Supplemental Figure 1 | Additional brain regions and mESC analyzed by bulk RNA-seq. (A) Regions of the cerebellum: culmen lobules IV-V (CUL4,5), central lobule II (CENT2), uvula (IX) (UVU), and cerebellar nuclei (CBN). (B) Entorhinal area (ENT) and flocculus (FL). (C) Mouse embryonic stem cells, C57BL/6 clone 1 (B6-1) and clone 2 (B6-2).
Supplemental Figure 2 | Coronal sections showing the regions in the adult mouse brain analyzed by bulk RNA-seq. The bregma distance for each slice is indicated. The boxed portion of the coronal hemispheric section in the top panels are enlarged and shown in the bottom panels (A to Q, adapted from Allen Brain Atlas, P56). A, FRP; B and C, ACA; D and E, ACB; F, PVH; G, PVH and LHA; H, DMH, VMH, ARH, LHA; I, DMH, ARH, LHA; J and K, VTA (left), ENT (right); L, PB; M, CENT2 and PB (left), FL (right); N, CUL4,5; O, from the top to the bottom, CUL4,5, CBN, NTS; P, NTS; Q, UVU, DVC.
Supplemental Figure 3 | Sagittal sections showing the regions in the embryonic brain analyzed by bulk RNA-seq. The boxed regions in the central figures are enlarged and shown on both sides (A and B, adapted from Allen Brain Atlas, E13.5). A and B, top left M; bottom left F; top right H; bottom right THy, PHy.
Supplemental Figure 4 | Expression profiling of obesity-associated genes throughout the brain regions of energy balance. Scaled TPM values are indicated in heat maps where the darker the blue, the higher the expression. (A) Expression heat maps of genes identified by GWAS of BMI. (B) Heat map of genes associated with monogenic obesity. (C) Heat map of genes associated with rare coding variants associated with BMI. (D) Heat map of genes associated with low-frequency coding variants associated with BMI. (E) Heat map of genes associated with syndromic obesity. Genes were sorted by hierarchical clustering of scaled genes.
**Supplemental Figure 5 | Frequency distribution of all obesity-associated genes across the brain regions of energy balance.** (A) Frequency distributions for each obesity-associated gene was determined by calculating the TPM percentage for each region compared to the sum of TPM values for all samples (brain regions and mESC, averaged across each replicate). For each genetic category, the frequency score and standard error was calculated by compiling the percentage for all the genes in a gene list, and shown as mean ± SE. Individual percentage values for each gene was displayed as dot. N = 190. (B) Detailed analysis of the two most enriched brain regions (embryonic midbrain (M) and ARH). Visualization of the 3 genes with the highest percentage expression. Each slice represent the percentage of expression for a specific gene or group of genes (as indicated in the legend), and the sum of all the slices represent the total expression (100%) of genes for a specific genetic category in a selected brain region.
A

Enrichment score

THyPhy
F
M
H
FRP
ACA
ACB
VTA
LHA
PVH
DMH
VMH
ARH
PB
NTS
DVC
ENT
CENT2
CUL4.5
UVU
CBN
FL
BS-1
BS-2

B

Enrichment plots:

MONOGENIC - THyPhy
MONOGENIC - F
MONOGENIC - M
MONOGENIC - H
MONOGENIC - FRP
MONOGENIC - ACA
**Supplemental Figure 6 | GSEA of obesity-associated genes across the brain regions of energy balance.** (A) The enrichment score generated by GSEA was plotted, and regions with a positive enrichment score and a FDR adjusted p-value < 0.05 were denoted with a *. For each region, individual enrichment plots are displayed for genes associated to each genetic category: monogenic obesity (B); rare coding variants (C); low-frequency coding variants (D); GWAS (E); syndromic (F).
Supplemental Figure 7 | Obesity-associated genes cluster in 11 modules. WGCNA cluster dendrogram. Replicates of the same brain region were averaged, and then a soft thresholding power was chosen to give the highest separation between modules.
Supplemental Figure 8 | Organization of obesity-associated genes into modules. (A) Unsupervised hierarchical clustering and heat map of obesity-associated genes. TPM values were scaled for each gene to improve visualization. Higher expression is denoted by darker shades of blue. Module 1 shows enrichment of genes in the embryonic regions and mESC lines. Genes in module 2 had higher expression in stem cells. Module 3 featured genes with high expression in embryonic and hypothalamic regions. Module 4 was characterized by genes with high expression in the embryonic hindbrain. In module
there was enrichment of genes in regions of the embryonic brain, executive system, reward system and cerebellum. In module 6, expression was highest in the embryonic regions. Genes defining module 7 had high expression in regions of the executive system, reward system and cerebellum. Genes in module 8 showed enrichment in regions of the homeostatic system and cerebellum. Module 9 showed the presence of genes specifically enriched in regions of the executive system. Modules 10 and 11 showed increased expression of genes in regions of the executive and reward system. Distinguishing module 10 and 11, module 10 had increased expression in homeostatic regions and module 11 had increased expression in hypothalamic regions. Relative abundance (given as percentage) of the genes within the modules, based on the genetic categories. All modules were characterized by the presence of genes belonging to more than one genetic category, with module 5 being defined by genes associated with all five the genetic evidence categories. Except for GWAS genes which were distributed across all modules, genes from the remaining genetic categories were present only in some modules. Genes associated with monogenic obesity were expressed in modules 3, 4, 5, 9, 10, and 11; but primarily in module 3, the module that is enriched for genes in embryonic and hypothalamic regions in panel A. Rare coding variant genes were distributed across modules 3, 5, 6, 8, 9 and 10 with predominance in module 6, the module that is enriched for genes in embryonic regions in panel A. Low-frequency coding variant genes were identified in modules 5, 6, 7, 8, 10 and 11, with prevalence in module 11, in which there was enrichment in regions of the executive system, reward system and hypothalamus in panel A. Syndromic genes were distributed across all modules, except module 10, with predominance in module 11.
Supplemental Figure 9 | Organization of obesity-associated genes into smaller modules. (A) Unsupervised hierarchical clustering and heat map of obesity-associated genes, and separation into modules based on the hierarchical clustering. For heat map, TPM values were scaled for each gene to improve visualization. Genes were sorted by hierarchical clustering of scaled genes. Scaled TPM value are shown in shades of blue (darker is higher expression). (B) Percentage distribution of the genes within the modules, based on the genetic categories.
Two independent clustering approaches for obesity-associated genes show a consistent signature. Alluvial diagram was used to visualize the composition of the 11 modules obtained using WGCNA (on the left) as well as unsupervised hierarchical clustering (on the right).
Supplemental Figure 11 | GSEA of obesity-, T1D-, T2D-, autism- and breast cancer-associated genes across the brain regions of energy balance. For each system (homeostatic, executive, reward, embryonic brain, cerebellum, mESC) samples from all the regions were aggregated, and individual enrichment plots are displayed for genes associated to each disease: obesity (A); T1D (B); T2D (C); autism (D); breast cancer (E).
Supplemental Figure 12 | Obesity-, T2D-, T1D-, autism-, breast cancer-associated genes cluster in 15 modules. WGCNA cluster dendrogram. Replicates of the same brain region were averaged, and then a soft thresholding power was chosen to give the highest separation between modules.
Supplemental Figure 13 | Figure 4 | K-means clustering of obesity-associated genes with genes associated with other diseases. The localization of expression of the obesity genes and the genes associated with one or more other diseases were clustered into k clusters in which each observation belongs to the cluster with the nearest mean. Enrichment was calculated as over-representation score which indicates the deviation from an equal distribution across modules, normalizing for module size and gene list size, and was plotted to show a positive deflection where a gene list is over-represented. (A) Four clusters of T1D- and obesity-associated genes were chosen based on the elbow plot in F. Cluster 1 contained predominantly T1D-associated genes, on the other hand, clusters 2 and 4 were mainly contributed by obesity-associated genes. (B) Four clusters of T2D- and obesity-associated genes were chosen based on the elbow plot in G. Clusters 1, 2 and 3 are mostly defined by obesity-associated genes, the main contribution to cluster 4 are T2D-associated genes. (C) Four clusters of autism- and obesity-associated genes were chosen based on the elbow plot in H. Clusters 1 and 2 are predominantly defined by autism associated genes. In clusters 3 and 4 the contribution is mixed between autism and obesity. (D) Four clusters of breast cancer- and obesity-associated genes were chosen based on the elbow plot in I. Cluster 1 consist mainly of breast cancer-associated genes, both clusters 2 and 4 showed primary contribution by obesity-associated genes, and only cluster 3 has a more equal contribution between the diseases. (E) Six clusters formed from all genes across all five diseases together were chosen based on the elbow plot in J. Cluster 1 is mainly contributed by breast cancer-associated genes; clusters 2 and 5 are mainly defined by autism-associated genes; obesity-associated genes are enriched in clusters 3 and 4; cluster 6 is predominantly contributed by T1D-associated genes. was plotted to show a positive deflection where a gene list is over-represented.
**Supplemental Table 1 | Abbreviations for brain regions and mouse stem cells.**

Acronyms for brain regions were taken from the Allen Brain Atlas.

| Color Key | Abbreviation | Region/Cell Line Name |
|-----------|--------------|-----------------------|
|           | THy, PHy     | Terminal (rostral) and peduncular (caudal) hypothalamus |
|           | F            | Forebrain              |
|           | M            | Midbrain               |
|           | H            | Hindbrain              |
|           | FRP          | Frontal pole cortex    |
|           | ACA          | Anterior cingulate area |
|           | ACB          | Nucleus accumbens      |
|           | VTA          | Ventral tegmental area |
|           | LHA          | Lateral hypothalamic area |
|           | PVH          | Paraventricular hypothalamic nucleus |
|           | DMH          | Dorsomedial nucleus of the hypothalamus |
|           | VMH          | Ventromedial hypothalamic nucleus |
|           | ARH          | Arcuate hypothalamic nucleus |
|           | PB           | Parabrachial nucleus |
|           | NTS          | Nucleus of the solitary tract |
|           | DVC          | Dorsal-vagal complex |
|           | ENT          | Entorhinal area        |
|           | CENT2        | Central lobule II      |
|           | CUL4,5       | Culmen lobules IV-V    |
| Color Key | Abbreviation | Region/Cell Line Name |
|-----------|--------------|----------------------|
|           | UVU          | Uvula (IX)           |
|           | CBN          | Cerebellar nuclei    |
|           | FL           | Flocculus            |
|           | B6-1         | C57BL/6 mouse embryonic stem cells, clone 1 |
|           | B6-2         | C57BL/6 mouse embryonic stem cells, clone 2 |
**Supplemental Table 2 | Samples overview.** Color-keyed description of each brain sample including: region, sample batch, number of mice, number of sections per sample, number of mice and type of punch.

| Color Key | Region | Batch # | N Mice | N Sections | Age | Punch  |
|-----------|--------|---------|--------|------------|-----|--------|
|           | THy, PHy | 6       | 4      | 4          |     |        |
|           |         | 7       | 4      | 4          | E14.5 | Single |
|           |         | 8       | 4      | 4          |     |        |
|           | F       | 8       | 4      | 4          | E14.5 | Single |
|           | M       | 6       | 4      | 4          | E14.5 | Single |
|           |         | 8       | 4      | 4          |     |        |
|           | H       | 6       | 4      | 4          | E14.5 | Single |
|           |         | 7       | 4      | 4          |     |        |
|           |         | 8       | 4      | 4          |     |        |
|           | FRP     | 2       | 3      | 1          |     |        |
|           |         | 3       | 3      | 1          | P56 | Bilateral |
|           |         | 4       | 3      | 1          |     |        |
|           | ACA     | 1       | 3      | 2          |     |        |
|           |         | 3       | 3      | 2          | P56 | Bilateral |
|           |         | 4       | 3      | 2          |     |        |
|           | ACB     | 2       | 1      | 2          |     |        |
|           |         | 3       | 3      | 2          | P56 | Bilateral |
|           |         | 4       | 3      | 2          |     |        |
| Color Key | Region | Batch # | N Mice | N Sections | Age | Punch |
|-----------|--------|---------|--------|------------|-----|-------|
|           | VTA    | 2       | 3      | 2          | P56 | Bilateral |
|           |        | 3       | 3      | 2          |     |        |
|           | LHA    | 2       | 3      | 3          | P56 | Bilateral |
|           |        | 4       | 4      | 3          |     |        |
|           | PVH    | 1       | 3      | 2          | P56 | Bilateral |
|           |        | 4       | 3      | 2          |     |        |
|           | DMH    | 2       | 3      | 2          | P56 | Bilateral |
|           |        | 3       | 3      | 2          |     |        |
|           |        | 4       | 3      | 2          |     |        |
|           | VMH    | 2       | 3      | 1          | P56 | Bilateral |
|           |        | 3       | 3      | 1          |     |        |
|           | ARH    | 3       | 3      | 2          | P56 | Bilateral |
|           |        | 4       | 3      | 2          |     |        |
|           | PB     | 2       | 3      | 2          | P56 | Bilateral |
|           |        | 4       | 3      | 2          |     |        |
| Color Key | Region | Batch # | N Mice | N Sections | Age  | Punch   |
|-----------|--------|---------|--------|------------|------|---------|
|           | NTS    | 1       | 3      | 2          |      |         |
|           |        | 2       | 3      | 2          |      |         |
|           | DVC    | 3       | 3      | 1          | P56  | Bilateral |
|           | ENT    | 3       | 3      | 2          | P56  | Bilateral |
|           | CENT2  | 2       | 3      | 1          | P56  | Single  |
|           |        | 3       | 3      | 1          |      |         |
|           | CUL4,5 | 3       | 3      | 2          | P56  | Single  |
|           |        | 4       | 3      | 2          |      |         |
|           |        | 5       | 4      | 2          |      |         |
|           | UVU    | 1       | 3      | 1          | P56  | Single  |
|           |        | 2       | 3      | 1          |      |         |
### Supplemental Table 2 | Cont.

| Color Key | Region | Batch # | N Mice | N Sections | Age | Punch |
|-----------|--------|---------|--------|------------|-----|-------|
|           | UVU    | 5       | 4      | 1          | P56 | Single |
|           |        | 1       | 3      | 1          |     |       |
|           | CBN    | 3       | 3      | 1          | P56 | Bilateral |
|           |        | 4       | 3      | 1          |     |       |
|           | FL     | 2       | 3      | 1          | P56 | Single |
|           |        | 3       | 3      | 1          |     |       |
|           |        | 4       | 3      | 1          |     |       |
Supplemental Table 3 | Samples overview cont. Color-keyed description of mouse embryonic stem cells sample including: cell line name, mouse strain, sample batch, number of cells plated for each sample.

| Color Key | mESC Line | Batch # | Mouse Strain | N Cells/35 mm Well |
|-----------|-----------|---------|--------------|-------------------|
|           | B6-1      | 9       | C57BL/6      | 3 x 10^5          |
|           |           | 9       | C57BL/6      | 3 x 10^5          |
|           | B6-2      | 9       | C57BL/6      | 3 x 10^5          |
|           |           | 9       | C57BL/6      | 3 x 10^5          |
Supplemental Table 4 | Categories of obesity-associated genes.

| Genetic Category                  | N Genes |
|-----------------------------------|---------|
| Monogenic                         | 9       |
| Rare coding variants              | 12      |
| Low-frequency coding variants     | 9       |
| GWAS                              | 144     |
| Syndromic                         | 25      |
**Supplemental Table 5 | Obesity-associated genes.** Description of each gene including: module number based on hierarchical clustering, gene name and genetic category. Relates to Supplemental Figure 8. (B) biological candidate; (C) copy number variation; (D) depict analyses; (G) GRAIL results; (M) BMI-associated variant is in strong LD ($r^2 \geq 0.75$) with a missense variant in the indicated gene; (N) gene nearest to index SNP; (Q) association and eQTL data converge to affect gene expression.

| Module # | Gene Name | Genetic Category |
|----------|-----------|-----------------|
| 1        | Hif1an    | GWAS (N)        |
| 1        | Cep295    | GWAS           |
| 1        | Zbtb10    | GWAS (N)        |
| 1        | Pbrm1     | GWAS (N)        |
| 1        | Creb1     | GWAS (B, N)     |
| 1        | Phip      | Syndromic      |
| 1        | Mks1      | Syndromic      |
| 1        | Ino80e    | GWAS (N)        |
| 1        | Fancl     | GWAS (N)        |
| 1        | Rpl27a    | GWAS (N)        |
| 1        | Cnot9     | GWAS (Q)        |
| 1        | Nup54     | GWAS (M)        |
| 1        | Sfxn2     | GWAS (Q)        |
| 1        | Kat8      | GWAS (N)        |
| 1        | Usp37     | GWAS (N)        |
| 1        | Gtf3a     | GWAS (Q)        |
| 1        | Snrpd2    | GWAS (M)        |
| 1        | Ttll4     | GWAS (M, Q)     |
| 1        | Zfp646    | GWAS (M, Q)     |
| 2        | Apobr     | GWAS (B)        |
| 2        | Etv5      | GWAS (N)        |
| 2        | Rcc1I     | GWAS           |
| 2        | Tomm40    | GWAS (N)        |
| 2        | Polk      | GWAS           |
| 2        | Adpgk     | GWAS (N)        |
| 2        | Gdf15     | GWAS (B)        |
| 2        | Zfp64     | GWAS (N)        |
| 2        | Hmgalpha  | GWAS (B)        |
| 2        | Mftr2     | GWAS           |
| 2        | Cdkal1    | GWAS (N)        |
| 2        | Alms1     | Syndromic      |
| 2        | Mtch2     | GWAS (N)        |
| 2        | Nrcc3     | GWAS (N)        |
| 2        | Rab23     | Syndromic      |
| 3        | Prkd1     | GWAS (N)        |
| 3        | Bbs12     | Syndromic      |
### Supplemental Table 5 | Cont.

| Module # | Gene Name | Genetic Category |
|----------|-----------|------------------|
| 3        | Stk33     | GWAS             |
| 3        | Asb4      | GWAS (B, N)      |
| 3        | Pomc      | Monogenic/GWAS (Q, B) |
| 3        | Bbs10     | Syndromic        |
| 3        | Galnt10   | GWAS (N)         |
| 3        | Gpr151    | Rare             |
| 3        | Tcf7l2    | GWAS (B, N)      |
| 3        | Sim1      | Monogenic        |
| 3        | Smg6      | GWAS (D, N)      |
| 3        | Calcr     | GWAS (B, N)      |
| 3        | Bbs9      | Syndromic        |
| 3        | Tub       | Monogenic/GWAS (B) |
| 4        | Skor1     | GWAS (M)         |
| 4        | Lmx1b     | GWAS (B, N)      |
| 4        | Olig3     | GWAS (G)         |
| 4        | Lepr      | Monogenic/GWAS (N) |
| 4        | Vkorc1    | GWAS (Q)         |
| 4        | Lztf1     | Syndromic        |
| 4        | Rpgrlip1l | Syndromic        |
| 5        | Pex2      | GWAS             |
| 5        | Ift27     | Syndromic        |
| 5        | Txndc12   | GWAS             |
| 5        | Fam57b    | GWAS (D)         |
| 5        | Irs1      | GWAS (B, Q)      |
| 5        | Hip1      | GWAS (B, N)      |
| 5        | Sbk1      | GWAS (D, N)      |
| 5        | Sdca8g    | Syndromic        |
| 5        | Sh2b1     | Monogenic/GWAS (N) |
| 5        | Map2k5    | GWAS (N)         |
| 5        | Nudt3     | GWAS (N)         |
| 5        | Sema3a    | Rare             |
| 5        | Zfp169    | Low-frequency    |
| 5        | Bbip1     | Syndromic        |
| 5        | Poc5      | GWAS (M)         |
| 6        | Hmgcr     | GWAS (N, B)      |
| 6        | Plxna1    | Rare             |
| 6        | Stk36     | GWAS (B, M)      |
| 6        | Plxna3    | Rare             |
| 6        | Ptbp2     | GWAS (N)         |
| 6        | Zfp608    | GWAS (N)         |
| 6        | Fbx1l19   | GWAS (D)         |
| Module # | Gene Name | Genetic Category |
|---------|-----------|------------------|
| 6       | Kctd15    | GWAS (N)         |
| 6       | Ube2e3    | GWAS (N)         |
| 6       | Zfp668    | GWAS (Q)         |
| 6       | Elavl4    | GWAS (B, D, N, Q)|
| 6       | Klf7      | GWAS (B)         |
| 6       | Slc39a8   | GWAS (Q, M)      |
| 6       | Ift74     | Syndromic        |
| 6       | Nrp2      | Rare             |
| 6       | Ehbp1     | GWAS (B, N)      |
| 6       | Nrp1      | Rare             |
| 6       | Nav1      | GWAS (N)         |
| 6       | Fign      | GWAS (N)         |
| 6       | Zfhx3     | Low-frequency    |
| 6       | Pgpep1    | GWAS (Q, N)      |
| 6       | Tal1      | GWAS (N)         |
| 6       | Tfp2b     | GWAS (N)         |
| 6       | Gipr      | Rare/GWAS (B, M) |
| 6       | Lmo1      | GWAS             |
| 7       | Inpp5e    | Syndromic        |
| 7       | Cbln1     | GWAS (N)         |
| 7       | Kcnk3     | GWAS (D, N)      |
| 7       | Foxo3     | GWAS (B, N)      |
| 7       | Zfp142    | GWAS (M)         |
| 7       | Cyp17a1   | GWAS (B)         |
| 7       | Rasa2     | GWAS (N)         |
| 7       | Mtif3     | GWAS (N)         |
| 7       | Efr3b     | GWAS (M)         |
| 7       | Ric3      | GWAS (N)         |
| 7       | Scg3      | GWAS (B, D)      |
| 7       | Stx1b     | GWAS (D)         |
| 7       | Ypel3     | GWAS (D)         |
| 7       | Negr1     | GWAS (N)         |
| 7       | Arl6      | Syndromic        |
| 7       | Ksr2      | Low-frequency    |
| 7       | Nrxn3     | GWAS (N)         |
| 7       | Dmvl2     | GWAS (M, N)      |
| 7       | Frrs1l    | GWAS (D)         |
| 8       | Hhip      | GWAS (B, N)      |
| 8       | Tlr4      | GWAS (B, N)      |
| 8       | Sema3b    | Rare             |
| 8       | Tmem160   | GWAS (N, Q)      |
| Module # | Gene Name  | Genetic Category          |
|---------|------------|---------------------------|
| 8       | Cep290     | Syndromic                 |
| 8       | Gnpda2     | GWAS (N)                  |
| 8       | Rab21      | Low-frequency             |
| 8       | Hsd17b12   | GWAS (B, M, N)            |
| 8       | Gbe1       | GWAS (B, M, N)            |
| 8       | Scarb2     | GWAS (Q, N)               |
| 8       | Cobl1      | GWAS (N)                  |
| 8       | Cyp27a1    | GWAS (B)                  |
| 8       | Pcdh9      | GWAS (D)                  |
| 8       | Plcd4      | GWAS (B, Q)               |
| 8       | Gprc5b     | GWAS (N)                  |
| 8       | Ssfa2      | GWAS                      |
| 8       | Ankdd1b    | GWAS                      |
| 8       | Iars2      | GWAS                      |
| 8       | Mkks       | Syndromic                 |
| 8       | Zbtb7b     | Low-frequency             |
| 9       | Sec16b     | GWAS (N)                  |
| 9       | Plxna2     | Rare                      |
| 9       | Wdpcp      | Syndromic                 |
| 9       | Grp        | GWAS (B, G, N)            |
| 9       | Tnni3k     | GWAS (N)                  |
| 9       | Bdnf       | Monogenic/GWAS (N)        |
| 9       | Cadm2      | GWAS (N)                  |
| 9       | Stxbp6     | GWAS (N)                  |
| 10      | Sema3d     | Rare                      |
| 10      | Kcnk9      | GWAS (N)                  |
| 10      | Faim2      | GWAS (N)                  |
| 10      | Col4a3bp   | GWAS (N)                  |
| 10      | Dnajc27    | GWAS (M)                  |
| 10      | Rapgef3    | Low-frequency             |
| 10      | Trim66     | GWAS (D, M, N)            |
| 10      | Ache       | Low-frequency             |
| 10      | Rit2       | GWAS (B, D)               |
| 10      | Fhit       | GWAS (N)                  |
| 10      | Mc4r       | Monogenic/GWAS (N)        |
| 10      | Cadm1      | GWAS (N)                  |
| 10      | Slc22a3    | GWAS (N)                  |
| 10      | Lingo2     | GWAS (D, N)               |
| 10      | Lrfn2      | GWAS (D)                  |
| 10      | Agbl4      | GWAS (N)                  |
| 10      | Doc2a      | GWAS (D)                  |
| Module # | Gene Name | Genetic Category |
|---------|-----------|------------------|
| 10      | Pcsk1     | Monogenic        |
| 10      | Entpd6    | Low-frequency    |
| 10      | Adcy3     | GWAS (Q, M)      |
| 10      | Grid1     | GWAS (B, N)      |
| 10      | Sema3c    | Rare             |
| 10      | Plxna4    | Rare             |
| 10      | Rabep1    | GWAS (N)         |
| 10      | Erbb4     | GWAS (D, N)      |
| 10      | Kctd13    | GWAS (D)         |
| 10      | Mapk3     | GWAS (D)         |
| 11      | Rarb      | GWAS (B)         |
| 11      | Bbs1      | Syndromic        |
| 11      | Bbs7      | Syndromic        |
| 11      | Bbs2      | Syndromic        |
| 11      | Ttc8      | Syndromic        |
| 11      | Qpctl     | GWAS (N)         |
| 11      | Taok2     | GWAS (D)         |
| 11      | Fto       | GWAS (N)         |
| 11      | Nt5c2     | GWAS (N)         |
| 11      | Ralyl     | GWAS (D, N)      |
| 11      | Trim32    | Syndromic        |
| 11      | Zfr2      | Low-frequency    |
| 11      | Ifngr1    | GWAS (N)         |
| 11      | Bbs4      | GWAS (B, M, Q)/Syndromic |
| 11      | Ntrk2     | Monogenic/GWAS (N) |
| 11      | Lrp1b     | GWAS (N)         |
| 11      | Park2     | GWAS (B, D, N)   |
| 11      | Bbs5      | Syndromic        |
| 11      | Ets2      | GWAS (N)         |
| 11      | Epb41l4b  | GWAS (N)         |
| 11      | Tmem18    | GWAS (N)         |
Supplemental Table 6 | Expression levels of obesity-associated genes across the brain regions of energy balance. TPM values for each obesity-associate gene were reported for all brain regions and mouse embryonic stem cell samples. For each region TPM value from each replicate were aggregated to calculate the mean and SD.
Supplemental Table 7 | Frequency distribution of obesity-associated genes within each genetic category. Table shows one-way ANOVA reporting the Benjamini, Krieger and Yekutieli two step false discovery rate corrected p-value. Relates to Figure 3A.

| Region 1 | Region 2 | Monogenic | Rare | Low-frequency | GWAS | Syndromic |
|----------|----------|-----------|------|---------------|------|-----------|
| THy/PHy  | F        | 0.0147    | 0.4035 | 0.1           | 0.7353 | 0.7561 |
| THy/PHy  | M        | 0.0323    | 0.4339 | 0.6154        | 0.0033 | 0.7437 |
| THy/PHy  | H        | 0.0461    | 0.6168 | 0.547         | 0.4959 | 0.0772 |
| THy/PHy  | FRP      | 0.1137    | 0.0598 | 0.6084        | 0.5795 | 0.0902 |
| THy/PHy  | ACA      | 0.1693    | 0.0163 | 0.6217        | 0.4657 | 0.0863 |
| THy/PHy  | ACB      | 0.025     | 0.0245 | 0.8023        | 0.3327 | 0.763 |
| THy/PHy  | VTA      | 0.0365    | <0.0001 | 0.942       | 0.0165 | <0.0001 |
| THy/PHy  | LHA      | 0.0814    | 0.0258 | 0.236         | 0.4502 | 0.0211 |
| THy/PHy  | PVH      | 0.1694    | 0.0855 | 0.095         | 0.8314 | 0.1408 |
| THy/PHy  | DMH      | 0.3307    | 0.0603 | 0.1194        | 0.5624 | 0.6845 |
| THy/PHy  | VMH      | 0.2776    | 0.0218 | 0.0941        | 0.7427 | 0.692 |
| THy/PHy  | ARH      | 0.033     | 0.0596 | 0.1546        | 0.0365 | 0.372 |
| THy/PHy  | PB       | 0.0474    | 0.0022 | 0.6481        | 0.1239 | 0.0008 |
| THy/PHy  | NTS      | 0.0597    | 0.0269 | 0.5269        | 0.3187 | 0.0031 |
| THy/PHy  | DVC      | 0.1086    | 0.0238 | 0.2927        | 0.6727 | 0.0119 |
| THy/PHy  | ENT      | 0.0735    | 0.0238 | 0.6398        | 0.1994 | 0.0102 |
| THy/PHy  | CENT2    | 0.0234    | 0.0005 | 0.6379        | 0.7816 | 0.5535 |
| THy/PHy  | CUL4,5   | 0.0343    | 0.0027 | 0.372         | 0.979  | 0.8912 |
| THy/PHy  | UBV      | 0.0317    | 0.0014 | 0.7538        | 0.7487 | 0.8144 |
| THy/PHy  | CBN      | 0.019     | 0.0619 | 0.6193        | 0.1368 | 0.0026 |
| THy/PHy  | FL       | 0.0214    | 0.0016 | 0.6551        | 0.4507 | 0.0457 |
| THy/PHy  | mESC B61 | 0.0051    | <0.0001 | 0.0227      | 0.0084 | <0.0001 |
| THy/PHy  | mESC B62 | 0.0039    | <0.0001 | 0.0227      | 0.0005 | <0.0001 |
| F        | M        | 0.7596    | 0.1063 | 0.0323        | 0.001  | 0.5238 |
| F        | H        | 0.6494    | 0.1822 | 0.2953        | 0.3082 | 0.0379 |
| F        | FRP      | 0.3835    | 0.2931 | 0.2559        | 0.8289 | 0.0451 |
| F        | ACA      | 0.2802    | 0.1151 | 0.248         | 0.6955 | 0.0429 |
| F        | ACB      | 0.8387    | 0.1552 | 0.0585        | 0.5283 | 0.5405 |
| F        | VTA      | 0.7218    | 0.0015 | 0.1158        | 0.0393 | <0.0001 |
| F        | LHA      | 0.4781    | 0.1609 | 0.005         | 0.6767 | 0.0089 |
| F        | PVH      | 0.28      | 0.3745 | 0.001         | 0.9004 | 0.0747 |
| F        | DMH      | 0.1386    | 0.2947 | 0.0015        | 0.359  | 0.4735 |
| F        | VMH      | 0.1711    | 0.1425 | 0.001         | 0.5052 | 0.9318 |
| F        | ARH      | <0.0001   | 0.2923 | 0.0024        | 0.0151 | 0.5604 |
| F        | PB       | 0.6409    | 0.0252 | 0.0362        | 0.23   | 0.0003 |
| F        | NTS      | 0.5706    | 0.1661 | 0.0233        | 0.5099 | 0.0011 |
| F        | DVC      | 0.396     | 0.1521 | 0.0074        | 0.9328 | 0.0048 |
| F        | ENT      | 0.508     | 0.1518 | 0.2378        | 0.3446 | 0.004 |
| F        | CENT2    | 0.8587    | 0.0082 | 0.0349        | 0.9515 | 0.7779 |
| F        | CUL4,5   | 0.7409    | 0.0295 | 0.0116        | 0.7156 | 0.862 |
| F        | UBV      | 0.7653    | 0.0177 | 0.0506        | 0.9858 | 0.9395 |
| F        | CBN      | 0.9235    | 0.3001 | 0.0328        | 0.2502 | 0.0009 |
| F        | FL       | 0.8872    | 0.0191 | 0.037         | 0.6773 | 0.0211 |
| F        | mESC B61 | 0.7103    | <0.0001 | 0.453       | 0.0217 | <0.0001 |
### Supplemental Table 7 | Cont.

| Region 1 | Region 2 | Monogenic | Rare | Low-frequency | GWAS | Syndromic |
|----------|----------|-----------|------|---------------|------|-----------|
| F        | mESC B62 | 0.6439    | <0.0001 | 0.5201 | 0.0135 | <0.0001 |
| M        | H        | 0.8818    | 0.7776  | 0.2699 | 0.0238 | 0.1495 |
| M        | FRP      | 0.5713    | 0.008   | 0.3107 | 0.0005 | 0.1712 |
| M        | ACA      | 0.4384    | 0.0015  | 0.3198 | 0.0002 | 0.1647 |
| M        | ACB      | 0.9184    | 0.0026  | 0.801  | <0.0001 | 0.9797 |
| M        | VTA      | 0.9601    | <0.0001 | 0.5653 | <0.0001 | <0.0001 |
| M        | LHA      | 0.6864    | 0.0027  | 0.4937 | 0.0002 | 0.0476 |
| M        | PVH      | 0.4382    | 0.0127  | 0.2415 | 0.0016 | 0.2515 |
| M        | DMH      | 0.2391    | 0.008   | 0.29   | 0.0182 | 0.9367 |
| M        | VMH      | 0.2871    | 0.0022  | 0.2397 | 0.009  | 0.4697 |
| M        | ARH      | <0.0001   | 0.0079  | 0.3556 | 0.3954 | 0.2228 |
| M        | PB       | 0.8724    | 0.0001  | 0.9633 | <0.0001 | 0.0024 |
| M        | NTS      | 0.7939    | 0.0029  | 0.8961 | <0.0001 | 0.0083 |
| M        | DVC      | 0.587    | 0.0025  | 0.5817 | 0.0008 | 0.0285 |
| M        | ENT      | 0.7217    | 0.0025  | 0.3323 | <0.0001 | 0.0247 |
| M        | CENT2    | 0.8981    | <0.0001 | 0.9747 | 0.0013 | 0.358 |
| M        | CUL4,5   | 0.9804    | 0.0002  | 0.6958 | 0.0036 | 0.6429 |
| M        | UVU      | 0.9941    | <0.0001 | 0.8502 | 0.0011 | 0.5744 |
| M        | CBN      | 0.8337    | 0.0083  | 0.9957 | <0.0001 | 0.0072 |
| M        | FL       | 0.8696    | <0.0001 | 0.9556 | 0.0002 | 0.0944 |
| M        | mESC B61 | 0.4983    | <0.0001 | 0.0041 | <0.0001 | <0.0001 |
| M        | mESC B62 | 0.4426    | <0.0001 | 0.0056 | <0.0001 | <0.0001 |
| H        | FRP      | 0.6763    | 0.0175  | 0.9283 | 0.2168 | 0.9418 |
| H        | ACA      | 0.531     | 0.0038  | 0.9132 | 0.1584 | 0.9586 |
| H        | ACB      | 0.8017    | 0.0061  | 0.3941 | 0.0991 | 0.1425 |
| H        | VTA      | 0.9214    | <0.0001 | 0.5964 | 0.0021 | 0.0063 |
| H        | LHA      | 0.7986    | 0.0065  | 0.0747 | 0.151  | 0.5879 |
| H        | PVH      | 0.5307    | 0.0268  | 0.2363 | 0.3714 | 0.7679 |
| H        | DMH      | 0.3034    | 0.0177  | 0.0314 | 0.9189 | 0.1732 |
| H        | VMH      | 0.3595    | 0.0053  | 0.2333 | 0.7242 | 0.0307 |
| H        | ARH      | <0.0001   | 0.0174  | 0.0435 | 0.1583 | 0.0079 |
| H        | PB       | 0.9905    | 0.0004  | 0.2903 | 0.0265 | 0.1096 |
| H        | NTS      | 0.9104    | 0.0068  | 0.2175 | 0.0934 | 0.2288 |
| H        | DVC      | 0.6931    | 0.0059  | 0.0989 | 0.2699 | 0.4517 |
| H        | ENT      | 0.8356    | 0.0059  | 0.893  | 0.0495 | 0.4192 |
| H        | CENT2    | 0.782    | <0.0001 | 0.2838 | 0.3379 | 0.0185 |
| H        | CUL4,5   | 0.9012    | 0.0005  | 0.1357 | 0.5126 | 0.057 |
| H        | UVU      | 0.8759    | 0.0002  | 0.3601 | 0.3167 | 0.0454 |
| H        | CBN      | 0.7198    | 0.0182  | 0.2722 | 0.0301 | 0.2106 |
| H        | FL       | 0.7544    | 0.0003  | 0.2947 | 0.1513 | 0.8166 |
| H        | mESC B61 | 0.4091    | <0.0001 | 0.0732 | 0.0009 | <0.0001 |
| H        | mESC B62 | 0.3596    | <0.0001 | 0.0919 | 0.0005 | 0.0029 |
| FRP      | ACA      | 0.8343    | 0.5984  | 0.9848 | 0.8608 | 0.9832 |
| FRP      | ACB      | 0.5039    | 0.7101  | 0.4458 | 0.6784 | 0.1634 |
| FRP      | VTA      | 0.6058    | 0.0314  | 0.6602 | 0.0651 | 0.005 |
| FRP      | LHA      | 0.8709    | 0.7247  | 0.0903 | 0.8407 | 0.5387 |
| Region 1 | Region 2 | Monogenic | Rare | Low-frequency | GWAS | Syndromic |
|----------|----------|-----------|------|---------------|------|-----------|
| FRP      | PVH      | 0.834     | 0.87 | 0.0296        | 0.7329 | 0.8242    |
| FRP      | DMH      | 0.5401    | 0.9973 | 0.0391    | 0.2571 | 0.1973    |
| FRP      | VMH      | 0.6174    | 0.6767 | 0.0293    | 0.3776 | 0.0367    |
| FRP      | ARH      | 0.0002    | 0.9986 | 0.0536    | 0.0082 | 0.0098    |
| FRP      | PB       | 0.685     | 0.2324 | 0.3331    | 0.3249 | 0.0943    |
| FRP      | NTS      | 0.7603    | 0.7377 | 0.2527    | 0.6578 | 0.0218    |
| FRP      | DVC      | 0.9817    | 0.7022 | 0.1185    | 0.8952 | 0.4091    |
| FRP      | ENT      | 0.8336    | 0.7013 | 0.9645    | 0.4659 | 0.3784    |
| FRP      | CENT2    | 0.4877    | 0.1083 | 0.326     | 0.7819 | 0.0224    |
| FRP      | CUL4,5   | 0.5881    | 0.2575 | 0.1607    | 0.5616 | 0.0672    |
| FRP      | UUV      | 0.5663    | 0.1836 | 0.4091    | 0.8151 | 0.0538    |
| FRP      | CBN      | 0.4379    | 0.9879 | 0.3133    | 0.3503 | 0.1853    |
| FRP      | FL       | 0.4654    | 0.1934 | 0.3379    | 0.8414 | 0.7605    |
| FRP      | mESC B61 | 0.2144    | 0.0011 | 0.0601    | 0.0375 | <0.0001   |
| FRP      | mESC B62 | 0.183     | 0.0006 | 0.076     | 0.0242 | 0.0023    |
| ACA      | ACB      | 0.3804    | 0.8768 | 0.4572    | 0.8109 | 0.1571    |
| ACA      | VTA      | 0.4684    | 0.1031 | 0.674     | 0.095  | 0.0054    |
| ACA      | LHA      | 0.7102    | 0.8614 | 0.094     | 0.9796 | 0.5527    |
| ACA      | PVH      | 0.9997    | 0.49   | 0.0311    | 0.6055 | 0.8078    |
| ACA      | DMH      | 0.6864    | 0.596  | 0.0409    | 0.1907 | 0.1901    |
| ACA      | VMH      | 0.7715    | 0.9125 | 0.0307    | 0.2902 | 0.0349    |
| ACA      | ARH      | 0.0005    | 0.5996 | 0.0559    | 0.0048 | 0.0092    |
| ACA      | PB       | 0.5388    | 0.5037 | 0.3426    | 0.4184 | 0.0986    |
| ACA      | NTS      | 0.6072    | 0.8478 | 0.2607    | 0.7889 | 0.2094    |
| ACA      | DVC      | 0.8165    | 0.8851 | 0.123     | 0.7588 | 0.4211    |
| ACA      | ENT      | 0.6751    | 0.8862 | 0.9797    | 0.5797 | 0.39      |
| ACA      | CENT2    | 0.3667    | 0.2793 | 0.3354    | 0.6511 | 0.0212    |
| ACA      | CUL4,5   | 0.453     | 0.5441 | 0.1664    | 0.4498 | 0.0641    |
| ACA      | UVU      | 0.434     | 0.421  | 0.4199    | 0.6824 | 0.0513    |
| ACA      | CBN      | 0.3249    | 0.5879 | 0.3225    | 0.4481 | 0.1924    |
| ACA      | FL       | 0.3479    | 0.4382 | 0.3475    | 0.9803 | 0.7766    |
| ACA      | mESC B61 | 0.1473    | 0.0058 | 0.0575    | 0.0567 | <0.0001   |
| ACA      | mESC B62 | 0.1238    | 0.0036 | 0.0729    | 0.0376 | 0.0025    |
| ACB      | VTA      | 0.8788    | 0.0744 | 0.7466    | 0.1526 | <0.0001   |
| ACB      | LHA      | 0.6128    | 0.9844 | 0.3493    | 0.8308 | 0.0448    |
| ACB      | PVH      | 0.3802    | 0.5924 | 0.1551    | 0.4498 | 0.2411    |
| ACB      | DMH      | 0.2009    | 0.7075 | 0.1906    | 0.1217 | 0.9165    |
| ACB      | VMH      | 0.2435    | 0.964  | 0.1538    | 0.1947 | 0.4835    |
| ACB      | ARH      | <0.0001   | 0.7114 | 0.2401    | 0.0022 | 0.2326    |
| ACB      | PB       | 0.7925    | 0.4102 | 0.8367    | 0.5687 | 0.0022    |
| ACB      | NTS      | 0.7161    | 0.9706 | 0.702     | 0.9773 | 0.0077    |
| ACB      | DVC      | 0.5186    | 0.9916 | 0.4222    | 0.5849 | 0.0267    |
| ACB      | ENT      | 0.6465    | 0.9905 | 0.4728    | 0.7531 | 0.0232    |
| ACB      | CENT2    | 0.9796    | 0.2163 | 0.8255    | 0.4893 | 0.3714    |
| ACB      | CUL4,5   | 0.8989    | 0.4463 | 0.5203    | 0.3197 | 0.6612    |
| ACB      | UVU      | 0.9243    | 0.3374 | 0.9496    | 0.5167 | 0.5918    |
Supplemental Table 7 | Cont.

| Region 1 | Region 2 | Monogenic | Rare | Low-frequency | GWAS | Syndromic |
|----------|----------|-----------|------|--------------|------|-----------|
| ACB      | CBN      | 0.9143    | 0.6988 | 0.8052       | 0.6035 | 0.0067    |
| ACB      | FL       | 0.9508    | 0.3524 | 0.8442       | 0.8301 | 0.0896    |
| ACB      | mESC B61 | 0.5654    | 0.0036 | 0.0086       | 0.0957 | <0.0001   |
| ACB      | mESC B62 | 0.5057    | 0.0022 | 0.0116       | 0.0658 | <0.0001   |
| VTA      | LHA      | 0.7235    | 0.0713 | 0.2086       | 0.1002 | 0.0281    |
| VTA      | PVH      | 0.4682    | 0.0207 | 0.0816       | 0.0288 | 0.0025    |
| VTA      | DMH      | 0.2595    | 0.0312 | 0.1032       | 0.0029 | <0.0001   |
| VTA      | VMH      | 0.3103    | 0.082  | 0.0808       | 0.0064 | <0.0001   |
| VTA      | ARH      | <0.0001   | 0.0316 | 0.1347       | <0.0001 | <0.0001   |
| VTA      | PB       | 0.912     | 0.3348 | 0.5967       | 0.3894 | 0.2546    |
| VTA      | NTS      | 0.8327    | 0.0687 | 0.4805       | 0.1609 | 0.1245    |
| VTA      | DVC      | 0.6218    | 0.0762 | 0.2608       | 0.0481 | 0.0471    |
| VTA      | ENT      | 0.7595    | 0.0764 | 0.6927       | 0.2644 | 0.0535    |
| VTA      | CENT2    | 0.8587    | 0.5817 | 0.5868       | 0.0339 | <0.0001   |
| VTA      | CUL4,5   | 0.9797    | 0.3047 | 0.3344       | 0.0153 | <0.0001   |
| VTA      | UVU      | 0.9541    | 0.4074 | 0.6992       | 0.0377 | <0.0001   |
| VTA      | CBN      | 0.7948    | 0.0303 | 0.5689       | 0.3621 | 0.1368    |
| VTA      | FL       | 0.8304    | 0.3909 | 0.6034       | 0.1   | 0.0123    |
| VTA      | mESC B61 | 0.4672    | 0.2533 | 0.0207       | 0.8135 | 0.2329    |
| VTA      | mESC B62 | 0.4135    | 0.1948 | 0.0273       | 0.6823 | 0.806     |
| LHA      | PVH      | 0.7099    | 0.606  | 0.6253       | 0.5877 | 0.4027    |
| LHA      | DMH      | 0.4384    | 0.7222 | 0.7078       | 0.1821 | 0.0572    |
| LHA      | VMH      | 0.5081    | 0.9483 | 0.622        | 0.2787 | 0.007     |
| LHA      | ARH      | 0.0001    | 0.726  | 0.8104       | 0.0044 | 0.0014    |
| LHA      | PB       | 0.8078    | 0.3992 | 0.4652       | 0.4333 | 0.2894    |
| LHA      | NTS      | 0.8866    | 0.9862 | 0.5796       | 0.8087 | 0.5078    |
| LHA      | DVC      | 0.889     | 0.9759 | 0.8937       | 0.7394 | 0.833     |
| LHA      | ENT      | 0.9621    | 0.9749 | 0.099        | 0.5973 | 0.7901    |
| LHA      | CENT2    | 0.5949    | 0.2091 | 0.474        | 0.6328 | 0.0038    |
| LHA      | CUL4,5   | 0.7046    | 0.4348 | 0.769        | 0.4346 | 0.0146    |
| LHA      | UVU      | 0.6809    | 0.3276 | 0.3828       | 0.6637 | 0.0111    |
| LHA      | CBN      | 0.5395    | 0.7134 | 0.4903       | 0.4635 | 0.4773    |
| LHA      | FL       | 0.5702    | 0.3424 | 0.4593       | 0.9993 | 0.7565    |
| LHA      | mESC B61 | 0.2802    | 0.0034 | 0.0004       | 0.0601 | 0.0007    |
| LHA      | mESC B62 | 0.2419    | 0.0021 | 0.0006       | 0.0401 | 0.0147    |
| PVH      | DMH      | 0.6866    | 0.8727 | 0.9096       | 0.4283 | 0.2858    |
| PVH      | VMH      | 0.7718    | 0.5616 | 0.9963       | 0.5884 | 0.0618    |
| PVH      | ARH      | 0.0005    | 0.8686 | 0.8037       | 0.0212 | 0.0182    |
| PVH      | PB       | 0.5385    | 0.1747 | 0.2236       | 0.185  | 0.0582    |
| PVH      | NTS      | 0.607     | 0.6181 | 0.2978       | 0.4329 | 0.1342    |
| PVH      | DVC      | 0.8162    | 0.5851 | 0.5341       | 0.834  | 0.2949    |
| PVH      | ENT      | 0.6748    | 0.5842 | 0.0331       | 0.2845 | 0.2702    |
| PVH      | CENT2    | 0.3665    | 0.077  | 0.2291       | 0.9487 | 0.0391    |
| PVH      | CUL4,5   | 0.4528    | 0.1952 | 0.4345       | 0.8109 | 0.1075    |
| PVH      | UVU      | 0.4338    | 0.1356 | 0.1742       | 0.9145 | 0.0878    |
| PVH      | CBN      | 0.3248    | 0.8819 | 0.2394       | 0.2023 | 0.1221    |
### Supplemental Table 7 | Cont.

| Region 1 | Region 2 | Monogenic  | Rare  | Low-frequency | GWAS  | Syndromic |
|----------|----------|------------|-------|---------------|-------|-----------|
| PVH      | FL       | 0.3478     | 0.1434 | 0.22          | 0.5883 | 0.5982    |
| PVH      | mESC B61 | 0.1472     | 0.0006 | <0.0001       | 0.0155 | <0.0001   |
| PVH      | mESC B62 | 0.1237     | 0.0003 | <0.0001       | 0.0095 | 0.0011    |
| DMH      | VMH      | 0.9097     | 0.6742 | 0.9058        | 0.8018 | 0.4223    |
| DMH      | ARH      | 0.0021     | 0.9959 | 0.8927        | 0.1304 | 0.1942    |
| DMH      | PB       | 0.3089     | 0.2311 | 0.2696        | 0.0342 | 0.0031    |
| DMH      | NTS      | 0.3591     | 0.7351 | 0.3534        | 0.115  | 0.0105    |
| DMH      | DVC      | 0.525      | 0.6997 | 0.6112        | 0.3165 | 0.0347    |
| DMH      | ENT      | 0.4109     | 0.6987 | 0.0434        | 0.0626 | 0.0303    |
| DMH      | CENT2    | 0.1921     | 0.1075 | 0.2759        | 0.3917 | 0.318     |
| DMH      | CUL4,5   | 0.249      | 0.2561 | 0.504         | 0.5803 | 0.5871    |
| DMH      | UVU      | 0.2361     | 0.1825 | 0.2128        | 0.3684 | 0.5215    |
| DMH      | CBN      | 0.1658     | 0.9906 | 0.2875        | 0.0388 | 0.0091    |
| DMH      | FL       | 0.1801     | 0.1923 | 0.2655        | 0.1824 | 0.1111    |
| DMH      | mESC B61 | 0.0645     | 0.0111 | 0.0001        | 0.0013 | <0.0001   |
| DMH      | mESC B62 | 0.0526     | 0.0006 | 0.0002        | 0.0007 | <0.0001   |
| VMH      | ARH      | 0.0014     | 0.678  | 0.8001        | 0.0779 | 0.6194    |
| VMH      | PB       | 0.3657     | 0.4363 | 0.2219        | 0.062  | 0.0002    |
| VMH      | NTS      | 0.4214     | 0.9346 | 0.2956        | 0.1851 | 0.0008    |
| VMH      | DVC      | 0.6014     | 0.9724 | 0.531         | 0.4528 | 0.0036    |
| VMH      | ENT      | 0.4782     | 0.9734 | 0.0327        | 0.1071 | 0.0031    |
| VMH      | CENT2    | 0.2333     | 0.2335 | 0.2273        | 0.5448 | 0.8443    |
| VMH      | CUL4,5   | 0.2984     | 0.4737 | 0.4317        | 0.7627 | 0.7953    |
| VMH      | UVU      | 0.2838     | 0.3606 | 0.1727        | 0.5166 | 0.8717    |
| VMH      | CBN      | 0.2029     | 0.6657 | 0.2375        | 0.0694 | 0.0007    |
| VMH      | FL       | 0.2195     | 0.3762 | 0.2183        | 0.2791 | 0.0168    |
| VMH      | mESC B61 | 0.0824     | 0.0042 | <0.0001       | 0.0031 | <0.0001   |
| VMH      | mESC B62 | 0.0678     | 0.0026 | <0.0001       | 0.0017 | <0.0001   |
| ARH      | PB       | <0.0001    | 0.2331 | 0.3323        | 0.0003 | <0.0001   |
| ARH      | NTS      | <0.0001    | 0.739  | 0.4275        | 0.002  | 0.0001    |
| ARH      | DVC      | 0.0002     | 0.7035 | 0.7088        | 0.012  | 0.0007    |
| ARH      | ENT      | 0.0001     | 0.7026 | 0.0592        | 0.0007 | 0.0006    |
| ARH      | CENT2    | <0.0001    | 0.1086 | 0.3394        | 0.0179 | 0.764     |
| ARH      | CUL4,5   | <0.0001    | 0.2582 | 0.5937        | 0.0389 | 0.4496    |
| ARH      | UVU      | <0.0001    | 0.1842 | 0.2662        | 0.0159 | 0.5105    |
| ARH      | CBN      | <0.0001    | 0.9865 | 0.3528        | 0.0003 | 0.0001    |
| ARH      | FL       | <0.0001    | 0.194  | 0.3275        | 0.0044 | 0.0039    |
| ARH      | mESC B61 | <0.0001    | 0.0111 | 0.0002        | <0.0001| <0.0001   |
| ARH      | mESC B62 | <0.0001    | 0.0006 | 0.0003        | <0.0001| <0.0001   |
| PB       | NTS      | 0.9198     | 0.3896 | 0.8598        | 0.5882 | 0.6909    |
| PB       | DVC      | 0.7019     | 0.4163 | 0.5506        | 0.2644 | 0.3959    |
| PB       | ENT      | 0.8448     | 0.417  | 0.3557        | 0.7985 | 0.4274    |
| PB       | CENT2    | 0.7729     | 0.6788 | 0.9886        | 0.2072 | <0.0001   |
| PB       | CUL4,5   | 0.8919     | 0.9505 | 0.6621        | 0.1176 | 0.0005    |
| PB       | UVU      | 0.8666     | 0.8917 | 0.8864        | 0.2231 | 0.0003    |
| PB       | CBN      | 0.711      | 0.2265 | 0.9676        | 0.9597 | 0.7269    |
| Region 1 | Region 2 | Monogenic | Rare | Low-frequency | GWAS | Syndromic |
|----------|----------|-----------|------|---------------|------|-----------|
| PB       | FL       | 0.7454    | 0.915| 0.9923        | 0.4328| 0.171     |
| PB       | mESC B61 | 0.4024    | 0.0357| 0.0047        | 0.2728| 0.0199    |
| PB       | mESC B62 | 0.3535    | 0.0243| 0.0064        | 0.2041| 0.1663    |
| NTS      | DVC      | 0.7778    | 0.9622| 0.6741        | 0.5655| 0.6517    |
| NTS      | ENT      | 0.9243    | 0.9611| 0.2716        | 0.7747| 0.692     |
| NTS      | CENT2    | 0.6971    | 0.203 | 0.8711        | 0.4716| 0.0004    |
| NTS      | CUL4,5   | 0.8129    | 0.4247| 0.7945        | 0.3061| 0.002     |
| NTS      | UVU      | 0.7881    | 0.3192| 0.7494        | 0.4985| 0.0014    |
| NTS      | CBN      | 0.6375    | 0.7263| 0.8918        | 0.6235| 0.9614    |
| NTS      | FL       | 0.6706    | 0.3337| 0.8523        | 0.8081| 0.3311    |
| NTS      | mESC B61 | 0.3484    | 0.0032| 0.0027        | 0.1014| 0.0065    |
| NTS      | mESC B62 | 0.3038    | 0.002 | 0.0038        | 0.0701| 0.075     |
| DVC      | ENT      | 0.8515    | 0.999 | 0.1292        | 0.3893| 0.9559    |
| DVC      | CENT2    | 0.5022    | 0.2202| 0.5602        | 0.8846| 0.0019    |
| DVC      | CUL4,5   | 0.604     | 0.4527| 0.8728        | 0.6536| 0.008     |
| DVC      | UVU      | 0.5819    | 0.3427| 0.4596        | 0.9186| 0.006     |
| DVC      | CBN      | 0.4515    | 0.691 | 0.578         | 0.2866| 0.6172    |
| DVC      | FL       | 0.4795    | 0.3579| 0.5442        | 0.7401| 0.6025    |
| DVC      | mESC B61 | 0.223     | 0.0037| 0.0007        | 0.027 | 0.0015    |
| DVC      | mESC B62 | 0.1906    | 0.0023| 0.001         | 0.0171| 0.0258    |
| ENT      | CENT2    | 0.6283    | 0.2207| 0.3483        | 0.3144| 0.0016    |
| ENT      | CUL4,5   | 0.7402    | 0.4535| 0.1743        | 0.1904| 0.0068    |
| ENT      | UVU      | 0.7161    | 0.3434| 0.4347        | 0.3355| 0.0051    |
| ENT      | CBN      | 0.5714    | 0.6901| 0.335         | 0.8377| 0.6566    |
| ENT      | FL       | 0.6029    | 0.3586| 0.3607        | 0.5967| 0.5646    |
| ENT      | mESC B61 | 0.3019    | 0.0038| 0.0543        | 0.1764| 0.0018    |
| ENT      | mESC B62 | 0.2615    | 0.0023| 0.069         | 0.1272| 0.0296    |
| CENT2    | CUL4,5   | 0.8787    | 0.6339| 0.6725        | 0.7614| 0.6485    |
| CENT2    | UVU      | 0.904     | 0.781 | 0.8751        | 0.9657| 0.7204    |
| CENT2    | CBN      | 0.9347    | 0.105 | 0.9791        | 0.226 | 0.0003    |
| CENT2    | FL       | 0.9712    | 0.7585| 0.9809        | 0.6334| 0.0097    |
| CENT2    | mESC B61 | 0.5828    | 0.091 | 0.0045        | 0.0184| <0.0001   |
| CENT2    | mESC B62 | 0.5222    | 0.0652| 0.0062        | 0.0114| <0.0001   |
| CUL4,5   | UVU      | 0.9744    | 0.8429| 0.5621        | 0.7289| 0.9219    |
| CUL4,5   | CBN      | 0.8145    | 0.2512| 0.6918        | 0.13  | 0.0017    |
| CUL4,5   | FL       | 0.8503    | 0.866 | 0.6552        | 0.4351| 0.0329    |
| CUL4,5   | mESC B61 | 0.4829    | 0.0306| 0.0012        | 0.0078| <0.0001   |
| CUL4,5   | mESC B62 | 0.4282    | 0.0207| 0.0017        | 0.0046| <0.0001   |
| UVU      | CBN      | 0.8395    | 0.1787| 0.8545        | 0.2429| 0.0012    |
| UVU      | FL       | 0.8755    | 0.9765| 0.894         | 0.6643| 0.0257    |
| UVU      | mESC B61 | 0.503     | 0.0493| 0.0072        | 0.0207| <0.0001   |
| UVU      | mESC B62 | 0.447     | 0.0341| 0.0097        | 0.0129| <0.0001   |
| CBN      | FL       | 0.9634    | 0.1883| 0.96          | 0.463 | 0.3076    |
| CBN      | mESC B61 | 0.6402    | 0.001 | 0.0041        | 0.2513| 0.0075    |
| CBN      | mESC B62 | 0.5768    | 0.0006| 0.0057        | 0.1867| 0.0832    |
| FL       | mESC B61 | 0.6078    | 0.0461| 0.0048        | 0.06  | 0.0002    |
### Supplemental Table 7 | Cont.

| Region 1 | Region 2 | Monogenic | Rare  | Low-frequency | GWAS  | Syndromic |
|----------|----------|-----------|-------|---------------|-------|-----------|
| FL       | mESC B62 | 0.5459    | 0.0317| 0.0066        | 0.04  | 0.006     |
| mESC B61 | mESC B62 | 0.9276    | 0.8771| 0.9145        | 0.8623| 0.3433    |
**Supplemental Table 8 | Frequency distribution of obesity-associated genes across all genetic categories.** Table shows one-way ANOVA reporting the Benjamini, Krieger and Yekutieli two step false discovery rate corrected p-value. Relates to Supplemental Figure 5A.

| Region 1       | Region 2 | Obesity  |
|----------------|----------|----------|
| THy/Phy        | F        | 0.1493   |
| THy/Phy        | M        | 0.0318   |
| THy/Phy        | H        | 0.762    |
| THy/Phy        | FRP      | 0.0595   |
| THy/Phy        | ACA      | 0.0348   |
| THy/Phy        | ACB      | 0.0353   |
| THy/Phy        | VTA      | <0.0001  |
| THy/Phy        | LHA      | 0.0625   |
| THy/Phy        | PVH      | 0.3404   |
| THy/Phy        | DMH      | 0.928    |
| THy/Phy        | VMH      | 0.7456   |
| THy/Phy        | ARH      | 0.1536   |
| THy/Phy        | PB       | 0.0018   |
| THy/Phy        | NTS      | 0.0169   |
| THy/Phy        | DVC      | 0.0905   |
| THy/Phy        | ENT      | 0.0067   |
| THy/Phy        | CENT2    | 0.1453   |
| THy/Phy        | CUL4,5   | 0.2718   |
| THy/Phy        | UVU      | 0.1303   |
| THy/Phy        | CBN      | 0.0046   |
| THy/Phy        | FL       | 0.0275   |
| THy/Phy        | mESC B61 | <0.0001  |
| THy/Phy        | mESC B62 | <0.0001  |
| F              | M        | 0.0003   |
| F              | H        | 0.2547   |
| F              | FRP      | 0.6576   |
| F              | ACA      | 0.5035   |
| F              | ACB      | 0.5069   |
| F              | VTA      | 0.0042   |
| F              | LHA      | 0.6739   |
| F              | PVH      | 0.6251   |
| F              | DMH      | 0.1765   |
| F              | VMH      | 0.2638   |
| F              | ARH      | 0.0041   |
| F              | PB       | 0.0922   |
| F              | NTS      | 0.343    |
| F              | DVC      | 0.8016   |
| F              | ENT      | 0.2038   |
| F              | CENT2    | 0.9884   |
| F              | CUL4,5   | 0.7316   |
| F              | UVU      | 0.9433   |
| F              | CBN      | 0.1627   |
| F              | FL       | 0.4451   |
## Supplemental Table 8 | Cont.

| Region 1 | Region 2          | Obesity  |
|----------|-------------------|----------|
| F        | mESC B61          | 0.0001   |
| F        | mESC B62          | 0.0001   |
| M        | H                 | 0.0143   |
| M        | FRP               | <0.0001  |
| M        | ACA               | <0.0001  |
| M        | ACB               | <0.0001  |
| M        | VTA               | <0.0001  |
| M        | LHA               | <0.0001  |
| M        | PVH               | 0.0019   |
| M        | DMH               | 0.0252   |
| M        | VMH               | 0.0135   |
| M        | ARH               | 0.4712   |
| M        | PB                | <0.0001  |
| M        | NTS               | <0.0001  |
| M        | DVC               | 0.0001   |
| M        | ENT               | <0.0001  |
| M        | CENT2             | 0.0003   |
| M        | CUL4,5            | 0.0012   |
| M        | UVU               | 0.0003   |
| M        | CBN               | <0.0001  |
| M        | FL                | <0.0001  |
| M        | mESC B61          | <0.0001  |
| M        | mESC B62          | <0.0001  |
| H        | FRP               | 0.1136   |
| H        | ACA               | 0.0706   |
| H        | ACB               | 0.0715   |
| H        | VTA               | <0.0001  |
| H        | LHA               | 0.1188   |
| H        | PVH               | 0.5154   |
| H        | DMH               | 0.8317   |
| H        | VMH               | 0.9827   |
| H        | ARH               | 0.0837   |
| H        | PB                | 0.0048   |
| H        | NTS               | 0.0369   |
| H        | DVC               | 0.1645   |
| H        | ENT               | 0.016    |
| H        | CENT2             | 0.2486   |
| H        | CUL4,5            | 0.4259   |
| H        | UVU               | 0.2262   |
| H        | CBN               | 0.0113   |
| H        | FL                | 0.0571   |
| H        | mESC B61          | <0.0001  |
| H        | mESC B62          | <0.0001  |
| FRP      | ACA               | 0.8213   |
| FRP      | ACB               | 0.8255   |
| FRP      | VTA               | 0.0156   |
| Region 1 | Region 2 | Obesity |
|----------|----------|---------|
| FRP      | LHA      | 0.9821  |
| FRP      | PVH      | 0.3514  |
| FRP      | DMH      | 0.0727  |
| FRP      | VMH      | 0.1186  |
| FRP      | ARH      | 0.0009  |
| FRP      | PB       | 0.2147  |
| FRP      | NTS      | 0.6135  |
| FRP      | DVC      | 0.8478  |
| FRP      | ENT      | 0.4078  |
| FRP      | CENT2    | 0.6682  |
| FRP      | CUL4,5   | 0.4318  |
| FRP      | UVU      | 0.7098  |
| FRP      | CBN      | 0.3406  |
| FRP      | FL       | 0.7486  |
| FRP      | mESC B61 | 0.0007  |
| FRP      | mESC B62 | 0.0006  |
| ACA      | ACB      | 0.9557  |
| ACA      | VTA      | 0.0283  |
| ACA      | LHA      | 0.8039  |
| ACA      | PVH      | 0.247   |
| ACA      | DMH      | 0.0434  |
| ACA      | VMH      | 0.0741  |
| ACA      | ARH      | 0.0004  |
| ACA      | PB       | 0.3102  |
| ACA      | NTS      | 0.78    |
| ACA      | DVC      | 0.6761  |
| ACA      | ENT      | 0.5472  |
| ACA      | CENT2    | 0.5128  |
| ACA      | CUL4,5   | 0.3116  |
| ACA      | UVU      | 0.5499  |
| ACA      | CBN      | 0.4671  |
| ACA      | FL       | 0.9246  |
| ACA      | mESC B61 | 0.0016  |
| ACA      | mESC B62 | 0.0014  |
| ACB      | VTA      | 0.0279  |
| ACB      | LHA      | 0.8081  |
| ACB      | PVH      | 0.2492  |
| ACB      | DMH      | 0.0439  |
| ACB      | VMH      | 0.0749  |
| ACB      | ARH      | 0.0004  |
| ACB      | PB       | 0.3076  |
| ACB      | NTS      | 0.7759  |
| ACB      | DVC      | 0.68    |
| ACB      | ENT      | 0.5436  |
| ACB      | CENT2    | 0.5163  |
| ACB      | CUL4,5   | 0.3141  |
### Supplemental Table 8 | Cont.

| Region 1   | Region 2    | Obesity     |
|------------|-------------|-------------|
| ACB        | UVU         | 0.5535      |
| ACB        | CBN         | 0.4638      |
| ACB        | FL          | 0.9204      |
| ACB        | mESC B61    | 0.0016      |
| ACB        | mESC B62    | 0.0013      |
| VTA        | LHA         | 0.0146      |
| VTA        | PVH         | 0.0008      |
| VTA        | DMH         | <0.0001     |
| VTA        | VMH         | <0.0001     |
| VTA        | ARH         | <0.0001     |
| VTA        | PB          | 0.2384      |
| VTA        | NTS         | 0.0556      |
| VTA        | DVC         | 0.009       |
| VTA        | ENT         | 0.1114      |
| VTA        | CENT2       | 0.0044      |
| VTA        | CUL4,5      | 0.0014      |
| VTA        | UVU         | 0.0053      |
| VTA        | CBN         | 0.1425      |
| VTA        | FL          | 0.0358      |
| VTA        | mESC B61    | 0.3355      |
| VTA        | mESC B62    | 0.3131      |
| LHA        | PVH         | 0.3631      |
| LHA        | DMH         | 0.0764      |
| LHA        | VMH         | 0.124       |
| LHA        | ARH         | 0.001       |
| LHA        | PB          | 0.2066      |
| LHA        | NTS         | 0.5978      |
| LHA        | DVC         | 0.8654      |
| LHA        | ENT         | 0.3952      |
| LHA        | CENT2       | 0.6846      |
| LHA        | CUL4,5      | 0.445       |
| LHA        | UVU         | 0.7266      |
| LHA        | CBN         | 0.3294      |
| LHA        | FL          | 0.7317      |
| LHA        | mESC B61    | 0.0007      |
| LHA        | mESC B62    | 0.0006      |
| PVH        | DMH         | 0.3881      |
| PVH        | VMH         | 0.5294      |
| PVH        | ARH         | 0.0173      |
| PVH        | PB          | 0.0299      |
| PVH        | NTS         | 0.1508      |
| PVH        | DVC         | 0.4594      |
| PVH        | ENT         | 0.0785      |
| PVH        | CENT2       | 0.6148      |
| PVH        | CUL4,5      | 0.8842      |
| PVH        | UVU         | 0.5756      |
### Supplemental Table 8 | Cont.

| Region 1 | Region 2   | Obesity  |
|----------|------------|----------|
| PVH      | CBN        | 0.0595   |
| PVH      | FL         | 0.2105   |
| PVH      | mESC B61   | <0.0001  |
| PVH      | mESC B62   | <0.0001  |
| DMH      | VMH        | 0.8149   |
| DMH      | ARH        | 0.1292   |
| DMH      | PB         | 0.0024   |
| DMH      | NTS        | 0.0215   |
| DMH      | DVC        | 0.109    |
| DMH      | ENT        | 0.0087   |
| DMH      | CENT2      | 0.1719   |
| DMH      | CUL4,5     | 0.3132   |
| DMH      | UVU        | 0.1548   |
| DMH      | CBN        | 0.006    |
| DMH      | FL         | 0.0344   |
| DMH      | mESC B61   | <0.0001  |
| DMH      | mESC B62   | <0.0001  |
| VMH      | ARH        | 0.0799   |
| VMH      | PB         | 0.0051   |
| VMH      | NTS        | 0.0389   |
| VMH      | DVC        | 0.1711   |
| VMH      | ENT        | 0.0169   |
| VMH      | CENT2      | 0.2576   |
| VMH      | CUL4,5     | 0.4386   |
| VMH      | UVU        | 0.2346   |
| VMH      | CBN        | 0.012    |
| VMH      | FL         | 0.06     |
| VMH      | mESC B61   | <0.0001  |
| VMH      | mESC B62   | <0.0001  |
| ARH      | PB         | <0.0001  |
| ARH      | NTS        | 0.0001   |
| ARH      | DVC        | 0.0018   |
| ARH      | ENT        | <0.0001  |
| ARH      | CENT2      | 0.0039   |
| ARH      | CUL4,5     | 0.0116   |
| ARH      | UVU        | 0.0033   |
| ARH      | CBN        | <0.0001  |
| ARH      | FL         | 0.0003   |
| ARH      | mESC B61   | <0.0001  |
| ARH      | mESC B62   | <0.0001  |
| PB       | NTS        | 0.462    |
| PB       | DVC        | 0.152    |
| PB       | ENT        | 0.6797   |
| PB       | CENT2      | 0.0951   |
| PB       | CUL4,5     | 0.0427   |
| PB       | UVU        | 0.1068   |
Supplemental Table 8 | Cont.

| Region 1 | Region 2       | Obesity  |
|----------|---------------|---------|
| PB       | CBN           | 0.7736  |
| PB       | FL            | 0.3574  |
| PB       | mESC B61      | 0.0322  |
| PB       | mESC B62      | 0.0287  |
| NTS      | DVC           | 0.4857  |
| NTS      | ENT           | 0.7469  |
| NTS      | CENT2         | 0.3504  |
| NTS      | CUL4,5        | 0.1966  |
| NTS      | UVU           | 0.3804  |
| NTS      | CBN           | 0.6542  |
| NTS      | FL            | 0.8534  |
| NTS      | mESC B61      | 0.004   |
| NTS      | mESC B62      | 0.0035  |
| DVC      | ENT           | 0.3078  |
| DVC      | CENT2         | 0.8129  |
| DVC      | CUL4,5        | 0.5524  |
| DVC      | UVU           | 0.8571  |
| DVC      | CBN           | 0.2522  |
| DVC      | FL            | 0.6084  |
| DVC      | mESC B61      | 0.0004  |
| DVC      | mESC B62      | 0.0003  |
| ENT      | CENT2         | 0.209   |
| ENT      | CUL4,5        | 0.1066  |
| ENT      | UVU           | 0.2302  |
| ENT      | CBN           | 0.9004  |
| ENT      | FL            | 0.6119  |
| ENT      | mESC B61      | 0.0106  |
| ENT      | mESC B62      | 0.0093  |
| CENT2    | CUL4,5        | 0.7207  |
| CENT2    | UVU           | 0.9549  |
| CENT2    | CBN           | 0.1671  |
| CENT2    | FL            | 0.4538  |
| CENT2    | mESC B61      | 0.0001  |
| CENT2    | mESC B62      | 0.0001  |
| CUL4,5   | UVU           | 0.6788  |
| CUL4,5   | CBN           | 0.082   |
| CUL4,5   | FL            | 0.2685  |
| CUL4,5   | mESC B61      | <0.0001 |
| CUL4,5   | mESC B62      | <0.0001 |
| UVU      | CBN           | 0.1852  |
| UVU      | FL            | 0.4886  |
| UVU      | mESC B61      | 0.0002  |
| UVU      | mESC B62      | 0.0001  |
| CBN      | FL            | 0.527   |
| CBN      | mESC B61      | 0.0151  |
| CBN      | mESC B62      | 0.0133  |
| Region 1   | Region 2     | Obesity |
|-----------|--------------|---------|
| FL        | mESC B61     | 0.0022  |
| FL        | mESC B62     | 0.0019  |
| mESC B61  | mESC B62     | 0.9636  |
**Supplementary Table 9 | WGCNA analysis of obesity-associated genes.** Description of each gene including: color key and position in the WGCNA dendrogram, position in the hierarchical cluster dendrogram, module number, gene name following the heatmap order and genetic category. Relates to Fig. 5A. Heatmap in Fig 5A and table are in the same order.

| Gene name in heatmap | Genetic category |
|----------------------|------------------|
| Tcf7l2               | GWAS             |
| Sim1                 | Monogenic        |
| Smg6                 | GWAS             |
| Lepr                 | Monogenic/GWAS   |
| Bbs12                | Syndromic        |
| Stk33                | GWAS             |
| Pbrm1                | GWAS             |
| Hmgcr                | GWAS             |
| Plxna1               | Rare variants    |
| Stk36                | GWAS             |
| Plxna3               | Rare variants    |
| Ptbp2                | GWAS             |
| Zfp608               | GWAS             |
| Fbxl19               | GWAS             |
| Kctd15               | GWAS             |
| Zfp668               | GWAS             |
| Elavl4               | GWAS             |
| Slc39a8              | GWAS             |
| Ift74                | Syndromic        |
| Nrp2                 | Rare variants    |
| Ehhp1                | GWAS             |
| Nrp1                 | Rare variants    |
| Nav1                 | GWAS             |
| Fign                 | GWAS             |
| Zfhx3                | Low variants     |
| Pgpep1               | GWAS             |
| Tal1                 | GWAS             |
| Tfap2b               | GWAS             |
| Gipr                 | GWAS/Rare        |
| Lmo1                 | GWAS             |
| Olig3                | GWAS             |
| Lmx1b                | GWAS             |
| Rpgrip1l             | Syndromic        |
| Plxna2               | Rare variants    |
| Iars2                | GWAS             |
| Mkks                 | Syndromic        |
| Tmem160              | GWAS             |
Supplementary Table 9 | Cont.

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|----------------------------------|----------|----------------------|-----------------|
| 147                         | 34               | 2                                | Nudt3    | GWAS                 |
| 57                          | 70               | 2                                | Lztf1    | Syndromic            |
| 153                         | 80               | 2                                | Etv5     | GWAS                 |
| 107                         | 82               | 2                                | Polk     | GWAS                 |
| 136                         | 86               | 2                                | Nlrc3    | GWAS                 |
| 106                         | 87               | 2                                | Rab23    | Syndromic            |
| 24                          | 88               | 2                                | Rcc1l    | GWAS                 |
| 121                         | 89               | 2                                | Tomm40   | GWAS                 |
| 145                         | 90               | 2                                | Adpgk    | GWAS                 |
| 139                         | 91               | 2                                | Gdf15    | GWAS                 |
| 71                          | 92               | 2                                | Hmga1    | GWAS                 |
| 190                         | 93               | 2                                | Zfp64    | GWAS                 |
| 49                          | 94               | 2                                | Fancl    | GWAS                 |
| 29                          | 95               | 2                                | Mfr2     | GWAS                 |
| 54                          | 96               | 2                                | Mks1     | Syndromic            |
| 168                         | 97               | 2                                | Gtf3a    | GWAS                 |
| 79                          | 98               | 2                                | Snrpd2   | GWAS                 |
| 33                          | 99               | 2                                | Ttl4     | GWAS                 |
| 124                         | 101              | 2                                | Kat8     | GWAS                 |
| 130                         | 102              | 2                                | Sfxn2    | GWAS                 |
| 103                         | 103              | 2                                | Usp37    | GWAS                 |
| 86                          | 104              | 2                                | Cnot9    | GWAS                 |
| 142                         | 105              | 2                                | Ino80e   | GWAS                 |
| 146                         | 106              | 2                                | Nup54    | GWAS                 |
| 109                         | 107              | 2                                | Rpl27a   | GWAS                 |
| 152                         | 109              | 2                                | Sema3d   | Rare variants        |
| 60                          | 168              | 2                                | Sema3c   | Rare variants        |
| 46                          | 169              | 2                                | Plxn4    | Rare variants        |
| 122                         | 170              | 2                                | Rabep1   | GWAS                 |
| 21                          | 110              | 3                                | Rapgef3  | Low variants         |
| 180                         | 111              | 3                                | Trim66   | GWAS                 |
| 31                          | 112              | 3                                | Ache     | Low variants         |
| 41                          | 113              | 3                                | Rit2     | GWAS                 |
| 70                          | 114              | 3                                | Kcnk9    | GWAS                 |
| 183                         | 115              | 3                                | Faim2    | GWAS                 |
| 164                         | 116              | 3                                | Col4a3bp | GWAS                 |
| 154                         | 117              | 3                                | Dnajc27  | GWAS                 |
| 113                         | 118              | 3                                | Hsd17b12 | GWAS                 |
| 75                          | 119              | 3                                | Gbe1     | GWAS                 |
| 61                          | 120              | 3                                | Scarb2   | GWAS                 |
| Color key | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------|------------------|---------------------------------|----------|---------------------|-----------------|
| 110       | 130              | 3                               | Efr3b    | GWAS                |
| 149       | 135              | 3                               | Ifngr1   | GWAS                |
| 176       | 136              | 3                               | Gnpda2   | GWAS                |
| 155       | 137              | 3                               | Rab21    | Low variants        |
| 108       | 138              | 3                               | Cep290   | Syndromic           |
| 23        | 140              | 3                               | Tmem18   | GWAS                |
| 47        | 147              | 3                               | Fto      | GWAS                |
| 100       | 148              | 3                               | Nt5c2    | GWAS                |
| 143       | 177              | 3                               | Ankdd1b  | GWAS                |
| 38        | 183              | 3                               | CobII1   | GWAS                |
| 37        | 184              | 3                               | Cyp27a1  | GWAS                |
| 76        | 185              | 3                               | Pcdh9    | GWAS                |
| 55        | 186              | 3                               | Plcd4    | GWAS                |
| 30        | 187              | 3                               | Gprc5b   | GWAS                |
| 48        | 188              | 3                               | Ssfa2    | GWAS                |
| 89        | 189              | 3                               | Hhip     | GWAS                |
| 74        | 190              | 3                               | Tlr4     | GWAS                |
| 65        | 1                | 4                               | Gpr151   | Rare variants       |
| 27        | 14               | 4                               | Prkd1    | GWAS                |
| 17        | 79               | 4                               | Wdpcp    | Syndromic           |
| 140       | 108              | 4                               | Mc4r     | Monogenic/GWAS      |
| 19        | 128              | 4                               | Raly1    | GWAS                |
| 15        | 151              | 4                               | Slc22a3  | GWAS                |
| 151       | 152              | 4                               | Cadm1    | GWAS                |
| 115       | 153              | 4                               | Grid1    | GWAS                |
| 156       | 154              | 4                               | Lingo2   | GWAS                |
| 36        | 155              | 4                               | Lrfn2    | GWAS                |
| 132       | 156              | 4                               | Adcy3    | GWAS                |
| 7         | 157              | 4                               | Bbs4     | GWAS/Syndromic      |
| 94        | 158              | 4                               | Ntrk2    | Monogenic/GWAS      |
| 127       | 159              | 4                               | Lrp1b    | GWAS                |
| 129       | 160              | 4                               | Park2    | GWAS                |
| 150       | 161              | 4                               | Entpd6   | Low variants        |
| 148       | 162              | 4                               | Pcsk1    | Monogenic           |
| 157       | 164              | 4                               | Bdnf     | Monogenic/GWAS      |
| 63        | 165              | 4                               | Grp      | GWAS                |
| 178       | 166              | 4                               | Agbl4    | GWAS                |
| 189       | 167              | 4                               | Doc2a    | GWAS                |
| 102       | 171              | 4                               | Erbb4    | GWAS                |
| 171       | 173              | 4                               | Mapk3    | GWAS                |
## Supplementary Table 9 | Cont.

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|----------------------------|------------------|----------------------------------|----------|----------------------|------------------|
| Yellow                     | 137              | 175                              | 4        | Cadm2                | GWAS             |
| Yellow                     | 165              | 19                               | 5        | Inpp5e               | Syndromic        |
| Yellow                     | 166              | 20                               | 5        | Cbln1                | GWAS             |
| Yellow                     | 6                | 21                               | 5        | Kcnk3                | GWAS             |
| Yellow                     | 80               | 22                               | 5        | Foxo3                | GWAS             |
| Yellow                     | 99               | 23                               | 5        | Zfp142               | GWAS             |
| Yellow                     | 8                | 35                               | 5        | Zfp169               | Low variants     |
| Yellow                     | 187              | 37                               | 5        | Poc5                 | GWAS             |
| Yellow                     | 44               | 69                               | 5        | Mtif3                | GWAS             |
| Yellow                     | 167              | 123                              | 5        | Ksr2                 | Low variants     |
| Yellow                     | 128              | 124                              | 5        | Nrxn3                | GWAS             |
| Yellow                     | 72               | 125                              | 5        | Dmvl2                | GWAS             |
| Yellow                     | 161              | 126                              | 5        | Frrs1l               | GWAS             |
| Yellow                     | 26               | 131                              | 5        | Stxb1                | GWAS             |
| Yellow                     | 133              | 132                              | 5        | Ypel3                | GWAS             |
| Yellow                     | 95               | 133                              | 5        | Ric3                 | GWAS             |
| Yellow                     | 84               | 134                              | 5        | Scg3                 | GWAS             |
| Yellow                     | 101              | 139                              | 5        | Epb4114b             | GWAS             |
| Red                        | 11               | 180                              | 5        | Zbtb7b               | Low variants     |
| Red                        | 5                | 18                               | 6        | Rasa2                | GWAS             |
| Red                        | 92               | 76                               | 6        | Rarb                 | GWAS             |
| Red                        | 1                | 121                              | 6        | Negr1                | GWAS             |
| Red                        | 53               | 122                              | 6        | Arl6                 | Syndromic        |
| Red                        | 159              | 127                              | 6        | Trim32               | Syndromic        |
| Red                        | 126              | 129                              | 6        | Zfr2                 | Low variants     |
| Red                        | 83               | 141                              | 6        | Bbs5                 | Syndromic        |
| Red                        | 98               | 142                              | 6        | Ets2                 | GWAS             |
| Red                        | 9                | 143                              | 6        | Bbs1                 | Syndromic        |
| Red                        | 56               | 144                              | 6        | Bbs7                 | Syndromic        |
| Red                        | 174              | 145                              | 6        | Bbs2                 | Syndromic        |
| Red                        | 51               | 146                              | 6        | Ttc8                 | Syndromic        |
| Black                      | 62               | 149                              | 6        | Qpctl                | GWAS             |
| Black                      | 144              | 38                               | 7        | Hif1an               | GWAS             |
| Black                      | 69               | 39                               | 7        | Cep295               | GWAS             |
| Black                      | 42               | 40                               | 7        | Zbtb10               | GWAS             |
| Black                      | 118              | 83                               | 7        | Cdkal1               | GWAS             |
| Black                      | 58               | 84                               | 7        | Alms1                | Syndromic        |
| Black                      | 116              | 85                               | 7        | Mtch2                | GWAS             |
| Black                      | 172              | 100                              | 7        | Zfp646               | GWAS             |
| Black                      | 77               | 163                              | 7        | Tnni3k               | GWAS             |
### Supplementary Table 9 | Cont.

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|----------------------------|------------------|----------------------------------|---------|---------------------|------------------|
| 52                         | 172              | 7                                | Kctd13  | GWAS                |
| 186                        | 174              | 7                                | Fhit    | GWAS                |
| 181                        | 176              | 7                                | Stxbp6  | GWAS                |
| 173                        | 24               | 8                                | Pex2    | GWAS                |
| 162                        | 25               | 8                                | Ift27   | Syndromic           |
| 40                         | 26               | 8                                | Txndc12 | GWAS                |
| 119                        | 27               | 8                                | Fam57b  | GWAS                |
| 112                        | 32               | 8                                | Sh2b1   | Monogenic/GWAS      |
| 131                        | 33               | 8                                | Map2k5  | GWAS                |
| 22                         | 36               | 8                                | Bbip1   | Syndromic           |
| 87                         | 71               | 8                                | Sema3a  | Rare variants       |
| 185                        | 150              | 8                                | Taok2   | GWAS                |
| 43                         | 28               | 9                                | Irs1    | GWAS                |
| 45                         | 29               | 9                                | Hip1    | GWAS                |
| 20                         | 30               | 9                                | Sbk1    | GWAS                |
| 67                         | 42               | 9                                | Creb1   | GWAS                |
| 134                        | 43               | 9                                | Phip    | Syndromic           |
| 135                        | 52               | 9                                | Ube2e3  | GWAS                |
| 25                         | 55               | 9                                | Klf7    | GWAS                |
| 39                         | 73               | 9                                | Skor1   | GWAS                |
| 93                         | 5                | 10                               | Calcr   | GWAS                |
| 13                         | 6                | 10                               | Bbs9    | Syndromic           |
| 82                         | 7                | 10                               | Tub     | Monogenic/GWAS      |
| 12                         | 8                | 10                               | Asb4    | GWAS                |
| 138                        | 9                | 10                               | Pomc    | Monogenic/GWAS      |
| 141                        | 11               | 10                               | Vkorc1  | GWAS                |
| 123                        | 12               | 10                               | Bbs10   | Syndromic           |
| 85                         | 13               | 10                               | Galnt10 | GWAS                |
| 163                        | 17               | 11                               | Cyp17a1 | GWAS                |
| 35                         | 77               | 11                               | Sec16b  | GWAS                |
| 179                        | 81               | 11                               | Apobr   | GWAS                |
| 88                         | 181              | 11                               | Sema3b  | Rare variants       |
## Supplemental Table 10 | Type 1 diabetes-associated genes.

| Gene Name | Genetic Category |
|-----------|------------------|
| Bach2     | GWAS             |
| C1qtnf6   | GWAS             |
| Cars      | GWAS             |
| Cd69      | GWAS             |
| Cdk18     | GWAS             |
| Cenpw     | GWAS             |
| Clec16a   | GWAS             |
| Cobl      | GWAS             |
| Ctla4     | GWAS             |
| Cts       | GWAS             |
| Cux2      | Genomes-based Imputation |
| Dlk1      | GWAS             |
| Efr3b     | GWAS             |
| Erap1     | TaqMan Genotyping |
| Erbb3     | GWAS             |
| Fam189a2  | GWAS             |
| Fosl2     | GWAS             |
| Frmd3     | GWAS             |
| Glis3     | GWAS             |
| Herc2     | GWAS             |
| Htr1a     | Genotyping and Sequencing |
| Ifih1     | GWAS             |
| Ifng      | GWAS             |
| Ikzf4     | GWAS             |
| Il10      | GWAS             |
| Il2       | GWAS             |
| Il27      | GWAS             |
| Il2ra     | GWAS             |
| Ins2      | GWAS             |
| Itpr3     | TaqMan Genotyping |
| Kcnj11    | GWAS             |
| Kif5a     | TaqMan Genotyping |
| Lmo7      | GWAS             |
| Lpar3     | GWAS             |
| Mapk14    | GWAS             |
| Ormdl3    | GWAS             |
| Pgm1      | GWAS             |
| Phf1      | GWAS             |
| Pip4k2c   | TaqMan Genotyping |
| Pkd1      | GWAS             |
| Plekha1   | Dense Genotyping on the ImmunoChip |
| Ppar     | GWAS             |
| Ppil2     | Dense Genotyping on the ImmunoChip |
| Prkcq     | TaqMan Genotyping |
| Prkd2     | GWAS             |
| Ptpn2     | GWAS             |
| Gene Name | Genetic Category |
|-----------|-----------------|
| Ptpn22    | GWAS            |
| Rasgrp1   | GWAS            |
| Rnaset2a  | Dense Genotyping on the ImmunoChip |
| Rnls      | TaqMan genotyping |
| Sh2b3     | TaqMan genotyping |
| Skap2     | TaqMan genotyping |
| Stat3     | TaqMan genotyping |
| Stat4     | TaqMan genotyping |
| Suox      | GWAS            |
| Tagap     | GWAS            |
| Tcf7l2    | GWAS            |
| Tnfaip3   | TaqMan Genotyping |
| Tnfrsf11b | GWAS            |
| Tyk2      | GWAS            |
| Ubash3a   | GWAS            |
Supplemental Table 11 | Type 2 diabetes-associated genes.

| Gene Name | Genetic Category       |
|-----------|------------------------|
| Abcb11    | GWAS                   |
| Abcc8     | MODY                   |
| Abo       | Rare                   |
| Adamts9   | GWAS                   |
| Adcy5     | GWAS                   |
| Adra2a    | GWAS                   |
| Agmo      | GWAS                   |
| Ank1      | GWAS                   |
| Ankrd55   | GWAS                   |
| Ap3s2     | GWAS                   |
| Appl1     | MODY                   |
| Arap1     | GWAS                   |
| Arl15     | GWAS                   |
| Atg13     | Low-frequency          |
| Bcar1     | GWAS                   |
| Bcdin3d   | GWAS                   |
| Bcl11a    | GWAS                   |
| Blk       | MODY                   |
| C2cd4a    | GWAS                   |
| C2cd4b    | GWAS                   |
| Camk1d    | GWAS                   |
| Capa10    | GWAS                   |
| Ccnd2     | GWAS, Low-frequency    |
| Cdc123    | GWAS                   |
| Cdkal1    | GWAS                   |
| Cdkn2a    | GWAS                   |
| Cdkn2b    | GWAS                   |
| Cel       | MODY                   |
| Cilp2     | GWAS                   |
| Cobl1     | GWAS                   |
| Cry2      | GWAS                   |
| Dgkb      | GWAS                   |
| D pysl5   | GWAS-Glycemic Traits  |
| Dusp9     | GWAS                   |
| Fads1     | GWAS                   |
| Faf1      | GWAS                   |
| Faim2     | GWAS                   |
| Fitm2     | GWAS                   |
| Foxa2     | GWAS-Glycemic Traits  |
| Fto       | GWAS                   |
| G6pc2     | GWAS                   |
| Gatad2a   | GWAS                   |
| Gcc1      | GWAS                   |
| Gck       | GWAS, MODY             |
| Gckr      | GWAS                   |
| Gipr      | GWAS, GWAS-Glycemic Traits |
Supplemental Table 11 | Cont.

| Gene Name | Genetic Category |
|-----------|------------------|
| Glis3     | GWAS             |
| Gpsm1     | Rare             |
| Grb10     | GWAS-Glycemic Traits |
| Grb14     | GWAS             |
| Grk5      | GWAS             |
| Hectd4    | GWAS-Glycemic Traits |
| Hhex      | GWAS             |
| Hmg20a    | GWAS             |
| Hmga2     | GWAS             |
| Hnf1a     | GWAS, MODY, Rare |
| Hnf1b     | GWAS, MODY       |
| Hnf4a     | GWAS, MODY       |
| Ide       | GWAS             |
| Igf1      | GWAS             |
| Igf2      | GWAS             |
| Igf2bp2   | GWAS             |
| Ins2      | GWAS, MODY       |
| Irs1      | GWAS, GWAS-Glycemic Traits |
| Itgb6     | GWAS             |
| Jazf1     | GWAS             |
| Kank1     | Low-frequency    |
| Kcnj11    | GWAS, MODY       |
| Kcnk16    | GWAS             |
| Kcnq1     | GWAS             |
| Klf11     | MODY             |
| Klf14     | GWAS             |
| Klh142    | GWAS             |
| Lama1     | GWAS             |
| Larp6     | GWAS-Glycemic Traits |
| Lgr5      | GWAS             |
| Lpp       | GWAS             |
| Lyplal1   | GWAS-Glycemic Traits |
| Macf1     | GWAS             |
| Madd      | GWAS, Low-frequency |
| Maea      | GWAS             |
| Mc4r      | GWAS             |
| Mphosph9  | GWAS             |
| Msmd1     | GWAS-Glycemic Traits |
| Mttr1b    | GWAS             |
| Neurod1   | MODY             |
| Notch2    | GWAS             |
| Nyap2     | GWAS             |
| Oasl1     | GWAS             |
| Pam       | Rare, Low-frequency |
| Pax4      | GWAS, MODY       |
| Pcsk1     | GWAS-Glycemic Traits |
### Supplemental Table 11 | Cont.

| Gene Name | Genetic Category                              |
|-----------|----------------------------------------------|
| Pdgfc     | GWAS-Glycemic Traits                         |
| Pdx1      | GWAS-Glycemic Traits, MODY, Rare             |
| Pepd      | GWAS                                         |
| Pou5f1    | GWAS                                         |
| Pparg     | GWAS                                         |
| Pip5k2    | Low-frequency                                |
| Ppi1r3b   | GWAS-Glycemic Traits                         |
| Prc1      | GWAS                                         |
| Prox1     | GWAS                                         |
| Psmd6     | GWAS                                         |
| Ptprd     | GWAS                                         |
| R3hdm1    | GWAS                                         |
| Rasgrp1   | GWAS                                         |
| Rbms1     | GWAS                                         |
| Rnd3      | GWAS                                         |
| Rreb1     | GWAS                                         |
| Sdha4     | GWAS                                         |
| Sgcg      | GWAS                                         |
| Sgsm2     | GWAS-Glycemic Traits, Low-frequency          |
| Slic2a2   | GWAS-Glycemic Traits                         |
| Slic30a8  | GWAS, Rare                                   |
| Snx7      | GWAS-Glycemic Traits                         |
| Spry2     | GWAS                                         |
| Srr       | GWAS                                         |
| Srsf2     | GWAS                                         |
| Ssr1      | GWAS                                         |
| S6gal1    | GWAS                                         |
| Sugp1     | GWAS                                         |
| Taf11     | GWAS-Glycemic Traits                         |
| Tbc1d30   | Low-frequency                                |
| Tcerg1l   | GWAS-Glycemic Traits                         |
| Tcf19     | GWAS                                         |
| Tcf7      | GWAS                                         |
| Tcf7l2    | GWAS                                         |
| Thada     | GWAS                                         |
| Tle1      | GWAS                                         |
| Tle4      | GWAS                                         |
| Tmem163   | GWAS                                         |
| Trp53inp1 | GWAS                                         |
| Tspan8    | GWAS                                         |
| Ube2e2    | GWAS                                         |
| Vps13c    | GWAS, GWAS-Glycemic Traits                  |
| Vps26a    | GWAS                                         |
| Wfs1      | GWAS                                         |
| Zbed3     | GWAS                                         |
| Zfand3    | GWAS                                         |
| Gene Name | Genetic Category |
|-----------|-----------------|
| Zfand6    | GWAS            |
| Zmiz1     | GWAS            |
### Supplemental Table 12 | Autism-associated genes.

| Gene Name   | Genetic Category                                      |
|-------------|-------------------------------------------------------|
| Adnp        | Rare Single Gene Mutation, Syndromic, Functional      |
| Adsl        | Rare Single Gene Mutation, Syndromic                  |
| Aff2        | Rare Single Gene Mutation, Syndromic                  |
| Ahdc1       | Rare Single Gene Mutation, Syndromic                  |
| Aldh5a1     | Rare Single Gene Mutation, Syndromic                  |
| Ank2        | Rare Single Gene Mutation                             |
| Ank3        | Rare Single Gene Mutation, Genetic Association        |
| Ankrd11     | Rare Single Gene Mutation, Syndromic                  |
| Ap2s1       | Rare Single Gene Mutation                             |
| Arhgef9     | Rare Single Gene Mutation, Syndromic                  |
| Arid1b      | Rare Single Gene Mutation, Syndromic                  |
| Arx         | Rare Single Gene Mutation, Syndromic                  |
| Ash1I       | Rare Single Gene Mutation, Syndromic                  |
| Asxl3       | Rare Single Gene Mutation, Syndromic                  |
| Atrx        | Rare Single Gene Mutation, Syndromic                  |
| Auts2       | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Baz2b       | Rare Single Gene Mutation                             |
| Bckdk       | Rare Single Gene Mutation                             |
| Bcl11a      | Rare Single Gene Mutation, Syndromic                  |
| Braf        | Rare Single Gene Mutation, Syndromic                  |
| Brsk2       | Rare Single Gene Mutation, Syndromic                  |
| Cacna1c     | Rare Single Gene Mutation, Syndromic, Genetic Association, Functional |
| Cacna1e     | Rare Single Gene Mutation                             |
| Cacna2d3    | Rare Single Gene Mutation                             |
| Cask        | Rare Single Gene Mutation, Syndromic                  |
| Cdkl5       | Rare Single Gene Mutation, Syndromic                  |
| Celf4       | Rare Single Gene Mutation, Functional                 |
| Champ1      | Rare Single Gene Mutation, Syndromic                  |
| Chd2        | Rare Single Gene Mutation, Syndromic                  |
| Chd3        | Rare Single Gene Mutation, Syndromic                  |
| Chd7        | Rare Single Gene Mutation, Syndromic                  |
| Chd8        | Rare Single Gene Mutation, Syndromic, Functional      |
| Cic         | Rare Single Gene Mutation, Functional                 |
| Cnot3       | Rare Single Gene Mutation, Syndromic                  |
| Coro1a      | Rare Single Gene Mutation                             |
| Crebbp      | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Ctcf        | Rare Single Gene Mutation, Syndromic, Functional      |
| Ctnnb1      | Rare Single Gene Mutation, Syndromic                  |
| Cul3        | Rare Single Gene Mutation, Genetic Association        |
| D5Ertd579e  | Rare Single Gene Mutation                             |
| Ddx3x       | Rare Single Gene Mutation, Syndromic                  |
| Deaf1       | Rare Single Gene Mutation, Syndromic                  |
| Dhcr7       | Rare Single Gene Mutation, Syndromic                  |
| Dip2a       | Rare Single Gene Mutation, Functional                 |
| Dlg4        | Rare Single Gene Mutation, Syndromic, Functional      |
| Dmpk        | Rare Single Gene Mutation, Syndromic                  |
| Gene Name | Genetic Category |
|-----------|-----------------|
| Dnmt3a    | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Dpysl2    | Rare Single Gene Mutation, Genetic Association, Functional |
| Dscam     | Rare Single Gene Mutation, Genetic Association |
| Dynclh1   | Rare Single Gene Mutation, Syndromic |
| Dyrk1a    | Rare Single Gene Mutation, Syndromic, Functional |
| Ebf3      | Rare Single Gene Mutation, Syndromic |
| Ehmt1     | Rare Single Gene Mutation, Syndromic, Functional |
| Eif3g     | Rare Single Gene Mutation |
| Elavl3    | Rare Single Gene Mutation |
| Ep300     | Rare Single Gene Mutation, Syndromic |
| Fmr1      | Rare Single Gene Mutation, Syndromic, Genetic Association, Functional |
| Foxq1     | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Foxp1     | Rare Single Gene Mutation, Syndromic, Genetic Association, Functional |
| Foxp2     | Rare Single Gene Mutation, Genetic Association |
| Gabrb2    | Rare Single Gene Mutation |
| Gabrb3    | Rare Single Gene Mutation, Genetic Association |
| Gfap      | Rare Single Gene Mutation |
| Gifyf1    | Rare Single Gene Mutation |
| Gifyf2    | Rare Single Gene Mutation |
| Gna1      | Rare Single Gene Mutation |
| Gria2     | Rare Single Gene Mutation |
| Grin2b    | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Hdlbp     | Rare Single Gene Mutation |
| Hectd4    | Rare Single Gene Mutation |
| Hivep2    | Syndromic, Functional |
| Hnmlph2   | Rare Single Gene Mutation, Syndromic |
| Hnrmnu    | Rare Single Gene Mutation, Syndromic, Functional |
| Hras      | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Iqsec2    | Rare Single Gene Mutation, Syndromic, Functional |
| Ir2bpl    | Rare Single Gene Mutation, Syndromic |
| Kansl1    | Rare Single Gene Mutation, Syndromic |
| Katnal2   | Rare Single Gene Mutation |
| Kcnb1     | Rare Single Gene Mutation, Syndromic |
| Konq3     | Rare Single Gene Mutation, Genetic Association |
| Kdm3b     | Syndromic |
| Kdm5b     | Rare Single Gene Mutation, Syndromic, Functional |
| Kdm6b     | Rare Single Gene Mutation, Syndromic |
| Kmt2a     | Rare Single Gene Mutation, Syndromic |
| Kmt2c     | Rare Single Gene Mutation, Syndromic, Functional |
| Kmt2e     | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Kmt5b     | Rare Single Gene Mutation, Syndromic |
| Ldb1      | Rare Single Gene Mutation |
| Lrcc4c    | Rare Single Gene Mutation |
| Lztr1     | Rare Single Gene Mutation, Syndromic |
| Magel2    | Rare Single Gene Mutation, Syndromic |
| Map1a     | Rare Single Gene Mutation |
### Supplemental Table 12 | Cont.

| Gene Name | Genetic Category |
|-----------|------------------|
| Mbd5      | Rare Single Gene Mutation, Syndromic, Functional |
| Mboat7    | Rare Single Gene Mutation, Syndromic |
| Mecp2     | Rare Single Gene Mutation, Syndromic, Functional |
| Med13     | Rare Single Gene Mutation, Syndromic |
| Med13l    | Rare Single Gene Mutation, Syndromic |
| Meis2     | Rare Single Gene Mutation, Syndromic |
| Mkx       | Rare Single Gene Mutation |
| Myt11     | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Naa15     | Rare Single Gene Mutation, Syndromic |
| Nacc1     | Rare Single Gene Mutation, Syndromic |
| Nbea      | Rare Single Gene Mutation, Syndromic, Functional |
| Nckap1    | Rare Single Gene Mutation |
| Ncoa1     | Rare Single Gene Mutation |
| Nf1       | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Nipbl     | Rare Single Gene Mutation, Syndromic |
| Ngn2      | Rare Single Gene Mutation, Functional |
| Ngn3      | Rare Single Gene Mutation |
| Nr3c2     | Rare Single Gene Mutation, Syndromic |
| Nr4a2     | Rare Single Gene Mutation |
| Nrxn1     | Rare Single Gene Mutation, Syndromic, Genetic Association, Functional |
| Nrxn2     | Rare Single Gene Mutation, Genetic Association |
| Nrxn3     | Rare Single Gene Mutation, Genetic Association |
| Nsd1      | Rare Single Gene Mutation, Syndromic |
| Nup155    | Rare Single Gene Mutation |
| Pacs1     | Rare Single Gene Mutation, Syndromic |
| Pax5      | Rare Single Gene Mutation |
| Pcdh19    | Rare Single Gene Mutation, Syndromic, Functional |
| Phf12     | Rare Single Gene Mutation |
| Phf2      | Rare Single Gene Mutation |
| Phf21a    | Rare Single Gene Mutation, Syndromic |
| Phf3      | Rare Single Gene Mutation |
| Phip      | Rare Single Gene Mutation, Syndromic |
| Pogz      | Rare Single Gene Mutation, Syndromic, Functional |
| Pomgt1    | Rare Single Gene Mutation, Syndromic |
| Ppp1r9b   | Rare Single Gene Mutation |
| Ppp2r5d   | Rare Single Gene Mutation, Syndromic |
| Ppp5c     | Rare Single Gene Mutation |
| Prr12     | Rare Single Gene Mutation, Syndromic |
| Psmd12    | Syndromic |
| Ptchd1    | Rare Single Gene Mutation, Genetic Association |
| Pten      | Rare Single Gene Mutation, Syndromic, Functional |
| Ptk7      | Rare Single Gene Mutation |
| Ptpn11    | Rare Single Gene Mutation, Syndromic |
| Rai1      | Rare Single Gene Mutation, Syndromic |
| Reln      | Rare Single Gene Mutation, Syndromic, Genetic Association, Functional |
| Rere      | Rare Single Gene Mutation, Syndromic, Genetic Association |
## Supplemental Table 12 | Cont.

| Gene Name | Genetic Category |
|-----------|-----------------|
| Rfx3      | Rare Single Gene Mutation |
| Rims1     | Rare Single Gene Mutation, Genetic Association |
| Rorb      | Rare Single Gene Mutation, Syndromic, Functional |
| Satb1     | Rare Single Gene Mutation |
| Scn1a     | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Scn2a     | Rare Single Gene Mutation, Syndromic |
| Scn8a     | Rare Single Gene Mutation, Syndromic |
| Setbp1    | Rare Single Gene Mutation, Syndromic |
| Setd2     | Rare Single Gene Mutation, Syndromic |
| Shank2    | Rare Single Gene Mutation, Syndromic, Genetic Association, Functional |
| Shank3    | Rare Single Gene Mutation, Syndromic, Genetic Association, Functional |
| Sin3a     | Rare Single Gene Mutation, Syndromic |
| Ski       | Rare Single Gene Mutation |
| Slc6a1    | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Slc9a6    | Rare Single Gene Mutation, Syndromic, Functional |
| Smarcc2   | Rare Single Gene Mutation, Syndromic, Functional |
| Sox5      | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Spast     | Rare Single Gene Mutation |
| Srcap     | Rare Single Gene Mutation |
| Srpr      | Rare Single Gene Mutation |
| Stxbp1    | Rare Single Gene Mutation, Syndromic, Functional |
| Syngap1   | Rare Single Gene Mutation, Syndromic |
| Tanc2     | Rare Single Gene Mutation, Syndromic |
| Taok1     | Rare Single Gene Mutation, Syndromic |
| Tbck      | Syndromic |
| Tbl1xr1   | Rare Single Gene Mutation, Syndromic |
| Tbr1      | Rare Single Gene Mutation, Genetic Association, Functional |
| Tcf20     | Rare Single Gene Mutation, Syndromic |
| Tcf4      | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Tcf712    | Rare Single Gene Mutation |
| Tek       | Rare Single Gene Mutation |
| Tlk2      | Rare Single Gene Mutation, Syndromic |
| Tm9sf4    | Rare Single Gene Mutation |
| Traf7     | Rare Single Gene Mutation, Syndromic |
| Trim23    | Rare Single Gene Mutation |
| Trio      | Rare Single Gene Mutation, Syndromic |
| Trip12    | Rare Single Gene Mutation, Syndromic |
| Tsc1      | Rare Single Gene Mutation, Syndromic |
| Tsc2      | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Tshz3     | Rare Single Gene Mutation, Functional |
| Ube3a     | Rare Single Gene Mutation, Syndromic, Genetic Association |
| Ubr1      | Rare Single Gene Mutation |
| Upf3b     | Rare Single Gene Mutation, Syndromic |
| Vezf1     | Rare Single Gene Mutation |
| Vps13b    | Rare Single Gene Mutation, Syndromic |
| Gene Name | Genetic Category                                      |
|-----------|------------------------------------------------------|
| Wac       | Rare Single Gene Mutation, Syndromic                 |
| Wdfy3     | Rare Single Gene Mutation, Syndromic, Functional     |
| Zbtb20    | Rare Single Gene Mutation, Syndromic                 |
| Zfp292    | Rare Single Gene Mutation, Syndromic                 |
| Zfp462    | Rare Single Gene Mutation, Syndromic                 |
| Zmynd8    | Rare Single Gene Mutation                            |
## Supplemental Table 13 | Breast cancer-associated genes.

| Gene Name | Genetic Category |
|-----------|------------------|
| Abraxas1  | GWAS             |
| Adcy3     | GWAS             |
| Ahrr      | GWAS             |
| Akap9     | GWAS             |
| Amfr      | GWAS             |
| Ap4b1     | GWAS             |
| Arrdc3    | GWAS             |
| Ascc2     | GWAS             |
| Atf7ip    | GWAS             |
| Atg10     | GWAS             |
| Atm       | Hereditary       |
| Atp6ap1l  | GWAS             |
| Bard1     | Hereditary       |
| Bcl2i15   | GWAS             |
| Brca1     | Hereditary       |
| Brca2     | Hereditary       |
| Brip1     | Hereditary       |
| Casp8     | GWAS             |
| Cbx6      | GWAS             |
| Ccdc127   | GWAS             |
| Ccdc170   | GWAS             |
| Ccdc91    | GWAS             |
| Ccne1     | GWAS             |
| Cdca7l    | GWAS             |
| Cdh1      | Hereditary       |
| Cend1     | GWAS             |
| Cenpo     | GWAS             |
| Cfi1      | GWAS             |
| Chek2     | Hereditary       |
| Coq5      | GWAS             |
| Cox11     | GWAS             |
| Cul5      | GWAS             |
| Cyp51     | GWAS             |
| Dclre1b   | GWAS             |
| Dda1      | GWAS             |
| Dffa      | GWAS             |
| Dnajc27   | GWAS             |
| Efemp2    | GWAS             |
| Ell       | GWAS             |
| Enpp7     | GWAS             |
| Epcam     | Hereditary       |
| Esr1      | GWAS             |
| Gatad2a   | GWAS             |
| Hapln4    | GWAS             |
| Hlf       | GWAS             |
| Hspa4     | GWAS             |
| Gene Name  | Genetic Category |
|------------|------------------|
| Kcnn4      | GWAS             |
| L3mbtl3    | GWAS             |
| Lrcc25     | GWAS             |
| Lrrd1      | GWAS             |
| Mchr1      | GWAS             |
| Mdm4       | GWAS             |
| Mlh1       | Hereditary       |
| Mrps18c    | GWAS             |
| Msh2       | Hereditary       |
| Msh6       | Hereditary       |
| Nbn        | Hereditary       |
| Nf1        | Hereditary       |
| Nol12      | GWAS             |
| Npat       | GWAS             |
| Nudt17     | GWAS             |
| Ocel1      | GWAS             |
| Ogfod1     | GWAS             |
| Palb2      | Hereditary       |
| Pex14      | GWAS             |
| Pgpep1     | GWAS             |
| Pidd1      | GWAS             |
| Plk3c2b    | GWAS             |
| Pms2       | Hereditary       |
| Ppiil3     | GWAS             |
| Prc1       | GWAS             |
| Pten       | Hereditary       |
| Ptptn22    | GWAS             |
| Rad51c     | Hereditary       |
| Rad51d     | Hereditary       |
| Ralb       | GWAS             |
| Rccd1      | GWAS             |
| Rhbddd3    | GWAS             |
| Rnf115     | GWAS             |
| Rps23      | GWAS             |
| Sdha       | GWAS             |
| Sirt5      | GWAS             |
| Siva1      | GWAS             |
| Smg9       | GWAS             |
| Sspb4      | GWAS             |
| Stk11      | Hereditary       |
| Syne1      | GWAS             |
| Tefm       | GWAS             |
| Tgfb2      | GWAS             |
| Tlr1       | GWAS             |
| Tm6sf2     | GWAS             |
| Tmem184b   | GWAS             |
| Gene Name | Genetic Category |
|-----------|-----------------|
| Tnnt3     | GWAS            |
| Tns1      | GWAS            |
| Trp53     | Hereditary      |
| Wdr43     | GWAS            |
| Zbtb38    | GWAS            |
| Zfp703    | GWAS            |
Supplemental Table 14 | Expression levels of besity-, T1D-, T2D-, autism-, breast cancer-associated genes across the brain regions of energy balance. TPM values for genes associated to each were reported for all brain regions and mouse embryonic stem cell samples. For each region TPM value from each replicate were aggregated to calculate the mean and SD.
### Supplemental Table 15 | Genes associated with more than one disease.

| Gene Name | Obesity | T1D | T2D | Autism | Breast Cancer |
|-----------|---------|-----|-----|--------|---------------|
| Adcy3     | x       |     |     |        |               |
| Cdkal1    | x       |     |     |        |               |
| Cobl1     | x       |     |     |        |               |
| Dnajc27   | x       |     |     |        |               |
| Efr3b     | x       | x   |     |        |               |
| Faim2     | x       |     |     |        |               |
| Fto       | x       |     |     |        |               |
| Gipr      | x       |     |     |        |               |
| Irs1      | x       |     |     |        |               |
| Mc4r      | x       |     |     |        |               |
| Nrxn3     | x       |     |     | x      |               |
| Pcsk1     | x       |     |     | x      |               |
| Pgpep1    | x       |     |     |        | x             |
| Phip      | x       |     |     |        | x             |
| Tcf7l2    | x       | x   |     |        | x             |
**Supplementary Table 16 | WGCNA analysis of obesity-, T1D-, T2D-, autism- and breast cancer-associated genes.** Description of each gene including: color key and position in the WGCNA dendrogram, position in the hierarchical cluster dendrogram, module number, gene name following the heatmap order and genetic category. Relates to Fig. 7A.

| Color key | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------|------------------|--------------------------------|----------|----------------------|-----------------|
| 451       | 5                | 1                              | Ifngr1   | Obesity              |
| 537       | 6                | 1                              | Ctsh     | T1D                  |
| 631       | 8                | 1                              | Ptpn11   | Autism               |
| 435       | 57               | 1                              | Efr3b    | Obesity/T1D          |
| 391       | 85               | 1                              | Tlr4     | Obesity              |
| 315       | 111              | 1                              | Ube3a    | Autism               |
| 155       | 114              | 1                              | Mtif3    | Obesity              |
| 335       | 189              | 1                              | Lztf1    | Obesity              |
| 9         | 195              | 1                              | Erbb4    | Obesity              |
| 46        | 196              | 1                              | Mapk3    | Obesity              |
| 267       | 197              | 1                              | Sema3c   | Obesity              |
| 178       | 216              | 1                              | Scl9a6   | Autism               |
| 322       | 218              | 1                              | Zfr2     | Obesity              |
| 591       | 228              | 1                              | Vps26a   | T2D                  |
| 131       | 229              | 1                              | Cbl      | T1D                  |
| 549       | 230              | 1                              | Etv5     | Obesity              |
| 414       | 276              | 1                              | Rabep1   | Obesity              |
| 174       | 304              | 1                              | Apobr    | Obesity              |
| 402       | 306              | 1                              | Pepd     | T2D                  |
| 453       | 308              | 1                              | Rreb1    | T2D                  |
| 395       | 310              | 1                              | Spry2    | T2D                  |
| 553       | 325              | 1                              | Itpr3    | T1D                  |
| 552       | 326              | 1                              | Tyk2     | T1D                  |
| 95        | 337              | 1                              | Tbl1xr1  | Autism               |
| 107       | 342              | 1                              | Pdgfc    | T2D                  |
| 337       | 343              | 1                              | Nacc1    | Autism               |
| 158       | 344              | 1                              | Tomm40   | Obesity              |
| 132       | 345              | 1                              | Mrps18c  | Breast cancer        |
| 449       | 346              | 1                              | Rcc1l    | Obesity              |
| 63        | 347              | 1                              | Ino80e   | Obesity              |
| 578       | 348              | 1                              | Eif3g    | Autism               |
| 308       | 349              | 1                              | Rpl27a   | Obesity              |
| 355       | 350              | 1                              | Atm      | Breast cancer        |
| 490       | 351              | 1                              | Pidd1    | Breast cancer        |
| 373       | 352              | 1                              | Siva1    | Breast cancer        |
| 645       | 353              | 1                              | Fancl    | Obesity              |
| 244       | 354              | 1                              | Stat4    | T1D                  |
| 255       | 355              | 1                              | Tefm     | Breast cancer        |
| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|----------------------------|-------------------|---------------------------------|----------|----------------------|------------------|
| 514 | 356 | 1 | Mdm4 | Breast cancer |
| 27 | 357 | 1 | Nup54 | Obesity |
| 240 | 358 | 1 | Ddx3x | Autism |
| 588 | 359 | 1 | Naa15 | Autism |
| 253 | 360 | 1 | Pgm1 | T1D |
| 521 | 361 | 1 | Il10 | T1D |
| 11 | 362 | 1 | Npat | Breast cancer |
| 181 | 363 | 1 | Rad51c | Breast cancer |
| 620 | 364 | 1 | Brca2 | Breast cancer |
| 290 | 365 | 1 | Adsl | Autism |
| 62 | 366 | 1 | Cars | T1D |
| 384 | 367 | 1 | Thada | T2D |
| 281 | 368 | 1 | Cenpw | T1D |
| 511 | 369 | 1 | Trp53 | Breast cancer |
| 593 | 370 | 1 | Palb2 | Breast cancer |
| 121 | 371 | 1 | Mtrf2 | Obesity |
| 311 | 372 | 1 | Brca1 | Breast cancer |
| 438 | 373 | 1 | Brip1 | Breast cancer |
| 582 | 374 | 1 | Gatad2a | T2D/Breast cancer |
| 5 | 375 | 1 | Nup155 | Autism |
| 319 | 376 | 1 | Trip12 | Autism |
| 227 | 377 | 1 | Zfp64 | Obesity |
| 232 | 378 | 1 | Rps23 | Breast cancer |
| 567 | 379 | 1 | Tcf7 | T2D |
| 81 | 380 | 1 | Trp53inp1 | T2D |
| 268 | 381 | 1 | Abraxas1 | Breast cancer |
| 496 | 382 | 1 | Msh2 | Breast cancer |
| 84 | 383 | 1 | Wdr43 | Breast cancer |
| 498 | 384 | 1 | Hdlbp | Autism |
| 526 | 385 | 1 | Epcam | Breast cancer |
| 590 | 386 | 1 | Hnf4a | T2D |
| 531 | 387 | 1 | Hspa4 | Breast cancer |
| 303 | 388 | 1 | Hmga1 | Obesity |
| 461 | 389 | 1 | Bard1 | Breast cancer |
| 472 | 390 | 1 | Chek2 | Breast cancer |
| 277 | 391 | 1 | Hhex | T2D |
| 82 | 392 | 1 | Ubash3a | T1D |
| 371 | 393 | 1 | Ccne1 | Breast cancer |
| 318 | 394 | 1 | Ide | T2D |
| 564 | 395 | 1 | Cdh1 | Breast cancer |
| Color key | WGCNA | Hierarchical | Module | Gene name in heatmap | Genetic category |
|-----------|--------|--------------|--------|----------------------|------------------|
| dendrogram | dendrogram | # | | | |
| 363 | 396 | 1 | Msh6 | Breast cancer |
| 554 | 397 | 1 | Hnf1a | T2D |
| 478 | 398 | 1 | Gdf15 | Obesity |
| 572 | 399 | 1 | Cdkn2a | T2D |
| 530 | 400 | 1 | Dusp9 | T2D |
| 411 | 401 | 1 | Pou5f1 | T2D |
| 642 | 402 | 1 | G6pc2 | T2D |
| 133 | 403 | 1 | Polk | Obesity |
| 389 | 404 | 1 | Adpgk | Obesity |
| 517 | 405 | 1 | Psmd12 | Autism |
| 347 | 406 | 1 | R3hdmi | T2D |
| 1 | 407 | 1 | Abo | T2D |
| 463 | 408 | 1 | Skap2 | T1D |
| 31 | 409 | 1 | Ap3s2 | T2D |
| 245 | 410 | 1 | Psmd6 | T2D |
| 455 | 411 | 1 | Ppil3 | Breast cancer |
| 304 | 412 | 1 | Dhcr7 | Autism |
| 360 | 415 | 1 | Gtf3a | Obesity |
| 546 | 416 | 1 | Snrpd2 | Obesity |
| 275 | 418 | 1 | Cenpo | Breast cancer |
| 477 | 420 | 1 | Cdc7i | Breast cancer |
| 509 | 421 | 1 | Prc1 | T2D/Breast cancer |
| 302 | 422 | 1 | Cnot9 | Obesity |
| 78 | 425 | 1 | Lyplal1 | T2D |
| 544 | 426 | 1 | Faf1 | T2D |
| 26 | 427 | 1 | Klf11 | T2D |
| 622 | 428 | 1 | Lama1 | T2D |
| 91 | 429 | 1 | Kdm5b | Autism |
| 122 | 430 | 1 | Ptk7 | Autism |
| 151 | 544 | 1 | Pex2 | Obesity |
| 262 | 606 | 1 | Dynclh1 | Autism |
| 471 | 619 | 1 | Zfp703 | Breast cancer |
| 598 | 628 | 1 | Nudt3 | Obesity |
| 201 | 629 | 1 | Brsk2 | Autism |
| 37 | 630 | 1 | Map2k5 | Obesity |
| 536 | 638 | 1 | Phtf1 | T1D |
| 314 | 639 | 1 | Dpysl2 | Autism |
| 450 | 640 | 1 | Fto | Obesity/T2D |
| 312 | 641 | 1 | Nf1 | Autism/Breast cancer |
## Supplementary Table 16 | Cont.

| WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|------------------|---------------------------------|---------|----------------------|------------------|
| 508              | 645                             | 1       | Ptprd               | T2D              |
| 213              | 646                             | 1       | Ank3                | Autism           |
| 397              | 647                             | 1       | Plxna4              | Obesity          |
| 100              | 649                             | 1       | Tgfr2               | Breast cancer    |
| 586              | 42                              | 2       | Iars2               | Obesity          |
| 378              | 112                             | 2       | Macf1               | T2D              |
| 462              | 113                             | 2       | Rere                | Autism           |
| 13               | 184                             | 2       | Bbs9                | Obesity          |
| 527              | 185                             | 2       | Klf14               | T2D              |
| 626              | 193                             | 2       | Tub                 | Obesity          |
| 418              | 305                             | 2       | Cdkn2b              | T2D              |
| 377              | 314                             | 2       | Erbb3               | T1D              |
| 352              | 339                             | 2       | Nol12               | Breast cancer    |
| 24               | 434                             | 2       | Sim1                | Obesity          |
| 506              | 435                             | 2       | Dlk1                | T1D              |
| 90               | 436                             | 2       | Magei2              | Autism           |
| 79               | 437                             | 2       | Lrd1                | Breast cancer    |
| 273              | 438                             | 2       | Akap9               | Breast cancer    |
| 116              | 439                             | 2       | Ikzf4               | T1D              |
| 35               | 440                             | 2       | Deaf1               | Autism           |
| 331              | 441                             | 2       | Prr12               | Autism           |
| 45               | 442                             | 2       | Plxna1              | Obesity          |
| 4                | 443                             | 2       | Smg6                | Obesity          |
| 189              | 444                             | 2       | Hip1                | Obesity          |
| 229              | 446                             | 2       | Zmir1               | T2D              |
| 254              | 447                             | 2       | Stk36               | Obesity          |
| 265              | 448                             | 2       | Ptbp2               | Obesity          |
| 338              | 449                             | 2       | Vezf1               | Autism           |
| 568              | 450                             | 2       | Plxna3              | Obesity          |
| 556              | 451                             | 2       | Zfp608              | Obesity          |
| 152              | 452                             | 2       | Zfp688              | Obesity          |
| 561              | 453                             | 2       | Ldb1                | Autism           |
| 589              | 454                             | 2       | Zbed3               | T2D              |
| 69               | 455                             | 2       | Adnp                | Autism           |
| 18               | 456                             | 2       | Fbxl19              | Obesity          |
| 285              | 457                             | 2       | Kctd15              | Obesity          |
| 190              | 458                             | 2       | Spast               | Autism           |
| 246              | 459                             | 2       | Dpysl5              | T2D              |
| 324              | 460                             | 2       | Rnd3                | T2D              |
| 270              | 461                             | 2       | Bach2               | T1D              |
### Supplementary Table 16 | Cont.

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|----------------------------------|----------|----------------------|------------------|
| 320                         | 462              | 2                                | Tle1     | T2D                  |
| 522                         | 463              | 2                                | Casp8    | Breast cancer        |
| 257                         | 464              | 2                                | St6gal1  | T2D                  |
| 492                         | 487              | 2                                | Champ1   | Autism               |
| 415                         | 502              | 2                                | Ctnnb1   | Autism               |
| 194                         | 503              | 2                                | Pbrm1    | Obesity              |
| 294                         | 504              | 2                                | Ppil2    | T1D                  |
| 566                         | 505              | 2                                | Zfp462   | Autism               |
| 263                         | 509              | 2                                | C1qtnf6  | T1D                  |
| 431                         | 515              | 2                                | Arx      | Autism               |
| 474                         | 516              | 2                                | Ccnd2    | T2D                  |
| 437                         | 517              | 2                                | Cel      | T2D                  |
| 585                         | 534              | 2                                | Bbs12    | Obesity              |
| 148                         | 542              | 2                                | Prox1    | T2D                  |
| 205                         | 543              | 2                                | Rnls     | T1D                  |
| 510                         | 545              | 2                                | Ift27    | Obesity              |
| 139                         | 546              | 2                                | Txndc12  | Obesity              |
| 60                          | 547              | 2                                | Lrrc25   | Breast cancer        |
| 447                         | 548              | 2                                | Dda1     | Breast cancer        |
| 173                         | 549              | 2                                | Hmg20a   | T2D                  |
| 576                         | 550              | 2                                | Rai1     | Autism               |
| 516                         | 551              | 2                                | Capn10   | T2D                  |
| 479                         | 552              | 2                                | L3mbtl3  | Breast cancer        |
| 280                         | 553              | 2                                | Nrp1     | Obesity              |
| 502                         | 554              | 2                                | Glis3    | T1D/T2D              |
| 55                          | 555              | 2                                | Grb10    | T2D                  |
| 272                         | 556              | 2                                | Ift74    | Obesity              |
| 258                         | 557              | 2                                | Nrp2     | Obesity              |
| 408                         | 558              | 2                                | Phf2     | Autism               |
| 452                         | 559              | 2                                | Zfand3   | T2D                  |
| 339                         | 560              | 2                                | Setbp1   | Autism               |
| 200                         | 561              | 2                                | Ube2e3   | Obesity              |
| 614                         | 562              | 2                                | Dmpk     | Autism               |
| 125                         | 563              | 2                                | Notch2   | T2D                  |
| 195                         | 564              | 2                                | Prkd2    | T1D                  |
| 59                          | 566              | 2                                | Tlk2     | Autism               |
| 231                         | 568              | 2                                | Tcf7l2   | Obesity/T1D/T2D/Autism |
| 221                         | 569              | 2                                |Pgpep1    | Obesity/Breast cancer |
Supplementary Table 16 | Cont.

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|---------------------------------|----------|----------------------|-----------------|
| 427                         | 570              | 2                               | Ppip5k2  | T2D                  |
| 630                         | 571              | 2                               | Fign     | Obesity              |
| 291                         | 572              | 2                               | Zfhx3    | Obesity              |
| 83                          | 573              | 2                               | Asxl3    | Autism               |
| 110                         | 574              | 2                               | Nav1     | Obesity              |
| 606                         | 575              | 2                               | Aff2     | Autism               |
| 12                          | 576              | 2                               | Slc39a8  | Obesity              |
| 241                         | 577              | 2                               | Lmx1b    | Obesity              |
| 113                         | 578              | 2                               | Ebf3     | Autism               |
| 374                         | 580              | 2                               | Pik3c2b  | Breast cancer        |
| 605                         | 581              | 2                               | Gipr     | Obesity/T2D          |
| 68                          | 582              | 2                               | Lmo1     | Obesity              |
| 396                         | 584              | 2                               | Tfap2b   | Obesity              |
| 141                         | 585              | 2                               | Pax5     | Autism               |
| 612                         | 586              | 2                               | Tal1     | Obesity              |
| 369                         | 593              | 2                               | Tshz3    | Autism               |
| 298                         | 599              | 2                               | Rpgrip1l | Obesity             |
| 64                          | 600              | 2                               | Cfl1     | Breast cancer        |
| 348                         | 601              | 2                               | Hmgcr    | Obesity              |
| 209                         | 602              | 2                               | Sox5     | Autism               |
| 332                         | 603              | 2                               | Rfx3     | Autism               |
| 446                         | 604              | 2                               | Bcl11a   | T2D/Autism           |
| 500                         | 605              | 2                               | Plxna2   | Obesity              |
| 410                         | 607              | 2                               | Elavl4   | Obesity              |
| 627                         | 608              | 2                               | Tbck     | Autism               |
| 609                         | 609              | 2                               | Cask     | Autism               |
| 641                         | 610              | 2                               | Ehbp1    | Obesity              |
| 123                         | 618              | 2                               | Sema3a   | Obesity              |
| 607                         | 620              | 2                               | Gpsm1    | T2D                  |
| 494                         | 621              | 2                               | Klf7     | Obesity              |
| 616                         | 622              | 2                               | Kmt2e    | Autism               |
| 219                         | 623              | 2                               | Elavl3   | Autism               |
| 249                         | 624              | 2                               | Smarcc2  | Autism               |
| 135                         | 625              | 2                               | Efemp2   | Breast cancer        |
| 456                         | 626              | 2                               | Irs1     | Obesity/T2D          |
| 545                         | 632              | 2                               | Arid1b   | Autism               |
| 43                          | 648              | 2                               | Frmd3    | T1D                  |
| 507                         | 1                | 3                               | Cep290   | Obesity              |
| 161                         | 46               | 3                               | Tmem184b | Breast cancer        |
| 77                          | 47               | 3                               | Zbtb38   | Breast cancer        |
| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|---------------------------------|----------|----------------------|------------------|
| 32                          | 48               | 3                               | Mkks     | Obesity              |
| 67                          | 49               | 3                               | Iqsec2   | Autism               |
| 611                         | 50               | 3                               | Scn8a    | Autism               |
| 489                         | 51               | 3                               | Slc6a1   | Autism               |
| 341                         | 52               | 3                               | Coq5     | Breast cancer        |
| 167                         | 53               | 3                               | Ric3     | Obesity              |
| 385                         | 54               | 3                               | Scg3     | Obesity              |
| 105                         | 55               | 3                               | Amfr     | Breast cancer        |
| 252                         | 56               | 3                               | Wdfy3    | Autism               |
| 93                          | 58               | 3                               | Pex14    | Breast cancer        |
| 501                         | 59               | 3                               | Vps13c   | T2D                  |
| 214                         | 60               | 3                               | Stx1b    | Obesity              |
| 118                         | 61               | 3                               | Stxbp1   | Autism               |
| 23                          | 62               | 3                               | Kcnj11   | T1D/T2D              |
| 128                         | 63               | 3                               | Ypel3    | Obesity              |
| 413                         | 64               | 3                               | Clec16a  | T1D                  |
| 224                         | 65               | 3                               | Dmxl2    | Obesity              |
| 597                         | 66               | 3                               | Madd     | T2D                  |
| 525                         | 67               | 3                               | Ank2     | Autism               |
| 250                         | 68               | 3                               | Gna1     | Autism               |
| 202                         | 69               | 3                               | Gabrb2   | Autism               |
| 464                         | 70               | 3                               | Nrxn3    | Obesity/Autism       |
| 448                         | 72               | 3                               | Rnf115   | Breast cancer        |
| 573                         | 81               | 3                               | Sirt5    | Breast cancer        |
| 644                         | 121              | 3                               | Pomgnt1  | Autism               |
| 218                         | 124              | 3                               | Ankrd11  | Autism               |
| 114                         | 128              | 3                               | Cnr2     | T2D                  |
| 426                         | 129              | 3                               | Scn2a    | Autism               |
| 197                         | 130              | 3                               | Cbx6     | Breast cancer        |
| 185                         | 131              | 3                               | Nrxn1    | Autism               |
| 592                         | 132              | 3                               | Cacna1c  | Autism               |
| 547                         | 133              | 3                               | Hlf      | Breast cancer        |
| 405                         | 134              | 3                               | Arl6     | Obesity              |
| 259                         | 135              | 3                               | Ash1l    | Autism               |
| 127                         | 136              | 3                               | Ksr2     | Obesity              |
| 198                         | 137              | 3                               | Cacna1e  | Autism               |
| 416                         | 138              | 3                               | Negr1    | Obesity              |
| 358                         | 139              | 3                               | Shank3   | Autism               |
| 104                         | 140              | 3                               | Braf     | Autism               |
| 150                         | 141              | 3                               | Ncoa1    | Autism               |
| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|---------------------------|-----------------|--------------------------------|--------|---------------------|-----------------|
| 569                       | 142             | 3                             | Atp6ap1l | Breast cancer       |
| 562                       | 143             | 3                             | Grk5    | T2D                |
| 282                       | 145             | 3                             | Ppp5c   | Autism              |
| 193                       | 146             | 3                             | Frrs1l  | Obesity             |
| 188                       | 148             | 3                             | Nrxn2   | Autism              |
| 204                       | 149             | 3                             | Rims1   | Autism              |
| 488                       | 150             | 3                             | Shank2  | Autism              |
| 366                       | 153             | 3                             | Rasa2   | Obesity             |
| 208                       | 154             | 3                             | Appl1   | T2D                |
| 433                       | 155             | 3                             | Taok1   | Autism              |
| 575                       | 160             | 3                             | Ccc127  | Breast cancer       |
| 376                       | 162             | 3                             | Epb414b | Obesity             |
| 628                       | 163             | 3                             | Ubr1    | Autism              |
| 66                        | 164             | 3                             | Bbs5    | Obesity             |
| 400                       | 165             | 3                             | Ets2    | Obesity             |
| 541                       | 166             | 3                             | Tmem18  | Obesity             |
| 469                       | 167             | 3                             | Vps13b  | Autism              |
| 548                       | 168             | 3                             | Atg13   | T2D                |
| 523                       | 169             | 3                             | Trim23  | Autism              |
| 261                       | 235             | 3                             | Bdnf    | Obesity             |
| 466                       | 236             | 3                             | Pip4k2c | T1D                |
| 176                       | 237             | 3                             | Pparg   | T1D/T2D             |
| 361                       | 260             | 3                             | Hvep2   | Autism              |
| 187                       | 269             | 3                             | Ocel1   | Breast cancer       |
| 86                        | 278             | 3                             | Tbc1d30 | T2D                |
| 484                       | 279             | 3                             | Hectd4  | T2D/Autism          |
| 560                       | 280             | 3                             | Trim32  | Obesity             |
| 621                       | 282             | 3                             | Mbd5    | Autism              |
| 467                       | 340             | 3                             | Tle4    | T2D                |
| 306                       | 413             | 3                             | Mks1    | Obesity             |
| 212                       | 414             | 3                             | Ascc2   | Breast cancer       |
| 140                       | 431             | 3                             | Adamts9 | T2D                |
| 382                       | 525             | 3                             | Gckr    | T2D                |
| 618                       | 527             | 3                             | Ppp2r5d | Autism              |
| 276                       | 565             | 3                             | Cyp51   | Breast cancer       |
| 143                       | 616             | 3                             | Hnmrph2 | Autism              |
| 558                       | 617             | 3                             | Tcf4    | Autism              |
| 54                        | 2               | 4                             | Kank1   | T2D                |
| 635                       | 3               | 4                             | Erap1   | T1D                |
| 75                        | 4               | 4                             | Fam189a2| T1D                |
| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|----------------------------|------------------|--------------------------------|---------|----------------------|-----------------|
| 540                        | 7                | 4                              | Rab21   | Obesity              |
| 503                        | 9                | 4                              | Aldh5a1 | Autism               |
| 570                        | 10               | 4                              | Gnpda2  | Obesity              |
| 247                        | 12               | 4                              | Ssfa2   | Obesity              |
| 637                        | 13               | 4                              | Fitm2   | T2D                  |
| 632                        | 14               | 4                              | Gprc5b  | Obesity              |
| 368                        | 15               | 4                              | Hapln4  | Breast cancer        |
| 186                        | 16               | 4                              | Scn1a   | Autism               |
| 216                        | 17               | 4                              | Cend1   | Breast cancer        |
| 412                        | 18               | 4                              | Dnajc27 | Obesity/Breast cancer|
| 648                        | 20               | 4                              | Dip2a   | Autism               |
| 499                        | 21               | 4                              | Pcdh9   | Obesity              |
| 432                        | 23               | 4                              | Larp6   | T2D                  |
| 454                        | 24               | 4                              | Rapgef3 | Obesity              |
| 15                         | 26               | 4                              | Prkc5   | T1D                  |
| 579                        | 27               | 4                              | Kcnk9   | Obesity              |
| 357                        | 28               | 4                              | Sdha    | Breast cancer        |
| 53                         | 29               | 4                              | Col4a3bp | Obesity            |
| 359                        | 30               | 4                              | Faim2   | Obesity/T2D          |
| 22                         | 31               | 4                              | Ifih1   | T1D                  |
| 14                         | 32               | 4                              | Tns1    | Breast cancer        |
| 638                        | 33               | 4                              | Hsd17b12 | Obesity          |
| 444                        | 34               | 4                              | Gbe1    | Obesity              |
| 108                        | 35               | 4                              | Scarb2  | Obesity              |
| 559                        | 36               | 4                              | Ccdc91  | Breast cancer        |
| 353                        | 37               | 4                              | Plcd4   | Obesity              |
| 321                        | 38               | 4                              | Ankrd55 | T2D                  |
| 398                        | 39               | 4                              | Ache    | Obesity              |
| 159                        | 40               | 4                              | Rit2    | Obesity              |
| 44                         | 41               | 4                              | Cox11   | Breast cancer        |
| 404                        | 43               | 4                              | Rad51d  | Breast cancer        |
| 596                        | 44               | 4                              | Lgr5    | T2D                  |
| 458                        | 86               | 4                              | Gfap    | Autism               |
| 639                        | 87               | 4                              | Hhip    | Obesity              |
| 475                        | 88               | 4                              | Il2ra   | T1D                  |
| 297                        | 89               | 4                              | Tek     | Autism               |
| 617                        | 90               | 4                              | Cobll1  | Obesity/T2D          |
| 154                        | 91               | 4                              | Cyp27a1 | Obesity              |
| 482                        | 92               | 4                              | Ankdd1b | Obesity              |

**Supplementary Table 16 | Cont.**
**Supplementary Table 16 | Cont.**

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|----------------------------|------------------|---------------------------------|---------|---------------------|-----------------|
| 96                         | 200              | 4                               | Adra2a  | T2D                 |
| 401                        | 203              | 4                               | Trim66  | Obesity             |
| 423                        | 205              | 4                               | Fads1   | T2D                 |
| 230                        | 219              | 4                               | Mc4r    | Obesity/T2D         |
| 206                        | 220              | 4                               | Msmo1   | T2D                 |
| 519                        | 221              | 4                               | Slc30a8 | T2D                 |
| 390                        | 222              | 4                               | Maea    | T2D                 |
| 56                         | 335              | 4                               | Arl15   | T2D                 |
| 70                         | 336              | 4                               | Med13l  | Autism              |
| 76                         | 338              | 4                               | Tcf20   | Autism              |
| 424                        | 536              | 4                               | Cdc123  | T2D                 |
| 260                        | 541              | 4                               | Rnaset2a| T1D                 |
| 146                        | 595              | 4                               | Sema3b  | Obesity             |
| 529                        | 11               | 5                               | Dffa    | Breast cancer       |
| 242                        | 19               | 5                               | Map1a   | Autism              |
| 289                        | 22               | 5                               | Agmo    | T2D                 |
| 61                         | 25               | 5                               | Grb14   | T2D                 |
| 383                        | 84               | 5                               | Tmem160 | Obesity             |
| 587                        | 199              | 5                               | Kif5a   | T1D                 |
| 283                        | 204              | 5                               | Atg10   | Breast cancer       |
| 278                        | 206              | 5                               | Sdha4   | T2D                 |
| 542                        | 214              | 5                               | Park2   | Obesity             |
| 574                        | 287              | 5                               | Nr3c2   | Autism              |
| 284                        | 315              | 5                               | Zmynd8  | Autism              |
| 215                        | 316              | 5                               | Atrx    | Autism              |
| 248                        | 317              | 5                               | Atf7ip  | Breast cancer       |
| 325                        | 318              | 5                               | Phf3    | Autism              |
| 425                        | 319              | 5                               | Fmr1    | Autism              |
| 646                        | 320              | 5                               | Gigyf2  | Autism              |
| 296                        | 341              | 5                               | Cilp2   | T2D                 |
| 417                        | 423              | 5                               | Srsf2   | T2D                 |
| 565                        | 424              | 5                               | Ralb    | Breast cancer       |
| 169                        | 432              | 5                               | Cul5    | Breast cancer       |
| 192                        | 467              | 5                               | Phf21a  | Autism              |
| 326                        | 468              | 5                               | Wac     | Autism              |
| 30                         | 469              | 5                               | Baz2b   | Autism              |
| 625                        | 470              | 5                               | Kmt5b   | Autism              |
| 392                        | 471              | 5                               | Chd2    | Autism              |
| 80                         | 472              | 5                               | Upf3b   | Autism              |
| 649                        | 473              | 5                               | Crebbp  | Autism              |
## Supplementary Table 16 | Cont.

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|---------------------------------|----------|----------------------|------------------|
| 177 | 474 | 5 | Kmt2a | Autism |
| 238 | 475 | 5 | Autos2 | Autism |
| 445 | 476 | 5 | Dyrk1a | Autism |
| 428 | 479 | 5 | Hnrnpu | Autism |
| 441 | 483 | 5 | Med13 | Autism |
| 367 | 488 | 5 | Creb1 | Obesity |
| 504 | 489 | 5 | Phip | Obesity/Autism |
| 74 | 490 | 5 | Rccd1 | Breast cancer |
| 636 | 491 | 5 | Cep295 | Obesity |
| 112 | 492 | 5 | Dnmt3a | Autism |
| 333 | 493 | 5 | Nipbl | Autism |
| 34 | 494 | 5 | Zbtb10 | Obesity |
| 295 | 495 | 5 | Setd5 | Autism |
| 220 | 496 | 5 | Mlh1 | Breast cancer |
| 228 | 497 | 5 | Traf7 | Autism |
| 20 | 498 | 5 | Hmga2 | T2D |
| 2 | 499 | 5 | Igf2bp2 | T2D |
| 624 | 500 | 5 | Cnot3 | Autism |
| 72 | 501 | 5 | Sin3a | Autism |
| 144 | 506 | 5 | Pogz | Autism |
| 643 | 507 | 5 | Srcap | Autism |
| 407 | 508 | 5 | Kdm6b | Autism |
| 88 | 510 | 5 | Ehmt1 | Autism |
| 102 | 511 | 5 | Zfp292 | Autism |
| 3 | 587 | 5 | Skor1 | Obesity |
| 647 | 588 | 5 | Rbms1 | T2D |
| 156 | 590 | 5 | Olig3 | Obesity |
| 130 | 592 | 5 | Cul3 | Autism |
| 619 | 71 | 6 | Fam57b | Obesity |
| 349 | 73 | 6 | Sgcg | T2D |
| 236 | 74 | 6 | Tnfrsf11b | T1D |
| 222 | 75 | 6 | Ank1 | T2D |
| 533 | 76 | 6 | Zbtb7b | Obesity |
| 217 | 77 | 6 | Ptdch1 | Autism |
| 286 | 78 | 6 | Abcc8 | T2D |
| 41 | 79 | 6 | Kcnk3 | Obesity |
| 162 | 80 | 6 | Suox | T1D |
| 199 | 82 | 6 | Inpp5e | Obesity |
| 403 | 83 | 6 | Tmem163 | T2D |
| 10 | 95 | 6 | Sh2b3 | T1D |
| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|-------------------------------|----------|----------------------|-----------------|
| 436                         | 96               | 6                             | Reln     | Autism               |
| 47                          | 97               | 6                             | Ski      | Autism               |
| 211                         | 98               | 6                             | Itgb6    | T2D                  |
| 535                         | 99               | 6                             | Foxo3    | Obesity              |
| 538                         | 100              | 6                             | Arap1    | T2D                  |
| 580                         | 101              | 6                             | Cbln1    | Obesity              |
| 615                         | 102              | 6                             | Neurod1  | T2D                  |
| 485                         | 103              | 6                             | Bcl2l15  | Breast cancer        |
| 251                         | 104              | 6                             | Ptpn22   | T1D/Breast cancer    |
| 103                         | 105              | 6                             | Supg1    | T2D                  |
| 175                         | 106              | 6                             | Tm6sf2   | Breast cancer        |
| 487                         | 107              | 6                             | Bcar1    | T2D                  |
| 316                         | 108              | 6                             | Chd7     | Autism               |
| 21                          | 109              | 6                             | Kmt2c    | Autism               |
| 434                         | 110              | 6                             | Lpp      | T2D                  |
| 439                         | 115              | 6                             | Zfp169   | Obesity              |
| 97                          | 118              | 6                             | Gcc1     | T2D                  |
| 239                         | 125              | 6                             | Poc5     | Obesity              |
| 476                         | 126              | 6                             | D5Ertd579e | Autism         |
| 101                         | 127              | 6                             | Pkd1     | T1D                  |
| 386                         | 144              | 6                             | Smg9     | Breast cancer        |
| 354                         | 147              | 6                             | Syne1    | Breast cancer        |
| 518                         | 161              | 6                             | Klhl42   | T2D                  |
| 375                         | 322              | 6                             | Alms1    | Obesity              |
| 515                         | 323              | 6                             | Mphosph9 | T2D                  |
| 623                         | 519              | 6                             | Nbn      | Breast cancer        |
| 50                          | 521              | 6                             | Cic      | Autism               |
| 73                          | 522              | 6                             | Stk11    | Breast cancer        |
| 388                         | 531              | 6                             | Zfp142   | Obesity              |
| 168                         | 532              | 6                             | Ell      | Breast cancer        |
| 505                         | 627              | 6                             | Plekha1  | T1D                  |
| 313                         | 633              | 6                             | Trio     | Autism               |
| 370                         | 636              | 6                             | Bbip1    | Obesity              |
| 106                         | 637              | 6                             | Tsc2     | Autism               |
| 233                         | 174              | 7                             | Pam      | T2D                  |
| 601                         | 187              | 7                             | Tagap    | T1D                  |
| 38                          | 188              | 7                             | Tcerg1l  | T2D                  |
| 577                         | 192              | 7                             | Ssbp4    | Breast cancer        |
| 468                         | 201              | 7                             | Nudt17   | Breast cancer        |
| Color key WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|----------------------------|-------------------------------|----------|----------------------|------------------|
| 145                        | 202                           | 7        | Cdk18                | T1D              |
| 421                        | 207                           | 7        | Pcsk1                | Obesity/T2D      |
| 126                        | 208                           | 7        | Ogfod1               | Breast cancer    |
| 266                        | 209                           | 7        | Entpd6               | Obesity          |
| 379                        | 210                           | 7        | Mboat7               | Autism           |
| 524                        | 211                           | 7        | Adcy3                | Obesity/breast cancer |
| 443                        | 212                           | 7        | Ntrk2                | Obesity          |
| 470                        | 213                           | 7        | Lrp1b                | Obesity          |
| 406                        | 215                           | 7        | Bbs4                 | Obesity          |
| 334                        | 217                           | 7        | Ralyl                | Obesity          |
| 493                        | 223                           | 7        | Nt5c2                | Obesity          |
| 184                        | 224                           | 7        | Rhbdd3              | Breast cancer    |
| 85                         | 225                           | 7        | Dscam                | Autism           |
| 309                        | 226                           | 7        | Pcdh19               | Autism           |
| 25                         | 275                           | 7        | Ap2s1                | Autism           |
| 346                        | 277                           | 7        | Ube2e2               | T2D              |
| 16                         | 281                           | 7        | Herc2                | T1D              |
| 512                        | 288                           | 7        | Grp                  | Obesity          |
| 323                        | 289                           | 7        | Agbl4                | Obesity          |
| 225                        | 290                           | 7        | Doc2a                | Obesity          |
| 170                        | 291                           | 7        | Slc22a3              | Obesity          |
| 532                        | 292                           | 7        | Rorb                 | Autism           |
| 603                        | 293                           | 7        | Grid1                | Obesity          |
| 563                        | 294                           | 7        | Lingo2               | Obesity          |
| 480                        | 295                           | 7        | Lrfn2                | Obesity          |
| 165                        | 296                           | 7        | Chd3                 | Autism           |
| 36                         | 297                           | 7        | Pacs1                | Autism           |
| 520                        | 298                           | 7        | Sgsm2                | T2D              |
| 52                         | 299                           | 7        | Tanc2                | Autism           |
| 137                        | 300                           | 7        | Celf4                | Autism           |
| 179                        | 301                           | 7        | Nlgn3                | Autism           |
| 94                         | 302                           | 7        | Cadm1                | Obesity          |
| 119                        | 303                           | 7        | Jazf1                | T2D              |
| 58                         | 526                           | 7        | Gpr151               | Obesity          |
| 351                        | 537                           | 7        | Taf11                | T2D              |
| 226                        | 540                           | 7        | Prkd1                | Obesity          |
| 595                        | 642                           | 7        | Qpctl                | Obesity          |
| 264                        | 231                           | 8        | C2cd4a               | T2D              |
| 486                        | 232                           | 8        | Tnni3k               | Obesity          |
| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|---------------------------------|----------|----------------------|-----------------|
| 581                         | 233              | 8                               | C2cd4b   | T2D                  |
| 350                         | 234              | 8                               | Tbr1     | Autism               |
| 409                         | 238              | 8                               | Sec16b   | Obesity              |
| 633                         | 239              | 8                               | Mkx      | Autism               |
| 71                          | 240              | 8                               | Stxbp6   | Obesity              |
| 602                         | 251              | 8                               | Srr      | T2D                  |
| 393                         | 252              | 8                               | Grin2b   | Autism               |
| 99                          | 253              | 8                               | Syngap1  | Autism               |
| 138                         | 254              | 8                               | Pten     | Autism/Breast cancer |
| 465                         | 255              | 8                               | Cdkl5    | Autism               |
| 528                         | 256              | 8                               | Rasgrp1  | T1D/T2D              |
| 235                         | 257              | 8                               | Lztr1    | Autism               |
| 28                          | 258              | 8                               | Tnfaip3  | T1D                  |
| 157                         | 259              | 8                               | Coro1a   | Autism               |
| 481                         | 261              | 8                               | Nyap2    | T2D                  |
| 497                         | 262              | 8                               | Kcnq3    | Autism               |
| 6                           | 263              | 8                               | Kcnb1    | Autism               |
| 364                         | 264              | 8                               | Lrrc4c   | Autism               |
| 301                         | 265              | 8                               | Hras     | Autism               |
| 234                         | 266              | 8                               | Snx7     | T2D                  |
| 380                         | 267              | 8                               | Myt1l    | Autism               |
| 191                         | 268              | 8                               | Fosl2    | T1D                  |
| 163                         | 270              | 8                               | Gabrb3   | Autism               |
| 171                         | 271              | 8                               | Dlg4     | Autism               |
| 340                         | 272              | 8                               | Gria2    | Autism               |
| 543                         | 273              | 8                               | Arhgef9  | Autism               |
| 381                         | 274              | 8                               | Ppp1r9b  | Autism               |
| 153                         | 283              | 8                               | Camk1d   | T2D                  |
| 299                         | 284              | 8                               | Cadm2    | Obesity              |
| 29                          | 285              | 8                               | Nckap1   | Autism               |
| 182                         | 313              | 8                               | Arrdc3   | Breast cancer        |
| 305                         | 611              | 8                               | Cux2     | T1D                  |
| 98                          | 612              | 8                               | Satb1    | Autism               |
| 356                         | 613              | 8                               | Wdpcp    | Obesity              |
| 457                         | 94               | 9                               | Sema3d   | Obesity              |
| 51                          | 194              | 9                               | Fhit     | Obesity              |
| 583                         | 198              | 9                               | Htr1a    | T1D                  |
| 551                         | 286              | 9                               | Kctd13   | Obesity              |
| 183                         | 309              | 9                               | Mapk14   | T1D                  |
Supplementary Table 16 | Cont.

| Color key | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|------------|------------------|---------------------------------|----------|----------------------|------------------|
|            | 328              | 321                             | 9        | Mtch2                | Obesity          |
|            | 243              | 324                             | 9        | Cdkal1               | Obesity/T2D      |
|            | 307              | 327                             | 9        | Ep300                | Autism           |
|            | 292              | 328                             | 9        | Pms2                 | Breast cancer    |
|            | 111              | 329                             | 9        | Ptpn2                | T1D              |
|            | 387              | 330                             | 9        | Sfxn2                | Obesity          |
|            | 550              | 331                             | 9        | Kdm3b                | Autism           |
|            | 210              | 332                             | 9        | Nsd1                 | Autism           |
|            | 147              | 333                             | 9        | Dclre1b              | Breast cancer    |
|            | 604              | 334                             | 9        | Kat8                 | Obesity          |
|            | 149              | 417                             | 9        | Usp37                | Obesity          |
|            | 491              | 419                             | 9        | Ttl4                 | Obesity          |
|            | 539              | 477                             | 9        | Zfp646               | Obesity          |
|            | 429              | 478                             | 9        | Ctcf                 | Autism           |
|            | 256              | 480                             | 9        | Chd8                 | Autism           |
|            | 460              | 481                             | 9        | Phf12                | Autism           |
|            | 422              | 482                             | 9        | Hif1an               | Obesity          |
|            | 180              | 513                             | 9        | Tcf19                | T2D              |
|            | 129              | 528                             | 9        | Nlrc3                | Obesity          |
|            | 49               | 530                             | 9        | Rab23                | Obesity          |
|            | 399              | 157                             | 10       | Ccdc170              | Breast cancer    |
|            | 115              | 170                             | 10       | Tspan8               | T2D              |
|            | 330              | 171                             | 10       | Calcr                | Obesity          |
|            | 329              | 172                             | 10       | Gck                  | T2D              |
|            | 634              | 173                             | 10       | Hnf1b                | T2D              |
|            | 600              | 175                             | 10       | Ssr1                 | T2D              |
|            | 459              | 176                             | 10       | Stat3                | T1D              |
|            | 495              | 177                             | 10       | Pdx1                 | T2D              |
|            | 372              | 178                             | 10       | Esr1                 | Breast cancer    |
|            | 420              | 179                             | 10       | Iftn                 | T1D              |
|            | 87               | 180                             | 10       | Enpp7                | Breast cancer    |
|            | 117              | 181                             | 10       | Pomc                 | Obesity          |
|            | 40               | 182                             | 10       | Asb4                 | Obesity          |
|            | 440              | 183                             | 10       | Katna2               | Autism           |
|            | 336              | 186                             | 10       | Tm9sf4               | Autism           |
|            | 571              | 307                             | 10       | Srpr                 | Autism           |
|            | 237              | 535                             | 10       | Stk33                | Obesity          |
|            | 17               | 538                             | 10       | Bbs10                | Obesity          |
|            | 172              | 539                             | 10       | Galnt10              | Obesity          |
|            | 57               | 116                             | 11       | Bbs2                 | Obesity          |
**Supplementary Table 16 | Cont.**

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|---------------------------------|---------|---------------------|-----------------|
| 196                         | 117              | 11                              | Zbtb20  | Autism              |
| 288                         | 119              | 11                              | Ormdl3  | T1D                 |
| 394                         | 120              | 11                              | Ttc8    | Obesity             |
| 124                         | 122              | 11                              | Nbea    | Autism              |
| 342                         | 123              | 11                              | Nlgn2   | Autism              |
| 65                          | 190              | 11                              | Bbs1    | Obesity             |
| 343                         | 191              | 11                              | Bbs7    | Obesity             |
| 203                         | 631              | 11                              | Mecp2   | Autism              |
| 594                         | 634              | 11                              | Sdccag8 | Obesity             |
| 442                         | 635              | 11                              | Sh2b1   | Obesity             |
| 109                         | 643              | 11                              | Taok2   | Obesity             |
| 279                         | 644              | 11                              | Tsc1    | Autism              |
| 92                          | 152              | 12                              | Ahdc1   | Autism              |
| 473                         | 445              | 12                              | Sbk1    | Obesity             |
| 365                         | 484              | 12                              | Irf2bpl | Autism              |
| 599                         | 485              | 12                              | Kansl1  | Autism              |
| 430                         | 486              | 12                              | Setd2   | Autism              |
| 327                         | 518              | 12                              | Bckdk   | Autism              |
| 317                         | 520              | 12                              | Ahrr    | Breast cancer       |
| 166                         | 523              | 12                              | Bcdin3d | T2D                 |
| 207                         | 524              | 12                              | Zland6  | T2D                 |
| 584                         | 529              | 12                              | Ap4b1   | Breast cancer       |
| 557                         | 533              | 12                              | Gigyf1  | Autism              |
| 274                         | 241              | 13                              | Lmo7    | T1D                 |
| 134                         | 242              | 13                              | Adcy5   | T2D                 |
| 136                         | 243              | 13                              | Rarb    | Obesity             |
| 39                          | 244              | 13                              | Cacna2d3| Autism              |
| 362                         | 245              | 13                              | Wfs1    | T2D                 |
| 300                         | 246              | 13                              | Dgkb    | T2D                 |
| 48                          | 247              | 13                              | Mchr1   | Breast cancer       |
| 269                         | 248              | 13                              | Abcb11  | T2D                 |
| 160                         | 249              | 13                              | Foxp1   | Autism              |
| 42                          | 250              | 13                              | Meis2   | Autism              |
| 555                         | 465              | 14                              | Igf2    | T2D                 |
| 608                         | 466              | 14                              | Ppp1r3b | T2D                 |
| 483                         | 579              | 14                              | Foxp2   | Autism              |
| 613                         | 589              | 14                              | Tnnt3   | Breast cancer       |
| 7                           | 591              | 14                              | Tlr1    | Breast cancer       |
| 142                         | 596              | 14                              | Lepr    | Obesity             |
| 8                           | 597              | 14                              | Vkorc1  | Obesity             |
### Supplementary Table 16 | Cont.

| Color key WGCNA dendrogram | WGCNA dendrogram | Hierarchical cluster dendrogram | Module # | Gene name in heatmap | Genetic category |
|-----------------------------|------------------|-------------------------------|----------|---------------------|-----------------|
|                             | 513              | 598                           | 14       | Igf1                | T2D             |
|                             | 271              | 45                            | 15       | Slc2a2              | T2D             |
|                             | 610              | 93                            | 15       | Blk                 | T2D             |
|                             | 640              | 151                           | 15       | Cyp17a1             | Obesity         |
|                             | 629              | 156                           | 15       | Kcnn4               | Breast cancer   |
|                             | 419              | 158                           | 15       | Lpar3               | T1D             |
|                             | 287              | 159                           | 15       | Il2                 | T1D             |
|                             | 223              | 227                           | 15       | Pax4                | T2D             |
|                             | 33               | 311                           | 15       | Il27                | T1D             |
|                             | 19               | 312                           | 15       | Oasl1               | T2D             |
|                             | 534              | 433                           | 15       | Cd69                | T1D             |
|                             | 344              | 512                           | 15       | Kcnq1               | T2D             |
|                             | 293              | 514                           | 15       | Foxg1               | Autism          |
|                             | 345              | 567                           | 15       | Kcnk16              | T2D             |
|                             | 310              | 583                           | 15       | Foxa2               | T2D             |
|                             | 89               | 594                           | 15       | Ins2                | T1D/T2D         |
|                             | 164              | 614                           | 15       | Ctla4               | T1D             |
|                             | 120              | 615                           | 15       | Nr4a2               | Autism          |
### Supplementary Table 17 | Clustering of obesity- and T1D-associated genes.

Description of each gene including: module number, gene name and disease. Relates to Fig. 13A.

| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 1        | Adpgk     | Obesity |
| 1        | Alms1     | Obesity |
| 1        | Apobr     | Obesity |
| 1        | Cars      |         |
| 1        | Cdkal1    | Obesity |
| 1        | Cenpw     | T1D     |
| 1        | Cep295    | Obesity |
| 1        | Cnot9     | Obesity |
| 1        | Cobl      | T1D     |
| 1        | Erbb3     | T1D     |
| 1        | Etv5      | Obesity |
| 1        | Fancl     | Obesity |
| 1        | Gdf15     | Obesity |
| 1        | Gtf3a     | Obesity |
| 1        | Hif1an    | Obesity |
| 1        | Hmga1     | Obesity |
| 1        | Il10      | T1D     |
| 1        | Ino80e    | Obesity |
| 1        | Itpr3     | T1D     |
| 1        | Kat8      | Obesity |
| 1        | Mapk14    | T1D     |
| 1        | Mks1      | Obesity |
| 1        | Mtch2     | Obesity |
| 1        | Mtfr2     | Obesity |
| 1        | Nlrc3     | Obesity |
| 1        | Nup54     | Obesity |
| 1        | Pgm1      | T1D     |
| 1        | Polk      | Obesity |
| 1        | Ptpn2     | T1D     |
| 1        | Rab23     | Obesity |
| 1        | Rcc1l     | Obesity |
| 1        | Rpl27a    | Obesity |
| 1        | Sfxn2     | Obesity |
| 1        | Skap2     | T1D     |
| 1        | Snrpd2    | Obesity |
| 1        | Stat3     | T1D     |
| 1        | Stat4     | T1D     |
| 1        | Tomm40    | Obesity |
| 1        | Tll4      | Obesity |
| 1        | Tyk2      | T1D     |
### Supplementary Table 17 | Cont.

| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 1        | Ubash3a   | T1D     |
| 1        | Usp37     | Obesity |
| 1        | Zfp64     | Obesity |
| 1        | Zfp646    | Obesity |
| 2        | Asb4      | Obesity |
| 2        | Bach2     | T1D     |
| 2        | Bbs10     | Obesity |
| 2        | Bbs12     | Obesity |
| 2        | Bbs9      | Obesity |
| 2        | C1qtnf6   | T1D     |
| 2        | Cd69      | T1D     |
| 2        | Creb1     | Obesity |
| 2        | Dlk1      | T1D     |
| 2        | Ehbp1     | Obesity |
| 2        | Elavl4    | Obesity |
| 2        | Fbxl19    | Obesity |
| 2        | Fign      | Obesity |
| 2        | Frmd3     | T1D     |
| 2        | Galnt10   | Obesity |
| 2        | Gipr      | Obesity |
| 2        | Glis3     | T1D     |
| 2        | Hip1      | Obesity |
| 2        | Hmgcr     | Obesity |
| 2        | Ift27     | Obesity |
| 2        | Ift74     | Obesity |
| 2        | Ikzf4     | T1D     |
| 2        | Ins2      | T1D     |
| 2        | Irs1      | Obesity |
| 2        | Kctd15    | Obesity |
| 2        | Klf7      | Obesity |
| 2        | Lepr      | Obesity |
| 2        | Lmo1      | Obesity |
| 2        | Lmx1b     | Obesity |
| 2        | Nav1      | Obesity |
| 2        | Nrp1      | Obesity |
| 2        | Nrp2      | Obesity |
| 2        | Olig3     | Obesity |
| 2        | Pbrm1     | Obesity |
| 2        | Pgpep1    | Obesity |
| 2        | Phip      | Obesity |
| 2        | Plxna1    | Obesity |
| Module # | Gene Name | Disease       |
|----------|-----------|---------------|
| 2        | Plxna2    | Obesity       |
| 2        | Plxna3    | Obesity       |
| 2        | Ppil2     | T1D           |
| 2        | Prkd2     | T1D           |
| 2        | Ptbp2     | Obesity       |
| 2        | Rnls      | T1D           |
| 2        | Rpgrip1l  | Obesity       |
| 2        | Sbk1      | Obesity       |
| 2        | Sh2b1     | Obesity       |
| 2        | Sim1      | Obesity       |
| 2        | Skor1     | Obesity       |
| 2        | Sloc9a8   | Obesity       |
| 2        | Smg6      | Obesity       |
| 2        | Stk33     | Obesity       |
| 2        | Stk36     | Obesity       |
| 2        | Tal1      | Obesity       |
| 2        | Tcf7l2    | Obesity/T1D   |
| 2        | Tafp2b    | Obesity       |
| 2        | Txndc12   | Obesity       |
| 2        | Ube2e3    | Obesity       |
| 2        | Zbtb10    | Obesity       |
| 2        | Zfhx3     | Obesity       |
| 2        | Zfp608    | Obesity       |
| 2        | Zfp668    | Obesity       |
| 3        | Adcy3     | Obesity       |
| 3        | Agbl4     | Obesity       |
| 3        | Arl6      | Obesity       |
| 3        | Bbs1      | Obesity       |
| 3        | Bbs2      | Obesity       |
| 3        | Bbs4      | Obesity       |
| 3        | Bbs5      | Obesity       |
| 3        | Bbs7      | Obesity       |
| 3        | Bdnf      | Obesity       |
| 3        | Cadm1     | Obesity       |
| 3        | Cadm2     | Obesity       |
| 3        | Calcr     | Obesity       |
| 3        | Cdk18     | T1D           |
| 3        | Ctla4     | T1D           |
| 3        | Cux2      | T1D           |
| 3        | Cyp17a1   | Obesity       |
| 3        | Doc2a     | Obesity       |
| Module # | Gene Name | Disease |
|---------|-----------|---------|
| 3       | Entpd6    | Obesity |
| 3       | Erbb4     | Obesity |
| 3       | Ets2      | Obesity |
| 3       | Fhit      | Obesity |
| 3       | Fosl2     | T1D     |
| 3       | Gpr151    | Obesity |
| 3       | Grid1     | Obesity |
| 3       | Grp       | Obesity |
| 3       | Herc2     | T1D     |
| 3       | Htr1a     | T1D     |
| 3       | Ifng      | T1D     |
| 3       | Il2       | T1D     |
| 3       | Kctd13    | Obesity |
| 3       | Kif5a     | T1D     |
| 3       | Lingo2    | Obesity |
| 3       | Lmo7      | T1D     |
| 3       | Lrfn2     | Obesity |
| 3       | Lrp1b     | Obesity |
| 3       | Lztf1     | Obesity |
| 3       | Map2k5    | Obesity |
| 3       | Mapk3     | Obesity |
| 3       | Mc4r      | Obesity |
| 3       | Negr1     | Obesity |
| 3       | Nt5c2     | Obesity |
| 3       | Ntrk2     | Obesity |
| 3       | Nudt3     | Obesity |
| 3       | Ormd13    | T1D     |
| 3       | Park2     | Obesity |
| 3       | Pcsk1     | Obesity |
| 3       | Phf1      | T1D     |
| 3       | Pip4k2c   | T1D     |
| 3       | Plxna4    | Obesity |
| 3       | Pomp      | Obesity |
| 3       | Prkd1     | Obesity |
| 3       | Qpctl     | Obesity |
| 3       | Rabep1    | Obesity |
| 3       | Raly1     | Obesity |
| 3       | Rabr      | Obesity |
| 3       | Rasa2     | Obesity |
| 3       | Rasgrp1   | T1D     |
| 3       | Sdccag8   | Obesity |
| Module # | Gene Name | Disease |
|---------|-----------|---------|
| 3       | Sec16b    | Obesity |
| 3       | Sema3c    | Obesity |
| 3       | Slc22a3   | Obesity |
| 3       | Stxbp6    | Obesity |
| 3       | Tagap     | T1D     |
| 3       | Tako2     | Obesity |
| 3       | Tnfaip3   | T1D     |
| 3       | Tnni3k    | Obesity |
| 3       | Trim32    | Obesity |
| 3       | Trim66    | Obesity |
| 3       | Ttc8      | Obesity |
| 3       | Tub       | Obesity |
| 3       | Vkorc1    | Obesity |
| 3       | Wdpcp     | Obesity |
| 3       | Zfr2      | Obesity |
| 4       | Ache      | Obesity |
| 4       | Ankdd1b   | Obesity |
| 4       | Bbip1     | Obesity |
| 4       | Cbln1     | Obesity |
| 4       | Cep290    | Obesity |
| 4       | Clec16a   | T1D     |
| 4       | Cobll1    | Obesity |
| 4       | Col4a3bp  | Obesity |
| 4       | Ctsh      | T1D     |
| 4       | Cyp27a1   | Obesity |
| 4       | Dmxe2     | Obesity |
| 4       | Dnajc27   | Obesity |
| 4       | Efr3b     | Obesity/T1D |
| 4       | Epb41l4b  | Obesity |
| 4       | Erap1     | T1D     |
| 4       | Faim2     | Obesity |
| 4       | Fam189a2  | T1D     |
| 4       | Fam57b    | Obesity |
| 4       | Foxo3     | Obesity |
| 4       | Frrs1l    | Obesity |
| 4       | Fto       | Obesity |
| 4       | Gbe1      | Obesity |
| 4       | Gnpda2    | Obesity |
| 4       | Gprc5b    | Obesity |
| 4       | Hhip      | Obesity |
| 4       | Hsd17b12  | Obesity |
| Module # | Gene Name | Disease |
|---------|-----------|---------|
| 4       | Iars2     | Obesity |
| 4       | Ifih1     | T1D     |
| 4       | Ifnrg1    | Obesity |
| 4       | Il27      | T1D     |
| 4       | Il2ra     | T1D     |
| 4       | Inpp5e    | Obesity |
| 4       | Kcnj11    | T1D     |
| 4       | Kcnk3     | Obesity |
| 4       | Kcnk9     | Obesity |
| 4       | Ksr2      | Obesity |
| 4       | Lpar3     | T1D     |
| 4       | Mkks      | Obesity |
| 4       | Mtif3     | Obesity |
| 4       | Nrnxn3    | Obesity |
| 4       | Pcdh9     | Obesity |
| 4       | Pex2      | Obesity |
| 4       | Pkd1      | T1D     |
| 4       | Plcd4     | Obesity |
| 4       | Plekha1   | T1D     |
| 4       | Poc5      | Obesity |
| 4       | Pparg     | T1D     |
| 4       | Prkcq     | T1D     |
| 4       | Ptpn22    | T1D     |
| 4       | Rab21     | Obesity |
| 4       | Rapgefs   | Obesity |
| 4       | Ric3      | Obesity |
| 4       | Rit2      | Obesity |
| 4       | Rnaset2a  | T1D     |
| 4       | Scarb2    | Obesity |
| 4       | Scg3      | Obesity |
| 4       | Sema3a    | Obesity |
| 4       | Sema3b    | Obesity |
| 4       | Sema3d    | Obesity |
| 4       | Sh2b3     | T1D     |
| 4       | Ssfa2     | Obesity |
| 4       | Stx1b     | Obesity |
| 4       | Suox      | T1D     |
| 4       | Tlr4      | Obesity |
| 4       | Tmem160   | Obesity |
| 4       | Tmem18    | Obesity |
| 4       | Tnfrsf11b | T1D     |
| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 4        | Ypel3     | Obesity |
| 4        | Zbtb7b    | Obesity |
| 4        | Zfp142    | Obesity |
| 4        | Zfp169    | Obesity |
### Supplementary Table 18 | Clustering of obesity- and T2D-associated genes.

Description of each gene including: module number, gene name and disease. Relates to Fig. 13B.

| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 1        | Abcb11    | T2D     |
| 1        | Ache      | Obesity |
| 1        | Adcy3     | Obesity |
| 1        | Adcy5     | T2D     |
| 1        | Adra2a    | T2D     |
| 1        | Agbl4     | Obesity |
| 1        | Ankrd55   | T2D     |
| 1        | Arl6      | Obesity |
| 1        | Bbs1      | Obesity |
| 1        | Bbs2      | Obesity |
| 1        | Bbs4      | Obesity |
| 1        | Bbs5      | Obesity |
| 1        | Bbs7      | Obesity |
| 1        | Bdnf      | Obesity |
| 1        | C2cd4a    | T2D     |
| 1        | C2cd4b    | T2D     |
| 1        | Cadm1     | Obesity |
| 1        | Cadm2     | Obesity |
| 1        | Calcr     | Obesity |
| 1        | Camk1d    | T2D     |
| 1        | Cdc123    | T2D     |
| 1        | Col4a3bp  | Obesity |
| 1        | Cry2      | T2D     |
| 1        | Dgkb      | T2D     |
| 1        | Dnajc27   | Obesity |
| 1        | Doc2a     | Obesity |
| 1        | Entpd6    | Obesity |
| 1        | Erbb4     | Obesity |
| 1        | Ets2      | Obesity |
| 1        | Fads1     | T2D     |
| 1        | Faim2     | Obesity/T2D |
| 1        | Fhit      | Obesity |
| 1        | Fto       | Obesity/T2D |
| 1        | Gbe1      | Obesity |
| 1        | Gck       | T2D     |
| 1        | Gpr151    | Obesity |
| 1        | Grb14     | T2D     |
| 1        | Grid1     | Obesity |
| 1        | Grp       | Obesity |
| 1        | Hectd4    | T2D     |
| Module # | Gene Name | Disease     |
|---------|-----------|-------------|
| 1       | Hnf1b     | T2D         |
| 1       | Ifngr1    | Obesity     |
| 1       | Jazf1     | T2D         |
| 1       | Kcnk9     | Obesity     |
| 1       | Kctd13    | Obesity     |
| 1       | Lingo2    | Obesity     |
| 1       | Lrfn2     | Obesity     |
| 1       | Lrp1b     | Obesity     |
| 1       | Lztf1     | Obesity     |
| 1       | Maee      | T2D         |
| 1       | Mapk3     | Obesity     |
| 1       | Mc4r      | Obesity/T2D |
| 1       | Msmo1     | T2D         |
| 1       | Negfr1    | Obesity     |
| 1       | Nt5c2     | Obesity     |
| 1       | Ntrk2     | Obesity     |
| 1       | Nyap2     | T2D         |
| 1       | Pam       | T2D         |
| 1       | Park2     | Obesity     |
| 1       | Pcsk1     | Obesity/T2D |
| 1       | Plxna4    | Obesity     |
| 1       | Pomc      | Obesity     |
| 1       | Prkd1     | Obesity     |
| 1       | Ptprd     | T2D         |
| 1       | Qpctl     | Obesity     |
| 1       | Rabe1     | Obesity     |
| 1       | Ray1      | Obesity     |
| 1       | Rapgef3   | Obesity     |
| 1       | Rarb      | Obesity     |
| 1       | Rasa2     | Obesity     |
| 1       | Rasgrp1   | T2D         |
| 1       | Rit2      | Obesity     |
| 1       | Scarb2    | Obesity     |
| 1       | Sdhaf4    | T2D         |
| 1       | Sec16b    | Obesity     |
| 1       | Sema3c    | Obesity     |
| 1       | Sema3d    | Obesity     |
| 1       | Sgsm2     | T2D         |
| 1       | S1c2a3    | Obesity     |
| 1       | S1c2a2    | T2D         |
| 1       | S1c30a8   | T2D         |
### Supplementary Table 18 | Cont.

| Module # | Gene Name | Disease       |
|----------|-----------|---------------|
| 1        | Snx7      | T2D           |
| 1        | Srr       | T2D           |
| 1        | Stxbp6    | Obesity       |
| 1        | Taf11     | T2D           |
| 1        | Taok2     | Obesity       |
| 1        | Tbc1d30   | T2D           |
| 1        | Tcerg1l   | T2D           |
| 1        | Tnni3k    | Obesity       |
| 1        | Trim32    | Obesity       |
| 1        | Trim66    | Obesity       |
| 1        | Ttc8      | Obesity       |
| 1        | Tub       | Obesity       |
| 1        | Ube2e2    | T2D           |
| 1        | Vkorc1    | Obesity       |
| 1        | Wfs1      | T2D           |
| 1        | Zfr2      | Obesity       |
| 2        | Asb4      | Obesity       |
| 2        | Bbs10     | Obesity       |
| 2        | Bbs12     | Obesity       |
| 2        | Bbs9      | Obesity       |
| 2        | Bcdin3d   | T2D           |
| 2        | Bcl11a    | T2D           |
| 2        | Capn10    | T2D           |
| 2        | Ccnd2     | T2D           |
| 2        | Cel       | T2D           |
| 2        | Creb1     | Obesity       |
| 2        | Dpis5     | T2D           |
| 2        | Ehbp1     | Obesity       |
| 2        | Elav4     | Obesity       |
| 2        | Fbx119    | Obesity       |
| 2        | Fign      | Obesity       |
| 2        | Foxa2     | T2D           |
| 2        | Galnt10   | Obesity       |
| 2        | Gipr      | Obesity/T2D   |
| 2        | Glis3     | T2D           |
| 2        | Gpsm1     | T2D           |
| 2        | Grb10     | T2D           |
| 2        | Hip1      | Obesity       |
| 2        | Hmg20a    | T2D           |
| 2        | Hmgcr     | Obesity       |
| 2        | Ift27     | Obesity       |
| Module # | Gene Name | Disease     |
|----------|-----------|-------------|
| 2        | Ift74     | Obesity     |
| 2        | Igf1      | T2D         |
| 2        | Igf2      | T2D         |
| 2        | Ins2      | T2D         |
| 2        | Irs1      | Obesity/T2D |
| 2        | Kcnk16    | T2D         |
| 2        | Kcnq1     | T2D         |
| 2        | Kctd15    | Obesity     |
| 2        | Klf14     | T2D         |
| 2        | Klf7      | Obesity     |
| 2        | Lepr      | Obesity     |
| 2        | Lmo1      | Obesity     |
| 2        | Lmx1b     | Obesity     |
| 2        | Macf1     | T2D         |
| 2        | Nav1      | Obesity     |
| 2        | Notch2    | T2D         |
| 2        | Nrp1      | Obesity     |
| 2        | Nrp2      | Obesity     |
| 2        | Nudt3     | Obesity     |
| 2        | Olig3     | Obesity     |
| 2        | Pbrm1     | Obesity     |
| 2        | Pgpep1    | Obesity     |
| 2        | Phip      | Obesity     |
| 2        | Plxna1    | Obesity     |
| 2        | Plxna2    | Obesity     |
| 2        | Plxna3    | Obesity     |
| 2        | Ppip5k2   | T2D         |
| 2        | Ppp1r3b   | T2D         |
| 2        | Prox1     | T2D         |
| 2        | Ptbp2     | Obesity     |
| 2        | Rbms1     | T2D         |
| 2        | Rnd3      | T2D         |
| 2        | Rpgrip1l  | Obesity     |
| 2        | Sbk1      | Obesity     |
| 2        | Sdccag8   | Obesity     |
| 2        | Sh2b1     | Obesity     |
| 2        | Sim1      | Obesity     |
| 2        | Skor1     | Obesity     |
| 2        | Slc39a8   | Obesity     |
| 2        | Smg6      | Obesity     |
| 2        | St6gal1   | T2D         |
| Module # | Gene Name   | Disease  |
|---------|-------------|----------|
| 2       | Stk33       | Obesity  |
| 2       | Stk36       | Obesity  |
| 2       | Tal1        | Obesity  |
| 2       | Tcf7l2      | Obesity/T2D |
| 2       | Tfap2b      | Obesity  |
| 2       | Tle1        | T2D      |
| 2       | Tnndc12     | Obesity  |
| 2       | Ube2e3      | Obesity  |
| 2       | Wdpcp       | Obesity  |
| 2       | Zbed3       | T2D      |
| 2       | Zfand3      | T2D      |
| 2       | Zfand6      | T2D      |
| 2       | Zfhx3       | Obesity  |
| 2       | Zfp608      | Obesity  |
| 2       | Zfp668      | Obesity  |
| 2       | Zmiz1       | T2D      |
| 3       | Abcc8       | T2D      |
| 3       | Agmo        | T2D      |
| 3       | Ank1        | T2D      |
| 3       | Ankdd1b     | Obesity  |
| 3       | Appl1       | T2D      |
| 3       | Arap1       | T2D      |
| 3       | Atg13       | T2D      |
| 3       | Bbip1       | Obesity  |
| 3       | Bcar1       | T2D      |
| 3       | Blk         | T2D      |
| 3       | Cbln1       | Obesity  |
| 3       | Cep290      | Obesity  |
| 3       | Cobl1       | Obesity/T2D |
| 3       | Cyp17a1     | Obesity  |
| 3       | Cyp27a1     | Obesity  |
| 3       | Dmxl2       | Obesity  |
| 3       | Efr3b       | Obesity  |
| 3       | Epb41l4b    | Obesity  |
| 3       | Fam57b      | Obesity  |
| 3       | Fitm2       | T2D      |
| 3       | Foxo3       | Obesity  |
| 3       | Frrs1l      | Obesity  |
| 3       | Gcc1        | T2D      |
| 3       | Gckr        | T2D      |
| 3       | Gnpda2      | Obesity  |
### Supplementary Table 18 | Cont.

| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 3        | Gprc5b    | Obesity |
| 3        | Grk5      | T2D     |
| 3        | Hhip      | Obesity |
| 3        | Hsd17b12  | Obesity |
| 3        | Iars2     | Obesity |
| 3        | Inpp5e    | Obesity |
| 3        | Itgb6     | T2D     |
| 3        | Kank1     | T2D     |
| 3        | Kcnj11    | T2D     |
| 3        | Kcnk3     | Obesity |
| 3        | Klhl42    | T2D     |
| 3        | Ksr2      | Obesity |
| 3        | Larp6     | T2D     |
| 3        | Lgr5      | T2D     |
| 3        | Lpp       | T2D     |
| 3        | Madd      | T2D     |
| 3        | Map2k5    | Obesity |
| 3        | Mkks      | Obesity |
| 3        | Mtif3     | Obesity |
| 3        | Neurod1   | T2D     |
| 3        | Nrxn3     | Obesity |
| 3        | Pcdh9     | Obesity |
| 3        | Pex2      | Obesity |
| 3        | Pld4      | Obesity |
| 3        | Poc5      | Obesity |
| 3        | Pparg     | T2D     |
| 3        | Rab21     | Obesity |
| 3        | Ric3      | Obesity |
| 3        | Scg3      | Obesity |
| 3        | Sema3a    | Obesity |
| 3        | Sema3b    | Obesity |
| 3        | Sgcg      | T2D     |
| 3        | Ssfa2     | Obesity |
| 3        | Stx1b     | Obesity |
| 3        | Sugp1     | T2D     |
| 3        | Tlr4      | Obesity |
| 3        | Tmem160   | Obesity |
| 3        | Tmem163   | T2D     |
| 3        | Tmem18    | Obesity |
| 3        | Vps13c    | T2D     |
| 3        | Ypel3     | Obesity |
| Module # | Gene Name | Disease       |
|---------|-----------|---------------|
| 3       | Zbtb7b    | Obesity       |
| 3       | Zfp142    | Obesity       |
| 3       | Zfp169    | Obesity       |
| 4       | Abo       | T2D           |
| 4       | Adamts9   | Obesity       |
| 4       | Adpgk     | Obesity       |
| 4       | Alms1     | Obesity       |
| 4       | Ap3s2     | T2D           |
| 4       | Apobr     | Obesity       |
| 4       | Arl15     | T2D           |
| 4       | Cdkal1    | Obesity/T2D   |
| 4       | Cdkn2a    | T2D           |
| 4       | Cdkn2b    | T2D           |
| 4       | Cep295    | Obesity       |
| 4       | Cilp2     | T2D           |
| 4       | Cnot9     | Obesity       |
| 4       | Dusp9     | T2D           |
| 4       | Etv5      | Obesity       |
| 4       | Faf1      | T2D           |
| 4       | Fancl     | Obesity       |
| 4       | Fancl     | Obesity       |
| 4       | G6pc2     | T2D           |
| 4       | Gatad2a   | T2D           |
| 4       | Gdf15     | Obesity       |
| 4       | Gtf3a     | Obesity       |
| 4       | Hhex      | T2D           |
| 4       | Hif1an    | Obesity       |
| 4       | Hmga1     | Obesity       |
| 4       | Hmga2     | T2D           |
| 4       | Hnf1a     | T2D           |
| 4       | Hnf4a     | T2D           |
| 4       | Ide       | T2D           |
| 4       | Igf2bp2   | T2D           |
| 4       | Ino80e    | Obesity       |
| 4       | Kat8      | Obesity       |
| 4       | Klf11     | T2D           |
| 4       | Lama1     | T2D           |
| 4       | Lypal1    | T2D           |
| 4       | Mks1      | Obesity       |
| 4       | Mphosph9  | T2D           |
| 4       | Mtpl2     | Obesity       |
| 4       | Mtfr2     | Obesity       |
| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 4        | Nlrc3     | Obesity |
| 4        | Nup54     | Obesity |
| 4        | Oasl1     | T2D     |
| 4        | Pax4      | T2D     |
| 4        | Pdgfc     | T2D     |
| 4        | Pdx1      | T2D     |
| 4        | Pepd      | T2D     |
| 4        | Polk      | Obesity |
| 4        | Pou5f1    | T2D     |
| 4        | Prc1      | T2D     |
| 4        | Psmd6     | T2D     |
| 4        | R3hdml    | T2D     |
| 4        | Rab23     | Obesity |
| 4        | Rcc1l     | Obesity |
| 4        | Rpl27a    | Obesity |
| 4        | Rreb1     | T2D     |
| 4        | Sfxn2     | Obesity |
| 4        | Snrpd2    | Obesity |
| 4        | Spry2     | T2D     |
| 4        | Srsf2     | T2D     |
| 4        | Ssr1      | T2D     |
| 4        | Tcf19     | T2D     |
| 4        | Tcf7      | T2D     |
| 4        | Thada     | T2D     |
| 4        | Tle4      | T2D     |
| 4        | Tomm40    | Obesity |
| 4        | Trp53inp1 | T2D     |
| 4        | Tspan8    | T2D     |
| 4        | Ttl4      | Obesity |
| 4        | Usp37     | Obesity |
| 4        | Vps26a    | T2D     |
| 4        | Zbtb10    | Obesity |
| 4        | Zfp64     | Obesity |
| 4        | Zfp646    | Obesity |
Supplementary Table 19 | Clustering of obesity- and autism-associated genes. Description of each gene including: module number, gene name and disease. Relates to Fig. 13C.

| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 1        | Adpgk     | Obesity |
| 1        | Adsl      | Autism  |
| 1        | Alms1     | Obesity |
| 1        | Apobr     | Obesity |
| 1        | Atrx      | Autism  |
| 1        | Cdkal1    | Obesity |
| 1        | Cep295    | Obesity |
| 1        | Chd8      | Autism  |
| 1        | Cnot3     | Autism  |
| 1        | Cnot9     | Obesity |
| 1        | Ctfc      | Autism  |
| 1        | Ddx3x     | Autism  |
| 1        | Dhcr7     | Autism  |
| 1        | Dnmt3a    | Autism  |
| 1        | Eif3g     | Autism  |
| 1        | Ep300     | Autism  |
| 1        | Etv5      | Obesity |
| 1        | Fancl     | Obesity |
| 1        | Fmr1      | Autism  |
| 1        | Gdf15     | Obesity |
| 1        | Gigyf1    | Autism  |
| 1        | Gigyf2    | Autism  |
| 1        | Gtf3a     | Obesity |
| 1        | Hdlbp     | Autism  |
| 1        | Hif1an    | Obesity |
| 1        | Hmgα1     | Obesity |
| 1        | Hnrrnu    | Autism  |
| 1        | Ino80e    | Obesity |
| 1        | Kat8      | Obesity |
| 1        | Kdm3b     | Autism  |
| 1        | Kdm5b     | Autism  |
| 1        | Med13l    | Autism  |
| 1        | Mks1      | Obesity |
| 1        | Mtch2     | Obesity |
| 1        | Mtfr2     | Obesity |
| 1        | Naa15     | Autism  |
| 1        | Nacc1     | Autism  |
| 1        | Nipbl     | Autism  |
| 1        | Nlrc3     | Obesity |
### Supplementary Table 19 | Cont.

| Module # | Gene Name  | Disease |
|---------|------------|---------|
| 1       | Nsd1       | Autism  |
| 1       | Nup155     | Autism  |
| 1       | Nup54      | Obesity |
| 1       | Phf12      | Autism  |
| 1       | Phf3       | Autism  |
| 1       | Polk       | Obesity |
| 1       | Psmd12     | Autism  |
| 1       | Ptk7       | Autism  |
| 1       | Rab23      | Obesity |
| 1       | Rcc1l      | Obesity |
| 1       | Rpl27a     | Obesity |
| 1       | Setd5      | Autism  |
| 1       | Sfxn2      | Obesity |
| 1       | Sin3a      | Autism  |
| 1       | Snrpd2     | Obesity |
| 1       | Srpr       | Autism  |
| 1       | Tbl1xr1    | Autism  |
| 1       | Tcf20      | Autism  |
| 1       | Tomm40     | Obesity |
| 1       | Traf7      | Autism  |
| 1       | Trip12     | Autism  |
| 1       | Ttl4       | Obesity |
| 1       | Usp37      | Obesity |
| 1       | Zbtb10     | Obesity |
| 1       | Zfp142     | Obesity |
| 1       | Zfp64      | Obesity |
| 1       | Zfp646     | Obesity |
| 1       | Zmynd8     | Autism  |
| 2       | Ache       | Obesity |
| 2       | Aldh5a1    | Autism  |
| 2       | Ank2       | Autism  |
| 2       | Ank3       | Autism  |
| 2       | Ankdd1b    | Obesity |
| 2       | Ankrd11    | Autism  |
| 2       | Cbln1      | Obesity |
| 2       | Cep290     | Obesity |
| 2       | Cobll1     | Obesity |
| 2       | Col4a3bp   | Obesity |
| 2       | Cyp27a1    | Obesity |
| 2       | D5Ertd579e | Autism  |
| 2       | Dip2a      | Autism  |
| Module # | Gene Name | Disease       |
|----------|-----------|---------------|
| 2        | Dnajc27   | Obesity       |
| 2        | Efr3b     | Obesity       |
| 2        | Epb41l4b  | Obesity       |
| 2        | Faim2     | Obesity       |
| 2        | Fam57b    | Obesity       |
| 2        | Fhit      | Obesity       |
| 2        | Foxo3     | Obesity       |
| 2        | Frrs1l    | Obesity       |
| 2        | Fto       | Obesity       |
| 2        | Gabrb2    | Autism        |
| 2        | Gbe1      | Obesity       |
| 2        | Gfap      | Autism        |
| 2        | Gnai1     | Autism        |
| 2        | Gnnda2    | Obesity       |
| 2        | Gprc5b    | Obesity       |
| 2        | Hhip      | Obesity       |
| 2        | Hsd17b12  | Obesity       |
| 2        | Iars2     | Obesity       |
| 2        | Ifngr1    | Obesity       |
| 2        | Inpp5e    | Obesity       |
| 2        | Kcnk3     | Obesity       |
| 2        | Kcnk9     | Obesity       |
| 2        | Map1a     | Autism        |
| 2        | Mkks      | Obesity       |
| 2        | Mtf3      | Obesity       |
| 2        | Nrxn3     | Obesity/Autism|
| 2        | Park2     | Obesity       |
| 2        | Pcdh9     | Obesity       |
| 2        | Pex2      | Obesity       |
| 2        | Plcd4     | Obesity       |
| 2        | Poc5      | Obesity       |
| 2        | Ppp5c     | Autism        |
| 2        | Ptchd1    | Autism        |
| 2        | Ptpn11    | Autism        |
| 2        | Rab21     | Obesity       |
| 2        | Rapgef3   | Obesity       |
| 2        | Reln      | Autism        |
| 2        | Ric3      | Obesity       |
| 2        | Rit2      | Obesity       |
| 2        | Scarb2    | Obesity       |
| 2        | Scg3      | Obesity       |
### Supplementary Table 19 | Cont.

| Module # | Gene Name | Disease |
|----------|-----------|---------|
| 2        | Scn1a     | Autism  |
| 2        | Scn8a     | Autism  |
| 2        | Sema3b    | Obesity |
| 2        | Sema3d    | Obesity |
| 2        | Ski       | Autism  |
| 2        | Slc6a1    | Autism  |
| 2        | Sfna2     | Obesity |
| 2        | Stx1b     | Obesity |
| 2        | Stxbp1    | Autism  |
| 2        | Tek       | Autism  |
| 2        | Tlr4      | Obesity |
| 2        | Tmem160   | Obesity |
| 2        | Tmem18    | Obesity |
| 2        | Trim66    | Obesity |
| 2        | Ubr1      | Autism  |
| 2        | Vkorc1    | Obesity |
| 2        | Vps13b    | Autism  |
| 2        | Wdfy3     | Autism  |
| 2        | Ypel3     | Obesity |
| 2        | Zbtb7b    | Obesity |
| 2        | Zfp169    | Obesity |
| 3        | Adnp      | Autism  |
| 3        | Aff2      | Autism  |
| 3        | Arid1b    | Autism  |
| 3        | Arx       | Autism  |
| 3        | Asb4      | Obesity |
| 3        | Asxl3     | Autism  |
| 3        | Auts2     | Autism  |
| 3        | Baz2b     | Autism  |
| 3        | Bbip1     | Obesity |
| 3        | Bbs10     | Obesity |
| 3        | Bbs12     | Obesity |
| 3        | Bbs9      | Obesity |
| 3        | Bckdk     | Autism  |
| 3        | Bcl11a    | Autism  |
| 3        | Cask      | Autism  |
| 3        | Champ1    | Autism  |
| 3        | Chd2      | Autism  |
| 3        | Chd7      | Autism  |
| 3        | Cic       | Autism  |
| 3        | Creb1     | Obesity |
| Module # | Gene Name | Disease |
|---------|-----------|---------|
| 3       | Crebbp    | Autism  |
| 3       | Ctnnb1    | Autism  |
| 3       | Cul3      | Autism  |
| 3       | Deaf1     | Autism  |
| 3       | Dmpk      | Autism  |
| 3       | Dyn1h1    | Autism  |
| 3       | Dyrk1a    | Autism  |
| 3       | Ebf3      | Autism  |
| 3       | Ehbp1     | Obesity |
| 3       | Ehmt1     | Autism  |
| 3       | Elavl3    | Autism  |
| 3       | Elavl4    | Obesity |
| 3       | Fbxl19    | Obesity |
| 3       | Fign      | Obesity |
| 3       | Foxg1     | Autism  |
| 3       | Foxp2     | Autism  |
| 3       | Galnt10   | Obesity |
| 3       | Gipr      | Obesity |
| 3       | Hip1      | Obesity |
| 3       | Hmgcr     | Obesity |
| 3       | Ift27     | Obesity |
| 3       | Ift74     | Obesity |
| 3       | Irf2bpl   | Autism  |
| 3       | Irs1      | Obesity |
| 3       | Kansl1    | Autism  |
| 3       | Katnal2   | Autism  |
| 3       | Kctd15    | Obesity |
| 3       | Kdm6b     | Autism  |
| 3       | Klf7      | Obesity |
| 3       | Kmt2a     | Autism  |
| 3       | Kmt2c     | Autism  |
| 3       | Kmt2e     | Autism  |
| 3       | Kmt5b     | Autism  |
| 3       | Ldb1      | Autism  |
| 3       | Lepr      | Obesity |
| 3       | Lmo1      | Obesity |
| 3       | Lmx1b     | Obesity |
| 3       | Magel2    | Autism  |
| 3       | Med13     | Autism  |
| 3       | Meis2     | Autism  |
| 3       | Nav1      | Obesity |
| Module # | Gene Name | Disease         |
|---------|-----------|----------------|
| 3       | Nrp1      | Obesity        |
| 3       | Nrp2      | Obesity        |
| 3       | Olig3     | Obesity        |
| 3       | Pax5      | Autism         |
| 3       | Pbrm1     | Obesity        |
| 3       | Pgpep1    | Obesity        |
| 3       | Phf2      | Autism         |
| 3       | Phf21a    | Autism         |
| 3       | Phip      | Obesity/Autism |
| 3       | Plxna1    | Obesity        |
| 3       | Plxna2    | Obesity        |
| 3       | Plxna3    | Obesity        |
| 3       | Pogz      | Autism         |
| 3       | Prr12     | Autism         |
| 3       | Ptbp2     | Obesity        |
| 3       | Rai1      | Autism         |
| 3       | Rere      | Autism         |
| 3       | Rfx3      | Autism         |
| 3       | Rpgrip1l  | Obesity        |
| 3       | Satb1     | Autism         |
| 3       | Sbk1      | Obesity        |
| 3       | Sema3a    | Obesity        |
| 3       | Setbp1    | Autism         |
| 3       | Setd2     | Autism         |
| 3       | Sh2b1     | Obesity        |
| 3       | Sim1      | Obesity        |
| 3       | Skor1     | Obesity        |
| 3       | Slc39a8   | Obesity        |
| 3       | Smarcc2   | Autism         |
| 3       | Smg6      | Obesity        |
| 3       | Sox5      | Autism         |
| 3       | Spast     | Autism         |
| 3       | Srcap     | Autism         |
| 3       | Stk33     | Obesity        |
| 3       | Stk36     | Obesity        |
| 3       | Tal1      | Obesity        |
| 3       | Tbck      | Autism         |
| 3       | Tcf7l2    | Obesity/Autism |
| 3       | Tfap2b    | Obesity        |
| 3       | Tk2       | Autism         |
| 3       | Trio      | Autism         |
| Module # | Gene Name | Disease   |
|---------|-----------|-----------|
| 3       | Tsc2      | Autism    |
| 3       | Tshz3     | Autism    |
| 3       | Txndc12   | Obesity   |
| 3       | Ube2e3    | Obesity   |
| 3       | Upf3b     | Autism    |
| 3       | Vezf1     | Autism    |
| 3       | Wac       | Autism    |
| 3       | Zfhx3     | Obesity   |
| 3       | Zfp292    | Autism    |
| 3       | Zfp462    | Autism    |
| 3       | Zfp608    | Obesity   |
| 3       | Zfp668    | Obesity   |
| 4       | Adcy3     | Obesity   |
| 4       | Agbl4     | Obesity   |
| 4       | Ahdc1     | Autism    |
| 4       | Ap2s1     | Autism    |
| 4       | Arhgef9   | Autism    |
| 4       | Arl6      | Obesity   |
| 4       | Ash1l     | Autism    |
| 4       | Bbs1      | Obesity   |
| 4       | Bbs2      | Obesity   |
| 4       | Bbs4      | Obesity   |
| 4       | Bbs5      | Obesity   |
| 4       | Bbs7      | Obesity   |
| 4       | Bdnf      | Obesity   |
| 4       | Braf      | Autism    |
| 4       | Brsk2     | Autism    |
| 4       | Cacna1c   | Autism    |
| 4       | Cacna1e   | Autism    |
| 4       | Cacna2d3  | Autism    |
| 4       | Cadm1     | Obesity   |
| 4       | Cadm2     | Obesity   |
| 4       | Calcr     | Obesity   |
| 4       | Cdkl5     | Autism    |
| 4       | Celf4     | Autism    |
| 4       | Chd3      | Autism    |
| 4       | Coro1a    | Autism    |
| 4       | Cyp17a1   | Obesity   |
| 4       | Dlg4      | Autism    |
| 4       | Dm-xl2    | Obesity   |
| 4       | Doc2a     | Obesity   |
## Supplementary Table 19 | Cont.

| Module # | Gene Name | Disease  |
|----------|-----------|----------|
| 4        | Dpysl2    | Autism   |
| 4        | Dscam     | Autism   |
| 4        | Entpd6    | Obesity  |
| 4        | Erbb4     | Obesity  |
| 4        | Ets2      | Obesity  |
| 4        | Foxp1     | Autism   |
| 4        | Gabrb3    | Autism   |
| 4        | Gpr151    | Obesity  |
| 4        | Gria2     | Autism   |
| 4        | Grid1     | Obesity  |
| 4        | Grin2b    | Autism   |
| 4        | Grp       | Obesity  |
| 4        | Hectd4    | Autism   |
| 4        | Hivep2    | Autism   |
| 4        | Hnrnph2   | Autism   |
| 4        | Hras      | Autism   |
| 4        | Iqsec2    | Autism   |
| 4        | Kcnb1     | Autism   |
| 4        | Kcnq3     | Autism   |
| 4        | Kctd13    | Obesity  |
| 4        | Ksr2      | Obesity  |
| 4        | Lingo2    | Obesity  |
| 4        | Lrfn2     | Obesity  |
| 4        | Lrp1b     | Obesity  |
| 4        | Lrrc4c    | Autism   |
| 4        | Lztf1     | Obesity  |
| 4        | Lztr1     | Autism   |
| 4        | Map2k5    | Obesity  |
| 4        | Mapk3     | Obesity  |
| 4        | Mbd5      | Autism   |
| 4        | Mboat7    | Autism   |
| 4        | Mc4r      | Obesity  |
| 4        | Mecp2     | Autism   |
| 4        | Mkhx      | Autism   |
| 4        | Myt1l     | Autism   |
| 4        | Nbea      | Autism   |
| 4        | Nckap1    | Autism   |
| 4        | Ncoa1     | Autism   |
| 4        | Negr1     | Obesity  |
| 4        | Nf1       | Autism   |
| 4        | Nlgn2     | Autism   |
| Module # | Gene Name | Disease |
|---------|-----------|---------|
| 4       | Nlgn3     | Autism  |
| 4       | Nr3c2     | Autism  |
| 4       | Nr4a2     | Autism  |
| 4       | Nrxn1     | Autism  |
| 4       | Nrxn2     | Autism  |
| 4       | Nt5c2     | Obesity |
| 4       | Ntrk2     | Obesity |
| 4       | Nudt3     | Obesity |
| 4       | Pacs1     | Autism  |
| 4       | Pcdn19    | Autism  |
| 4       | Pcsk1     | Obesity |
| 4       | Plxna4    | Obesity |
| 4       | Pmc       | Obesity |
| 4       | Pomgnt1   | Autism  |
| 4       | Ppp1r9b   | Autism  |
| 4       | Ppp2r5d   | Autism  |
| 4       | Prkd1     | Obesity |
| 4       | Pten      | Autism  |
| 4       | Qpctl     | Obesity |
| 4       | Rabep1    | Obesity |
| 4       | Ralyl     | Obesity |
| 4       | Rarb      | Obesity |
| 4       | Rasa2     | Obesity |
| 4       | Rims1     | Autism  |
| 4       | Rorb      | Autism  |
| 4       | Scn2a     | Autism  |
| 4       | Sdcccag8  | Obesity |
| 4       | Sec16b    | Obesity |
| 4       | Sema3c    | Obesity |
| 4       | Shank2    | Autism  |
| 4       | Shank3    | Autism  |
| 4       | Slc22a3   | Obesity |
| 4       | Slc9a6    | Autism  |
| 4       | Stxbp6    | Obesity |
| 4       | Syngap1   | Autism  |
| 4       | Tanc2     | Autism  |
| 4       | Taok1     | Autism  |
| 4       | Taok2     | Obesity |
| 4       | Tbr1      | Autism  |
| 4       | Tcf4      | Autism  |
| 4       | Tm9sf4    | Autism  |
## Supplementary Table 19 | Cont.

| Module # | Gene Name | Disease   |
|----------|-----------|-----------|
| 4        | Tnni3k    | Obesity   |
| 4        | Trim23    | Autism    |
| 4        | Trim32    | Obesity   |
| 4        | Tsc1      | Autism    |
| 4        | Ttc8      | Obesity   |
| 4        | Tub       | Obesity   |
| 4        | Ube3a     | Autism    |
| 4        | Wdpcp     | Obesity   |
| 4        | Zbtb20    | Autism    |
| 4        | Zfr2      | Obesity   |
### Supplementary Table 20 | Clustering of obesity- and breast cancer-associated genes.
Description of each gene including: module number, gene name and disease. Relates to Fig. 13D.

| Module # | Gene Name   | Disease          |
|----------|-------------|------------------|
| 1        | Abraxas1    | Breast cancer    |
| 1        | Adpgk       | Obesity          |
| 1        | Alms1       | Obesity          |
| 1        | Apobr       | Obesity          |
| 1        | Arrdc3      | Breast cancer    |
| 1        | Ascc2       | Breast cancer    |
| 1        | Atf7ip      | Breast cancer    |
| 1        | Atm         | Breast cancer    |
| 1        | Bard1       | Breast cancer    |
| 1        | Brca1       | Breast cancer    |
| 1        | Brca2       | Breast cancer    |
| 1        | Brip1       | Breast cancer    |
| 1        | Ccne1       | Breast cancer    |
| 1        | Cdca7l      | Breast cancer    |
| 1        | Cdh1        | Breast cancer    |
| 1        | Cdkal1      | Obesity          |
| 1        | Cenpo       | Breast cancer    |
| 1        | Cep295      | Obesity          |
| 1        | Chek2       | Breast cancer    |
| 1        | Cnot9       | Obesity          |
| 1        | Cul5        | Breast cancer    |
| 1        | Dclre1b     | Breast cancer    |
| 1        | Ell         | Breast cancer    |
| 1        | Epcam       | Breast cancer    |
| 1        | Etv5        | Obesity          |
| 1        | Fancl       | Obesity          |
| 1        | Gatad2a     | Breast cancer    |
| 1        | Gdf15       | Obesity          |
| 1        | Gtf3a       | Obesity          |
| 1        | Hif1an      | Obesity          |
| 1        | Hmga1       | Obesity          |
| 1        | Hspa4       | Breast cancer    |
| 1        | Ino80e      | Obesity          |
| 1        | Kat8        | Obesity          |
| 1        | Mdm4        | Breast cancer    |
| 1        | Mks1        | Obesity          |
| 1        | Mlh1        | Breast cancer    |
| 1        | Mrps18c     | Breast cancer    |
| 1        | Msh2        | Breast cancer    |
### Supplementary Table 20 | Cont.

| Module # | Gene Name | Disease       |
|----------|-----------|---------------|
| 1        | Msh6      | Breast cancer |
| 1        | Mtch2     | Obesity       |
| 1        | Mtfr2     | Obesity       |
| 1        | Nbn       | Breast cancer |
| 1        | Nlrc3     | Obesity       |
| 1        | Npat      | Breast cancer |
| 1        | Nup54     | Obesity       |
| 1        | Palb2     | Breast cancer |
| 1        | Pidd1     | Breast cancer |
| 1        | Pms2      | Breast cancer |
| 1        | Polk      | Obesity       |
| 1        | Ppil3     | Breast cancer |
| 1        | Prc1      | Breast cancer |
| 1        | Rab23     | Obesity       |
| 1        | Rad51c    | Breast cancer |
| 1        | Rabl      | Breast cancer |
| 1        | Rcc1l     | Obesity       |
| 1        | Rpl27a    | Obesity       |
| 1        | Rps23     | Breast cancer |
| 1        | Sfxn2     | Obesity       |
| 1        | Siva1     | Breast cancer |
| 1        | Snrpd2    | Obesity       |
| 1        | Tefm      | Breast cancer |
| 1        | Tomm40    | Obesity       |
| 1        | Trp53     | Breast cancer |
| 1        | Ttl4      | Obesity       |
| 1        | Usp37     | Obesity       |
| 1        | Wdr43     | Breast cancer |
| 1        | Zbttb10   | Obesity       |
| 1        | Zfp64     | Obesity       |
| 1        | Zfp646    | Obesity       |
| 2        | Ahr       | Breast cancer |
| 2        | Akap9     | Breast cancer |
| 2        | Ap4b1     | Breast cancer |
| 2        | Asb4      | Obesity       |
| 2        | Bbip1     | Obesity       |
| 2        | Bbs10     | Obesity       |
| 2        | Bbs12     | Obesity       |
| 2        | Bbs9      | Obesity       |
| 2        | Casp8     | Breast cancer |
| 2        | Cfl1      | Breast cancer |
| Module # | Gene Name | Disease            |
|---------|-----------|--------------------|
| 2       | Creb1     | Obesity            |
| 2       | Cyp51     | Breast cancer      |
| 2       | Dda1      | Breast cancer      |
| 2       | Efemp2    | Breast cancer      |
| 2       | Ehbp1     | Obesity            |
| 2       | Elavl4    | Obesity            |
| 2       | Fbxl19    | Obesity            |
| 2       | Fign      | Obesity            |
| 2       | Galnt10   | Obesity            |
| 2       | Gipr      | Obesity            |
| 2       | Hip1      | Obesity            |
| 2       | Hmgcr     | Obesity            |
| 2       | Ift27     | Obesity            |
| 2       | Ift74     | Obesity            |
| 2       | Irs1      | Obesity            |
| 2       | Kctd15    | Obesity            |
| 2       | Klf7      | Obesity            |
| 2       | L3mbtl3   | Breast cancer      |
| 2       | Lepr      | Obesity            |
| 2       | Lmo1      | Obesity            |
| 2       | Lmx1b     | Obesity            |
| 2       | Lrcc25    | Breast cancer      |
| 2       | Lrrd1     | Breast cancer      |
| 2       | Nav1      | Obesity            |
| 2       | Nol12     | Breast cancer      |
| 2       | Nrp1      | Obesity            |
| 2       | Nrp2      | Obesity            |
| 2       | Nudt3     | Obesity            |
| 2       | Olig3     | Obesity            |
| 2       | Pbrm1     | Obesity            |
| 2       | Pex2      | Obesity            |
| 2       | Pgpep1    | Obesity/Breast cancer |
| 2       | Phip      | Obesity            |
| 2       | Pik3c2b   | Breast cancer      |
| 2       | Plxna1    | Obesity            |
| 2       | Plxna2    | Obesity            |
| 2       | Plxna3    | Obesity            |
| 2       | Ptbp2     | Obesity            |
| 2       | Rccd1     | Breast cancer      |
| 2       | Rpgrip1l  | Obesity            |
| 2       | Sbk1      | Obesity            |
| Module # | Gene Name | Disease       |
|----------|-----------|---------------|
| 2        | Sdccag8   | Obesity       |
| 2        | Sec16b    | Obesity       |
| 2        | Sema3a    | Obesity       |
| 2        | Sh2b1     | Obesity       |
| 2        | Sim1      | Obesity       |
| 2        | Skor1     | Obesity       |
| 2        | Slc39a8   | Obesity       |
| 2        | Smg6      | Obesity       |
| 2        | Stk11     | Breast cancer |
| 2        | Stk33     | Obesity       |
| 2        | Stk36     | Obesity       |
| 2        | Tal1      | Obesity       |
| 2        | Tcf7l2    | Obesity       |
| 2        | Tfap2b    | Obesity       |
| 2        | Tgfbr2    | Breast cancer |
| 2        | Tlr1      | Breast cancer |
| 2        | Tm6sf2    | Breast cancer |
| 2        | Tnnt3     | Breast cancer |
| 2        | Txndc12   | Obesity       |
| 2        | Ube2e3    | Obesity       |
| 2        | Wdpcp     | Obesity       |
| 2        | Zfhx3     | Obesity       |
| 2        | Zfp608    | Obesity       |
| 2        | Zfp668    | Obesity       |
| 2        | Zfp703    | Breast cancer |
| 3        | Amfr      | Breast cancer |
| 3        | Ankdd1b   | Obesity       |
| 3        | Atp6ap1l  | Breast cancer |
| 3        | Bcl215    | Breast cancer |
| 3        | Cbln1     | Obesity       |
| 3        | Ccdc127   | Breast cancer |
| 3        | Ccdc91    | Breast cancer |
| 3        | Cend1     | Breast cancer |
| 3        | Cep290    | Obesity       |
| 3        | Cobl1     | Obesity       |
| 3        | Col4a3bp  | Obesity       |
| 3        | Coq5      | Breast cancer |
| 3        | Cox11     | Breast cancer |
| 3        | Cyp17a1   | Obesity       |
| 3        | Cyp27a1   | Obesity       |
| 3        | Dffa      | Breast cancer |
| Module # | Gene Name | Disease       |
|----------|-----------|---------------|
| 3        | Dmxl2     | Obesity       |
| 3        | Dnajc27   | Obesity/Breast cancer |
| 3        | Efr3b     | Obesity       |
| 3        | Epb41I4b  | Obesity       |
| 3        | Fam2      | Obesity       |
| 3        | Fam57b    | Obesity       |
| 3        | Foxo3     | Obesity       |
| 3        | Frrs1l    | Obesity       |
| 3        | Gbe1      | Obesity       |
| 3        | Gnpda2    | Obesity       |
| 3        | Gprc5b    | Obesity       |
| 3        | HaplN4    | Breast cancer |
| 3        | Hhip      | Obesity       |
| 3        | Hsd17b12  | Obesity       |
| 3        | Iars2     | Obesity       |
| 3        | Inpp5e    | Obesity       |
| 3        | Kcnk3     | Obesity       |
| 3        | Kcnk9     | Obesity       |
| 3        | Ksr2      | Obesity       |
| 3        | Map2k5    | Obesity       |
| 3        | Mkks      | Obesity       |
| 3        | Mtif3     | Obesity       |
| 3        | Nrnxn3    | Obesity       |
| 3        | Pcdh9     | Obesity       |
| 3        | Pex14     | Breast cancer |
| 3        | Plcd4     | Obesity       |
| 3        | Poc5      | Obesity       |
| 3        | Ptpn22    | Breast cancer |
| 3        | Rab21     | Obesity       |
| 3        | Rad51d    | Breast cancer |
| 3        | Ric3      | Obesity       |
| 3        | Rit2      | Obesity       |
| 3        | Rnf115    | Breast cancer |
| 3        | Scarb2    | Obesity       |
| 3        | Scg3      | Obesity       |
| 3        | Sdha      | Breast cancer |
| 3        | Sema3b    | Obesity       |
| 3        | Sirt5     | Breast cancer |
| 3        | Smg9      | Breast cancer |
| 3        | Ssfa2     | Obesity       |
| 3        | Stx1b     | Obesity       |
| Module # | Gene Name  | Disease         |
|----------|------------|-----------------|
| 3        | Syne1      | Breast cancer   |
| 3        | Tlr4       | Obesity         |
| 3        | Tmem160    | Obesity         |
| 3        | Tmem18     | Obesity         |
| 3        | Tmem184b   | Breast cancer   |
| 3        | Tns1       | Breast cancer   |
| 3        | Ypel3      | Obesity         |
| 3        | Zbtb38     | Breast cancer   |
| 3        | Zbtb7b     | Obesity         |
| 3        | Zfp142     | Obesity         |
| 3        | Zfp169     | Obesity         |
| 4        | Ache       | Obesity         |
| 4        | Adcy3      | Obesity/Breast cancer |
| 4        | Agbl4      | Obesity         |
| 4        | Arl6       | Obesity         |
| 4        | Atg10      | Breast cancer   |
| 4        | Bbs1       | Obesity         |
| 4        | Bbs2       | Obesity         |
| 4        | Bbs4       | Obesity         |
| 4        | Bbs5       | Obesity         |
| 4        | Bbs7       | Obesity         |
| 4        | Bdnf       | Obesity         |
| 4        | Cadm1      | Obesity         |
| 4        | Cadm2      | Obesity         |
| 4        | Calcr      | Obesity         |
| 4        | Cbx6       | Breast cancer   |
| 4        | Ccdc170    | Breast cancer   |
| 4        | Doc2a      | Obesity         |
| 4        | Enpp7      | Breast cancer   |
| 4        | Entpd6     | Obesity         |
| 4        | Erbb4      | Obesity         |
| 4        | Esr1       | Breast cancer   |
| 4        | Ets2       | Obesity         |
| 4        | Fhit       | Obesity         |
| 4        | Fto        | Obesity         |
| 4        | Gpr151     | Obesity         |
| 4        | Grid1      | Obesity         |
| 4        | Grp        | Obesity         |
| 4        | Hlf        | Breast cancer   |
| 4        | Ifngr1     | Obesity         |
| 4        | Kcnn4      | Breast cancer   |
| Module # | Gene Name | Disease         |
|---------|-----------|-----------------|
| 4       | Kctd13    | Obesity         |
| 4       | Lingo2    | Obesity         |
| 4       | Lrfn2     | Obesity         |
| 4       | Lrp1b     | Obesity         |
| 4       | Lztf1     | Obesity         |
| 4       | Mapk3     | Obesity         |
| 4       | Mc4r      | Obesity         |
| 4       | Mchr1     | Breast cancer   |
| 4       | Negr1     | Obesity         |
| 4       | Nf1       | Breast cancer   |
| 4       | Nt5c2     | Obesity         |
| 4       | Ntrk2     | Obesity         |
| 4       | Nudt17    | Breast cancer   |
| 4       | Ocel1     | Breast cancer   |
| 4       | Ogfod1    | Breast cancer   |
| 4       | Park2     | Obesity         |
| 4       | Pcsk1     | Obesity         |
| 4       | Plxna4    | Obesity         |
| 4       | Pomc      | Obesity         |
| 4       | Prkd1     | Obesity         |
| 4       | Pten      | Breast cancer   |
| 4       | Qpctl     | Obesity         |
| 4       | Rabep1    | Obesity         |
| 4       | Raly      | Obesity         |
| 4       | Rapgef3   | Obesity         |
| 4       | Rarb      | Obesity         |
| 4       | Rasa2     | Obesity         |
| 4       | Rhbdd3    | Breast cancer   |
| 4       | Sema3c    | Obesity         |
| 4       | Sema3d    | Obesity         |
| 4       | Slc22a3   | Obesity         |
| 4       | Ssbp4     | Breast cancer   |
| 4       | Stxbp6    | Obesity         |
| 4       | Taok2     | Obesity         |
| 4       | Tnni3k    | Obesity         |
| 4       | Trim32    | Obesity         |
| 4       | Trim66    | Obesity         |
| 4       | Ttc8      | Obesity         |
| 4       | Tub       | Obesity         |
| 4       | Vkorc1    | Obesity         |
| 4       | Zfr2      | Obesity         |
### Supplementary Table 21: Clustering of obesity-, T1D-, T2D-, autism- and breast cancer-associated genes.

Description of each gene including: module number, gene name and disease. Relates to Fig. 13E.

| Module # | Gene Name  | Disease                  |
|----------|------------|--------------------------|
| 1        | Abcb11     | T2D                      |
| 1        | Adcy3      | Obesity/Breast Cancer    |
| 1        | Adcy5      | T2D                      |
| 1        | Agbl4      | Obesity                  |
| 1        | Ap2s1      | Autism                   |
| 1        | Arhgef9    | Autism                   |
| 1        | Arl6       | Obesity                  |
| 1        | Atg13      | T2D                      |
| 1        | Bbs1       | Obesity                  |
| 1        | Bbs5       | Obesity                  |
| 1        | Bdnf       | Obesity                  |
| 1        | Braf       | Autism                   |
| 1        | C2cd4a     | T2D                      |
| 1        | C2cd4b     | T2D                      |
| 1        | Cacna1c    | Autism                   |
| 1        | Cacna1e    | Autism                   |
| 1        | Cacna2d3   | Autism                   |
| 1        | Cadm1      | Obesity                  |
| 1        | Cadm2      | Obesity                  |
| 1        | Camk1d     | T2D                      |
| 1        | Cbx6       | Breast Cancer            |
| 1        | Cdkl5      | Autism                   |
| 1        | Cel5f4     | Autism                   |
| 1        | Chd3       | Autism                   |
| 1        | Coro1a     | Autism                   |
| 1        | Cry2       | T2D                      |
| 1        | Ctla4      | T1D                      |
| 1        | Cux2       | T1D                      |
| 1        | Dgkb       | T2D                      |
| 1        | Dlg4       | Autism                   |
| 1        | Dmkl2      | Obesity                  |
| 1        | Doc2a      | Obesity                  |
| 1        | Erbb4      | Obesity                  |
| 1        | Fosl2      | T1D                      |
| 1        | Foxp1      | Autism                   |
| 1        | Gabrb3     | Autism                   |
| 1        | Gna1       | Autism                   |
| 1        | Gria2      | Autism                   |
| 1        | Grid1      | Obesity                  |
| Module # | Gene Name | Disease          |
|---------|-----------|------------------|
| 1       | Grin2b    | Autism           |
| 1       | Grp       | Obesity          |
| 1       | Hectd4    | T2D/Autism       |
| 1       | Herc2     | T1D              |
| 1       | Hivep2    | Autism           |
| 1       | Hlf       | Breast Cancer    |
| 1       | Hras      | Autism           |
| 1       | Htr1a     | T1D              |
| 1       | Il2       | T1D              |
| 1       | Iqsec2    | Autism           |
| 1       | Jazf1     | T2D              |
| 1       | Kcnb1     | Autism           |
| 1       | Kcnq3     | Autism           |
| 1       | Kctd13    | Obesity          |
| 1       | Kif5a     | T1D              |
| 1       | Lingo2    | Obesity          |
| 1       | Lmo7      | T1D              |
| 1       | Lrfn2     | Obesity          |
| 1       | Lrcc4c    | Autism           |
| 1       | Lztr1     | Autism           |
| 1       | Mapk3     | Obesity          |
| 1       | Mbd5      | Autism           |
| 1       | Mboat7    | Autism           |
| 1       | Mchr1     | Breast Cancer    |
| 1       | Mkx       | Autism           |
| 1       | Myt1l     | Autism           |
| 1       | Nbea      | Autism           |
| 1       | Nckap1    | Autism           |
| 1       | Negr1     | Obesity          |
| 1       | Nlgn2     | Autism           |
| 1       | Nlgn3     | Autism           |
| 1       | Nr3c2     | Autism           |
| 1       | Nr4a2     | Autism           |
| 1       | Nrxn1     | Autism           |
| 1       | Nyap2     | T2D              |
| 1       | Ocel1     | Breast Cancer    |
| 1       | Pacs1     | Autism           |
| 1       | Pax4      | T2D              |
| 1       | Pcsk1     | Obesity/T2D      |
| 1       | Pip4k2c   | T1D              |
| 1       | Plxna4    | Obesity          |
## Supplementary Table 21 | Cont.

| Module # | Gene Name | Disease               |
|----------|-----------|-----------------------|
| 1        | Pomgnt1   | Autism                |
| 1        | Ppp1r9b   | Autism                |
| 1        | Pten      | Autism/Breast Cancer  |
| 1        | Rabep1    | Obesity               |
| 1        | Raly1     | Obesity               |
| 1        | Rarb      | Obesity               |
| 1        | Rasgrp1   | T1D/T2D               |
| 1        | Rims1     | Autism                |
| 1        | Rorb      | Autism                |
| 1        | Scn2a     | Autism                |
| 1        | Sdccag8   | Obesity               |
| 1        | Sec16b    | Obesity               |
| 1        | Sema3c    | Obesity               |
| 1        | Sgsm2     | T2D                   |
| 1        | Slc22a3   | Obesity               |
| 1        | Snx7      | T2D                   |
| 1        | Srr       | T2D                   |
| 1        | Stxbp6    | Obesity               |
| 1        | Syngap1   | Autism                |
| 1        | Tanc2     | Autism                |
| 1        | Tbc1d30   | T2D                   |
| 1        | Tbr1      | Autism                |
| 1        | Tnfaip3   | T1D                   |
| 1        | Tnni3k    | Obesity               |
| 1        | Trim23    | Autism                |
| 1        | Trim32    | Obesity               |
| 1        | Ube2e2    | T2D                   |
| 1        | Wdpcp     | Obesity               |
| 1        | Wfs1      | T2D                   |
| 1        | Zfr2      | Obesity               |
| 2        | Abcc8     | T2D                   |
| 2        | Ahdc1     | Autism                |
| 2        | Amfr      | Breast Cancer         |
| 2        | Ank1      | T2D                   |
| 2        | Ank2      | Autism                |
| 2        | Ankrd11   | Autism                |
| 2        | Appl1     | T2D                   |
| 2        | Arap1     | T2D                   |
| 2        | Ash1l     | Autism                |
| 2        | Atp6ap1l  | Breast Cancer         |
| 2        | Bbip1     | Obesity               |
| Module # | Gene Name     | Disease          |
|---------|---------------|------------------|
| 2       | Bcar1         | T2D              |
| 2       | Bcl2l15       | Breast Cancer    |
| 2       | Brsk2         | Autism           |
| 2       | Cbln1         | Obesity          |
| 2       | Chd7          | Autism           |
| 2       | Cic           | Autism           |
| 2       | Clec16a       | T1D              |
| 2       | Cyp17a1       | Obesity          |
| 2       | D5erld579e    | Autism           |
| 2       | Ell           | Breast Cancer    |
| 2       | Epb41l4b      | Obesity          |
| 2       | Fam57b        | Obesity          |
| 2       | Foxo3         | Obesity          |
| 2       | Frrs1l        | Obesity          |
| 2       | Gabrb2        | Autism           |
| 2       | Gcc1          | T2D              |
| 2       | Gckr          | T2D              |
| 2       | Grk5          | T2D              |
| 2       | Hnrnph2       | Autism           |
| 2       | Il27          | T1D              |
| 2       | Inpp5e        | Obesity          |
| 2       | Itgb6         | T2D              |
| 2       | Kcnk3         | Obesity          |
| 2       | Kihl42        | T2D              |
| 2       | Kmt2c         | Autism           |
| 2       | Ksr2          | Obesity          |
| 2       | Lpp           | T2D              |
| 2       | Madd          | T2D              |
| 2       | Map2k5        | Obesity          |
| 2       | Mecp2         | Autism           |
| 2       | Mphosph9      | T2D              |
| 2       | Mtf3          | Obesity          |
| 2       | Ncoa1         | Autism           |
| 2       | Neurod1       | T2D              |
| 2       | Nrnx2         | Autism           |
| 2       | Nrnx3         | Obesity/Autism   |
| 2       | Nudt3         | Obesity          |
| 2       | Pex2          | Obesity          |
| 2       | Pkd1          | T1D              |
| 2       | Plekha1       | T1D              |
| 2       | Poc5          | Obesity          |
| Module # | Gene Name | Disease                  |
|---------|-----------|--------------------------|
| 2       | Pparg     | T1D/T2D                  |
| 2       | Ppp2r5d   | Autism                   |
| 2       | Ppp5c     | Autism                   |
| 2       | Ptchd1    | Autism                   |
| 2       | Ptpn22    | T1D/Breast Cancer        |
| 2       | Rasa2     | Obesity                  |
| 2       | Reln      | Autism                   |
| 2       | Rnf115    | Breast Cancer            |
| 2       | Scg3      | Obesity                  |
| 2       | Sema3a    | Obesity                  |
| 2       | Sgcg      | T2D                      |
| 2       | Sh2b1     | Obesity                  |
| 2       | Sh2b3     | T1D                      |
| 2       | Shank2    | Autism                   |
| 2       | Shank3    | Autism                   |
| 2       | Sirt5     | Breast Cancer            |
| 2       | Ski       | Autism                   |
| 2       | Smg9      | Breast Cancer            |
| 2       | Stk11     | Breast Cancer            |
| 2       | Sugp1     | T2D                      |
| 2       | Suox      | T1D                      |
| 2       | Syne1     | Breast Cancer            |
| 2       | Taok1     | Autism                   |
| 2       | Tc4       | Autism                   |
| 2       | Tm6sf2    | Breast Cancer            |
| 2       | Tmem163   | T2D                      |
| 2       | Tmem184b  | Breast Cancer            |
| 2       | Tnfrsf11b | T1D                      |
| 2       | Trio      | Autism                   |
| 2       | Tsc2      | Autism                   |
| 2       | Ubr1      | Autism                   |
| 2       | Vps13b    | Autism                   |
| 2       | Vps13c    | T2D                      |
| 2       | Wdfy3     | Autism                   |
| 2       | Zbttb38   | Breast Cancer            |
| 2       | Zfp142    | Obesity                  |
| 2       | Zfp169    | Obesity                  |
| 2       | Zfp703    | Breast Cancer            |
| 3       | Ache      | Obesity                  |
| 3       | Adra2a    | T2D                      |
| 3       | Agmo      | T2D                      |
| Module # | Gene Name | Disease          |
|---------|-----------|------------------|
| 3       | Aldh5a1   | Autism           |
| 3       | Ank3      | Autism           |
| 3       | Ankdd1b   | Obesity          |
| 3       | Ankr55    | T2D              |
| 3       | Atg10     | Breast Cancer    |
| 3       | Bbs4      | Obesity          |
| 3       | Blk       | T2D              |
| 3       | Ccnc127   | Breast Cancer    |
| 3       | Ccnc91    | Breast Cancer    |
| 3       | Cdk18     | T1D              |
| 3       | Cdkn2b    | T2D              |
| 3       | Cend1     | Breast Cancer    |
| 3       | Cep290    | Obesity          |
| 3       | Cobll1    | Obesity/T2D      |
| 3       | Col4a3bp  | Obesity          |
| 3       | Coq5      | Breast Cancer    |
| 3       | Cova1     | Breast Cancer    |
| 3       | Ctsh      | T1D              |
| 3       | Cyp27a1   | Obesity          |
| 3       | Dfffa     | Breast Cancer    |
| 3       | Dip2a     | Autism           |
| 3       | Dnajc27   | Obesity/Breast Cancer |
| 3       | Efr3b     | Obesity/T1D      |
| 3       | Erp1      | T1D              |
| 3       | Fads1     | T2D              |
| 3       | Faim2     | Obesity/T2D      |
| 3       | Fam189a2  | T1D              |
| 3       | Fhit      | Obesity          |
| 3       | Fitm2     | T2D              |
| 3       | Fto       | Obesity/T2D      |
| 3       | Gbe1      | Obesity          |
| 3       | Gfap      | Autism           |
| 3       | Gnpda2    | Obesity          |
| 3       | Gpnc5b    | Obesity          |
| 3       | Grb14     | T2D              |
| 3       | Hapln4    | Breast Cancer    |
| 3       | Hhip      | Obesity          |
| 3       | Hsd17b12  | Obesity          |
| 3       | Iars2     | Obesity          |
| 3       | Ifih1     | T1D              |
| 3       | Ifngr1    | Obesity          |
| Module # | Gene Name | Disease     |
|----------|-----------|-------------|
| 3        | Il2ra     | T1D         |
| 3        | Kank1     | T2D         |
| 3        | Kcnj11    | T1D/T2D     |
| 3        | Kcnk9     | Obesity     |
| 3        | Larp6     | T2D         |
| 3        | Lgr5      | T2D         |
| 3        | Lrp1b     | Obesity     |
| 3        | Map1a     | Autism      |
| 3        | Mc4r      | Obesity/T2D |
| 3        | Mkks      | Obesity     |
| 3        | Msмо1     | T2D         |
| 3        | Ntrk2     | Obesity     |
| 3        | Nudt17    | Breast Cancer|
| 3        | Ogfd1     | Breast Cancer|
| 3        | Park2     | Obesity     |
| 3        | Pcdh9     | Obesity     |
| 3        | Pex14     | Breast Cancer|
| 3        | Plcd4     | Obesity     |
| 3        | Prkcq     | T1D         |
| 3        | Ptptn11   | Autism      |
| 3        | Ptprd     | T2D         |
| 3        | Rab21     | Obesity     |
| 3        | Rad51d    | Breast Cancer|
| 3        | Rapgef3   | Obesity     |
| 3        | Ric3      | Obesity     |
| 3        | Rit2      | Obesity     |
| 3        | Scarb2    | Obesity     |
| 3        | Scn1a     | Autism      |
| 3        | Scn8a     | Autism      |
| 3        | Sdha      | Breast Cancer|
| 3        | Sdhaf4    | T2D         |
| 3        | Sema3b    | Obesity     |
| 3        | Sema3d    | Obesity     |
| 3        | Slc2a2    | T2D         |
| 3        | Slc30a8   | T2D         |
| 3        | Slc6a1    | Autism      |
| 3        | Slc9a6    | Autism      |
| 3        | Ssf2a     | Obesity     |
| 3        | Stx1b     | Obesity     |
| 3        | Stxbp1    | Autism      |
| 3        | Tek       | Autism      |
| Module # | Gene Name | Disease       |
|----------|-----------|---------------|
| 3        | Tgfbr2    | Breast Cancer |
| 3        | Tlr4      | Obesity       |
| 3        | Tmem160   | Obesity       |
| 3        | Tmem18    | Obesity       |
| 3        | Tns1      | Breast Cancer |
| 3        | Trim66    | Obesity       |
| 3        | Ypel3     | Obesity       |
| 3        | Zbtb7b    | Obesity       |
| 4        | Ap4b1     | Breast Cancer |
| 4        | Asb4      | Obesity       |
| 4        | Bbs10     | Obesity       |
| 4        | Bbs2      | Obesity       |
| 4        | Bbs7      | Obesity       |
| 4        | Bbs9      | Obesity       |
| 4        | Calcr     | Obesity       |
| 4        | Ccdc170   | Breast Cancer |
| 4        | Cdc123    | T2D           |
| 4        | Dda1      | Breast Cancer |
| 4        | Dpsyl2    | Autism        |
| 4        | Dscam     | Autism        |
| 4        | Enpp7     | Breast Cancer |
| 4        | Entpd6    | Obesity       |
| 4        | Esr1      | Breast Cancer |
| 4        | Ets2      | Obesity       |
| 4        | Galnt10   | Obesity       |
| 4        | Gck       | T2D           |
| 4        | Gpr151    | Obesity       |
| 4        | Hnf1b     | T2D           |
| 4        | Ifng      | T1D           |
| 4        | Katnal2   | Autism        |
| 4        | Kcnk16    | T2D           |
| 4        | Kcnn4     | Breast Cancer |
| 4        | Klf14     | T2D           |
| 4        | Lpar3     | T1D           |
| 4        | Lrrc25    | Breast Cancer |
| 4        | Lztf1     | Obesity       |
| 4        | Macf1     | T2D           |
| 4        | Maea      | T2D           |
| 4        | Magel2    | Autism        |
| 4        | Nf1       | Autism/Breast Cancer |
| 4        | Nt5c2     | Obesity       |
| Module # | Gene Name | Disease            |
|---------|-----------|--------------------|
| 4       | Ormdl3    | T1D                |
| 4       | Pam       | T2D                |
| 4       | Pcdh19    | Autism             |
| 4       | Pdx1      | T2D                |
| 4       | Phtf1     | T1D                |
| 4       | Pomc      | Obesity            |
| 4       | Prkd1     | Obesity            |
| 4       | Prox1     | T2D                |
| 4       | Qpctl     | Obesity            |
| 4       | Rhbddd3   | Breast Cancer      |
| 4       | Rnaset2a  | T1D                |
| 4       | Rpgrip1l  | Obesity            |
| 4       | Sim1      | Obesity            |
| 4       | Ssbp4     | Breast Cancer      |
| 4       | Stat3     | T1D                |
| 4       | Stk33     | Obesity            |
| 4       | Taf11     | T2D                |
| 4       | Tagap     | T1D                |
| 4       | Taok2     | Obesity            |
| 4       | Tcerg1l   | T2D                |
| 4       | Tm9sf4    | Autism             |
| 4       | Tsc1      | Autism             |
| 4       | Tspan8    | T2D                |
| 4       | Ttc8      | Obesity            |
| 4       | Tub       | Obesity            |
| 4       | Ube3a     | Autism             |
| 4       | Vkorc1    | Obesity            |
| 4       | Zbtb20    | Autism             |
| 5       | Abo       | T2D                |
| 5       | Abraxas1  | Breast Cancer      |
| 5       | Adamts9   | T2D                |
| 5       | Adpgk     | Obesity            |
| 5       | Adsl      | Autism             |
| 5       | Alms1     | Obesity            |
| 5       | Ap3s2     | T2D                |
| 5       | Apobr     | Obesity            |
| 5       | Arl15     | T2D                |
| 5       | Arrdc3    | Breast Cancer      |
| 5       | Ascc2     | Breast Cancer      |
| 5       | Atm       | Breast Cancer      |
| 5       | Atrx      | Autism             |
| Module # | Gene Name | Disease          |
|---------|-----------|------------------|
| 5       | Bard1     | Breast Cancer    |
| 5       | Brca1     | Breast Cancer    |
| 5       | Brca2     | Breast Cancer    |
| 5       | Brip1     | Breast Cancer    |
| 5       | Cars      | T1D              |
| 5       | Ccne1     | Breast Cancer    |
| 5       | Cdca7l    | Breast Cancer    |
| 5       | Cdh1      | Breast Cancer    |
| 5       | Cdkal1    | Obesity/T2D      |
| 5       | Cdkn2a    | T2D              |
| 5       | Cenpo     | Breast Cancer    |
| 5       | Cenpw     | T1D              |
| 5       | Cep295    | Obesity          |
| 5       | Chd8      | Autism           |
| 5       | Chek2     | Breast Cancer    |
| 5       | Cilp2     | T2D              |
| 5       | Cnot3     | Autism           |
| 5       | Cnot9     | Obesity          |
| 5       | Cobl      | T1D              |
| 5       | Ctcf      | Autism           |
| 5       | Cul5      | Breast Cancer    |
| 5       | Dclre1b   | Breast Cancer    |
| 5       | Ddx3x     | Autism           |
| 5       | Dhcr7     | Autism           |
| 5       | Dusp9     | T2D              |
| 5       | Eif3g     | Autism           |
| 5       | Ep300     | Autism           |
| 5       | Epcam     | Breast Cancer    |
| 5       | Erbb3     | T1D              |
| 5       | Etv5      | Obesity          |
| 5       | Faf1      | T2D              |
| 5       | Fancl     | Obesity          |
| 5       | Fmr1      | Autism           |
| 5       | G6pc2     | T2D              |
| 5       | Gatad2a   | T2D/Breast Cancer|
| 5       | Gdf15     | Obesity          |
| 5       | Gigyf2    | Autism           |
| 5       | Gtf3a     | Obesity          |
| 5       | Hdlbp     | Autism           |
| 5       | Hhex      | T2D              |
| 5       | Hif1an    | Obesity          |
| Module # | Gene Name | Disease          |
|----------|-----------|------------------|
| 5        | Hmga1     | Obesity          |
| 5        | Hmga2     | T2D              |
| 5        | Hnf1a     | T2D              |
| 5        | Hnf4a     | T2D              |
| 5        | Hnrnpu    | Autism           |
| 5        | Hspa4     | Breast Cancer    |
| 5        | Ide       | T2D              |
| 5        | Igf2bp2   | T2D              |
| 5        | Il10      | T1D              |
| 5        | Ino80e    | Obesity          |
| 5        | Itpr3     | T1D              |
| 5        | Kat8      | Obesity          |
| 5        | Kdm3b     | Autism           |
| 5        | Kdm5b     | Autism           |
| 5        | Klf11     | T2D              |
| 5        | Lama1     | T2D              |
| 5        | Lypal1    | T2D              |
| 5        | Mapk14    | T1D              |
| 5        | Mdm4      | Breast Cancer    |
| 5        | Med13l    | Autism           |
| 5        | Mks1      | Obesity          |
| 5        | Mlh1      | Breast Cancer    |
| 5        | Mrps18c   | Breast Cancer    |
| 5        | Msh2      | Breast Cancer    |
| 5        | Msh6      | Breast Cancer    |
| 5        | Mtch2     | Obesity          |
| 5        | Mtf2r     | Obesity          |
| 5        | Naa15     | Autism           |
| 5        | Nacc1     | Autism           |
| 5        | Nbn       | Breast Cancer    |
| 5        | Nlrc3     | Obesity          |
| 5        | Npat      | Breast Cancer    |
| 5        | Nsd1      | Autism           |
| 5        | Nup155    | Autism           |
| 5        | Nup54     | Obesity          |
| 5        | Oasl1     | T2D              |
| 5        | Palb2     | Breast Cancer    |
| 5        | Pdgfc     | T2D              |
| 5        | Pepd      | T2D              |
| 5        | Pgm1      | T1D              |
| 5        | Phf12     | Autism           |
| Module # | Gene Name   | Disease               |
|---------|-------------|-----------------------|
| 5       | Phf3        | Autism                |
| 5       | Pidd1       | Breast Cancer         |
| 5       | Pms2        | Breast Cancer         |
| 5       | Polk        | Obesity               |
| 5       | Pou5f1      | T2D                   |
| 5       | Ppi3        | Breast Cancer         |
| 5       | Prc1        | T2D/Breast Cancer     |
| 5       | Psmd12      | Autism                |
| 5       | Psmd6       | T2D                   |
| 5       | Ptk7        | Autism                |
| 5       | Pttn2       | T1D                   |
| 5       | R3hdm1      | T2D                   |
| 5       | Rab23       | Obesity               |
| 5       | Rad51c      | Breast Cancer         |
| 5       | Rab         | Breast Cancer         |
| 5       | Rcc1l       | Obesity               |
| 5       | Rpl27a      | Obesity               |
| 5       | Rps23       | Breast Cancer         |
| 5       | Rreb1       | T2D                   |
| 5       | Setd5       | Autism                |
| 5       | Sfxn2       | Obesity               |
| 5       | Sin3a       | Autism                |
| 5       | Siva1       | Breast Cancer         |
| 5       | Skap2       | T1D                   |
| 5       | Snrpd2      | Obesity               |
| 5       | Spry2       | T2D                   |
| 5       | Srpr        | Autism                |
| 5       | Srsf2       | T2D                   |
| 5       | Ssr1        | T2D                   |
| 5       | Stat4       | T1D                   |
| 5       | Tbl1xr1     | Autism                |
| 5       | Tcf20       | Autism                |
| 5       | Tcf7        | T2D                   |
| 5       | Tefm        | Breast Cancer         |
| 5       | Thada       | T2D                   |
| 5       | Tle4        | T2D                   |
| 5       | Tomm40      | Obesity               |
| 5       | Traf7       | Autism                |
| 5       | Trip12      | Autism                |
| 5       | Trp53       | Breast Cancer         |
| 5       | Trp53inp1   | T2D                   |
| Module # | Gene Name | Disease          |
|---------|-----------|------------------|
| 5       | Ttll4     | Obesity          |
| 5       | Tyk2      | T1D              |
| 5       | Ubash3a   | T1D              |
| 5       | Usp37     | Obesity          |
| 5       | Vps26a    | T2D              |
| 5       | Wdr43     | Breast Cancer    |
| 5       | Zfp64     | Obesity          |
| 5       | Zfp646    | Obesity          |
| 6       | Adnp      | Autism           |
| 6       | Aff2      | Autism           |
| 6       | Ahrr      | Breast Cancer    |
| 6       | Akap9     | Breast Cancer    |
| 6       | Arid1b    | Autism           |
| 6       | Arx       | Autism           |
| 6       | Asxl3     | Autism           |
| 6       | Atf7ip    | Breast Cancer    |
| 6       | Auts2     | Autism           |
| 6       | Bach2     | T1D              |
| 6       | Baz2b     | Autism           |
| 6       | Bbs12     | Obesity          |
| 6       | Bcdin3d   | T2D              |
| 6       | Bckdk     | Autism           |
| 6       | Bcl11a    | T2D/Autism       |
| 6       | C1qtnf6   | T1D              |
| 6       | Capn10    | T2D              |
| 6       | Cask      | Autism           |
| 6       | Casp8     | Breast Cancer    |
| 6       | Ccnd2     | T2D              |
| 6       | Cd69      | T1D              |
| 6       | Cel       | T2D              |
| 6       | Cfl1      | Breast Cancer    |
| 6       | Champ1    | Autism           |
| 6       | Chd2      | Autism           |
| 6       | Creb1     | Obesity          |
| 6       | Crebbp    | Autism           |
| 6       | Ctnnb1    | Autism           |
| 6       | Cul3      | Autism           |
| 6       | Cyp51     | Breast Cancer    |
| 6       | Deaf1     | Autism           |
| 6       | Dlk1      | T1D              |
| 6       | Dmpk      | Autism           |
| Module # | Gene Name | Disease       |
|---------|-----------|---------------|
| 6       | Dnmt3a    | Autism        |
| 6       | Dpysl5    | T2D           |
| 6       | Dynclh1   | Autism        |
| 6       | Dyrk1a    | Autism        |
| 6       | Ebf3      | Autism        |
| 6       | Efemp2    | Breast Cancer |
| 6       | Ehbp1     | Obesity       |
| 6       | Ehmt1     | Autism        |
| 6       | Elavl3    | Autism        |
| 6       | Elavl4    | Obesity       |
| 6       | Fbxl19    | Obesity       |
| 6       | Fign      | Obesity       |
| 6       | Foxa2     | T2D           |
| 6       | Foxg1     | Autism        |
| 6       | Foxp2     | Autism        |
| 6       | Frmd3     | T1D           |
| 6       | Gigyf1    | Autism        |
| 6       | Gipr      | Obesity/T2D   |
| 6       | Glis3     | T1D/T2D       |
| 6       | Gpsm1     | T2D           |
| 6       | Grb10     | T2D           |
| 6       | Hip1      | Obesity       |
| 6       | Hmg20a    | T2D           |
| 6       | Hmgcr     | Obesity       |
| 6       | Ift27     | Obesity       |
| 6       | Ift74     | Obesity       |
| 6       | Igf1      | T2D           |
| 6       | Igf2      | T2D           |
| 6       | Ikzf4     | T1D           |
| 6       | Ins2      | T1D/T2D       |
| 6       | Irf2bpl   | Autism        |
| 6       | Irs1      | Obesity/T2D   |
| 6       | Kansl1    | Autism        |
| 6       | Kcnq1     | T2D           |
| 6       | Kctd15    | Obesity       |
| 6       | Kdm6b     | Autism        |
| 6       | Klf7      | Obesity       |
| 6       | Kmt2a     | Autism        |
| 6       | Kmt2e     | Autism        |
| 6       | Kmt5b     | Autism        |
| 6       | L3mbt13   | Breast Cancer |
| Module # | Gene Name | Disease          |
|---------|-----------|------------------|
| 6       | Ldb1      | Autism           |
| 6       | Lepr      | Obesity          |
| 6       | Lmo1      | Obesity          |
| 6       | Lmx1b     | Obesity          |
| 6       | Lrrd1     | Breast Cancer    |
| 6       | Med13     | Autism           |
| 6       | Meis2     | Autism           |
| 6       | Nav1      | Obesity          |
| 6       | Nipbl     | Autism           |
| 6       | Nol12     | Breast Cancer    |
| 6       | Notch2    | T2D              |
| 6       | Nrp1      | Obesity          |
| 6       | Nrp2      | Obesity          |
| 6       | Olig3     | Obesity          |
| 6       | Pax5      | Autism           |
| 6       | Pbrm1     | Obesity          |
| 6       | Pgpep1    | Obesity/Breast Cancer |
| 6       | Phf2      | Autism           |
| 6       | Phf21a    | Autism           |
| 6       | Phip      | Obesity/Autism   |
| 6       | Pik3c2b   | Breast Cancer    |
| 6       | Plxna1    | Obesity          |
| 6       | Plxna2    | Obesity          |
| 6       | Plxna3    | Obesity          |
| 6       | Pogz      | Autism           |
| 6       | Ppl2      | T1D              |
| 6       | Ppip5k2   | T2D              |
| 6       | Ppp1r3b   | T2D              |
| 6       | Prkd2     | T1D              |
| 6       | Prr12     | Autism           |
| 6       | Ptbp2     | Obesity          |
| 6       | Rai1      | Autism           |
| 6       | Rbms1     | T2D              |
| 6       | Rccd1     | Breast Cancer    |
| 6       | Rere      | Autism           |
| 6       | Rfx3      | Autism           |
| 6       | Rnd3      | T2D              |
| 6       | Rnls      | T1D              |
| 6       | Satb1     | Autism           |
| 6       | Sbk1      | Obesity          |
| 6       | Setbp1    | Autism           |
| Module # | Gene Name | Disease          |
|---------|-----------|------------------|
|         | Setd2     | Autism           |
|         | Skor1     | Obesity          |
|         | SIC39A8   | Obesity          |
|         | Smarcc2   | Autism           |
|         | Smg6      | Obesity          |
|         | Sox5      | Autism           |
|         | Spast     | Autism           |
|         | Srcap     | Autism           |
|         | ST6GAL1   | T2D              |
|         | STK36     | Obesity          |
|         | Tal1      | Obesity          |
|         | Tbck      | Autism           |
|         | TCF19     | T2D              |
|         | TCF7L2    | Obesity/T1D/T2D/Autism |
|         | Tcfap2b   | Obesity          |
|         | TLE1      | T2D              |
|         | Tk1       | Autism           |
|         | Tlr1      | Breast Cancer    |
|         | Tnnt3     | Breast Cancer    |
|         | Tshz3     | Autism           |
|         | Txndc12   | Obesity          |
|         | Ube2e3    | Obesity          |
|         | Upf3b     | Autism           |
|         | Vezf1     | Autism           |
|         | Wac       | Autism           |
|         | Zbed3     | T2D              |
|         | Zbtb10    | Obesity          |
|         | Zfand3    | T2D              |
|         | Zfand6    | T2D              |
|         | Zfhx3     | Obesity          |
|         | Zfp292    | Autism           |
|         | Zfp462    | Autism           |
|         | Zfp608    | Obesity          |
|         | Zfp668    | Obesity          |
|         | Zmiz1     | T2D              |
|         | Zmynd8    | Autism           |