	3 (<0.1%)
KLK5	3 (<0.1%)
KLK6	18 (<0.1%)
KLRB1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
KLRC4-KLRK1	1 (<0.1%)
KLRD1	3 (<0.1%)
KLRG2	3 (<0.1%)
KMT2A	10 (<0.1%)
KMT2B	4 (<0.1%)
KMT2C	2 (<0.1%)
KMT2D	1 (<0.1%)
KMT5B	2 (<0.1%)
KNDC1	4 (<0.1%)
KNOP1	2 (<0.1%)
KNTC1	1 (<0.1%)
KPNA6	2 (<0.1%)
KPNA7	1 (<0.1%)
KPNB1	6 (<0.1%)
KREMEN1	10 (<0.1%)
KRI1	6 (<0.1%)
KRT19	1 (<0.1%)
KRT24	2 (<0.1%)
KRT27	1 (<0.1%)
KRT73	1 (<0.1%)
KRT8	6 (<0.1%)
KRT83	1 (<0.1%)
KRTCAP3	2 (<0.1%)
KSR1	4 (<0.1%)
KSR2	4 (<0.1%)
KTN1	6 (<0.1%)
KY	1 (<0.1%)
KYAT1	10 (<0.1%)
KYNU	3 (<0.1%)
L1TD1	4 (<0.1%)
L3MBTL1	6 (<0.1%)
L3MBTL2	1 (<0.1%)
LACTB	7 (<0.1%)
LAG3	1 (<0.1%)
LAMA1	1 (<0.1%)
LAMA2	4 (<0.1%)
LAMB1	3 (<0.1%)
LAMB2	1 (<0.1%)
LAMB4	3 (<0.1%)
LAMC2	2 (<0.1%)
LAMC3	7 (<0.1%)
LAMP1	3 (<0.1%)
LAP3	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LAPTM4B	2 (<0.1%)
LARGE1	6 (<0.1%)
LARGE2	2 (<0.1%)
LARP4B	2 (<0.1%)
LARS2	2 (<0.1%)
LARS2-AS1	1 (<0.1%)
LASP1	15 (<0.1%)
LAT	12 (<0.1%)
LAT2	6 (<0.1%)
LATS1	11 (<0.1%)
LATS2	4 (<0.1%)
LAYN	3 (<0.1%)
LBHD1	1 (<0.1%)
LBP	2 (<0.1%)
LBR	2 (<0.1%)
LBX1-AS1	1 (<0.1%)
LCK	4 (<0.1%)
LCMT1	8 (<0.1%)
LCMT1-AS2	1 (<0.1%)
LCN12	1 (<0.1%)
LCP2	1 (<0.1%)
LCT	1 (<0.1%)
LDAF1	1 (<0.1%)
LDB1	1 (<0.1%)
LDB3	3 (<0.1%)
LDHA	6 (<0.1%)
LDLR	30 (<0.1%)
LDLRAD1	10 (<0.1%)
LDLRAD2	5 (<0.1%)
LDLRAD3	3 (<0.1%)
LDLRAD4	2 (<0.1%)
LDLRAP1	1 (<0.1%)
LEF1	8 (<0.1%)
LEFTY2	6 (<0.1%)
LEMD2	4 (<0.1%)
LEP	2 (<0.1%)
LETM1	3 (<0.1%)
LETM2	28 (<0.1%)
LETMD1	8 (<0.1%)
LEUTX	1 (<0.1%)
LGALS1	1 (<0.1%)
LGALS8	5 (<0.1%)
LGI4	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LGMN	4 (<0.1%)
LGR4	1 (<0.1%)
LGR6	6 (<0.1%)
LHFPL2	1 (<0.1%)
LHFPL3	1 (<0.1%)
LHFPL5	2 (<0.1%)
LHPP	10 (<0.1%)
LIG1	12 (<0.1%)
LILRB4	5 (<0.1%)
LIMA1	8 (<0.1%)
LIMCH1	7 (<0.1%)
LIMD1	3 (<0.1%)
LIMK1	11 (<0.1%)
LIMK2	1 (<0.1%)
LIMS1	6 (<0.1%)
LIMS2	5 (<0.1%)
LIN54	21 (<0.1%)
LIN7B	2 (<0.1%)
LIN9	3 (<0.1%)
LINC-PINT	32 (<0.1%)
LINC00051	1 (<0.1%)
LINC00111	1 (<0.1%)
LINC00159	1 (<0.1%)
LINC00222	1 (<0.1%)
LINC00299	2 (<0.1%)
LINC00339	12 (<0.1%)
LINC00359	1 (<0.1%)
LINC00379	1 (<0.1%)
LINC00424	1 (<0.1%)
LINC00426	1 (<0.1%)
LINC00482	1 (<0.1%)
LINC00518	2 (<0.1%)
LINC00525	1 (<0.1%)
LINC00550	1 (<0.1%)
LINC00570	1 (<0.1%)
LINC00598	3 (<0.1%)
LINC00607	2 (<0.1%)
LINC00640	2 (<0.1%)
LINC00649	2 (<0.1%)
LINC00652	2 (<0.1%)
LINC00661	1 (<0.1%)
LINC00671	1 (<0.1%)
LINC00673	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LINC00687	1 (<0.1%)
LINC00841	1 (<0.1%)
LINC00862	1 (<0.1%)
LINC00870	1 (<0.1%)
LINC00877	1 (<0.1%)
LINC00880	1 (<0.1%)
LINC00885	2 (<0.1%)
LINC00886	1 (<0.1%)
LINC00910	12 (<0.1%)
LINC00928	4 (<0.1%)
LINC00941	1 (<0.1%)
LINC00996	1 (<0.1%)
LINC01004	1 (<0.1%)
LINC01010	4 (<0.1%)
LINC01088	2 (<0.1%)
LINC01091	1 (<0.1%)
LINC01098	1 (<0.1%)
LINC01132	1 (<0.1%)
LINC01169	1 (<0.1%)
LINC01191	1 (<0.1%)
LINC01209	1 (<0.1%)
LINC01226	1 (<0.1%)
LINC01234	2 (<0.1%)
LINC01237	5 (<0.1%)
LINC01250	1 (<0.1%)
LINC01258	2 (<0.1%)
LINC01312	2 (<0.1%)
LINC01342	1 (<0.1%)
LINC01356	3 (<0.1%)
LINC01363	1 (<0.1%)
LINC01416	1 (<0.1%)
LINC01426	4 (<0.1%)
LINC01476	1 (<0.1%)
LINC01505	1 (<0.1%)
LINC01512	1 (<0.1%)
LINC01531	2 (<0.1%)
LINC01547	2 (<0.1%)
LINC01588	2 (<0.1%)
LINC01599	2 (<0.1%)
LINC01622	2 (<0.1%)
LINC01624	1 (<0.1%)
LINC01634	1 (<0.1%)
LINC01637	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LINC01664	1 (<0.1%)
LINC01672	2 (<0.1%)
LINC01704	1 (<0.1%)
LINC01792	1 (<0.1%)
LINC01804	2 (<0.1%)
LINC01845	1 (<0.1%)
LINC01968	2 (<0.1%)
LINC01978	1 (<0.1%)
LINC01979	1 (<0.1%)
LINC02015	1 (<0.1%)
LINC02042	1 (<0.1%)
LINC02069	2 (<0.1%)
LINC02082	1 (<0.1%)
LINC02112	1 (<0.1%)
LINC02245	1 (<0.1%)
LINC02346	2 (<0.1%)
LINC02453	1 (<0.1%)
LINC02532	2 (<0.1%)
LINC02583	1 (<0.1%)
LINC02613	2 (<0.1%)
LINC02653	1 (<0.1%)
LINC02740	1 (<0.1%)
LINC02878	1 (<0.1%)
LINC02982	2 (<0.1%)
LINC03006	1 (<0.1%)
LINC03019	1 (<0.1%)
LINC03033	2 (<0.1%)
LINGO1	1 (<0.1%)
LINGO3	1 (<0.1%)
LIPE-AS1	4 (<0.1%)
LITAF	8 (<0.1%)
LLGL2	14 (<0.1%)
LMAN2L	6 (<0.1%)
LMCD1-AS1	1 (<0.1%)
LMF1	10 (<0.1%)
LMF1-AS1	4 (<0.1%)
LMLN	8 (<0.1%)
LMNA	18 (<0.1%)
LMNB1	4 (<0.1%)
LMO7	1 (<0.1%)
LMOD1	3 (<0.1%)
LMTK2	5 (<0.1%)
LMTK3	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LNCRNA-IUR	3 (<0.1%)
LNX1	5 (<0.1%)
LOC100128770	2 (<0.1%)
LOC100129066	2 (<0.1%)
LOC100129148	1 (<0.1%)
LOC100129697	1 (<0.1%)
LOC100129931	2 (<0.1%)
LOC100130691	1 (<0.1%)
LOC100130872	1 (<0.1%)
LOC100130987	3 (<0.1%)
LOC100506023	2 (<0.1%)
LOC100506071	1 (<0.1%)
LOC100506472	2 (<0.1%)
LOC100507053	1 (<0.1%)
LOC100507384	1 (<0.1%)
LOC100507443	3 (<0.1%)
LOC100630923	5 (<0.1%)
LOC101448202	1 (<0.1%)
LOC101927040	1 (<0.1%)
LOC101927045	1 (<0.1%)
LOC101927053	1 (<0.1%)
LOC101927131	1 (<0.1%)
LOC101927314	1 (<0.1%)
LOC101927418	1 (<0.1%)
LOC101927421	1 (<0.1%)
LOC101927550	1 (<0.1%)
LOC101927557	1 (<0.1%)
LOC101927572	4 (<0.1%)
LOC101927769	1 (<0.1%)
LOC101927814	1 (<0.1%)
LOC101928002	2 (<0.1%)
LOC101928371	2 (<0.1%)
LOC101928372	2 (<0.1%)
LOC101928517	1 (<0.1%)
LOC101928519	1 (<0.1%)
LOC101928682	2 (<0.1%)
LOC101928911	2 (<0.1%)
LOC101929268	2 (<0.1%)
LOC102503427	1 (<0.1%)
LOC118142757	2 (<0.1%)
LOC145845	1 (<0.1%)
LOC158435	1 (<0.1%)
LOC284009	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LOC284379	2 (<0.1%)
LOC338694	2 (<0.1%)
LOC339975	1 (<0.1%)
LOC344967	1 (<0.1%)
LOC388282	1 (<0.1%)
LOC440700	2 (<0.1%)
LOC574538	1 (<0.1%)
LOC643201	2 (<0.1%)
LOC643339	4 (<0.1%)
LOC644554	1 (<0.1%)
LOC646471	1 (<0.1%)
LOC650226	1 (<0.1%)
LOC653712	1 (<0.1%)
LOC729683	1 (<0.1%)
LONP1	32 (<0.1%)
LONP2	2 (<0.1%)
LONRF2	2 (<0.1%)
LOXL1	1 (<0.1%)
LOXL1-AS1	5 (<0.1%)
LOXL2	4 (<0.1%)
LOXL3	2 (<0.1%)
LPAR2	1 (<0.1%)
LPAR5	2 (<0.1%)
LPCAT1	1 (<0.1%)
LPCAT4	1 (<0.1%)
LPGAT1	1 (<0.1%)
LPIN1	22 (<0.1%)
LPIN2	1 (<0.1%)
LPIN3	3 (<0.1%)
LPO	6 (<0.1%)
LPP	16 (<0.1%)
LRBA	6 (<0.1%)
LRCH1	3 (<0.1%)
LRCH3	4 (<0.1%)
LRCH4	2 (<0.1%)
LRFN1	1 (<0.1%)
LRFN2	2 (<0.1%)
LRFN3	1 (<0.1%)
LRGUK	1 (<0.1%)
LRIF1	2 (<0.1%)
LRP1	6 (<0.1%)
LRP11	5 (<0.1%)
LRP4	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LRP5	13 (<0.1%)
LRP5L	2 (<0.1%)
LRP6	1 (<0.1%)
LRP8	4 (<0.1%)
LRPAP1	8 (<0.1%)
LRRC15	2 (<0.1%)
LRRC2	1 (<0.1%)
LRRC27	6 (<0.1%)
LRRC29	2 (<0.1%)
LRRC36	1 (<0.1%)
LRRC3B	1 (<0.1%)
LRRC41	1 (<0.1%)
LRRC42	2 (<0.1%)
LRRC43	13 (<0.1%)
LRRC47	1 (<0.1%)
LRRC4B	4 (<0.1%)
LRRC51	5 (<0.1%)
LRRC58	1 (<0.1%)
LRRC61	2 (<0.1%)
LRRC69	1 (<0.1%)
LRRC74A	3 (<0.1%)
LRRC74B	3 (<0.1%)
LRRC75B	2 (<0.1%)
LRRC8A	6 (<0.1%)
LRRC8B	2 (<0.1%)
LRRC8D	2 (<0.1%)
LRRFIP1	11 (<0.1%)
LRRFIP2	4 (<0.1%)
LRRK1	5 (<0.1%)
LRRN2	4 (<0.1%)
LRRN3	3 (<0.1%)
LRRN4CL	2 (<0.1%)
LRSAM1	8 (<0.1%)
LRTOMT	6 (<0.1%)
LSM1	3 (<0.1%)
LSM12	1 (<0.1%)
LSM14A	2 (<0.1%)
LSM2	5 (<0.1%)
LSM4	4 (<0.1%)
LSM5	4 (<0.1%)
LSM7	2 (<0.1%)
LSMEM1	2 (<0.1%)
LSP1	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
LSR	5 (<0.1%)
LSS	8 (<0.1%)
LST1	8 (<0.1%)
LTA4H	3 (<0.1%)
LTBP1	5 (<0.1%)
LTBP2	4 (<0.1%)
LTBP3	6 (<0.1%)
LTBP4	3 (<0.1%)
LTBR	4 (<0.1%)
LTO1	2 (<0.1%)
LUC7L	2 (<0.1%)
LUC7L2	3 (<0.1%)
LUZP1	6 (<0.1%)
LY6G5B	1 (<0.1%)
LY6G6C	1 (<0.1%)
LY86-AS1	1 (<0.1%)
LY9	3 (<0.1%)
LYG2	1 (<0.1%)
LYN	12 (<0.1%)
LYPD5	1 (<0.1%)
LYPD6B	1 (<0.1%)
LYRM2	4 (<0.1%)
LYRM4	4 (<0.1%)
LYRM7	5 (<0.1%)
LYRM9	1 (<0.1%)
LYST	2 (<0.1%)
LZIC	2 (<0.1%)
LZTR1	1 (<0.1%)
LZTS1	1 (<0.1%)
M1AP	3 (<0.1%)
M6PR	2 (<0.1%)
MACF1	7 (<0.1%)
MACROD1	10 (<0.1%)
MACROD2	3 (<0.1%)
MACROH2A2	3 (<0.1%)
MAD1L1	48 (0.1%)
MADD	10 (<0.1%)
MAEA	8 (<0.1%)
MAEL	4 (<0.1%)
MAFF	8 (<0.1%)
MAFK	1 (<0.1%)
MAG	3 (<0.1%)
MAGI1	15 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MAGI2	1 (<0.1%)
MAGI2-AS3	4 (<0.1%)
MAGOH	1 (<0.1%)
MAIP1	1 (<0.1%)
MAJIN	2 (<0.1%)
MAK	3 (<0.1%)
MAL	4 (<0.1%)
MAML1	3 (<0.1%)
MAML2	1 (<0.1%)
MAML3	4 (<0.1%)
MAMSTR	3 (<0.1%)
MAN1B1	6 (<0.1%)
MAN1C1	8 (<0.1%)
MAN2A2	2 (<0.1%)
MAN2B1	10 (<0.1%)
MAN2B2	1 (<0.1%)
MAN2C1	12 (<0.1%)
MANBA	1 (<0.1%)
MANEAL	3 (<0.1%)
MANF	1 (<0.1%)
MANSC1	2 (<0.1%)
MANSC4	1 (<0.1%)
MAP1LC3A	1 (<0.1%)
MAP1LC3B	1 (<0.1%)
MAP1LC3B2	1 (<0.1%)
MAP2K1	2 (<0.1%)
MAP2K2	3 (<0.1%)
MAP2K3	4 (<0.1%)
MAP2K5	2 (<0.1%)
MAP3K1	1 (<0.1%)
MAP3K10	6 (<0.1%)
MAP3K11	2 (<0.1%)
MAP3K12	2 (<0.1%)
MAP3K13	11 (<0.1%)
MAP3K14	3 (<0.1%)
MAP3K19	5 (<0.1%)
MAP3K20	4 (<0.1%)
MAP3K4	2 (<0.1%)
MAP3K5	5 (<0.1%)
MAP3K7	4 (<0.1%)
MAP3K7CL	7 (<0.1%)
MAP3K8	2 (<0.1%)
MAP3K9	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MAP4	7 (<0.1%)
MAP4K1	4 (<0.1%)
MAP4K2	4 (<0.1%)
MAP4K3-DT	3 (<0.1%)
MAP4K4	10 (<0.1%)
MAP4K5	4 (<0.1%)
MAP6	2 (<0.1%)
MAP6D1	2 (<0.1%)
MAP7	19 (<0.1%)
MAP7D1	15 (<0.1%)
MAPK10	4 (<0.1%)
MAPK13	2 (<0.1%)
MAPK3	7 (<0.1%)
MAPK8IP1	1 (<0.1%)
MAPK8IP3	16 (<0.1%)
MAPK9	10 (<0.1%)
MAPKAP1	6 (<0.1%)
MAPKAPK2	2 (<0.1%)
MAPKAPK3	6 (<0.1%)
MAPKAPK5	2 (<0.1%)
MAPKBP1	5 (<0.1%)
MAPT	80 (0.2%)
MARCHF10	16 (<0.1%)
MARCHF2	12 (<0.1%)
MARCHF4	3 (<0.1%)
MARCHF5	2 (<0.1%)
MARCHF7	10 (<0.1%)
MARCHF8	3 (<0.1%)
MARCHF9	1 (<0.1%)
MARF1	3 (<0.1%)
MARK2	21 (<0.1%)
MARK3	5 (<0.1%)
MARK4	16 (<0.1%)
MARS1	4 (<0.1%)
MARVELD3	11 (<0.1%)
MASP2	2 (<0.1%)
MAST1	5 (<0.1%)
MAST2	1 (<0.1%)
MAST3	7 (<0.1%)
MATK	3 (<0.1%)
MATN2	2 (<0.1%)
MATN4	6 (<0.1%)
MATR3	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MAU2	2 (<0.1%)
MAVS	9 (<0.1%)
MAX	8 (<0.1%)
MB	3 (<0.1%)
MB21D2	4 (<0.1%)
MBD1	2 (<0.1%)
MBD2	2 (<0.1%)
MBD3	8 (<0.1%)
MBNL1	14 (<0.1%)
MBNL2	2 (<0.1%)
MBOAT7	4 (<0.1%)
MBP	12 (<0.1%)
MBTD1	4 (<0.1%)
MBTPS1	2 (<0.1%)
MCAM	2 (<0.1%)
MCC	7 (<0.1%)
MCCC1	4 (<0.1%)
MCCC2	1 (<0.1%)
MCF2L	7 (<0.1%)
MCF2L2	3 (<0.1%)
MCFD2	7 (<0.1%)
MCM10	4 (<0.1%)
MCM3AP	6 (<0.1%)
MCM4	2 (<0.1%)
MCM9	1 (<0.1%)
MCMDC2	3 (<0.1%)
MCOLN1	1 (<0.1%)
MCOLN2	1 (<0.1%)
MCPH1	3 (<0.1%)
MCTP2	2 (<0.1%)
MDC1	3 (<0.1%)
MDFI	1 (<0.1%)
MDM2	10 (<0.1%)
MDM4	14 (<0.1%)
MDP1	3 (<0.1%)
ME1	2 (<0.1%)
ME3	3 (<0.1%)
MEA7	1 (<0.1%)
MECOM	2 (<0.1%)
MECR	10 (<0.1%)
MED12L	3 (<0.1%)
MED13L	3 (<0.1%)
MED15	8 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MED16	1 (<0.1%)
MED23	4 (<0.1%)
MED24	8 (<0.1%)
MED27	2 (<0.1%)
MEF2B	2 (<0.1%)
MEFV	6 (<0.1%)
MEGF11	9 (<0.1%)
MEGF8	8 (<0.1%)
MEI1	3 (<0.1%)
MEIS3	4 (<0.1%)
MEMO1	2 (<0.1%)
MEOX1	3 (<0.1%)
MEST	6 (<0.1%)
MESTIT1	1 (<0.1%)
METAP1D	1 (<0.1%)
METTL16	5 (<0.1%)
METTL21A	4 (<0.1%)
METTL22	4 (<0.1%)
METTL25B	8 (<0.1%)
METTL27	1 (<0.1%)
METTL6	2 (<0.1%)
METTL9	4 (<0.1%)
MEX3D	4 (<0.1%)
MFAP3L	4 (<0.1%)
MFF	8 (<0.1%)
MFNG	3 (<0.1%)
MFSD11	21 (<0.1%)
MFSD12	4 (<0.1%)
MFSD13A	3 (<0.1%)
MFSD4A	2 (<0.1%)
MGA	2 (<0.1%)
MGAM	1 (<0.1%)
MGAT3	7 (<0.1%)
MGAT4A	2 (<0.1%)
MGAT4EP	4 (<0.1%)
MGAT4FP	1 (<0.1%)
MGAT5B	9 (<0.1%)
MGLL	6 (<0.1%)
MGMT	2 (<0.1%)
MGRN1	40 (0.1%)
MGST2	2 (<0.1%)
MIA	2 (<0.1%)
MIA-RAB4B	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MIA2	7 (<0.1%)
MIATNB	2 (<0.1%)
MICAL1	3 (<0.1%)
MICAL2	34 (<0.1%)
MICAL3	12 (<0.1%)
MICALL1	1 (<0.1%)
MICOS10-NBL1	2 (<0.1%)
MICU1	2 (<0.1%)
MIDEAS	4 (<0.1%)
MIDEAS-AS1	1 (<0.1%)
MIDN	1 (<0.1%)
MIGA1	6 (<0.1%)
MIIP	3 (<0.1%)
MINDY1	5 (<0.1%)
MINDY2	2 (<0.1%)
MINK1	4 (<0.1%)
MIOS	2 (<0.1%)
MIPOL1	3 (<0.1%)
MIR1256	1 (<0.1%)
MIR1273H	8 (<0.1%)
MIR210HG	1 (<0.1%)
MIR3134	9 (<0.1%)
MIR31HG	1 (<0.1%)
MIR3667HG	2 (<0.1%)
MIR3680-1	3 (<0.1%)
MIR3680-2	3 (<0.1%)
MIR3681HG	2 (<0.1%)
MIR3936HG	1 (<0.1%)
MIR3945HG	1 (<0.1%)
MIR548AC	1 (<0.1%)
MIR548AE2	3 (<0.1%)
MIR548AN	4 (<0.1%)
MIR548AY	1 (<0.1%)
MIR548AZ	12 (<0.1%)
MIR548F1	3 (<0.1%)
MIR548F5	2 (<0.1%)
MIR548G	4 (<0.1%)
MIR548H4	2 (<0.1%)
MIR548N	1 (<0.1%)
MIR548O2	2 (<0.1%)
MIR548W	4 (<0.1%)
MIR5694	1 (<0.1%)
MIR7-3HG	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MIR7851	17 (<0.1%)
MIR924HG	1 (<0.1%)
MIRLET7BHG	2 (<0.1%)
MIS18A	2 (<0.1%)
MITD1	2 (<0.1%)
MIXL1	2 (<0.1%)
MKLN1	1 (<0.1%)
MKNK1	15 (<0.1%)
MKNK1-AS1	2 (<0.1%)
MKNK2	2 (<0.1%)
MKRN2OS	1 (<0.1%)
MLC1	4 (<0.1%)
MLEC	2 (<0.1%)
MLF2	1 (<0.1%)
MLH1	7 (<0.1%)
MLH3	2 (<0.1%)
MLLT1	2 (<0.1%)
MLLT10	4 (<0.1%)
MLLT6	2 (<0.1%)
MLN	3 (<0.1%)
MLXIP	2 (<0.1%)
MLXIPL	4 (<0.1%)
MLYCD	2 (<0.1%)
MMAA	1 (<0.1%)
MMAB	2 (<0.1%)
MMACHC	2 (<0.1%)
MMP14	1 (<0.1%)
MMP15	2 (<0.1%)
MMP17	3 (<0.1%)
MMP24	3 (<0.1%)
MMRN2	1 (<0.1%)
MMS19	8 (<0.1%)
MN1	2 (<0.1%)
MNAT1	2 (<0.1%)
MNT	3 (<0.1%)
MOB1B	3 (<0.1%)
MOB2	3 (<0.1%)
MOB3A	10 (<0.1%)
MOCS1	2 (<0.1%)
MOG	27 (<0.1%)
MOGAT3	4 (<0.1%)
MOGS	4 (<0.1%)
MOK	7 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MON1A	2 (<0.1%)
MON1B	3 (<0.1%)
MON2	10 (<0.1%)
MORC2	1 (<0.1%)
MORC2-AS1	1 (<0.1%)
MORC3	1 (<0.1%)
MORN1	3 (<0.1%)
MORN2	1 (<0.1%)
MORN3	3 (<0.1%)
MOV10	6 (<0.1%)
MOV10L1	16 (<0.1%)
MOXD1	2 (<0.1%)
MPDZ	3 (<0.1%)
MPG	3 (<0.1%)
MPHOSPH8	1 (<0.1%)
MPHOSPH9	2 (<0.1%)
MPND	2 (<0.1%)
MPO	1 (<0.1%)
MPP2	2 (<0.1%)
MPP4	1 (<0.1%)
MPP7	3 (<0.1%)
MPPED1	1 (<0.1%)
MPRIP	4 (<0.1%)
MPV17	2 (<0.1%)
MPZL1	3 (<0.1%)
MRAP	6 (<0.1%)
MRC2	7 (<0.1%)
MRGPRE	1 (<0.1%)
MRGPRF	2 (<0.1%)
MRM2	3 (<0.1%)
MRNIP	16 (<0.1%)
MRO	1 (<0.1%)
MROCKI	1 (<0.1%)
MROH1	38 (0.1%)
MROH2B	2 (<0.1%)
MROH7	2 (<0.1%)
MROH7-TTC4	3 (<0.1%)
MRPL10	3 (<0.1%)
MRPL12	3 (<0.1%)
MRPL24	2 (<0.1%)
MRPL27	1 (<0.1%)
MRPL32	1 (<0.1%)
MRPL38	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MRPL4	9 (<0.1%)
MRPL47	2 (<0.1%)
MRPL49	3 (<0.1%)
MRPL52	18 (<0.1%)
MRPS12	3 (<0.1%)
MRPS14	2 (<0.1%)
MRPS15	1 (<0.1%)
MRPS16	1 (<0.1%)
MRPS18B	2 (<0.1%)
MRPS21	6 (<0.1%)
MRPS25	3 (<0.1%)
MRPS27	3 (<0.1%)
MRPS35	2 (<0.1%)
MRPS6	1 (<0.1%)
MRPS7	2 (<0.1%)
MRRF	2 (<0.1%)
MRTO4	2 (<0.1%)
MS4A15	4 (<0.1%)
MS4A8	1 (<0.1%)
MSANTD2	1 (<0.1%)
MSH4	1 (<0.1%)
MSH5	12 (<0.1%)
MSH5-SAPCD1	3 (<0.1%)
MSI2	15 (<0.1%)
MSL2	2 (<0.1%)
MSRA	8 (<0.1%)
MSRB3	8 (<0.1%)
MSS51	1 (<0.1%)
MST1R	4 (<0.1%)
MTA1	24 (<0.1%)
MTA3	13 (<0.1%)
MTCH2	1 (<0.1%)
MTCL1	1 (<0.1%)
MTERF4	8 (<0.1%)
MTFMT	1 (<0.1%)
MTFR1	3 (<0.1%)
MTFR2	2 (<0.1%)
MTG2	12 (<0.1%)
MTHFD1	2 (<0.1%)
MTHFD1L	21 (<0.1%)
MTHFR	1 (<0.1%)
MTHFSD	7 (<0.1%)
MTIF2	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MTMR10	1 (<0.1%)
MTMR12	1 (<0.1%)
MTMR14	9 (<0.1%)
MTMR3	3 (<0.1%)
MTMR6	1 (<0.1%)
MTMR7	1 (<0.1%)
MTMR9	2 (<0.1%)
MTMR9LP	1 (<0.1%)
MTO1	3 (<0.1%)
MTOR	9 (<0.1%)
MTRES1	3 (<0.1%)
MTRFR	3 (<0.1%)
MTSS1	15 (<0.1%)
MTURN	3 (<0.1%)
MTUS1	14 (<0.1%)
MTUS2	2 (<0.1%)
MUC13	1 (<0.1%)
MUC16	1 (<0.1%)
MUC21	2 (<0.1%)
MUC4	9 (<0.1%)
MUTYH	6 (<0.1%)
MVD	2 (<0.1%)
MVP	20 (<0.1%)
MX1	3 (<0.1%)
MX2	2 (<0.1%)
MXD3	2 (<0.1%)
MXRA7	15 (<0.1%)
MYADM	24 (<0.1%)
MYBBP1A	2 (<0.1%)
MYBPC1	20 (<0.1%)
MYBPC2	1 (<0.1%)
MYBPC3	1 (<0.1%)
MYBPHL	2 (<0.1%)
MYDGF	1 (<0.1%)
MYH10	6 (<0.1%)
MYH11	76 (0.2%)
MYH14	54 (0.2%)
MYH3	2 (<0.1%)
MYH7B	4 (<0.1%)
MYH9	6 (<0.1%)
MYL10	1 (<0.1%)
MYL2	2 (<0.1%)
MYLIP	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
MYLK	12 (<0.1%)
MYLK-AS1	3 (<0.1%)
MYLK3	3 (<0.1%)
MYLK4	1 (<0.1%)
MLPF	1 (<0.1%)
MYO10	3 (<0.1%)
MYO15A	6 (<0.1%)
MYO16	2 (<0.1%)
MYO18A	6 (<0.1%)
MYO18B	2 (<0.1%)
MYO1C	12 (<0.1%)
MYO1D	3 (<0.1%)
MYO1E	7 (<0.1%)
MYO1F	6 (<0.1%)
MYO1H	4 (<0.1%)
MYO3B	15 (<0.1%)
MYO5A	8 (<0.1%)
MYO5B	1 (<0.1%)
MYO5C	1 (<0.1%)
MYO6	2 (<0.1%)
MYO7A	2 (<0.1%)
MYO7B	3 (<0.1%)
MYO9A	2 (<0.1%)
MYO9B	36 (0.1%)
MYOCD	4 (<0.1%)
MYOF	6 (<0.1%)
MYOM1	8 (<0.1%)
MYOM2	1 (<0.1%)
MYOM3	3 (<0.1%)
MYORG	1 (<0.1%)
MYOSLID-AS1	1 (<0.1%)
MYPN	5 (<0.1%)
MYRF	10 (<0.1%)
MYT1	2 (<0.1%)
MYT1L	3 (<0.1%)
MYZAP	2 (<0.1%)
MZB1	1 (<0.1%)
N4BP2L1	15 (<0.1%)
N4BP2L2	3 (<0.1%)
N4BP3	1 (<0.1%)
NAA25	2 (<0.1%)
NAA50	2 (<0.1%)
NAA60	21 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
NAALADL1	1 (<0.1%)
NAALADL2	3 (<0.1%)
NABP2	2 (<0.1%)
NACA	2 (<0.1%)
NACC2	1 (<0.1%)
NADK	13 (<0.1%)
NADSYN1	2 (<0.1%)
NAE1	8 (<0.1%)
NAGLU	2 (<0.1%)
NAGPA	2 (<0.1%)
NAIF1	1 (<0.1%)
NALCN-AS1	2 (<0.1%)
NANOGNB	2 (<0.1%)
NANOS1	1 (<0.1%)
NANP	1 (<0.1%)
NANS	1 (<0.1%)
NAP1L4	1 (<0.1%)
NAPA	6 (<0.1%)
NAPA-AS1	2 (<0.1%)
NAPB	10 (<0.1%)
NAPG	1 (<0.1%)
NARF	12 (<0.1%)
NARS2	2 (<0.1%)
NAT10	2 (<0.1%)
NAT9	1 (<0.1%)
NAV1	5 (<0.1%)
NAV2	9 (<0.1%)
NAXD	6 (<0.1%)
NBPF10	7 (<0.1%)
NBPF20	7 (<0.1%)
NBPF8	3 (<0.1%)
NCALD	14 (<0.1%)
NCAM1	10 (<0.1%)
NCAPD2	1 (<0.1%)
NCBP1	1 (<0.1%)
NCBP2	2 (<0.1%)
NCBP3	1 (<0.1%)
NCEH1	8 (<0.1%)
NCF2	12 (<0.1%)
NCK1	1 (<0.1%)
NCK2	10 (<0.1%)
NCKAP5	4 (<0.1%)
NCKAP5L	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
NCLN	7 (<0.1%)
NCMAP-DT	1 (<0.1%)
NCOA1	3 (<0.1%)
NCOA2	1 (<0.1%)
NCOA3	8 (<0.1%)
NCOA6	2 (<0.1%)
NCOA7	5 (<0.1%)
NCOR1	14 (<0.1%)
NCOR2	39 (0.1%)
NCS1	3 (<0.1%)
NCSTN	3 (<0.1%)
NDC1	3 (<0.1%)
NDE1	18 (<0.1%)
NDOR1	8 (<0.1%)
NDRG2	3 (<0.1%)
NDRG3	15 (<0.1%)
NDRG4	14 (<0.1%)
NDST1	3 (<0.1%)
NDST1-AS1	4 (<0.1%)
NDST2	1 (<0.1%)
NDUFA11	6 (<0.1%)
NDUFA7	1 (<0.1%)
NDUFAF6	1 (<0.1%)
NDUFAF7	2 (<0.1%)
NDUFB2	3 (<0.1%)
NDUFB3	2 (<0.1%)
NDUFB5	3 (<0.1%)
NDUFB6	3 (<0.1%)
NDUFB7	1 (<0.1%)
NDUFC2	3 (<0.1%)
NDUFC2-KCTD14	15 (<0.1%)
NDUFS2	4 (<0.1%)
NDUFS6	1 (<0.1%)
NDUFS8	2 (<0.1%)
NDUFV1	2 (<0.1%)
NDUFV3	6 (<0.1%)
NECAB2	1 (<0.1%)
NECAB3	2 (<0.1%)
NECAP2	3 (<0.1%)
NECTIN1	3 (<0.1%)
NECTIN2	4 (<0.1%)
NECTIN4	1 (<0.1%)
NEDD4	12 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
NEDD4L	33 (<0.1%)
NEDD8	2 (<0.1%)
NEDD8-MDP1	3 (<0.1%)
NEDD9	11 (<0.1%)
NEIL1	6 (<0.1%)
NEK10	3 (<0.1%)
NEK3	4 (<0.1%)
NEK6	29 (<0.1%)
NEK8	1 (<0.1%)
NELFA	4 (<0.1%)
NELFB	3 (<0.1%)
NELFCD	2 (<0.1%)
NELFE	3 (<0.1%)
NEMF	8 (<0.1%)
NEO1	3 (<0.1%)
NEURL1	3 (<0.1%)
NEURL1B	1 (<0.1%)
NEURL4	6 (<0.1%)
NEXN	2 (<0.1%)
NEXN-AS1	2 (<0.1%)
NF1	6 (<0.1%)
NFAM1	1 (<0.1%)
NFASC	13 (<0.1%)
NFAT5	12 (<0.1%)
NFATC1	49 (0.1%)
NFATC2	40 (0.1%)
NFATC2IP	4 (<0.1%)
NFATC3	12 (<0.1%)
NFE2L2	3 (<0.1%)
NFIA	12 (<0.1%)
NFIC	70 (0.2%)
NFIX	12 (<0.1%)
NFKBIB	3 (<0.1%)
NFU1	5 (<0.1%)
NFX1	5 (<0.1%)
NFYC	5 (<0.1%)
NFYC-AS1	1 (<0.1%)
NGEF	1 (<0.1%)
NHEJ1	1 (<0.1%)
NHSL1	2 (<0.1%)
NHSL1-AS1	1 (<0.1%)
NIBAN1	2 (<0.1%)
NIBAN2	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
NICN1	1 (<0.1%)
NID1	2 (<0.1%)
NID2	2 (<0.1%)
NIFK-AS1	5 (<0.1%)
NINJ2	6 (<0.1%)
NIP7	2 (<0.1%)
NIPA1	4 (<0.1%)
NIPAL3	1 (<0.1%)
NIPBL	2 (<0.1%)
NISCH	9 (<0.1%)
NIT1	3 (<0.1%)
NKAIN1	7 (<0.1%)
NKD1	1 (<0.1%)
NKPD1	2 (<0.1%)
NLE1	2 (<0.1%)
NLN	1 (<0.1%)
NLRC3	2 (<0.1%)
NLRC4	5 (<0.1%)
NLRC5	3 (<0.1%)
NLRP1	2 (<0.1%)
NLRP12	3 (<0.1%)
NLRP2	8 (<0.1%)
NLRP7	3 (<0.1%)
NLRX1	16 (<0.1%)
NME1-NME2	2 (<0.1%)
NME2	5 (<0.1%)
NME5	1 (<0.1%)
NME8	1 (<0.1%)
NMNAT1	1 (<0.1%)
NMNAT2	7 (<0.1%)
NMNAT3	2 (<0.1%)
NMRAL1	5 (<0.1%)
NMRAL2P	1 (<0.1%)
NMRK2	12 (<0.1%)
NMT1	2 (<0.1%)
NMT2	8 (<0.1%)
NOBOX	3 (<0.1%)
NODAL	3 (<0.1%)
NOL10	4 (<0.1%)
NOL3	8 (<0.1%)
NOL4L	10 (<0.1%)
NOL4L-DT	2 (<0.1%)
NOL9	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
NOM1	3 (<0.1%)
NOP14	2 (<0.1%)
NOP14-AS1	1 (<0.1%)
NOP2	5 (<0.1%)
NOP53	3 (<0.1%)
NOP58	5 (<0.1%)
NOS1	21 (<0.1%)
NOS3	4 (<0.1%)
NOSIP	2 (<0.1%)
NOTCH1	4 (<0.1%)
NOTCH3	10 (<0.1%)
NOTCH4	7 (<0.1%)
NOTUM	2 (<0.1%)
NOX3	1 (<0.1%)
NOX4	1 (<0.1%)
NOX5	5 (<0.1%)
NPAS1	2 (<0.1%)
NPAS2	7 (<0.1%)
NPAS2-AS1	1 (<0.1%)
NPAS3	16 (<0.1%)
NPC1	3 (<0.1%)
NPEPL1	3 (<0.1%)
NPEPPS	1 (<0.1%)
NPFFR1	1 (<0.1%)
NPFFR2	1 (<0.1%)
NPHP3	1 (<0.1%)
NPHP3-ACAD11	2 (<0.1%)
NPLOC4	3 (<0.1%)
NPR1	2 (<0.1%)
NPRL3	20 (<0.1%)
NPTX2	1 (<0.1%)
NPTXR	1 (<0.1%)
NPY6R	1 (<0.1%)
NQO1	12 (<0.1%)
NR1H3	20 (<0.1%)
NR1I3	75 (0.2%)
NR2C1	3 (<0.1%)
NR2C2	1 (<0.1%)
NR2F2-AS1	1 (<0.1%)
NR5A2	3 (<0.1%)
NRAP	3 (<0.1%)
NRBP1	1 (<0.1%)
NRCAM	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
NRDC	6 (<0.1%)
NRDE2	1 (<0.1%)
NREP	2 (<0.1%)
NRG3	3 (<0.1%)
NRP1	24 (<0.1%)
NRP2	6 (<0.1%)
NRROS	2 (<0.1%)
NRTN	2 (<0.1%)
NRXN1	2 (<0.1%)
NRXN3	4 (<0.1%)
NSD1	2 (<0.1%)
NSD2	14 (<0.1%)
NSD3	4 (<0.1%)
NSL1	2 (<0.1%)
NSMAF	2 (<0.1%)
NSMCE1	2 (<0.1%)
NSMCE1-DT	3 (<0.1%)
NSMCE2	7 (<0.1%)
NSRP1	4 (<0.1%)
NSUN2	6 (<0.1%)
NSUN6	1 (<0.1%)
NSUN7	1 (<0.1%)
NT5C2	4 (<0.1%)
NT5C3B	3 (<0.1%)
NT5DC2	2 (<0.1%)
NT5DC3	3 (<0.1%)
NTAQ1	15 (<0.1%)
NTHL1	1 (<0.1%)
NTMT1	4 (<0.1%)
NTN1	6 (<0.1%)
NTN5	1 (<0.1%)
NTNG2	3 (<0.1%)
NTRK3	4 (<0.1%)
NUBP1	6 (<0.1%)
NUBP2	4 (<0.1%)
NUCB1-AS1	2 (<0.1%)
NUDC	3 (<0.1%)
NUDCD3	1 (<0.1%)
NUDT1	21 (<0.1%)
NUDT13	7 (<0.1%)
NUDT16-DT	1 (<0.1%)
NUDT22	8 (<0.1%)
NUDT3	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
NUDT5	2 (<0.1%)
NUDT9	3 (<0.1%)
NUMA1	3 (<0.1%)
NUMB	4 (<0.1%)
NUMBL	12 (<0.1%)
NUP133	1 (<0.1%)
NUP153	6 (<0.1%)
NUP160	2 (<0.1%)
NUP205	2 (<0.1%)
NUP210L	8 (<0.1%)
NUP214	2 (<0.1%)
NUP50	2 (<0.1%)
NUP54	5 (<0.1%)
NUP62	15 (<0.1%)
NUP85	1 (<0.1%)
NUP88	4 (<0.1%)
NUP93	1 (<0.1%)
NUP98	8 (<0.1%)
NUPR2	2 (<0.1%)
NUSAP1	5 (<0.1%)
NUTF2	3 (<0.1%)
NUTM1	12 (<0.1%)
NVL	4 (<0.1%)
NWD1	16 (<0.1%)
NXF1	4 (<0.1%)
NXN	59 (0.2%)
NXNL1	2 (<0.1%)
NXPE1	1 (<0.1%)
NXPE3	2 (<0.1%)
NYAP1	1 (<0.1%)
OACYLP	1 (<0.1%)
OAF	1 (<0.1%)
OBSCN	9 (<0.1%)
OBSL1	5 (<0.1%)
OCIAD2	5 (<0.1%)
ODAD1	1 (<0.1%)
ODAD4	2 (<0.1%)
ODC1	4 (<0.1%)
ODF2	32 (<0.1%)
ODF3L2	1 (<0.1%)
ODF4	1 (<0.1%)
ODR4	6 (<0.1%)
OGA	8 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
OGDH	5 (<0.1%)
OGFOD3	30 (<0.1%)
OGFR	2 (<0.1%)
OGG1	24 (<0.1%)
OLAH	2 (<0.1%)
OLFM1	2 (<0.1%)
OLFM2	5 (<0.1%)
OLFML2A	2 (<0.1%)
OLFML2B	1 (<0.1%)
OLR1	3 (<0.1%)
OPA1	16 (<0.1%)
OPA1-AS1	1 (<0.1%)
OPA3	15 (<0.1%)
OPCML	1 (<0.1%)
OPN1SW	1 (<0.1%)
OPRD1	2 (<0.1%)
OPRK1	2 (<0.1%)
OPRM1	23 (<0.1%)
OPTC	2 (<0.1%)
OPTN	4 (<0.1%)
OR9Q1	2 (<0.1%)
ORAI1	2 (<0.1%)
ORAI2	20 (<0.1%)
ORC2	6 (<0.1%)
ORC3	6 (<0.1%)
OS9	8 (<0.1%)
OSBP2	44 (0.1%)
OSBPL10	6 (<0.1%)
OSBPL1A	9 (<0.1%)
OSBPL2	15 (<0.1%)
OSBPL3	7 (<0.1%)
OSBPL5	6 (<0.1%)
OSBPL6	4 (<0.1%)
OSBPL7	1 (<0.1%)
OSBPL9	23 (<0.1%)
OSCAR	12 (<0.1%)
OSCP1	1 (<0.1%)
OSER1-DT	3 (<0.1%)
OSGEP	4 (<0.1%)
OSGIN1	1 (<0.1%)
OSTCP1	2 (<0.1%)
OSTM1	2 (<0.1%)
OSTN	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
OTOA	3 (<0.1%)
OTOF	2 (<0.1%)
OTOGL	1 (<0.1%)
OTOP2	2 (<0.1%)
OTOP3	2 (<0.1%)
OTUB1	2 (<0.1%)
OTUD3	1 (<0.1%)
OTUD4	4 (<0.1%)
OTUD7B	1 (<0.1%)
OTULIN	1 (<0.1%)
OVCH2	1 (<0.1%)
OVOL3	2 (<0.1%)
OXNAD1	1 (<0.1%)
OXR1	14 (<0.1%)
OXSR1	1 (<0.1%)
P2RX1	1 (<0.1%)
P2RX4	24 (<0.1%)
P2RX6	2 (<0.1%)
P2RX6P	1 (<0.1%)
P2RX7	30 (<0.1%)
P2RY11	2 (<0.1%)
P2RY14	2 (<0.1%)
P2RY6	5 (<0.1%)
P3H1	3 (<0.1%)
P3H3	2 (<0.1%)
P3H4	2 (<0.1%)
P4HA1	8 (<0.1%)
P4HB	3 (<0.1%)
PA2G4	1 (<0.1%)
PABPC1L	4 (<0.1%)
PACRG	3 (<0.1%)
PACS1	11 (<0.1%)
PACS2	27 (<0.1%)
PACSIN2	9 (<0.1%)
PADI2	1 (<0.1%)
PAFAH1B1	2 (<0.1%)
PAFAH1B2	5 (<0.1%)
PAFAH1B3	6 (<0.1%)
PAFAH2	2 (<0.1%)
PAG1	1 (<0.1%)
PAK1	4 (<0.1%)
PAK2	2 (<0.1%)
PAK6	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PALB2	3 (<0.1%)
PALD1	5 (<0.1%)
PALLD	18 (<0.1%)
PALM	18 (<0.1%)
PAM16	3 (<0.1%)
PAN2	3 (<0.1%)
PANK3	1 (<0.1%)
PAOX	21 (<0.1%)
PAPSS2	2 (<0.1%)
PAQR5	3 (<0.1%)
PAQR8	4 (<0.1%)
PARD3	41 (0.1%)
PARD6G	1 (<0.1%)
PARD6G-AS1	3 (<0.1%)
PARL	2 (<0.1%)
PARN	3 (<0.1%)
PARP10	1 (<0.1%)
PARP12	2 (<0.1%)
PARP14	1 (<0.1%)
PARP16	2 (<0.1%)
PARP2	6 (<0.1%)
PARP4	3 (<0.1%)
PARP6	2 (<0.1%)
PARP9	6 (<0.1%)
PARVB	15 (<0.1%)
PARVG	2 (<0.1%)
PASK	15 (<0.1%)
PATJ	4 (<0.1%)
PAWR	2 (<0.1%)
PAX3	6 (<0.1%)
PAX5	26 (<0.1%)
PAX7	3 (<0.1%)
PAX8	8 (<0.1%)
PAX8-AS1	2 (<0.1%)
PBLD	2 (<0.1%)
PBRM1	1 (<0.1%)
PBX1	6 (<0.1%)
PBX4	12 (<0.1%)
PC	9 (<0.1%)
PCARE	1 (<0.1%)
PCAT18	1 (<0.1%)
PCBD1	2 (<0.1%)
PCBP1-AS1	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PCBP2	7 (<0.1%)
PCCA	9 (<0.1%)
PCDH1	1 (<0.1%)
PCDHA1	2 (<0.1%)
PCDHA10	2 (<0.1%)
PCDHA2	1 (<0.1%)
PCDHA3	1 (<0.1%)
PCDHA4	1 (<0.1%)
PCDHA5	1 (<0.1%)
PCDHA6	2 (<0.1%)
PCDHA7	1 (<0.1%)
PCDHA8	1 (<0.1%)
PCDHA9	1 (<0.1%)
PCDHGA1	3 (<0.1%)
PCDHGA2	3 (<0.1%)
PCDHGA3	3 (<0.1%)
PCDHGA4	2 (<0.1%)
PCDHGA5	1 (<0.1%)
PCDHGA6	1 (<0.1%)
PCDHGA7	1 (<0.1%)
PCDHGA8	1 (<0.1%)
PCDHGB1	3 (<0.1%)
PCDHGB2	1 (<0.1%)
PCDHGB3	1 (<0.1%)
PCDHGB4	1 (<0.1%)
PCDHGB5	1 (<0.1%)
PCED1B	12 (<0.1%)
PCED1B-AS1	2 (<0.1%)
PCGF3	9 (<0.1%)
PCK2	2 (<0.1%)
PCLAF	2 (<0.1%)
PCMT1	6 (<0.1%)
PCMTD2	2 (<0.1%)
PCNA	2 (<0.1%)
PCNT	7 (<0.1%)
PCNX1	1 (<0.1%)
PCNX2	4 (<0.1%)
PCNX4	1 (<0.1%)
PCOLCE	2 (<0.1%)
PCSK4	3 (<0.1%)
PCSK6	26 (<0.1%)
PCSK7	6 (<0.1%)
PCSK9	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PCYT1A	7 (<0.1%)
PDAP1	1 (<0.1%)
PDC	1 (<0.1%)
PDCD6IPP2	1 (<0.1%)
PDCD7	2 (<0.1%)
PDCL2	1 (<0.1%)
PDE1B	4 (<0.1%)
PDE2A	2 (<0.1%)
PDE4A	10 (<0.1%)
PDE4B	4 (<0.1%)
PDE4C	17 (<0.1%)
PDE4D	8 (<0.1%)
PDE6A	1 (<0.1%)
PDE6B	9 (<0.1%)
PDE6G	2 (<0.1%)
PDE7A	2 (<0.1%)
PDE7B	2 (<0.1%)
PDE8A	9 (<0.1%)
PDE9A	100 (0.3%)
PDGFA-DT	1 (<0.1%)
PDGFB	2 (<0.1%)
PDGFRL	1 (<0.1%)
PDHX	3 (<0.1%)
PDIA5	4 (<0.1%)
PDIA6	12 (<0.1%)
PDK2	3 (<0.1%)
PDLIM1	3 (<0.1%)
PDLIM2	3 (<0.1%)
PDP1	4 (<0.1%)
PDP2	2 (<0.1%)
PDPK1	6 (<0.1%)
PDPR	1 (<0.1%)
PDS5A	4 (<0.1%)
PDSS1	1 (<0.1%)
PDSS2	1 (<0.1%)
PDXDC1	8 (<0.1%)
PDXK	2 (<0.1%)
PDXP-DT	1 (<0.1%)
PDZD2	5 (<0.1%)
PDZD7	3 (<0.1%)
PDZD8	1 (<0.1%)
PDZRN3	3 (<0.1%)
PDZRN4	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PEAK1	1 (<0.1%)
PEAK3	3 (<0.1%)
PEBP1	1 (<0.1%)
PEBP4	1 (<0.1%)
PECAM1	2 (<0.1%)
PEDS1	3 (<0.1%)
PEDS1-UBE2V1	1 (<0.1%)
PELATON	2 (<0.1%)
PELI2	1 (<0.1%)
PEMT	22 (<0.1%)
PER2	2 (<0.1%)
PER3	30 (<0.1%)
PET117	2 (<0.1%)
PEX11A	3 (<0.1%)
PEX11G	2 (<0.1%)
PEX14	3 (<0.1%)
PEX16	2 (<0.1%)
PEX19	4 (<0.1%)
PEX26	3 (<0.1%)
PEX5L	16 (<0.1%)
PEX6	1 (<0.1%)
PEX7	2 (<0.1%)
PFAS	2 (<0.1%)
PFDN4	2 (<0.1%)
PFDN5	2 (<0.1%)
PFKFB2	2 (<0.1%)
PFKFB3	6 (<0.1%)
PFKFB4	1 (<0.1%)
PFKL	2 (<0.1%)
PFKM	2 (<0.1%)
PFKP	12 (<0.1%)
PGAM5	2 (<0.1%)
PGAP2	42 (0.1%)
PGAP3	2 (<0.1%)
PGAP6	1 (<0.1%)
PGBD3	1 (<0.1%)
PGLS	3 (<0.1%)
PGLYRP1	1 (<0.1%)
PGLYRP2	1 (<0.1%)
PGLYRP4	2 (<0.1%)
PGM1	2 (<0.1%)
PGM2L1	1 (<0.1%)
PGPEP1L	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PGS1	12 (<0.1%)
PHACTR1	14 (<0.1%)
PHACTR2	4 (<0.1%)
PHACTR2-AS1	1 (<0.1%)
PHACTR4	1 (<0.1%)
PHAF1	3 (<0.1%)
PHB2	2 (<0.1%)
PHC2	4 (<0.1%)
PHC3	1 (<0.1%)
PHF13	2 (<0.1%)
PHF20	7 (<0.1%)
PHF21A	4 (<0.1%)
PHF21B	4 (<0.1%)
PHF7	4 (<0.1%)
PHKB	6 (<0.1%)
PHLDB2	5 (<0.1%)
PHLDB3	4 (<0.1%)
PHLPP1	3 (<0.1%)
PHLPP2	10 (<0.1%)
PHOX2A	1 (<0.1%)
PHRF1	20 (<0.1%)
PHYH	4 (<0.1%)
PHYHIP	2 (<0.1%)
PI16	2 (<0.1%)
PI4KA	3 (<0.1%)
PI4KB	4 (<0.1%)
PICK1	3 (<0.1%)
PIEZO1	3 (<0.1%)
PIEZO2	1 (<0.1%)
PIF1	20 (<0.1%)
PIGG	16 (<0.1%)
PIGL	3 (<0.1%)
PIGN	2 (<0.1%)
PIGQ	2 (<0.1%)
PIGR	1 (<0.1%)
PIGS	1 (<0.1%)
PIGX	2 (<0.1%)
PIGZ	3 (<0.1%)
PIH1D1	2 (<0.1%)
PIK3AP1	2 (<0.1%)
PIK3C2B	2 (<0.1%)
PIK3CB	6 (<0.1%)
PIK3CD	8 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PIK3CG	3 (<0.1%)
PIK3IP1	4 (<0.1%)
PIK3R2	12 (<0.1%)
PIK3R3	2 (<0.1%)
PIK3R4	2 (<0.1%)
PIK3R5	6 (<0.1%)
PIK3R6	9 (<0.1%)
PIKFYVE	1 (<0.1%)
PILRA	3 (<0.1%)
PIN1	6 (<0.1%)
PINK1-AS	1 (<0.1%)
PINLYP	2 (<0.1%)
PIP4K2A	1 (<0.1%)
PIP5K1A	12 (<0.1%)
PIP5K1B	2 (<0.1%)
PIP5K1C	12 (<0.1%)
PITHD1	1 (<0.1%)
PITPNA	2 (<0.1%)
PITPNC1	12 (<0.1%)
PITPNM2	6 (<0.1%)
PITPNM3	2 (<0.1%)
PITRM1	9 (<0.1%)
PITRM1-AS1	1 (<0.1%)
PITX3	1 (<0.1%)
PIWIL3	12 (<0.1%)
PKD1	2 (<0.1%)
PKD1L1	1 (<0.1%)
PKD1L2	18 (<0.1%)
PKN1	1 (<0.1%)
PKNOX1	4 (<0.1%)
PKNOX2	2 (<0.1%)
PKP1	2 (<0.1%)
PKP2	2 (<0.1%)
PLA2G10	2 (<0.1%)
PLA2G15	1 (<0.1%)
PLA2G4E	1 (<0.1%)
PLA2G5	2 (<0.1%)
PLA2G6	9 (<0.1%)
PLAAT3	2 (<0.1%)
PLAGL1	21 (<0.1%)
PLAT	8 (<0.1%)
PLAU	2 (<0.1%)
PLAUR	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PLB1	2 (<0.1%)
PLBD2	6 (<0.1%)
PLCB1	4 (<0.1%)
PLCB3	2 (<0.1%)
PLCD3	3 (<0.1%)
PLCD4	6 (<0.1%)
PLCE1	9 (<0.1%)
PLCG1	2 (<0.1%)
PLCG2	8 (<0.1%)
PLCH1	6 (<0.1%)
PLCL1	1 (<0.1%)
PLCXD2	2 (<0.1%)
PLCZ1	1 (<0.1%)
PLD1	10 (<0.1%)
PLD2	8 (<0.1%)
PLD3	20 (<0.1%)
PLEC	2 (<0.1%)
PLEK2	2 (<0.1%)
PLEKHA1	1 (<0.1%)
PLEKHA4	2 (<0.1%)
PLEKHA5	20 (<0.1%)
PLEKHA6	3 (<0.1%)
PLEKHA7	1 (<0.1%)
PLEKHA8P1	1 (<0.1%)
PLEKHB2	27 (<0.1%)
PLEKHG1	2 (<0.1%)
PLEKHG2	1 (<0.1%)
PLEKHG3	1 (<0.1%)
PLEKHG4B	1 (<0.1%)
PLEKHG5	33 (<0.1%)
PLEKHG6	3 (<0.1%)
PLEKHH1	3 (<0.1%)
PLEKHH2	1 (<0.1%)
PLEKHM2	7 (<0.1%)
PLEKHM3	2 (<0.1%)
PLEKHN1	2 (<0.1%)
PLEKHO1	1 (<0.1%)
PLEKHS1	4 (<0.1%)
PLIN2	2 (<0.1%)
PLIN3	21 (<0.1%)
PLIN4	1 (<0.1%)
PLIN5	3 (<0.1%)
PLK3	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PLK4	3 (<0.1%)
PLLP	1 (<0.1%)
PLOD1	5 (<0.1%)
PLOD3	7 (<0.1%)
PLPBP	3 (<0.1%)
PLPP1	3 (<0.1%)
PLPP3	4 (<0.1%)
PLPP5	6 (<0.1%)
PLPP7	2 (<0.1%)
PLPPR2	4 (<0.1%)
PLPPR3	12 (<0.1%)
PLS1	2 (<0.1%)
PLSCR1	1 (<0.1%)
PLTP	4 (<0.1%)
PLXDC1	3 (<0.1%)
PLXNA2	1 (<0.1%)
PLXNA4	2 (<0.1%)
PLXNB2	1 (<0.1%)
PLXNC1	7 (<0.1%)
PM20D2	1 (<0.1%)
PMEL	12 (<0.1%)
PML	18 (<0.1%)
PMPCA	6 (<0.1%)
PMS1	6 (<0.1%)
PNKD	10 (<0.1%)
PNKP	1 (<0.1%)
PNMA8A	2 (<0.1%)
PNN	2 (<0.1%)
PNPLA5	2 (<0.1%)
PNPLA6	30 (<0.1%)
PNPLA7	16 (<0.1%)
POC1A	3 (<0.1%)
PODN	4 (<0.1%)
PODNL1	3 (<0.1%)
PODXL2	1 (<0.1%)
POGLUT2	1 (<0.1%)
POGLUT3	3 (<0.1%)
POLA2	2 (<0.1%)
POLD1	6 (<0.1%)
POLD2	3 (<0.1%)
POLE	8 (<0.1%)
POLH	2 (<0.1%)
POLK	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
POLL	8 (<0.1%)
POLN	2 (<0.1%)
POLQ	2 (<0.1%)
POLR1A	3 (<0.1%)
POLR1G	1 (<0.1%)
POLR2A	5 (<0.1%)
POLR2B	2 (<0.1%)
POLR2E	3 (<0.1%)
POLR2F	1 (<0.1%)
POLR2H	12 (<0.1%)
POLR3A	5 (<0.1%)
POLR3C	2 (<0.1%)
POLR3E	24 (<0.1%)
POLR3K	1 (<0.1%)
POMGNT1	8 (<0.1%)
POMT2	3 (<0.1%)
POPDC3	1 (<0.1%)
POR	8 (<0.1%)
POU2F1	3 (<0.1%)
POU2F3	2 (<0.1%)
POU5F1	2 (<0.1%)
POU6F1	1 (<0.1%)
POU6F2	4 (<0.1%)
PP2D1	2 (<0.1%)
PPA1	1 (<0.1%)
PPAN	2 (<0.1%)
PPAN-P2RY11	8 (<0.1%)
PPARA	16 (<0.1%)
PPARD	15 (<0.1%)
PPARG	4 (<0.1%)
PPARGC1B	5 (<0.1%)
PPCDC	1 (<0.1%)
PPCS	1 (<0.1%)
PPFIA1	12 (<0.1%)
PPFIA3	4 (<0.1%)
PPFIA4	1 (<0.1%)
PPFIBP1	8 (<0.1%)
PPID	1 (<0.1%)
PPIEL	3 (<0.1%)
PPIL1	2 (<0.1%)
PPIL2	12 (<0.1%)
PPIL6	10 (<0.1%)
PPL	5 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PPM1A	3 (<0.1%)
PPM1E	2 (<0.1%)
PPM1F	4 (<0.1%)
PPM1G	1 (<0.1%)
PPM1H	4 (<0.1%)
PPOX	2 (<0.1%)
PPP1CA	3 (<0.1%)
PPP1CC	2 (<0.1%)
PPP1R12A	5 (<0.1%)
PPP1R12B	6 (<0.1%)
PPP1R13B	3 (<0.1%)
PPP1R13L	4 (<0.1%)
PPP1R14A	6 (<0.1%)
PPP1R14C	1 (<0.1%)
PPP1R16B	4 (<0.1%)
PPP1R1B	3 (<0.1%)
PPP1R1C	5 (<0.1%)
PPP1R21	4 (<0.1%)
PPP1R26-AS1	5 (<0.1%)
PPP1R27	1 (<0.1%)
PPP1R36	1 (<0.1%)
PPP1R37	3 (<0.1%)
PPP1R3B	2 (<0.1%)
PPP1R3E	2 (<0.1%)
PPP1R7	18 (<0.1%)
PPP1R8	9 (<0.1%)
PPP1R9A	5 (<0.1%)
PPP2R1B	5 (<0.1%)
PPP2R2C	7 (<0.1%)
PPP2R2D	2 (<0.1%)
PPP2R3A	3 (<0.1%)
PPP2R3C	1 (<0.1%)
PPP2R5A	4 (<0.1%)
PPP2R5B	2 (<0.1%)
PPP2R5C	30 (<0.1%)
PPP2R5E	6 (<0.1%)
PPP3CC	3 (<0.1%)
PPP3R1	1 (<0.1%)
PPP4R1L	3 (<0.1%)
PPP4R2	2 (<0.1%)
PPP4R3A	4 (<0.1%)
PPP4R4	1 (<0.1%)
PPP5D1P	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PPP6R1	1 (<0.1%)
PPP6R2	16 (<0.1%)
PPP6R3	12 (<0.1%)
PPRC1	3 (<0.1%)
PPT1	2 (<0.1%)
PPT2	6 (<0.1%)
PPT2-EGFL8	4 (<0.1%)
PPTC7	2 (<0.1%)
PRAG1	3 (<0.1%)
PRAM1	6 (<0.1%)
PRAME	15 (<0.1%)
PRC1	15 (<0.1%)
PRC1-AS1	1 (<0.1%)
PRDM10	4 (<0.1%)
PRDM12	2 (<0.1%)
PRDM15	45 (0.1%)
PRDM16	6 (<0.1%)
PRDM2	5 (<0.1%)
PRDX2	1 (<0.1%)
PRDX3	2 (<0.1%)
PRELID3A	2 (<0.1%)
PREP	2 (<0.1%)
PREPL	7 (<0.1%)
PREX1	3 (<0.1%)
PRG2	2 (<0.1%)
PRH1-PRR4	1 (<0.1%)
PRICKLE1	5 (<0.1%)
PRICKLE2	1 (<0.1%)
PRICKLE2-AS1	1 (<0.1%)
PRIMA1	2 (<0.1%)
PRIMPOL	1 (<0.1%)
PRKAA1	2 (<0.1%)
PRKACA	2 (<0.1%)
PRKAG1	3 (<0.1%)
PRKAG2	11 (<0.1%)
PRKAR1A	2 (<0.1%)
PRKAR1B	111 (0.3%)
PRKAR2A	1 (<0.1%)
PRKAR2B	1 (<0.1%)
PRKCA	10 (<0.1%)
PRKCD	2 (<0.1%)
PRKCE	5 (<0.1%)
PRKCG	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PRKCH	3 (<0.1%)
PRKCQ	16 (<0.1%)
PRKCSH	10 (<0.1%)
PRKCZ	65 (0.2%)
PRKD2	20 (<0.1%)
PRKD3	1 (<0.1%)
PRKDC	6 (<0.1%)
PRKN	6 (<0.1%)
PRKRIP1	5 (<0.1%)
PRLR	19 (<0.1%)
PRMT1	4 (<0.1%)
PRMT2	16 (<0.1%)
PRMT3	3 (<0.1%)
PRMT5	12 (<0.1%)
PRMT7	12 (<0.1%)
PRNT	3 (<0.1%)
PRODH	4 (<0.1%)
PROKR1	1 (<0.1%)
PROM1	14 (<0.1%)
PROSER2	4 (<0.1%)
PROSER2-AS1	6 (<0.1%)
PRPF18	2 (<0.1%)
PRPF31	6 (<0.1%)
PRPF40B	2 (<0.1%)
PRPF6	5 (<0.1%)
PRPF8	8 (<0.1%)
PRPSAP1	3 (<0.1%)
PRPSAP2	10 (<0.1%)
PRR11	1 (<0.1%)
PRR12	4 (<0.1%)
PRR14	1 (<0.1%)
PRR23A	1 (<0.1%)
PRR25	2 (<0.1%)
PRR3	4 (<0.1%)
PRR5	29 (<0.1%)
PRR5-ARHGAP8	5 (<0.1%)
PRR5L	4 (<0.1%)
PRRC2A	10 (<0.1%)
PRRC2B	1 (<0.1%)
PRRG4	1 (<0.1%)
PRRT3	2 (<0.1%)
PRRT3-AS1	1 (<0.1%)
PRRX1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PRRX2	7 (<0.1%)
PRSS27	2 (<0.1%)
PRSS36	3 (<0.1%)
PRSS46P	1 (<0.1%)
PRSS48	1 (<0.1%)
PRSS54	3 (<0.1%)
PRSS55	4 (<0.1%)
PRSS57	1 (<0.1%)
PRTFDC1	2 (<0.1%)
PRTN3	2 (<0.1%)
PRUNE1	2 (<0.1%)
PRUNE2	2 (<0.1%)
PRX	2 (<0.1%)
PRXL2C	1 (<0.1%)
PSD3	2 (<0.1%)
PSEN1	2 (<0.1%)
PSEN2	4 (<0.1%)
PSKH1	1 (<0.1%)
PSMA3-AS1	2 (<0.1%)
PSMA6	1 (<0.1%)
PSMA8	3 (<0.1%)
PSMB5	6 (<0.1%)
PSMB6	2 (<0.1%)
PSMB7	1 (<0.1%)
PSMB8	2 (<0.1%)
PSMB8-AS1	4 (<0.1%)
PSMB9	2 (<0.1%)
PSMC3IP	8 (<0.1%)
PSMD1	18 (<0.1%)
PSMD14	1 (<0.1%)
PSMD2	3 (<0.1%)
PSMD7-DT	1 (<0.1%)
PSMD9	12 (<0.1%)
PSME3IP1	1 (<0.1%)
PSME4	1 (<0.1%)
PSMG3-AS1	3 (<0.1%)
PSORS1C1	4 (<0.1%)
PSORS1C3	1 (<0.1%)
PSPH	2 (<0.1%)
PSTPIP1	1 (<0.1%)
PSTPIP2	2 (<0.1%)
PTAFR	18 (<0.1%)
PTCD1	5 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PTCD2	8 (<0.1%)
PTCD3	1 (<0.1%)
PTCH1	7 (<0.1%)
PTCRA	4 (<0.1%)
PTDSS1	4 (<0.1%)
PTDSS2	4 (<0.1%)
PTER	10 (<0.1%)
PTGER2	1 (<0.1%)
PTGES2	6 (<0.1%)
PTGES3L-AARSD1	6 (<0.1%)
PTGIR	4 (<0.1%)
PTGIS	2 (<0.1%)
PTGR2	9 (<0.1%)
PTH1R	4 (<0.1%)
PTK2	18 (<0.1%)
PTK2B	8 (<0.1%)
PTK6	2 (<0.1%)
PTK7	28 (<0.1%)
PTN	1 (<0.1%)
PTOV1-AS1	2 (<0.1%)
PTP4A2	4 (<0.1%)
PTPA	18 (<0.1%)
PTPN1	4 (<0.1%)
PTPN13	4 (<0.1%)
PTPN14	2 (<0.1%)
PTPN18	2 (<0.1%)
PTPN2	4 (<0.1%)
PTPN21	5 (<0.1%)
PTPN22	3 (<0.1%)
PTPN23	2 (<0.1%)
PTPN3	16 (<0.1%)
PTPN9	1 (<0.1%)
PTPRC	4 (<0.1%)
PTPRD	12 (<0.1%)
PTPRF	6 (<0.1%)
PTPRG	4 (<0.1%)
PTPRJ	6 (<0.1%)
PTPRK	2 (<0.1%)
PTPRM	4 (<0.1%)
PTPRN	3 (<0.1%)
PTPRN2	21 (<0.1%)
PTPRO	2 (<0.1%)
PTPRR	10 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
PTPRS	76 (0.2%)
PTPRU	4 (<0.1%)
PTRH2	2 (<0.1%)
PTRHD1	1 (<0.1%)
PTTG1IP	3 (<0.1%)
PTX3	1 (<0.1%)
PUM1	2 (<0.1%)
PUS1	3 (<0.1%)
PUS10	1 (<0.1%)
PVALEF	1 (<0.1%)
PVR	4 (<0.1%)
PVT1	4 (<0.1%)
PWP1	1 (<0.1%)
PWWP2A	2 (<0.1%)
PWWP3A	2 (<0.1%)
PXDN	4 (<0.1%)
PXK	21 (<0.1%)
PXMP2	1 (<0.1%)
PXMP4	2 (<0.1%)
PXN	22 (<0.1%)
PXYLP1	3 (<0.1%)
PYGL	4 (<0.1%)
PYGM	2 (<0.1%)
PYM1	2 (<0.1%)
PYROXD2	1 (<0.1%)
PYY	3 (<0.1%)
PZP	1 (<0.1%)
QARS1	6 (<0.1%)
QPCT	2 (<0.1%)
QPRT	7 (<0.1%)
QRICH1	12 (<0.1%)
QSOX2	1 (<0.1%)
QTRT2	4 (<0.1%)
R3HDM1	4 (<0.1%)
R3HDM2	3 (<0.1%)
R3HDM4	1 (<0.1%)
R3HDML	2 (<0.1%)
RAB10	3 (<0.1%)
RAB11B-AS1	1 (<0.1%)
RAB11FIP1	4 (<0.1%)
RAB11FIP3	22 (<0.1%)
RAB11FIP4	1 (<0.1%)
RAB11FIP5	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RAB14	1 (<0.1%)
RAB15	1 (<0.1%)
RAB18	6 (<0.1%)
RAB19	1 (<0.1%)
RAB1A	6 (<0.1%)
RAB1B	1 (<0.1%)
RAB20	1 (<0.1%)
RAB25	1 (<0.1%)
RAB29	4 (<0.1%)
RAB2B	3 (<0.1%)
RAB30	3 (<0.1%)
RAB31	1 (<0.1%)
RAB35	6 (<0.1%)
RAB36	2 (<0.1%)
RAB37	1 (<0.1%)
RAB3B	5 (<0.1%)
RAB3GAP1	2 (<0.1%)
RAB3GAP2	1 (<0.1%)
RAB3IP	8 (<0.1%)
RAB40B	9 (<0.1%)
RAB40C	45 (0.1%)
RAB44	1 (<0.1%)
RAB4A	3 (<0.1%)
RAB4B	2 (<0.1%)
RAB4B-EGLN2	2 (<0.1%)
RAB5B	6 (<0.1%)
RAB6B	1 (<0.1%)
RAB8A	1 (<0.1%)
RABEP1	6 (<0.1%)
RABEP2	7 (<0.1%)
RABGAP1L	2 (<0.1%)
RABGEF1	4 (<0.1%)
RABGEF1P1	1 (<0.1%)
RABIF	1 (<0.1%)
RABL6	25 (<0.1%)
RAC1	4 (<0.1%)
RACK1	1 (<0.1%)
RAD21	1 (<0.1%)
RAD51-AS1	1 (<0.1%)
RAD51AP1	2 (<0.1%)
RAD51B	12 (<0.1%)
RAD51C	4 (<0.1%)
RAD51D	15 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RAD51L3-RFFL	7 (<0.1%)
RAD52	1 (<0.1%)
RAD54L	2 (<0.1%)
RAD54L2	1 (<0.1%)
RAD9A	1 (<0.1%)
RAD9B	7 (<0.1%)
RADIL	6 (<0.1%)
RAET1E	1 (<0.1%)
RAET1E-AS1	2 (<0.1%)
RAF1	2 (<0.1%)
RAI1	3 (<0.1%)
RAI14	15 (<0.1%)
RALA	1 (<0.1%)
RALBP1	3 (<0.1%)
RALGAPA1	4 (<0.1%)
RALGAPA1P1	1 (<0.1%)
RALGAPA2	1 (<0.1%)
RALGDS	4 (<0.1%)
RALGPS1	6 (<0.1%)
RALGPS2	2 (<0.1%)
RALY	6 (<0.1%)
RAMP1	2 (<0.1%)
RANBP10	1 (<0.1%)
RANBP17	1 (<0.1%)
RANBP3	3 (<0.1%)
RANBP3-DT	7 (<0.1%)
RANGAP1	2 (<0.1%)
RAP1B	6 (<0.1%)
RAP1GAP	11 (<0.1%)
RAP1GAP2	12 (<0.1%)
RAPGEF1	11 (<0.1%)
RAPGEF2	1 (<0.1%)
RAPGEF6	6 (<0.1%)
RAPGEFL1	1 (<0.1%)
RAPSN	4 (<0.1%)
RARA	6 (<0.1%)
RARRES1	11 (<0.1%)
RASA1	4 (<0.1%)
RASA2	1 (<0.1%)
RASA3	3 (<0.1%)
RASAL1	9 (<0.1%)
RASAL3	1 (<0.1%)
RASD2	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RASGEF1C	3 (<0.1%)
RASGRF1	13 (<0.1%)
RASGRF2	1 (<0.1%)
RASGRP1	2 (<0.1%)
RASGRP3	14 (<0.1%)
RASGRP4	21 (<0.1%)
RASIP1	6 (<0.1%)
RASL10B	1 (<0.1%)
RASSF1	13 (<0.1%)
RASSF3	10 (<0.1%)
RASSF8	4 (<0.1%)
RB1	3 (<0.1%)
RBFADN	1 (<0.1%)
RBFOX1	16 (<0.1%)
RBFOX2	12 (<0.1%)
RBFOX3	3 (<0.1%)
RBKS	4 (<0.1%)
RBL1	4 (<0.1%)
RBL2	2 (<0.1%)
RBM12B	1 (<0.1%)
RBM18	6 (<0.1%)
RBM19	12 (<0.1%)
RBM20	3 (<0.1%)
RBM23	9 (<0.1%)
RBM26	6 (<0.1%)
RBM33	1 (<0.1%)
RBM34	2 (<0.1%)
RBM38	2 (<0.1%)
RBM39	7 (<0.1%)
RBM42	1 (<0.1%)
RBM45	1 (<0.1%)
RBM47	9 (<0.1%)
RBM4B	2 (<0.1%)
RBM5	6 (<0.1%)
RBM6	10 (<0.1%)
RBMS1	4 (<0.1%)
RBMS2	1 (<0.1%)
RBPJL	15 (<0.1%)
RBPMS	4 (<0.1%)
RBPMS2	6 (<0.1%)
RBSN	2 (<0.1%)
RC3H1	2 (<0.1%)
RC3H2	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RCAN1	17 (<0.1%)
RCAN2	2 (<0.1%)
RCAN3	44 (0.1%)
RCBTB1	1 (<0.1%)
RCBTB2	8 (<0.1%)
RCC1	13 (<0.1%)
RCC1L	9 (<0.1%)
RCCD1	2 (<0.1%)
RCN3	1 (<0.1%)
RCOR2	2 (<0.1%)
RCSD1	4 (<0.1%)
RDH12	3 (<0.1%)
RDH13	1 (<0.1%)
RDM1P5	2 (<0.1%)
RDX	6 (<0.1%)
RECQL5	1 (<0.1%)
REEP1	4 (<0.1%)
REEP5	1 (<0.1%)
REL	3 (<0.1%)
REL-DT	3 (<0.1%)
RELA	4 (<0.1%)
RELB	5 (<0.1%)
RELN	2 (<0.1%)
RELT	2 (<0.1%)
REN	2 (<0.1%)
REPS1	4 (<0.1%)
RERE	17 (<0.1%)
RESF1	5 (<0.1%)
RET	2 (<0.1%)
RETREG1-AS1	1 (<0.1%)
RETSAT	1 (<0.1%)
REXO1	2 (<0.1%)
REXO4	6 (<0.1%)
RFC1	2 (<0.1%)
RFC2	20 (<0.1%)
RFC4	2 (<0.1%)
RFC5	4 (<0.1%)
RFFL	3 (<0.1%)
RFLNA	1 (<0.1%)
RFLNB	2 (<0.1%)
RFPL3	1 (<0.1%)
RFPL4B	1 (<0.1%)
RFX1	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RFX2	32 (<0.1%)
RFX4	5 (<0.1%)
RFX8	2 (<0.1%)
RGL1	2 (<0.1%)
RGL3	24 (<0.1%)
RGMA	6 (<0.1%)
RGMB	2 (<0.1%)
RGS10	6 (<0.1%)
RGS11	4 (<0.1%)
RGS12	11 (<0.1%)
RGS20	23 (<0.1%)
RGS3	8 (<0.1%)
RGS6	20 (<0.1%)
RGS7	4 (<0.1%)
RGS9	6 (<0.1%)
RGSL1	1 (<0.1%)
RHBDD1	2 (<0.1%)
RHBDD2	2 (<0.1%)
RHBDD3	3 (<0.1%)
RHBDF2	13 (<0.1%)
RHBDL2	2 (<0.1%)
RHBG	4 (<0.1%)
RHEB	1 (<0.1%)
RHNO1	21 (<0.1%)
RHOA	5 (<0.1%)
RHOBTB1	2 (<0.1%)
RHOBTB2	8 (<0.1%)
RHOBTB3	1 (<0.1%)
RHOD	2 (<0.1%)
RHOF	2 (<0.1%)
RHOG	2 (<0.1%)
RHOQ	1 (<0.1%)
RIBC2	1 (<0.1%)
RIC8A	2 (<0.1%)
RIC8B	1 (<0.1%)
RILP	1 (<0.1%)
RILPL1	3 (<0.1%)
RIMBP2	2 (<0.1%)
RIMS3	1 (<0.1%)
RIN3	5 (<0.1%)
RINL	4 (<0.1%)
RINT1	1 (<0.1%)
RIOK2	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RIOX2	4 (<0.1%)
RIPK4	1 (<0.1%)
RIPOR1	3 (<0.1%)
RIPOR2	1 (<0.1%)
RIPOR3	28 (<0.1%)
RIPPLY3	1 (<0.1%)
RLBP1	2 (<0.1%)
RLF	1 (<0.1%)
RLN3	1 (<0.1%)
RMDN2-AS1	1 (<0.1%)
RMI2	1 (<0.1%)
RMND1	2 (<0.1%)
RMND5B	6 (<0.1%)
RNASE11	1 (<0.1%)
RNASE4	3 (<0.1%)
RNASEH1-DT	3 (<0.1%)
RNASEH2A	2 (<0.1%)
RNASEH2B-AS1	1 (<0.1%)
RNASET2	1 (<0.1%)
RND2	2 (<0.1%)
RNF10	1 (<0.1%)
RNF11	2 (<0.1%)
RNF111	4 (<0.1%)
RNF114	1 (<0.1%)
RNF121	3 (<0.1%)
RNF123	1 (<0.1%)
RNF130	2 (<0.1%)
RNF139	1 (<0.1%)
RNF139-DT	1 (<0.1%)
RNF144A	1 (<0.1%)
RNF145	5 (<0.1%)
RNF149	1 (<0.1%)
RNF157	5 (<0.1%)
RNF167	1 (<0.1%)
RNF17	2 (<0.1%)
RNF185	6 (<0.1%)
RNF19A	2 (<0.1%)
RNF19B	6 (<0.1%)
RNF212	3 (<0.1%)
RNF212B	2 (<0.1%)
RNF213	16 (<0.1%)
RNF213-AS1	7 (<0.1%)
RNF214	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RNF216	12 (<0.1%)
RNF217	3 (<0.1%)
RNF220	4 (<0.1%)
RNF222	1 (<0.1%)
RNF25	1 (<0.1%)
RNF31	3 (<0.1%)
RNF32	3 (<0.1%)
RNF32-DT	1 (<0.1%)
RNF40	4 (<0.1%)
RNF41	5 (<0.1%)
RNFT2	2 (<0.1%)
RNMT	1 (<0.1%)
RNPEP	1 (<0.1%)
RNPS1	18 (<0.1%)
RNU5F-1	6 (<0.1%)
ROBO1	4 (<0.1%)
ROBO2	9 (<0.1%)
ROBO3	1 (<0.1%)
ROCK2	2 (<0.1%)
ROPN1L	2 (<0.1%)
ROR1	2 (<0.1%)
ROR2	2 (<0.1%)
RORA	24 (<0.1%)
RORC	2 (<0.1%)
ROS1	1 (<0.1%)
RPA1	8 (<0.1%)
RPAP1	1 (<0.1%)
RPAP3	3 (<0.1%)
RPGRIP1	4 (<0.1%)
RPGRIP1L	2 (<0.1%)
RPH3AL	40 (0.1%)
RPL17	8 (<0.1%)
RPL17-C18orf32	2 (<0.1%)
RPL22	1 (<0.1%)
RPL24	1 (<0.1%)
RPL26L1-AS1	2 (<0.1%)
RPL32P3	1 (<0.1%)
RPL3L	1 (<0.1%)
RPL5	1 (<0.1%)
RPLP2	1 (<0.1%)
RPN2	4 (<0.1%)
RPP14	12 (<0.1%)
RPP38	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RPS10-NUDT3	2 (<0.1%)
RPS6KA1	2 (<0.1%)
RPS6KA2	10 (<0.1%)
RPS6KA4	6 (<0.1%)
RPS6KA5	4 (<0.1%)
RPS6KL1	2 (<0.1%)
RPS7	1 (<0.1%)
RPSA	1 (<0.1%)
RPTOR	40 (0.1%)
RPUSD3	10 (<0.1%)
RPUSD4	2 (<0.1%)
RRAD	2 (<0.1%)
RRAS2	4 (<0.1%)
RRBP1	2 (<0.1%)
RREB1	12 (<0.1%)
RRP1	1 (<0.1%)
RRP12	12 (<0.1%)
RRP1B	1 (<0.1%)
RRP7A	1 (<0.1%)
RSBN1	1 (<0.1%)
RSF1	5 (<0.1%)
RSPH1	2 (<0.1%)
RSPH14	1 (<0.1%)
RSPO1	4 (<0.1%)
RSPRY1	2 (<0.1%)
RSRC2	8 (<0.1%)
RSRP1	1 (<0.1%)
RSU1	2 (<0.1%)
RSU1P2	1 (<0.1%)
RTCA	2 (<0.1%)
RTF1	3 (<0.1%)
RTN4RL1	3 (<0.1%)
RUBCN	2 (<0.1%)
RUBCNL	14 (<0.1%)
RUFY1	13 (<0.1%)
RUFY2	8 (<0.1%)
RUFY3	8 (<0.1%)
RUND3A-AS1	1 (<0.1%)
RUNX1	2 (<0.1%)
RUNX1T1	15 (<0.1%)
RUNX2	3 (<0.1%)
RUSC1	9 (<0.1%)
RUSC2	5 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
RUSF1	1 (<0.1%)
RUVBL1	2 (<0.1%)
RUVBL2	1 (<0.1%)
RWDD2B	1 (<0.1%)
RWDD4	2 (<0.1%)
RXRA	1 (<0.1%)
RXYLT1	2 (<0.1%)
RYR1	30 (<0.1%)
RYR2	2 (<0.1%)
RYR3	4 (<0.1%)
S100A12	1 (<0.1%)
S100A13	1 (<0.1%)
S100PBP	4 (<0.1%)
S1PR2	2 (<0.1%)
SACS	5 (<0.1%)
SAE1	4 (<0.1%)
SAFB	8 (<0.1%)
SAFB2	2 (<0.1%)
SAG	4 (<0.1%)
SAMD14	2 (<0.1%)
SAMD4A	5 (<0.1%)
SAMSN1	1 (<0.1%)
SANBR	1 (<0.1%)
SAP30BP	3 (<0.1%)
SARDH	2 (<0.1%)
SARNP	3 (<0.1%)
SARS1	2 (<0.1%)
SART1	4 (<0.1%)
SART3	1 (<0.1%)
SASH1	2 (<0.1%)
SAV1	1 (<0.1%)
SBF2	5 (<0.1%)
SBF2-AS1	1 (<0.1%)
SBK1	4 (<0.1%)
SBNO2	11 (<0.1%)
SBSPON	1 (<0.1%)
SCAF1	1 (<0.1%)
SCAF11	2 (<0.1%)
SCAMP1-AS1	1 (<0.1%)
SCAMP2	1 (<0.1%)
SCAMP3	6 (<0.1%)
SCAMP4	5 (<0.1%)
SCAMP5	8 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SCAP	2 (<0.1%)
SCAPER	3 (<0.1%)
SCARA3	2 (<0.1%)
SCARA5	2 (<0.1%)
SCARB1	16 (<0.1%)
SCARB2	2 (<0.1%)
SCARF2	2 (<0.1%)
SCART1	1 (<0.1%)
SCAT1	2 (<0.1%)
SCHIP1	9 (<0.1%)
SCIMP	8 (<0.1%)
SCLY	2 (<0.1%)
SCMH1	14 (<0.1%)
SCN1A	1 (<0.1%)
SCN1A-AS1	1 (<0.1%)
SCN4A	3 (<0.1%)
SCN5A	6 (<0.1%)
SCN9A	1 (<0.1%)
SCNM1	3 (<0.1%)
SCNN1A	3 (<0.1%)
SCNN1B	5 (<0.1%)
SCPEP1	1 (<0.1%)
SCRIB	2 (<0.1%)
SCRN1	4 (<0.1%)
SCTR	2 (<0.1%)
SCUBE1	2 (<0.1%)
SCUBE2	6 (<0.1%)
SCYL1	12 (<0.1%)
SDAD1	3 (<0.1%)
SDC3	2 (<0.1%)
SDCBP2	3 (<0.1%)
SDCBP2-AS1	6 (<0.1%)
SDCCAG8	3 (<0.1%)
SDE2	1 (<0.1%)
SDF4	6 (<0.1%)
SDK1	16 (<0.1%)
SDK2	9 (<0.1%)
SDS	1 (<0.1%)
SDSL	2 (<0.1%)
SEC14L1	35 (0.1%)
SEC14L2	14 (<0.1%)
SEC14L4	8 (<0.1%)
SEC14L5	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SEC14L6	2 (<0.1%)
SEC16A	8 (<0.1%)
SEC1P	2 (<0.1%)
SEC22C	2 (<0.1%)
SEC23A	2 (<0.1%)
SEC23B	5 (<0.1%)
SEC24C	2 (<0.1%)
SEC31A	24 (<0.1%)
SEC31B	1 (<0.1%)
SEC61A1	1 (<0.1%)
SEC61G-DT	1 (<0.1%)
SEC62	2 (<0.1%)
SEL1L	3 (<0.1%)
SEL1L2	3 (<0.1%)
SEL1L3	1 (<0.1%)
SELENON	2 (<0.1%)
SELENOO	2 (<0.1%)
SELL	2 (<0.1%)
SELPLG	1 (<0.1%)
SEMA3D	1 (<0.1%)
SEMA4A	24 (<0.1%)
SEMA4B	10 (<0.1%)
SEMA4D	6 (<0.1%)
SEMA4G	4 (<0.1%)
SEMA5B	5 (<0.1%)
SEMA6A	1 (<0.1%)
SEMA6A-AS1	1 (<0.1%)
SEMA6B	1 (<0.1%)
SEMA6D	1 (<0.1%)
SENP3-EIF4A1	1 (<0.1%)
SENP5	2 (<0.1%)
SENP6	4 (<0.1%)
SENP7	6 (<0.1%)
SEPHS1	3 (<0.1%)
SEPTIN1	1 (<0.1%)
SEPTIN10	6 (<0.1%)
SEPTIN11	1 (<0.1%)
SEPTIN12	4 (<0.1%)
SEPTIN2	18 (<0.1%)
SEPTIN3	4 (<0.1%)
SEPTIN4-AS1	2 (<0.1%)
SEPTIN7	6 (<0.1%)
SEPTIN7P11	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SEPTIN9	49 (0.1%)
SERBP1	4 (<0.1%)
SERF2	3 (<0.1%)
SERGEF	3 (<0.1%)
SERHL2	8 (<0.1%)
SERINC5	6 (<0.1%)
SERPINA4	3 (<0.1%)
SERPINB5	2 (<0.1%)
SERPIND1	3 (<0.1%)
SERPINE1	3 (<0.1%)
SERPINE2	12 (<0.1%)
SERPINF1	3 (<0.1%)
SERPINF2	12 (<0.1%)
SERPING1	10 (<0.1%)
SERPINH1	2 (<0.1%)
SESN1	3 (<0.1%)
SESN2	1 (<0.1%)
SET	4 (<0.1%)
SETD1A	6 (<0.1%)
SETD1B	3 (<0.1%)
SETD2	2 (<0.1%)
SETD3	2 (<0.1%)
SETD4	5 (<0.1%)
SETD5	1 (<0.1%)
SETD9	2 (<0.1%)
SEZ6	3 (<0.1%)
SEZ6L2	42 (0.1%)
SF3A1	2 (<0.1%)
SF3B2	2 (<0.1%)
SF3B3	1 (<0.1%)
SF3B6	1 (<0.1%)
SFI1	10 (<0.1%)
SFMBT2	2 (<0.1%)
SFRP1	2 (<0.1%)
SFSWAP	26 (<0.1%)
SFTPB	2 (<0.1%)
SFXN5	3 (<0.1%)
SGCA	4 (<0.1%)
SGF29	1 (<0.1%)
SGK1	2 (<0.1%)
SGMS2	1 (<0.1%)
SGPL1	2 (<0.1%)
SGPP2	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SGSM2	16 (<0.1%)
SGSM3	3 (<0.1%)
SGTA	3 (<0.1%)
SGTB	1 (<0.1%)
SH2B1	5 (<0.1%)
SH2B3	2 (<0.1%)
SH2D3A	1 (<0.1%)
SH2D3C	25 (<0.1%)
SH3BP4	7 (<0.1%)
SH3BP5	8 (<0.1%)
SH3D19	10 (<0.1%)
SH3D21	8 (<0.1%)
SH3PXD2A	9 (<0.1%)
SH3PXD2B	5 (<0.1%)
SH3RF1	3 (<0.1%)
SH3RF3	4 (<0.1%)
SH3TC1	1 (<0.1%)
SHANK1	4 (<0.1%)
SHANK2	33 (<0.1%)
SHARPIN	2 (<0.1%)
SHB	2 (<0.1%)
SHBG	4 (<0.1%)
SHC1	10 (<0.1%)
SHC2	2 (<0.1%)
SHC3	1 (<0.1%)
SHD	1 (<0.1%)
SHE	1 (<0.1%)
SHF	1 (<0.1%)
SHFL	1 (<0.1%)
SHISA5	20 (<0.1%)
SHKBP1	1 (<0.1%)
SHLD1	1 (<0.1%)
SHLD2	1 (<0.1%)
SHMT1	6 (<0.1%)
SHOC1	1 (<0.1%)
SHPK	3 (<0.1%)
SHROOM1	2 (<0.1%)
SHROOM3	5 (<0.1%)
SIAE	2 (<0.1%)
SIAH1	2 (<0.1%)
SIDT1	1 (<0.1%)
SIDT2	2 (<0.1%)
SIGLEC1	1 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
SIGLEC11	2 (<0.1%)
SIK3	3 (<0.1%)
SIL1	6 (<0.1%)
SIM1	1 (<0.1%)
SIM2	3 (<0.1%)
SIMC1	1 (<0.1%)
SINHCAF	3 (<0.1%)
SIPA1	2 (<0.1%)
SIPA1L3	20 (<0.1%)
SIRT1	6 (<0.1%)
SIRT2	27 (<0.1%)
SIRT3	8 (<0.1%)
SIRT4	2 (<0.1%)
SIRT5	4 (<0.1%)
SIRT7	1 (<0.1%)
SKA1	2 (<0.1%)
SKA3	2 (<0.1%)
SKAP1	6 (<0.1%)
SKI	3 (<0.1%)
SLA	8 (<0.1%)
SLA2	2 (<0.1%)
SLBP	2 (<0.1%)
SLC11A1	1 (<0.1%)
SLC12A3	12 (<0.1%)
SLC12A6	11 (<0.1%)
SLC12A8	8 (<0.1%)
SLC12A9	18 (<0.1%)
SLC13A2	2 (<0.1%)
SLC13A3	2 (<0.1%)
SLC13A4	1 (<0.1%)
SLC15A3	2 (<0.1%)
SLC15A4	1 (<0.1%)
SLC16A1	2 (<0.1%)
SLC16A10	2 (<0.1%)
SLC16A14	2 (<0.1%)
SLC16A5	6 (<0.1%)
SLC16A6	2 (<0.1%)
SLC16A8	1 (<0.1%)
SLC17A2	1 (<0.1%)
SLC17A5	1 (<0.1%)
SLC17A7	1 (<0.1%)
SLC18A2	1 (<0.1%)
SLC19A1	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SLC19A3	6 (<0.1%)
SLC1A3	8 (<0.1%)
SLC1A6	3 (<0.1%)
SLC20A2	14 (<0.1%)
SLC22A11	1 (<0.1%)
SLC22A18	3 (<0.1%)
SLC22A2	2 (<0.1%)
SLC22A20P	2 (<0.1%)
SLC22A23	19 (<0.1%)
SLC22A4	1 (<0.1%)
SLC22A6	4 (<0.1%)
SLC23A2	2 (<0.1%)
SLC24A1	1 (<0.1%)
SLC24A4	9 (<0.1%)
SLC25A10	6 (<0.1%)
SLC25A12	2 (<0.1%)
SLC25A15	1 (<0.1%)
SLC25A17	7 (<0.1%)
SLC25A18	4 (<0.1%)
SLC25A19	9 (<0.1%)
SLC25A21	6 (<0.1%)
SLC25A23	1 (<0.1%)
SLC25A25	4 (<0.1%)
SLC25A29	1 (<0.1%)
SLC25A31	1 (<0.1%)
SLC25A35	2 (<0.1%)
SLC25A37	2 (<0.1%)
SLC25A41	2 (<0.1%)
SLC25A42	6 (<0.1%)
SLC25A45	4 (<0.1%)
SLC25A46	1 (<0.1%)
SLC25A47	1 (<0.1%)
SLC26A1	3 (<0.1%)
SLC26A11	16 (<0.1%)
SLC26A4	1 (<0.1%)
SLC26A5	10 (<0.1%)
SLC26A8	3 (<0.1%)
SLC26A9	4 (<0.1%)
SLC27A1	6 (<0.1%)
SLC27A2	4 (<0.1%)
SLC27A4	1 (<0.1%)
SLC28A1	17 (<0.1%)
SLC29A1	5 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SLC29A3	12 (<0.1%)
SLC2A11	10 (<0.1%)
SLC2A14	6 (<0.1%)
SLC2A6	4 (<0.1%)
SLC2A7	4 (<0.1%)
SLC2A9	1 (<0.1%)
SLC30A10	2 (<0.1%)
SLC30A6	4 (<0.1%)
SLC34A1	2 (<0.1%)
SLC35A1	6 (<0.1%)
SLC35B4	3 (<0.1%)
SLC35C1	3 (<0.1%)
SLC35E1	2 (<0.1%)
SLC35E2A	2 (<0.1%)
SLC35E2B	12 (<0.1%)
SLC35E3	1 (<0.1%)
SLC35F3	2 (<0.1%)
SLC35F6	1 (<0.1%)
SLC36A1	1 (<0.1%)
SLC36A2	1 (<0.1%)
SLC37A3	6 (<0.1%)
SLC38A1	6 (<0.1%)
SLC38A10	14 (<0.1%)
SLC38A3	1 (<0.1%)
SLC38A6	8 (<0.1%)
SLC38A7	1 (<0.1%)
SLC38A8	4 (<0.1%)
SLC38A9	2 (<0.1%)
SLC39A11	10 (<0.1%)
SLC39A13	2 (<0.1%)
SLC39A14	4 (<0.1%)
SLC39A3	2 (<0.1%)
SLC39A5	6 (<0.1%)
SLC3A1	1 (<0.1%)
SLC3A2	5 (<0.1%)
SLC43A2	26 (<0.1%)
SLC43A3	5 (<0.1%)
SLC44A2	6 (<0.1%)
SLC44A3	6 (<0.1%)
SLC44A3-AS1	1 (<0.1%)
SLC44A4	6 (<0.1%)
SLC45A1	8 (<0.1%)
SLC45A4	1 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
SLC47A1	2 (<0.1%)
SLC47A2	3 (<0.1%)
SLC49A4	1 (<0.1%)
SLC4A1	3 (<0.1%)
SLC4A11	3 (<0.1%)
SLC4A1AP	1 (<0.1%)
SLC4A5	1 (<0.1%)
SLC4A8	6 (<0.1%)
SLC51A	5 (<0.1%)
SLC51B	2 (<0.1%)
SLC5A1	1 (<0.1%)
SLC5A10	10 (<0.1%)
SLC5A11	4 (<0.1%)
SLC5A5	1 (<0.1%)
SLC5A6	2 (<0.1%)
SLC6A1	1 (<0.1%)
SLC6A13	2 (<0.1%)
SLC6A2	4 (<0.1%)
SLC6A6	7 (<0.1%)
SLC7A11-AS1	1 (<0.1%)
SLC7A2	4 (<0.1%)
SLC7A5	3 (<0.1%)
SLC7A6	8 (<0.1%)
SLC7A6OS	3 (<0.1%)
SLC7A7	3 (<0.1%)
SLC7A8	16 (<0.1%)
SLC7A9	15 (<0.1%)
SLC8A1	5 (<0.1%)
SLC8A2	1 (<0.1%)
SLC8A3	5 (<0.1%)
SLC8B1	6 (<0.1%)
SLC9A1	8 (<0.1%)
SLC9A2	2 (<0.1%)
SLC9A3	8 (<0.1%)
SLC9A3R2	2 (<0.1%)
SLC9A5	5 (<0.1%)
SLC9A8	6 (<0.1%)
SLCO2A1	1 (<0.1%)
SLCO2B1	6 (<0.1%)
SLCO3A1	6 (<0.1%)
SLFN12	2 (<0.1%)
SLFNL1	4 (<0.1%)
SLIT1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SLIT3	8 (<0.1%)
SLMAP	1 (<0.1%)
SLTM	2 (<0.1%)
SLX4	5 (<0.1%)
SLX9	1 (<0.1%)
SMAD2	3 (<0.1%)
SMAD3	2 (<0.1%)
SMAP2	4 (<0.1%)
SMARCA2	4 (<0.1%)
SMARCA4	104 (0.3%)
SMARCB1	4 (<0.1%)
SMARCC1	2 (<0.1%)
SMARCC2	6 (<0.1%)
SMARCD3	2 (<0.1%)
SMC1B	3 (<0.1%)
SMCO1	1 (<0.1%)
SMCO3	1 (<0.1%)
SMG5	1 (<0.1%)
SMG6	7 (<0.1%)
SMG9	1 (<0.1%)
SMIM12	3 (<0.1%)
SMIM14	1 (<0.1%)
SMIM18	1 (<0.1%)
SMIM19	8 (<0.1%)
SMIM7	1 (<0.1%)
SMO	3 (<0.1%)
SMOC2	6 (<0.1%)
SMPDL3B	1 (<0.1%)
SMTN	5 (<0.1%)
SMTNL2	6 (<0.1%)
SMU1	1 (<0.1%)
SMURF1	21 (<0.1%)
SMYD2	1 (<0.1%)
SMYD3	14 (<0.1%)
SMYD4	6 (<0.1%)
SNAI3	6 (<0.1%)
SNAP23	2 (<0.1%)
SNAP29	1 (<0.1%)
SNAP47	2 (<0.1%)
SNAPC4	1 (<0.1%)
SNCB	2 (<0.1%)
SND1	2 (<0.1%)
SNED1	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SNHG17	2 (<0.1%)
SNHG29	32 (<0.1%)
SNHG3	2 (<0.1%)
SNHG4	4 (<0.1%)
SNHG7	2 (<0.1%)
SNORC	1 (<0.1%)
SNRNP200	2 (<0.1%)
SNRNP35	2 (<0.1%)
SNRNP40	3 (<0.1%)
SNRNP70	1 (<0.1%)
SNRPA	2 (<0.1%)
SNRPA1	1 (<0.1%)
SNRPD2	2 (<0.1%)
SNRPE	1 (<0.1%)
SNRPN	3 (<0.1%)
SNTB2	4 (<0.1%)
SNTG2	1 (<0.1%)
SNU13	8 (<0.1%)
SNUPN	9 (<0.1%)
SNW1	2 (<0.1%)
SNX1	3 (<0.1%)
SNX18	2 (<0.1%)
SNX20	3 (<0.1%)
SNX21	8 (<0.1%)
SNX25	3 (<0.1%)
SNX29	20 (<0.1%)
SNX3	2 (<0.1%)
SNX30	2 (<0.1%)
SNX31	1 (<0.1%)
SNX5	3 (<0.1%)
SNX8	12 (<0.1%)
SNX9	3 (<0.1%)
SOAT2	1 (<0.1%)
SOCS2-AS1	1 (<0.1%)
SOCS3-DT	9 (<0.1%)
SOD1	2 (<0.1%)
SOGA1	16 (<0.1%)
SOGA3	2 (<0.1%)
SORBS1	40 (0.1%)
SORBS2	18 (<0.1%)
SORBS3	3 (<0.1%)
SORCS1	6 (<0.1%)
SORCS2	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SORT1	1 (<0.1%)
SOS1	2 (<0.1%)
SOX10	1 (<0.1%)
SOX13	3 (<0.1%)
SOX2-OT	3 (<0.1%)
SOX5	5 (<0.1%)
SOX7	1 (<0.1%)
SOX9-AS1	2 (<0.1%)
SP110	2 (<0.1%)
SP140	5 (<0.1%)
SP2	2 (<0.1%)
SPAG5-AS1	2 (<0.1%)
SPAG9	12 (<0.1%)
SPAM1	3 (<0.1%)
SPARC	1 (<0.1%)
SPATA13	21 (<0.1%)
SPATA17	1 (<0.1%)
SPATA2	2 (<0.1%)
SPATA21	5 (<0.1%)
SPATA24	1 (<0.1%)
SPATA2L	2 (<0.1%)
SPATA3-AS1	2 (<0.1%)
SPATA33	6 (<0.1%)
SPATA45	1 (<0.1%)
SPATC1L	2 (<0.1%)
SPATS2	5 (<0.1%)
SPATS2L	7 (<0.1%)
SPDYA	8 (<0.1%)
SPDYC	1 (<0.1%)
SPDYE4	1 (<0.1%)
SPECC1	6 (<0.1%)
SPECC1L	15 (<0.1%)
SPECC1L-ADORA2A	4 (<0.1%)
SPEN	3 (<0.1%)
SPEN-AS1	2 (<0.1%)
SPG11	4 (<0.1%)
SPG7	23 (<0.1%)
SPHK2	13 (<0.1%)
SPIDR	44 (0.1%)
SPINDOC	1 (<0.1%)
SPINK2	9 (<0.1%)
SPINT1	6 (<0.1%)
SPINT2	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SPIRE1	6 (<0.1%)
SPIRE2	3 (<0.1%)
SPN	2 (<0.1%)
SPNS1	20 (<0.1%)
SPNS2	4 (<0.1%)
SPNS3	2 (<0.1%)
SPOCK3	9 (<0.1%)
SPON2	1 (<0.1%)
SPOP	6 (<0.1%)
SPOPL	1 (<0.1%)
SPOUT1	1 (<0.1%)
SPPL3	4 (<0.1%)
SPRED2	4 (<0.1%)
SPRTN	6 (<0.1%)
SPSB1	4 (<0.1%)
SPTAN1	3 (<0.1%)
SPTBN1	6 (<0.1%)
SPTBN2	5 (<0.1%)
SPTBN4	13 (<0.1%)
SPTLC2	4 (<0.1%)
SPTLC3	1 (<0.1%)
SQSTM1	3 (<0.1%)
SRARP	1 (<0.1%)
SRCAP	3 (<0.1%)
SRCIN1	2 (<0.1%)
SRD5A1	3 (<0.1%)
SRD5A3	1 (<0.1%)
SRD5A3-AS1	1 (<0.1%)
SREBF1	2 (<0.1%)
SREBF2	8 (<0.1%)
SRGAP1	1 (<0.1%)
SRGN	1 (<0.1%)
SRL	3 (<0.1%)
SRM	5 (<0.1%)
SRP68	6 (<0.1%)
SRPK2	6 (<0.1%)
SRPRB	1 (<0.1%)
SRRM1	1 (<0.1%)
SRRM2	1 (<0.1%)
SRRM2-AS1	1 (<0.1%)
SRRM3	5 (<0.1%)
SRRM4	2 (<0.1%)
SRSF11	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
SRSF4	2 (<0.1%)
SRSF9	1 (<0.1%)
SS18L1	8 (<0.1%)
SSBP3	15 (<0.1%)
SSC4D	3 (<0.1%)
SSH1	27 (<0.1%)
SSH2	9 (<0.1%)
SSH3	3 (<0.1%)
SSPOP	1 (<0.1%)
SSR1	1 (<0.1%)
SSR2	1 (<0.1%)
SSU72	3 (<0.1%)
SSUH2	4 (<0.1%)
ST14	6 (<0.1%)
ST3GAL1	8 (<0.1%)
ST3GAL2	8 (<0.1%)
ST3GAL3	75 (0.2%)
ST3GAL4	4 (<0.1%)
ST3GAL5	5 (<0.1%)
ST3GAL5-AS1	1 (<0.1%)
ST3GAL6-AS1	1 (<0.1%)
ST6GAL1	13 (<0.1%)
ST6GALNAC1	6 (<0.1%)
ST6GALNAC4	4 (<0.1%)
ST6GALNAC6	7 (<0.1%)
ST7	4 (<0.1%)
ST7-AS2	2 (<0.1%)
ST7-OT3	1 (<0.1%)
ST8SIA2	1 (<0.1%)
ST8SIA5	1 (<0.1%)
ST8SIA6	4 (<0.1%)
ST8SIA6-AS1	2 (<0.1%)
STAB1	1 (<0.1%)
STAC3	12 (<0.1%)
STAG1	7 (<0.1%)
STAG3L5P-PVRIG2P-PILRB	6 (<0.1%)
STAM2	2 (<0.1%)
STAR	1 (<0.1%)
STARD10	4 (<0.1%)
STARD13	17 (<0.1%)
STARD3	3 (<0.1%)
STARD7-AS1	1 (<0.1%)
STARD9	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
STAT1	4 (<0.1%)
STAT2	2 (<0.1%)
STAT3	24 (<0.1%)
STAT5A	4 (<0.1%)
STAT6	12 (<0.1%)
STAU1	5 (<0.1%)
STAU2	4 (<0.1%)
STEAP4	3 (<0.1%)
STIM1	3 (<0.1%)
STIMATE	2 (<0.1%)
STIMATE-MUSTN1	2 (<0.1%)
STIP1	3 (<0.1%)
STK10	13 (<0.1%)
STK11	1 (<0.1%)
STK11IP	1 (<0.1%)
STK17A	1 (<0.1%)
STK19	3 (<0.1%)
STK24	3 (<0.1%)
STK25	9 (<0.1%)
STK3	1 (<0.1%)
STK31	5 (<0.1%)
STK32B	1 (<0.1%)
STK32C	1 (<0.1%)
STK35	2 (<0.1%)
STK4	1 (<0.1%)
STK40	9 (<0.1%)
STKLD1	4 (<0.1%)
STON1-GTF2A1L	9 (<0.1%)
STOX2	1 (<0.1%)
STPG1	16 (<0.1%)
STRA6	15 (<0.1%)
STRA8	3 (<0.1%)
STRADA	18 (<0.1%)
STRIP1	3 (<0.1%)
STRN	1 (<0.1%)
STRN3	8 (<0.1%)
STRN4	2 (<0.1%)
STT3A	3 (<0.1%)
STT3B	1 (<0.1%)
STX12	2 (<0.1%)
STX16-NPEPL1	2 (<0.1%)
STX18-AS1	3 (<0.1%)
STX1B	1 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
STX2	8 (<0.1%)
STX3	4 (<0.1%)
STX4	3 (<0.1%)
STX5	8 (<0.1%)
STX6	2 (<0.1%)
STX8	4 (<0.1%)
STXBP1	4 (<0.1%)
STXBP2	4 (<0.1%)
STXBP4	1 (<0.1%)
STXBP5-AS1	1 (<0.1%)
STXBP6	1 (<0.1%)
STYXL1	5 (<0.1%)
STYXL2	1 (<0.1%)
SUCO	4 (<0.1%)
SUFU	14 (<0.1%)
SUGP1	1 (<0.1%)
SUGP2	8 (<0.1%)
SUGT1P4-STR4LP-CCDC180	3 (<0.1%)
SULF1	4 (<0.1%)
SULF2	24 (<0.1%)
SULT2B1	4 (<0.1%)
SUMO1	9 (<0.1%)
SUN1	25 (<0.1%)
SUN2	3 (<0.1%)
SUOX	3 (<0.1%)
SUPT16H	1 (<0.1%)
SUPT3H	3 (<0.1%)
SUSD1	18 (<0.1%)
SUSD5	2 (<0.1%)
SUSD6	1 (<0.1%)
SV2A	1 (<0.1%)
SVIL	6 (<0.1%)
SVOPL	1 (<0.1%)
SWAP70	3 (<0.1%)
SYBU	4 (<0.1%)
SYCE1L	2 (<0.1%)
SYCE3	2 (<0.1%)
SYCP2L	1 (<0.1%)
SYF2	2 (<0.1%)
SYK	4 (<0.1%)
SYN2	2 (<0.1%)
SYN3	42 (0.1%)
SYNC	4 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
SYNDIG1L	2 (<0.1%)
SYNE1	16 (<0.1%)
SYNE2	10 (<0.1%)
SYNE3	1 (<0.1%)
SYNGR1	2 (<0.1%)
SYNGR2	1 (<0.1%)
SYNJ2	10 (<0.1%)
SYNJ2BP-COX16	3 (<0.1%)
SYNPO2L	2 (<0.1%)
SYS1-DBNDD2	1 (<0.1%)
SYT11	1 (<0.1%)
SYT12	8 (<0.1%)
SYT17	2 (<0.1%)
SYT3	15 (<0.1%)
SYT7	6 (<0.1%)
SYT9-AS1	1 (<0.1%)
SYTL1	8 (<0.1%)
SYTL2	4 (<0.1%)
SYTL3	12 (<0.1%)
TAB1	4 (<0.1%)
TAC4	10 (<0.1%)
TACC1	12 (<0.1%)
TACC2	18 (<0.1%)
TACC3	5 (<0.1%)
TADA3	12 (<0.1%)
TAF15	2 (<0.1%)
TAF1A-AS1	4 (<0.1%)
TAF4	1 (<0.1%)
TAF5	1 (<0.1%)
TAF5L	2 (<0.1%)
TAF9	2 (<0.1%)
TAFA1	2 (<0.1%)
TAFA5	3 (<0.1%)
TAGAP	6 (<0.1%)
TAMM41	3 (<0.1%)
TANC1	4 (<0.1%)
TANGO2	42 (0.1%)
TANGO6	9 (<0.1%)
TAOK1	4 (<0.1%)
TAOK3	4 (<0.1%)
TAPBP	3 (<0.1%)
TAPBPL	1 (<0.1%)
TARBP1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TARS2	5 (<0.1%)
TARS3	1 (<0.1%)
TASOR	1 (<0.1%)
TASOR2	2 (<0.1%)
TAT	1 (<0.1%)
TATDN2	1 (<0.1%)
TATDN3	15 (<0.1%)
TAX1BP1	4 (<0.1%)
TBC1D1	8 (<0.1%)
TBC1D10A	4 (<0.1%)
TBC1D14	28 (<0.1%)
TBC1D16	11 (<0.1%)
TBC1D2	7 (<0.1%)
TBC1D20	1 (<0.1%)
TBC1D22A	14 (<0.1%)
TBC1D22B	1 (<0.1%)
TBC1D24	18 (<0.1%)
TBC1D26	1 (<0.1%)
TBC1D2B	2 (<0.1%)
TBC1D31	6 (<0.1%)
TBC1D4	3 (<0.1%)
TBC1D5	2 (<0.1%)
TBC1D8	7 (<0.1%)
TBC1D9	1 (<0.1%)
TBC1D9B	8 (<0.1%)
TBCB	3 (<0.1%)
TBCCD1	3 (<0.1%)
TBCD	15 (<0.1%)
TBCE	8 (<0.1%)
TBK1	1 (<0.1%)
TBL3	1 (<0.1%)
TBX15	1 (<0.1%)
TBX21	1 (<0.1%)
TBXA2R	6 (<0.1%)
TBXAS1	20 (<0.1%)
TC2N	4 (<0.1%)
TCAF1	2 (<0.1%)
TCEA2	1 (<0.1%)
TCEA3	5 (<0.1%)
TCF12	13 (<0.1%)
TCF19	4 (<0.1%)
TCF20	8 (<0.1%)
TCF24	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TCF25	9 (<0.1%)
TCF3	8 (<0.1%)
TCF4	8 (<0.1%)
TCF7	12 (<0.1%)
TCF7L1	3 (<0.1%)
TCF7L2	52 (0.2%)
TCFL5	3 (<0.1%)
TCHP	8 (<0.1%)
TCN2	6 (<0.1%)
TCOF1	6 (<0.1%)
TCP10L	1 (<0.1%)
TCTA	1 (<0.1%)
TCTN1	5 (<0.1%)
TDGF1	1 (<0.1%)
TDH	1 (<0.1%)
TDP1	2 (<0.1%)
TDRD10	2 (<0.1%)
TDRD9	2 (<0.1%)
TDRKH	8 (<0.1%)
TEAD1	4 (<0.1%)
TEAD4	9 (<0.1%)
TECPR1	7 (<0.1%)
TECPR2	7 (<0.1%)
TECR	3 (<0.1%)
TECTA	2 (<0.1%)
TEDC2	2 (<0.1%)
TEKT3	1 (<0.1%)
TEKT5	5 (<0.1%)
TELO2	3 (<0.1%)
TENM2	2 (<0.1%)
TENM3	1 (<0.1%)
TENM4	1 (<0.1%)
TENT4B	2 (<0.1%)
TENT5B	1 (<0.1%)
TENT5C	1 (<0.1%)
TEP1	2 (<0.1%)
TERB1	1 (<0.1%)
TERB2	1 (<0.1%)
TERF2	1 (<0.1%)
TERT	8 (<0.1%)
TESC	15 (<0.1%)
TESMIN	1 (<0.1%)
TET1	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TET2	2 (<0.1%)
TET3	1 (<0.1%)
TEX101	7 (<0.1%)
TEX12	1 (<0.1%)
TEX14	9 (<0.1%)
TEX22	1 (<0.1%)
TEX261	1 (<0.1%)
TEX30	4 (<0.1%)
TEX36-AS1	1 (<0.1%)
TEX41	1 (<0.1%)
TEX43	2 (<0.1%)
TEX45	1 (<0.1%)
TEX46	1 (<0.1%)
TEX48	1 (<0.1%)
TFAP4	3 (<0.1%)
TFCP2	9 (<0.1%)
TFCP2L1	2 (<0.1%)
TFDP1	8 (<0.1%)
TFDP2	6 (<0.1%)
TFEB	5 (<0.1%)
TFIP11	4 (<0.1%)
TFR2	9 (<0.1%)
TFRC	8 (<0.1%)
TGFA	2 (<0.1%)
TGFA-IT1	1 (<0.1%)
TGFB1	4 (<0.1%)
TGFB3	1 (<0.1%)
TGFBI	3 (<0.1%)
TGFBR3	5 (<0.1%)
TGIF1	4 (<0.1%)
TGIF2	4 (<0.1%)
TGIF2-RAB51F	2 (<0.1%)
TGM3	3 (<0.1%)
TGM4	2 (<0.1%)
TGM5	4 (<0.1%)
TGM6	4 (<0.1%)
TGM7	2 (<0.1%)
THADA	11 (<0.1%)
THAP12	3 (<0.1%)
THAP3	7 (<0.1%)
THAP4	12 (<0.1%)
THAP8	1 (<0.1%)
THBS3	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
THEM4	3 (<0.1%)
THEMIS2	5 (<0.1%)
THG1L	3 (<0.1%)
THOC5	4 (<0.1%)
THOC7	6 (<0.1%)
THOP1	2 (<0.1%)
THPO	10 (<0.1%)
THRSP	1 (<0.1%)
THSD1	2 (<0.1%)
THSD4	6 (<0.1%)
THSD7B	1 (<0.1%)
THUMPD3-AS1	1 (<0.1%)
TIA1	2 (<0.1%)
TIAL1	2 (<0.1%)
TIAM1	6 (<0.1%)
TIAM2	5 (<0.1%)
TICAM1	1 (<0.1%)
TICAM2-AS1	2 (<0.1%)
TICRR	1 (<0.1%)
TIE1	4 (<0.1%)
TIFAB	1 (<0.1%)
TIGAR	1 (<0.1%)
TIGD7	2 (<0.1%)
TIMD4	6 (<0.1%)
TIMM17A	1 (<0.1%)
TIMM23B	6 (<0.1%)
TIMM44	1 (<0.1%)
TIMP2	10 (<0.1%)
TINAGL1	3 (<0.1%)
TIPARP	3 (<0.1%)
TIPIN	6 (<0.1%)
TIRAP	2 (<0.1%)
TJAP1	6 (<0.1%)
TJP2	6 (<0.1%)
TJP3	22 (<0.1%)
TK1	1 (<0.1%)
TK2	8 (<0.1%)
TKT	4 (<0.1%)
TLCD3A	1 (<0.1%)
TLCD4	6 (<0.1%)
TLCD4-RWDD3	3 (<0.1%)
TLDC2	2 (<0.1%)
TLE1	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TLE2	16 (<0.1%)
TLE6	4 (<0.1%)
TLK1	2 (<0.1%)
TLK2	3 (<0.1%)
TLL2	2 (<0.1%)
TLR3	2 (<0.1%)
TLR6	1 (<0.1%)
TLX1NB	2 (<0.1%)
TM4SF1-AS1	3 (<0.1%)
TM4SF19-DYNLT2B	2 (<0.1%)
TM6SF2	3 (<0.1%)
TM7SF3	2 (<0.1%)
TM9SF1	3 (<0.1%)
TM9SF2	1 (<0.1%)
TM9SF4	5 (<0.1%)
TMBIM1	2 (<0.1%)
TMC1	2 (<0.1%)
TMC4	2 (<0.1%)
TMC5	32 (<0.1%)
TMC7	6 (<0.1%)
TMCC1	5 (<0.1%)
TMCC2	12 (<0.1%)
TMCC3	2 (<0.1%)
TMCO1	4 (<0.1%)
TMCO3	4 (<0.1%)
TMCO4	7 (<0.1%)
TMED1	2 (<0.1%)
TMED6	1 (<0.1%)
TMED8	1 (<0.1%)
TMEM107	2 (<0.1%)
TMEM108	2 (<0.1%)
TMEM109	1 (<0.1%)
TMEM114	1 (<0.1%)
TMEM116	12 (<0.1%)
TMEM117	8 (<0.1%)
TMEM120A	2 (<0.1%)
TMEM120B	9 (<0.1%)
TMEM127	2 (<0.1%)
TMEM131L	2 (<0.1%)
TMEM132C	5 (<0.1%)
TMEM138	4 (<0.1%)
TMEM140	2 (<0.1%)
TMEM143	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TMEM145	1 (<0.1%)
TMEM14B	12 (<0.1%)
TMEM150B	4 (<0.1%)
TMEM151B	2 (<0.1%)
TMEM154	1 (<0.1%)
TMEM156	1 (<0.1%)
TMEM163	1 (<0.1%)
TMEM165	4 (<0.1%)
TMEM168	6 (<0.1%)
TMEM176B	4 (<0.1%)
TMEM179B	1 (<0.1%)
TMEM181	2 (<0.1%)
TMEM184A	1 (<0.1%)
TMEM184B	6 (<0.1%)
TMEM192	3 (<0.1%)
TMEM201	1 (<0.1%)
TMEM204	2 (<0.1%)
TMEM217	6 (<0.1%)
TMEM219	6 (<0.1%)
TMEM220-AS1	4 (<0.1%)
TMEM222	8 (<0.1%)
TMEM229B	1 (<0.1%)
TMEM234	1 (<0.1%)
TMEM242	1 (<0.1%)
TMEM245	2 (<0.1%)
TMEM25	2 (<0.1%)
TMEM254-AS1	5 (<0.1%)
TMEM258	2 (<0.1%)
TMEM266	3 (<0.1%)
TMEM270	2 (<0.1%)
TMEM35B	1 (<0.1%)
TMEM38A	1 (<0.1%)
TMEM40	2 (<0.1%)
TMEM41A	1 (<0.1%)
TMEM44	64 (0.2%)
TMEM44-AS1	3 (<0.1%)
TMEM51	4 (<0.1%)
TMEM51-AS2	4 (<0.1%)
TMEM61	1 (<0.1%)
TMEM63B	2 (<0.1%)
TMEM67	3 (<0.1%)
TMEM68	3 (<0.1%)
TMEM79	4 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TMEM82	3 (<0.1%)
TMEM87B	2 (<0.1%)
TMEM91	32 (<0.1%)
TMEM94	1 (<0.1%)
TMF1	1 (<0.1%)
TMOD2	2 (<0.1%)
TMOD3	2 (<0.1%)
TMPO	2 (<0.1%)
TMPRSS11F	2 (<0.1%)
TMPRSS4	7 (<0.1%)
TMPRSS6	2 (<0.1%)
TMPRSS9	4 (<0.1%)
TMTC1	4 (<0.1%)
TMTC2	4 (<0.1%)
TMX2-CTNND1	2 (<0.1%)
TNC	1 (<0.1%)
TNFAIP8L1	8 (<0.1%)
TNFAIP8L2	1 (<0.1%)
TNFAIP8L2-SCNM1	2 (<0.1%)
TNFAIP8L3	1 (<0.1%)
TNFRSF11A	5 (<0.1%)
TNFRSF17	1 (<0.1%)
TNFRSF1A	1 (<0.1%)
TNFRSF1B	4 (<0.1%)
TNFRSF21	1 (<0.1%)
TNFRSF25	5 (<0.1%)
TNFRSF8	2 (<0.1%)
TNFSF11	1 (<0.1%)
TNIK	9 (<0.1%)
TNIP1	10 (<0.1%)
TNK1	4 (<0.1%)
TNK2	3 (<0.1%)
TNKS	1 (<0.1%)
TNN	1 (<0.1%)
TNNI3	2 (<0.1%)
TNNT2	14 (<0.1%)
TNPO2	12 (<0.1%)
TNRC18	11 (<0.1%)
TNRC6A	2 (<0.1%)
TNRC6B	10 (<0.1%)
TNRC6C	4 (<0.1%)
TNS1	2 (<0.1%)
TNS3	3 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TNS4	3 (<0.1%)
TNXB	15 (<0.1%)
TOLLIP	1 (<0.1%)
TOM1	12 (<0.1%)
TOM1L2	30 (<0.1%)
TOMM20L	1 (<0.1%)
TOMM7	1 (<0.1%)
TONSL	2 (<0.1%)
TOP1	1 (<0.1%)
TOP1MT	12 (<0.1%)
TOP2A	1 (<0.1%)
TOP3A	4 (<0.1%)
TOP3B	6 (<0.1%)
TOPBP1	1 (<0.1%)
TOR1AIP2	3 (<0.1%)
TOR3A	3 (<0.1%)
TP53	33 (<0.1%)
TP53BP1	1 (<0.1%)
TP53INP1	2 (<0.1%)
TP63	12 (<0.1%)
TP73	13 (<0.1%)
TPCN1	2 (<0.1%)
TPD52	14 (<0.1%)
TPD52L2	11 (<0.1%)
TPGS1	1 (<0.1%)
TPM1	7 (<0.1%)
TPM3	1 (<0.1%)
TPM4	1 (<0.1%)
TPR	1 (<0.1%)
TPRA1	3 (<0.1%)
TPRG1L	1 (<0.1%)
TPST1	3 (<0.1%)
TPST2	5 (<0.1%)
TPT1	3 (<0.1%)
TPT1-AS1	2 (<0.1%)
TPTEP2	1 (<0.1%)
TPTEP2-CSNK1E	5 (<0.1%)
TRA2A	4 (<0.1%)
TRABD	2 (<0.1%)
TRABD2A	4 (<0.1%)
TRAF2	7 (<0.1%)
TRAF3	36 (0.1%)
TRAF3IP2	9 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TRAF3IP2-AS1	17 (<0.1%)
TRAFD1	2 (<0.1%)
TRAK1	11 (<0.1%)
TRAK2	1 (<0.1%)
TRANK1	1 (<0.1%)
TRAP1	14 (<0.1%)
TRAPPC10	1 (<0.1%)
TRAPPC11	4 (<0.1%)
TRAPPC12	3 (<0.1%)
TRAPPC3	1 (<0.1%)
TRAPPC4	1 (<0.1%)
TRAPPC8	1 (<0.1%)
TRAPPC9	32 (<0.1%)
TRARG1	1 (<0.1%)
TRERF1	8 (<0.1%)
TRIB3	3 (<0.1%)
TRIM11	2 (<0.1%)
TRIM13	8 (<0.1%)
TRIM14	4 (<0.1%)
TRIM16	2 (<0.1%)
TRIM17	3 (<0.1%)
TRIM26	8 (<0.1%)
TRIM27	7 (<0.1%)
TRIM29	1 (<0.1%)
TRIM33	2 (<0.1%)
TRIM36	1 (<0.1%)
TRIM38	2 (<0.1%)
TRIM39	4 (<0.1%)
TRIM39-RPP21	2 (<0.1%)
TRIM40	2 (<0.1%)
TRIM41	3 (<0.1%)
TRIM55	4 (<0.1%)
TRIM56	1 (<0.1%)
TRIM6-TRIM34	1 (<0.1%)
TRIM60	2 (<0.1%)
TRIM61	1 (<0.1%)
TRIM62	7 (<0.1%)
TRIM67	2 (<0.1%)
TRIM7	4 (<0.1%)
TRIM72	1 (<0.1%)
TRIM8	1 (<0.1%)
TRIML2	1 (<0.1%)
TRIO	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TRIOBP	11 (<0.1%)
TRIP10	12 (<0.1%)
TRIP12	3 (<0.1%)
TRIP13	1 (<0.1%)
TRIP4	2 (<0.1%)
TRMT1	6 (<0.1%)
TRMT10B	7 (<0.1%)
TRMT44	3 (<0.1%)
TRMT9B	2 (<0.1%)
TRNT1	1 (<0.1%)
TRPC1	4 (<0.1%)
TRPC4AP	6 (<0.1%)
TRPM1	4 (<0.1%)
TRPM2	4 (<0.1%)
TRPM4	2 (<0.1%)
TRPM5	1 (<0.1%)
TRPM6	3 (<0.1%)
TRPM7	3 (<0.1%)
TRPM8	1 (<0.1%)
TRPV1	23 (<0.1%)
TRPV2	1 (<0.1%)
TRPV3	6 (<0.1%)
TRPV4	8 (<0.1%)
TRRAP	14 (<0.1%)
TRUB1	1 (<0.1%)
TRUB2	1 (<0.1%)
TSBP1	27 (<0.1%)
TSC1	3 (<0.1%)
TSC2	24 (<0.1%)
TSC22D2	1 (<0.1%)
TSC22D4	1 (<0.1%)
TSEN2	15 (<0.1%)
TSEN54	1 (<0.1%)
TSGA10	1 (<0.1%)
TSHZ1	1 (<0.1%)
TSHZ2	5 (<0.1%)
TSKS	3 (<0.1%)
TSNARE1	2 (<0.1%)
TSNAX-DISC1	8 (<0.1%)
TSNAXIP1	18 (<0.1%)
TSPAN10	5 (<0.1%)
TSPAN16	4 (<0.1%)
TSPAN2	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TSPAN33	1 (<0.1%)
TSPAN9	6 (<0.1%)
TSPEAR	4 (<0.1%)
TSR1	1 (<0.1%)
TSSC2	1 (<0.1%)
TTBK1	2 (<0.1%)
TTBK2	1 (<0.1%)
TTC12	1 (<0.1%)
TTC16	2 (<0.1%)
TTC17	3 (<0.1%)
TTC21B-AS1	2 (<0.1%)
TTC22	2 (<0.1%)
TTC23	3 (<0.1%)
TTC23L	1 (<0.1%)
TTC28	1 (<0.1%)
TTC3	2 (<0.1%)
TTC37	1 (<0.1%)
TTC38	1 (<0.1%)
TTC39A	3 (<0.1%)
TTC39C	2 (<0.1%)
TTC39C-AS1	1 (<0.1%)
TTC7A	12 (<0.1%)
TTC7B	3 (<0.1%)
TTC7B-AS1	1 (<0.1%)
TTF1	4 (<0.1%)
TTI1	2 (<0.1%)
TTI2	6 (<0.1%)
TTL	1 (<0.1%)
TTLL1	2 (<0.1%)
TTLL10	2 (<0.1%)
TTLL12	2 (<0.1%)
TTLL3	16 (<0.1%)
TTLL4	4 (<0.1%)
TTLL5	1 (<0.1%)
TTLL6	2 (<0.1%)
TTLL9	2 (<0.1%)
TTYH1	3 (<0.1%)
TTYH2	3 (<0.1%)
TUBA3C	2 (<0.1%)
TUBA3E	1 (<0.1%)
TUBB	1 (<0.1%)
TUBD1	18 (<0.1%)
TUBGCP2	17 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
TUBGCP3	5 (<0.1%)
TUBGCP4	4 (<0.1%)
TUBGCP5	2 (<0.1%)
TUBGCP6	1 (<0.1%)
TUFT1	2 (<0.1%)
TULP1	2 (<0.1%)
TULP2	5 (<0.1%)
TUSC2	1 (<0.1%)
TVP23A	3 (<0.1%)
TVP23C-CDRT4	2 (<0.1%)
TWNK	4 (<0.1%)
TXLNB	2 (<0.1%)
TXNDC11	2 (<0.1%)
TXNDC12	5 (<0.1%)
TXNDC15	3 (<0.1%)
TXNL4B	3 (<0.1%)
TXNRD1	8 (<0.1%)
TXNRD2	8 (<0.1%)
TYK2	6 (<0.1%)
TYMP	10 (<0.1%)
TYMS	1 (<0.1%)
TYRO3	1 (<0.1%)
TYW1B	2 (<0.1%)
UACA	2 (<0.1%)
UBAC1	2 (<0.1%)
UBAC2	15 (<0.1%)
UBAP2	4 (<0.1%)
UBASH3A	6 (<0.1%)
UBASH3B	5 (<0.1%)
UBE2C	8 (<0.1%)
UBE2D3	11 (<0.1%)
UBE2E2	1 (<0.1%)
UBE2F	16 (<0.1%)
UBE2F-SCLY	4 (<0.1%)
UBE2H	3 (<0.1%)
UBE2I	16 (<0.1%)
UBE2J2	24 (<0.1%)
UBE2K	6 (<0.1%)
UBE2L3	6 (<0.1%)
UBE2L6	2 (<0.1%)
UBE2O	1 (<0.1%)
UBE3B	4 (<0.1%)
UBE3C	6 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
UBE3D	1 (<0.1%)
UBE4A	2 (<0.1%)
UBL7	6 (<0.1%)
UBN1	6 (<0.1%)
UBN2	1 (<0.1%)
UBOX5	6 (<0.1%)
UBP1	3 (<0.1%)
UBR1	2 (<0.1%)
UBR2	3 (<0.1%)
UBR4	1 (<0.1%)
UBR5	2 (<0.1%)
UBTD1	3 (<0.1%)
UBTD2	2 (<0.1%)
UBXN11	6 (<0.1%)
UBXN4	1 (<0.1%)
UBXN7	3 (<0.1%)
UCK1	4 (<0.1%)
UCK2	3 (<0.1%)
UCKL1-AS1	1 (<0.1%)
UEVLD	7 (<0.1%)
UGCG	3 (<0.1%)
UGGT1	2 (<0.1%)
UGP2	2 (<0.1%)
UGT1A10	1 (<0.1%)
UGT1A8	1 (<0.1%)
UGT1A9	1 (<0.1%)
UHRF1	45 (0.1%)
ULK1	5 (<0.1%)
UMPS	6 (<0.1%)
UNC13A	3 (<0.1%)
UNC13D	3 (<0.1%)
UNC45A	4 (<0.1%)
UNC5B	2 (<0.1%)
UNC5C	1 (<0.1%)
UNC79	1 (<0.1%)
UNC80	2 (<0.1%)
UNG	4 (<0.1%)
UNKL	30 (<0.1%)
UPB1	3 (<0.1%)
UPF1	2 (<0.1%)
UPF2	4 (<0.1%)
UPF3A	6 (<0.1%)
UPK1A	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
UPK1B	1 (<0.1%)
UPK3B	3 (<0.1%)
UPP1	6 (<0.1%)
UQCC1	6 (<0.1%)
UQCC2	1 (<0.1%)
UQCR10	2 (<0.1%)
UQCR11	1 (<0.1%)
URAD	1 (<0.1%)
URB1	3 (<0.1%)
URGCP	12 (<0.1%)
URGCP-MRPS24	2 (<0.1%)
URI1	5 (<0.1%)
URM1	16 (<0.1%)
UROS	2 (<0.1%)
USE1	4 (<0.1%)
USF1	3 (<0.1%)
USH1C	2 (<0.1%)
USHBP1	2 (<0.1%)
USO1	2 (<0.1%)
USP10	4 (<0.1%)
USP12-DT	2 (<0.1%)
USP14	4 (<0.1%)
USP2	7 (<0.1%)
USP20	3 (<0.1%)
USP28	2 (<0.1%)
USP29	4 (<0.1%)
USP30	1 (<0.1%)
USP31	2 (<0.1%)
USP33	3 (<0.1%)
USP34	7 (<0.1%)
USP36	3 (<0.1%)
USP39	9 (<0.1%)
USP4	15 (<0.1%)
USP40	1 (<0.1%)
USP42	1 (<0.1%)
USP45	2 (<0.1%)
USP48	2 (<0.1%)
USP49	10 (<0.1%)
USP5	2 (<0.1%)
USP54	2 (<0.1%)
USP6NL	2 (<0.1%)
USP7	7 (<0.1%)
USP8	9 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
UST	2 (<0.1%)
UTP18	1 (<0.1%)
UTRN	3 (<0.1%)
UTS2B	2 (<0.1%)
UVRAG	3 (<0.1%)
UVSSA	1 (<0.1%)
UXS1	9 (<0.1%)
VAC14	3 (<0.1%)
VAMP5	1 (<0.1%)
VARS1	1 (<0.1%)
VASH1	1 (<0.1%)
VASH1-AS1	2 (<0.1%)
VASP	1 (<0.1%)
VAT1L	1 (<0.1%)
VAV2	4 (<0.1%)
VCAN	4 (<0.1%)
VCL	2 (<0.1%)
VDR	9 (<0.1%)
VEZT	18 (<0.1%)
VGLL4	5 (<0.1%)
VIL1	4 (<0.1%)
VIPR1	5 (<0.1%)
VIPR2	1 (<0.1%)
VKORC1L1	2 (<0.1%)
VMAC	2 (<0.1%)
VMP1	1 (<0.1%)
VOPP1	16 (<0.1%)
VPS13B	2 (<0.1%)
VPS13D	10 (<0.1%)
VPS16	4 (<0.1%)
VPS18	2 (<0.1%)
VPS26B	1 (<0.1%)
VPS26C	2 (<0.1%)
VPS33A	1 (<0.1%)
VPS33B-DT	2 (<0.1%)
VPS35	1 (<0.1%)
VPS35L	9 (<0.1%)
VPS37C	1 (<0.1%)
VPS37D	1 (<0.1%)
VPS39	1 (<0.1%)
VPS41	2 (<0.1%)
VPS51	4 (<0.1%)
VPS52	32 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
VPS53	10 (<0.1%)
VPS54	2 (<0.1%)
VPS8	4 (<0.1%)
VPS9D1	2 (<0.1%)
VPS9D1-AS1	1 (<0.1%)
VRK3	2 (<0.1%)
VSIR	2 (<0.1%)
VSTM1	5 (<0.1%)
VSTM2B	1 (<0.1%)
VSTM2B-DT	1 (<0.1%)
VSTM2L	2 (<0.1%)
VSTM4	1 (<0.1%)
VSTM5	4 (<0.1%)
VTI1A	2 (<0.1%)
VTI1B	1 (<0.1%)
VWA3A	2 (<0.1%)
VWA3B	1 (<0.1%)
VWA5B1	3 (<0.1%)
VWA7	1 (<0.1%)
VWC2	1 (<0.1%)
VWF	6 (<0.1%)
WAC	6 (<0.1%)
WAC-AS1	1 (<0.1%)
WAKMAR2	1 (<0.1%)
WAPL	1 (<0.1%)
WARS1	12 (<0.1%)
WASF3	1 (<0.1%)
WBP1L	1 (<0.1%)
WBP2	1 (<0.1%)
WBP2NL	2 (<0.1%)
WDFY1	3 (<0.1%)
WDFY2	2 (<0.1%)
WDFY3	3 (<0.1%)
WDFY4	3 (<0.1%)
WDR1	2 (<0.1%)
WDR19	1 (<0.1%)
WDR20	2 (<0.1%)
WDR24	1 (<0.1%)
WDR25	2 (<0.1%)
WDR26	2 (<0.1%)
WDR27	8 (<0.1%)
WDR3	1 (<0.1%)
WDR31	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
WDR33	2 (<0.1%)
WDR37	2 (<0.1%)
WDR45B	5 (<0.1%)
WDR46	4 (<0.1%)
WDR48	1 (<0.1%)
WDR5	4 (<0.1%)
WDR53	2 (<0.1%)
WDR55	1 (<0.1%)
WDR59	4 (<0.1%)
WDR62	4 (<0.1%)
WDR70	1 (<0.1%)
WDR76	2 (<0.1%)
WDR77	1 (<0.1%)
WDR81	38 (0.1%)
WDR82	1 (<0.1%)
WDR83	6 (<0.1%)
WDR86	12 (<0.1%)
WDR87	6 (<0.1%)
WDR87BP	1 (<0.1%)
WDR88	2 (<0.1%)
WDR89	6 (<0.1%)
WDR90	1 (<0.1%)
WDR93	3 (<0.1%)
WDSUB1	3 (<0.1%)
WDTC1	2 (<0.1%)
WEE2-AS1	1 (<0.1%)
WFDC1	3 (<0.1%)
WFDC3	2 (<0.1%)
WIPF1	6 (<0.1%)
WIPF2	1 (<0.1%)
WIPI1	1 (<0.1%)
WIPI2	12 (<0.1%)
WIZ	1 (<0.1%)
WLS	6 (<0.1%)
WNK1	8 (<0.1%)
WNK2	6 (<0.1%)
WNK4	2 (<0.1%)
WNT11	2 (<0.1%)
WNT2	4 (<0.1%)
WNT3	2 (<0.1%)
WNT3A	3 (<0.1%)
WNT4	1 (<0.1%)
WNT5B	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
WNT6	1 (<0.1%)
WNT7A	1 (<0.1%)
WNT7B	1 (<0.1%)
WNT9B	2 (<0.1%)
WRN	1 (<0.1%)
WSCD1	1 (<0.1%)
WT1	10 (<0.1%)
WTIP	6 (<0.1%)
WWC1	12 (<0.1%)
WWC2	1 (<0.1%)
WWOX	12 (<0.1%)
WWP2	37 (0.1%)
WWTR1	6 (<0.1%)
XAB2	1 (<0.1%)
XAF1	9 (<0.1%)
XIRP2	3 (<0.1%)
XKR4	1 (<0.1%)
XKR5	2 (<0.1%)
XKR6	7 (<0.1%)
XPC	4 (<0.1%)
XPNPEP3	2 (<0.1%)
XPO1	1 (<0.1%)
XPO4	2 (<0.1%)
XPO5	2 (<0.1%)
XPO6	2 (<0.1%)
XPO7	1 (<0.1%)
XPR1	4 (<0.1%)
XRCC1	1 (<0.1%)
XRCC3	3 (<0.1%)
XRCC6	12 (<0.1%)
XRN1	3 (<0.1%)
XXYLT1	4 (<0.1%)
XYLT1	3 (<0.1%)
YAE1	1 (<0.1%)
YAP1	9 (<0.1%)
YARS1	4 (<0.1%)
YARS2	2 (<0.1%)
YBEY	3 (<0.1%)
YBX2	1 (<0.1%)
YEATS2	4 (<0.1%)
YES1	3 (<0.1%)
YIPF2	4 (<0.1%)
YIPF3	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
YJEFN3	4 (<0.1%)
YJU2	6 (<0.1%)
YJU2B	4 (<0.1%)
YLPM1	1 (<0.1%)
YPEL1	1 (<0.1%)
YPEL5	4 (<0.1%)
YRDC	1 (<0.1%)
YTHDF2	3 (<0.1%)
ZAN	14 (<0.1%)
ZAP70	2 (<0.1%)
ZAR1L	1 (<0.1%)
ZBED9	2 (<0.1%)
ZBTB11	2 (<0.1%)
ZBTB16	4 (<0.1%)
ZBTB2	2 (<0.1%)
ZBTB25	1 (<0.1%)
ZBTB38	2 (<0.1%)
ZBTB44	1 (<0.1%)
ZBTB46	7 (<0.1%)
ZBTB46-AS1	5 (<0.1%)
ZBTB49	1 (<0.1%)
ZBTB7A	5 (<0.1%)
ZBTB7C	2 (<0.1%)
ZC3H11A	1 (<0.1%)
ZC3H12D	3 (<0.1%)
ZC3H14	10 (<0.1%)
ZC3H18	6 (<0.1%)
ZC3H3	4 (<0.1%)
ZC3H7B	14 (<0.1%)
ZC3HAV1	4 (<0.1%)
ZCCHC14	8 (<0.1%)
ZCCHC24	1 (<0.1%)
ZCCHC8	2 (<0.1%)
ZDHHC1	1 (<0.1%)
ZDHHC14	8 (<0.1%)
ZDHHC19	3 (<0.1%)
ZDHHC20	4 (<0.1%)
ZDHHC23	1 (<0.1%)
ZDHHC3	4 (<0.1%)
ZDHHC5	1 (<0.1%)
ZDHHC7	4 (<0.1%)
ZER1	2 (<0.1%)
ZFAND1	7 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
ZFAND2A	1 (<0.1%)
ZFAND4	5 (<0.1%)
ZFAND6	9 (<0.1%)
ZFAS1	5 (<0.1%)
ZFAT	30 (<0.1%)
ZFHX2	3 (<0.1%)
ZFHX3	18 (<0.1%)
ZFP14	2 (<0.1%)
ZFP2	1 (<0.1%)
ZFP41	3 (<0.1%)
ZFP64	16 (<0.1%)
ZFP69	2 (<0.1%)
ZFPM1	1 (<0.1%)
ZFPM2	1 (<0.1%)
ZFR	1 (<0.1%)
ZFR2	2 (<0.1%)
ZFYVE1	12 (<0.1%)
ZFYVE21	2 (<0.1%)
ZFYVE26	1 (<0.1%)
ZFYVE28	52 (0.2%)
ZFYVE9	2 (<0.1%)
ZGLP1	1 (<0.1%)
ZGPAT	5 (<0.1%)
ZHX1	8 (<0.1%)
ZHX1-C8orf76	4 (<0.1%)
ZHX2	4 (<0.1%)
ZHX3	1 (<0.1%)
ZIM2-AS1	1 (<0.1%)
ZKSCAN1	9 (<0.1%)
ZKSCAN3	3 (<0.1%)
ZKSCAN5	2 (<0.1%)
ZMAT5	4 (<0.1%)
ZMIZ1	3 (<0.1%)
ZMIZ1-AS1	3 (<0.1%)
ZMIZ2	4 (<0.1%)
ZMYM2	4 (<0.1%)
ZMYM4	1 (<0.1%)
ZMYM5	9 (<0.1%)
ZMYND11	21 (<0.1%)
ZMYND15	3 (<0.1%)
ZMYND8	68 (0.2%)
ZNF106	12 (<0.1%)
ZNF12	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ZNF131	2 (<0.1%)
ZNF14	1 (<0.1%)
ZNF140	1 (<0.1%)
ZNF142	1 (<0.1%)
ZNF146	3 (<0.1%)
ZNF148	1 (<0.1%)
ZNF169	1 (<0.1%)
ZNF19	1 (<0.1%)
ZNF204P	1 (<0.1%)
ZNF207	3 (<0.1%)
ZNF213	3 (<0.1%)
ZNF213-AS1	2 (<0.1%)
ZNF227	18 (<0.1%)
ZNF232	1 (<0.1%)
ZNF233	2 (<0.1%)
ZNF235	1 (<0.1%)
ZNF236	1 (<0.1%)
ZNF236-DT	3 (<0.1%)
ZNF248	2 (<0.1%)
ZNF250	2 (<0.1%)
ZNF251	1 (<0.1%)
ZNF252P	1 (<0.1%)
ZNF254	3 (<0.1%)
ZNF266	2 (<0.1%)
ZNF268	9 (<0.1%)
ZNF274	4 (<0.1%)
ZNF276	12 (<0.1%)
ZNF277	1 (<0.1%)
ZNF282	4 (<0.1%)
ZNF295-AS1	1 (<0.1%)
ZNF296	1 (<0.1%)
ZNF3	1 (<0.1%)
ZNF30	4 (<0.1%)
ZNF311	4 (<0.1%)
ZNF316	4 (<0.1%)
ZNF318	1 (<0.1%)
ZNF32-AS3	1 (<0.1%)
ZNF337	1 (<0.1%)
ZNF34	3 (<0.1%)
ZNF341	4 (<0.1%)
ZNF341-AS1	2 (<0.1%)
ZNF345	12 (<0.1%)
ZNF358	2 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ZNF362	1 (<0.1%)
ZNF366	1 (<0.1%)
ZNF37BP	1 (<0.1%)
ZNF383	1 (<0.1%)
ZNF384	6 (<0.1%)
ZNF385A	6 (<0.1%)
ZNF391	1 (<0.1%)
ZNF394	1 (<0.1%)
ZNF395	2 (<0.1%)
ZNF398	9 (<0.1%)
ZNF407-AS1	1 (<0.1%)
ZNF410	24 (<0.1%)
ZNF423	21 (<0.1%)
ZNF425	2 (<0.1%)
ZNF428	3 (<0.1%)
ZNF436	2 (<0.1%)
ZNF444	2 (<0.1%)
ZNF445	1 (<0.1%)
ZNF45	1 (<0.1%)
ZNF451-AS1	1 (<0.1%)
ZNF461	3 (<0.1%)
ZNF467	1 (<0.1%)
ZNF48	2 (<0.1%)
ZNF480	1 (<0.1%)
ZNF496	2 (<0.1%)
ZNF497	4 (<0.1%)
ZNF516	2 (<0.1%)
ZNF521	1 (<0.1%)
ZNF526	5 (<0.1%)
ZNF536	1 (<0.1%)
ZNF540	1 (<0.1%)
ZNF541	1 (<0.1%)
ZNF544	1 (<0.1%)
ZNF554	1 (<0.1%)
ZNF555	2 (<0.1%)
ZNF559-ZNF177	2 (<0.1%)
ZNF562	3 (<0.1%)
ZNF565	4 (<0.1%)
ZNF57	1 (<0.1%)
ZNF585B	1 (<0.1%)
ZNF587	2 (<0.1%)
ZNF589	2 (<0.1%)
ZNF592	1 (<0.1%)

<sup>1</sup> n (%)

Characteristic	N = 34,619 <sup>1</sup>
ZNF594-DT	4 (<0.1%)
ZNF605	2 (<0.1%)
ZNF606	1 (<0.1%)
ZNF608	2 (<0.1%)
ZNF609	2 (<0.1%)
ZNF611	10 (<0.1%)
ZNF615	4 (<0.1%)
ZNF623	2 (<0.1%)
ZNF625-ZNF20	1 (<0.1%)
ZNF627	4 (<0.1%)
ZNF638	4 (<0.1%)
ZNF644	3 (<0.1%)
ZNF648	1 (<0.1%)
ZNF652-AS1	4 (<0.1%)
ZNF653	6 (<0.1%)
ZNF662	2 (<0.1%)
ZNF664-RFLNA	3 (<0.1%)
ZNF668	4 (<0.1%)
ZNF670-ZNF695	1 (<0.1%)
ZNF695	3 (<0.1%)
ZNF696	4 (<0.1%)
ZNF697	1 (<0.1%)
ZNF7	17 (<0.1%)
ZNF704	3 (<0.1%)
ZNF707	12 (<0.1%)
ZNF709	1 (<0.1%)
ZNF710	5 (<0.1%)
ZNF74	25 (<0.1%)
ZNF750	2 (<0.1%)
ZNF75A	1 (<0.1%)
ZNF76	1 (<0.1%)
ZNF766	1 (<0.1%)
ZNF77	3 (<0.1%)
ZNF778	15 (<0.1%)
ZNF783	2 (<0.1%)
ZNF784	1 (<0.1%)
ZNF787	1 (<0.1%)
ZNF789	5 (<0.1%)
ZNF791	2 (<0.1%)
ZNF821	5 (<0.1%)
ZNF827	2 (<0.1%)
ZNF83	12 (<0.1%)
ZNF835	1 (<0.1%)

<sup>1</sup>n (%)

Characteristic	N = 34,619 <sup>1</sup>
ZNF84	4 (<0.1%)
ZNF84-DT	1 (<0.1%)
ZNF841	1 (<0.1%)
ZNF843	1 (<0.1%)
ZNF844	2 (<0.1%)
ZNFX1	2 (<0.1%)
ZNHIT1	1 (<0.1%)
ZNRD1ASP	2 (<0.1%)
ZNRF1	1 (<0.1%)
ZNRF3	6 (<0.1%)
ZP2	4 (<0.1%)
ZP3	14 (<0.1%)
ZRANB1	1 (<0.1%)
ZRANB2	2 (<0.1%)
ZRANB2-DT	1 (<0.1%)
ZRANB3	3 (<0.1%)
ZSCAN1	2 (<0.1%)
ZSCAN10	2 (<0.1%)
ZSCAN12	4 (<0.1%)
ZSCAN18	6 (<0.1%)
ZSWIM4	10 (<0.1%)
ZSWIM5	3 (<0.1%)
ZSWIM8	6 (<0.1%)
ZW10	1 (<0.1%)
ZZEF1	4 (<0.1%)
ZZZ3	1 (<0.1%)
Unknown	221

<sup>1</sup>n (%)

## Clinical analysis

Quick look at the data