

## Supplementary Information

### EXOSC9 depletion attenuates P-body formation, stress resistance, and tumorigenicity of cancer cells

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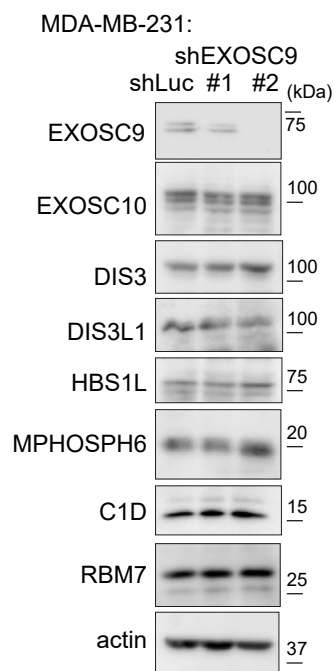
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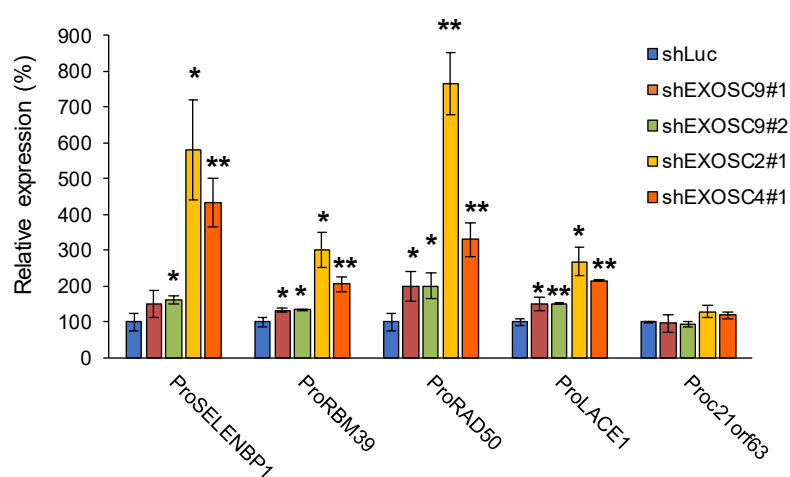
# These authors equally contributed to this study.

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a



b

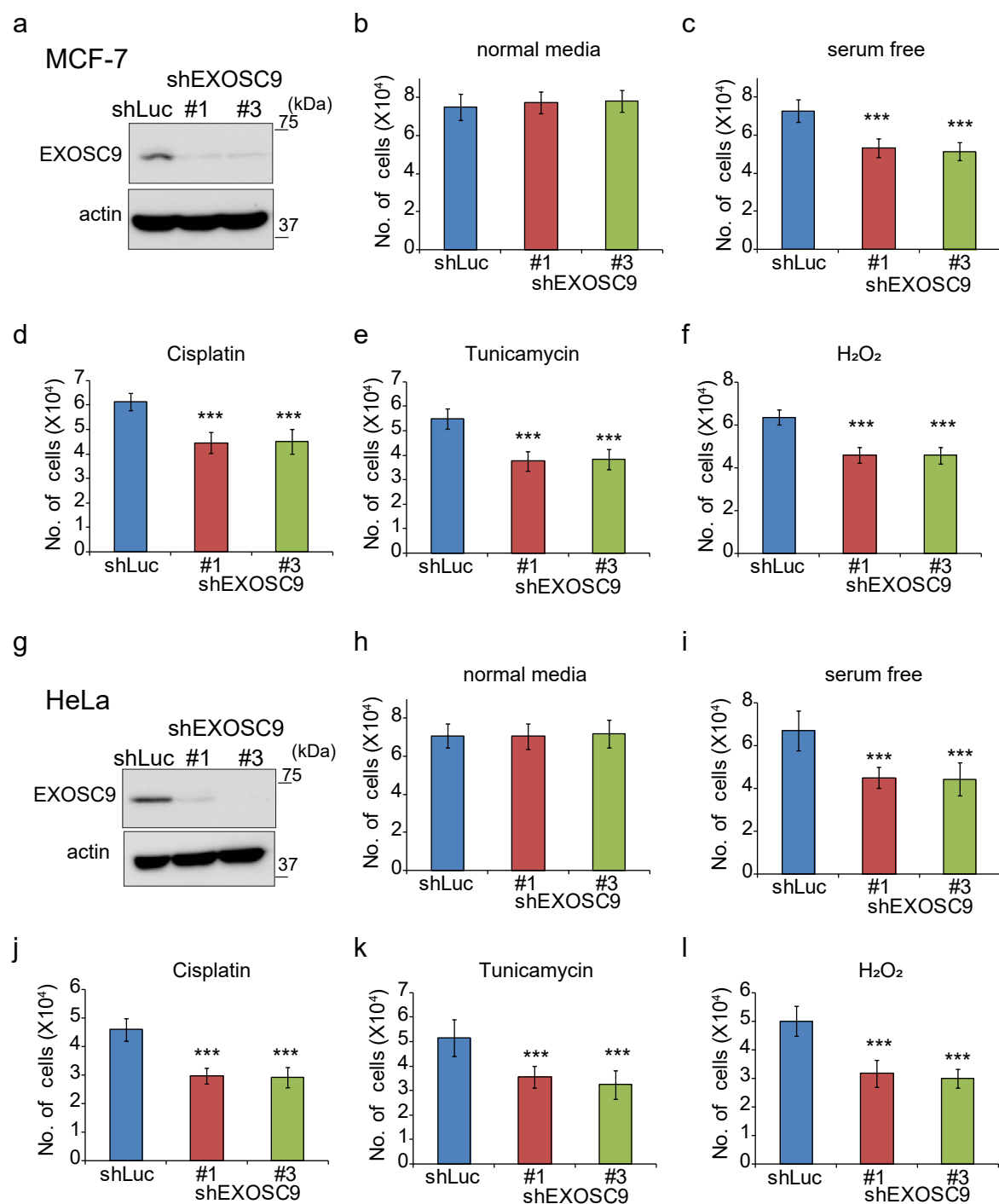


### Supplementary Figure S1. EXOSC9 depletion affects RNA exosome activity

(a) Expression of the RNA exosome-associated 5'–3' exoribonucleases and exosome cofactors in control (shLuc) and EXOSC9-depleted (shEXOSC9#1, #2) MDA-MB-231 cells.

(b) Expression of promoter upstream transcripts (PROMPTs; Pro) of indicated genes in control (shLuc), EXOSC9-depleted (shEXOSC9#1, #2), EXOSC2-depleted (shEXOSC2#1), and EXOSC4-depleted (shEXOSC4#1) MDA-MB-231 cells. n = 3. Data represent mean ± SD.

\* p < 0.05, \*\* p < 0.01 as determined by Student's t-tests. Note that PROMPTs, save for Proc21orf63, were accumulated in EXOSC9-, EXOSC2-, and EXOSC4-depleted cells.

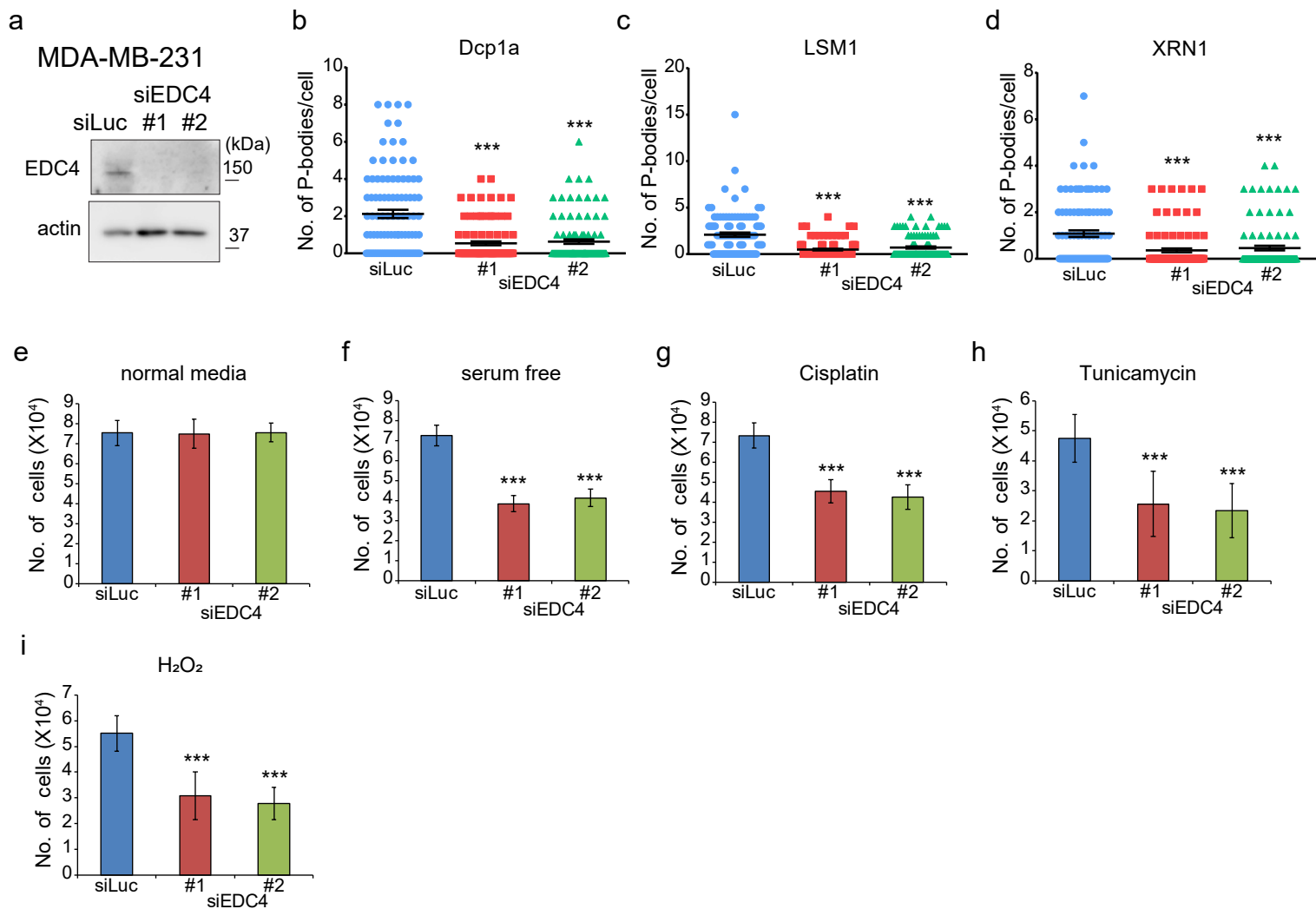


**Supplementary Figure S2. EXOSC9 is necessary for stress resistance in MCF-7 and HeLa cells.**

(a, g) Expression of EXOSC9 in control (shLuc) and EXOSC9-depleted (shEXOSC9#1, #3) MCF-7 (a) and HeLa cells (g).

(b-f, h-l) Cell number of control and EXOSC9-depleted MCF-7 (b-f) and HeLa cells (h-l) cultured in normal media (b, h), serum free media (c, i), or normal media in the presence of cisplatin (40  $\mu$ M) (d, j), tunicamycin (10  $\mu$ g/ml) (e, k), or  $H_2O_2$  (100  $\mu$ M) (f, l) for 24 h.

In b-f and h-l, n = 9 from three independent experiments. Data represent mean  $\pm$  SD. \*\*\* p < 0.001 by Student's t-test.



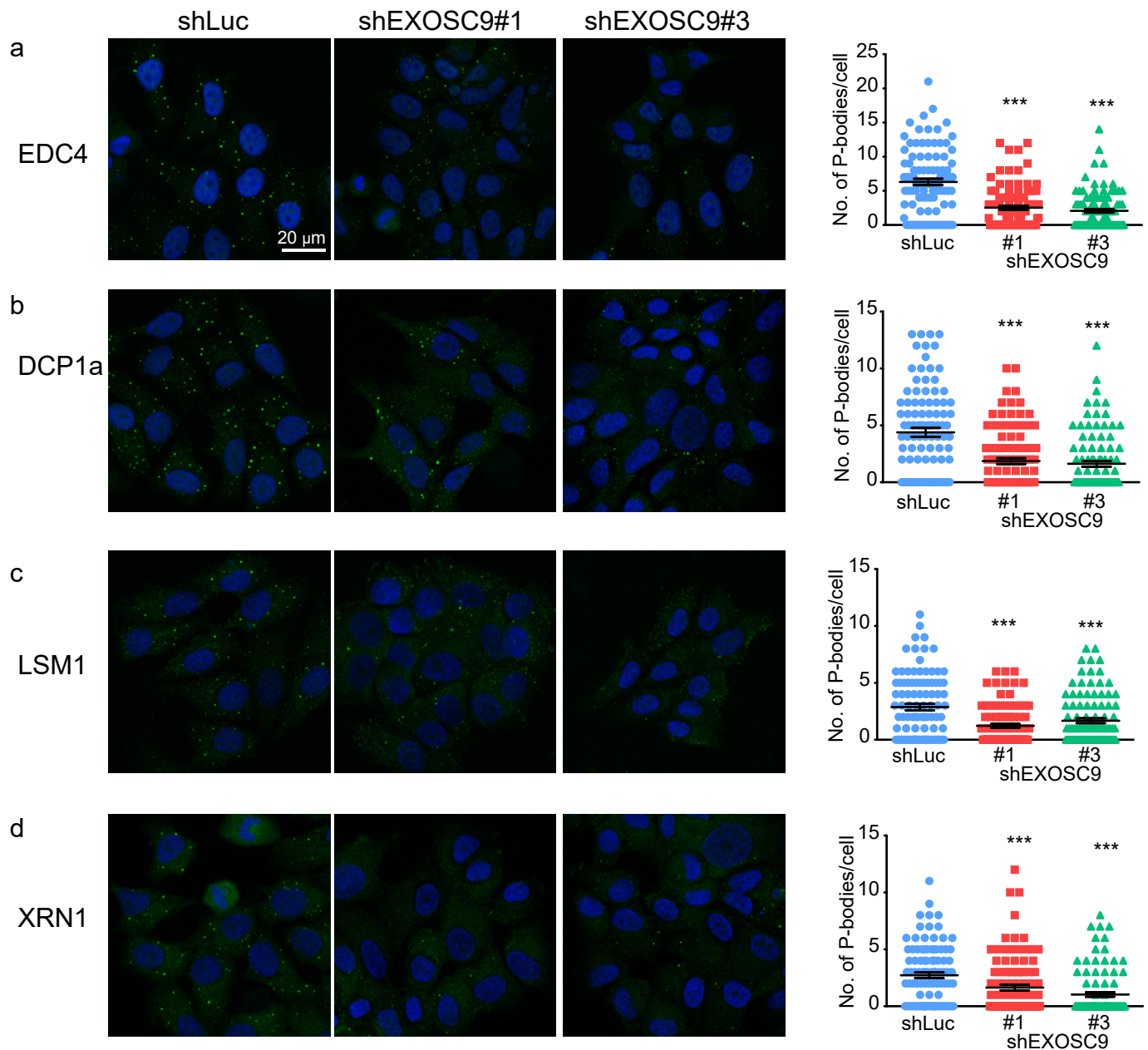
**Supplementary Figure S3. EDC4 depletion attenuates P-body formation and stress resistance in MDA-MB-231 cells.**

(a) Expression of EDC4 in control (siLuc) and EDC4-depleted (siEDC4#1, #2) MDA-MB-231 cells.

(b-d) The number of indicated P-body marker-positive granules in a cell was counted. n = 100 per group. Data represent mean  $\pm$  SEM. \*\*\* p < 0.001 by Mann-Whitney U-test.

(e-i) Cell number of control and EDC4-depleted MDA-MB-231 cells cultured under indicated conditions for 24 h. n = 9 from three independent experiments. Data represent mean  $\pm$  SD. \*\*\* p < 0.001 by Student's t-test.

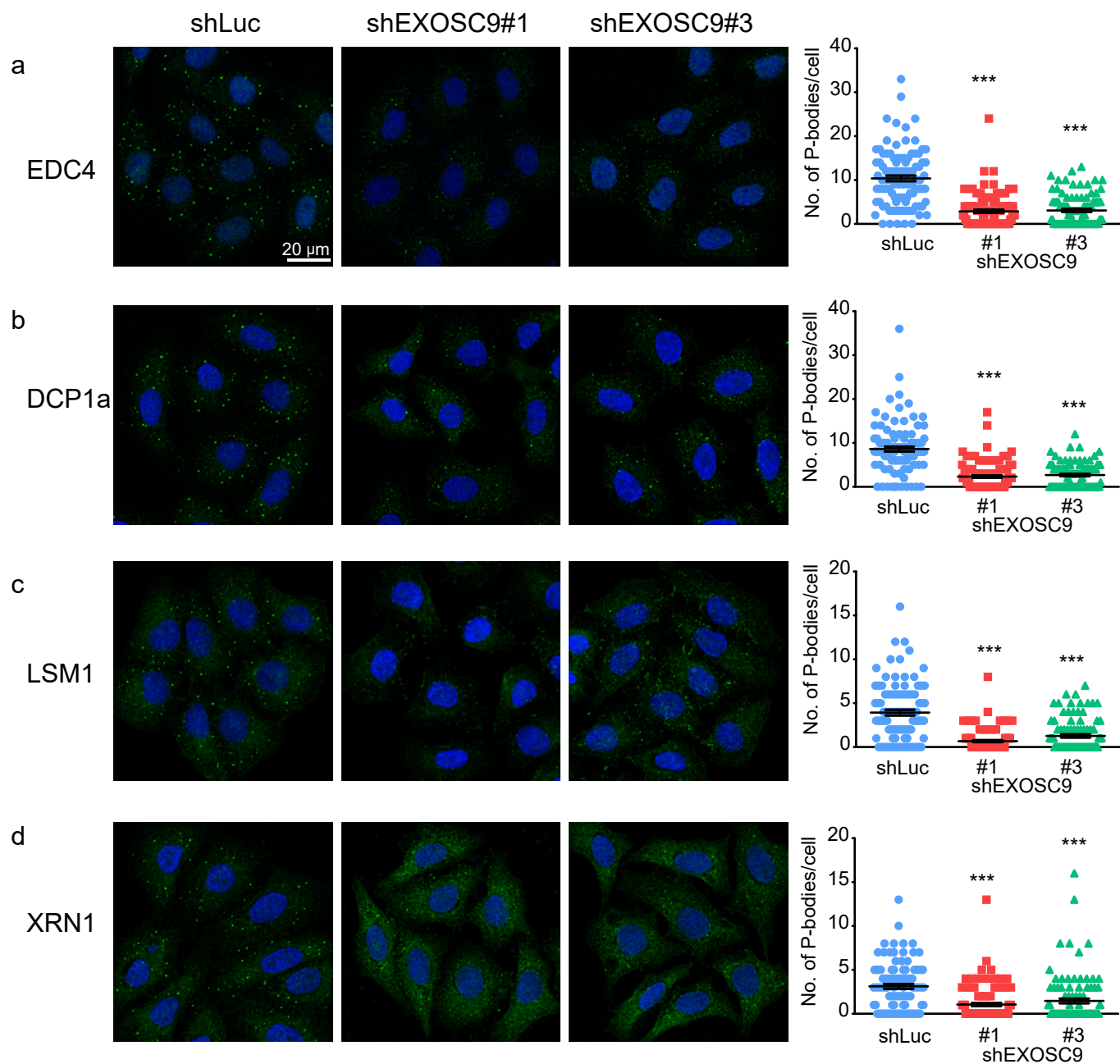
## MCF-7



**Supplementary Figure S4. EXOSC9 is necessary for P-body formation in MCF-7 cells.**

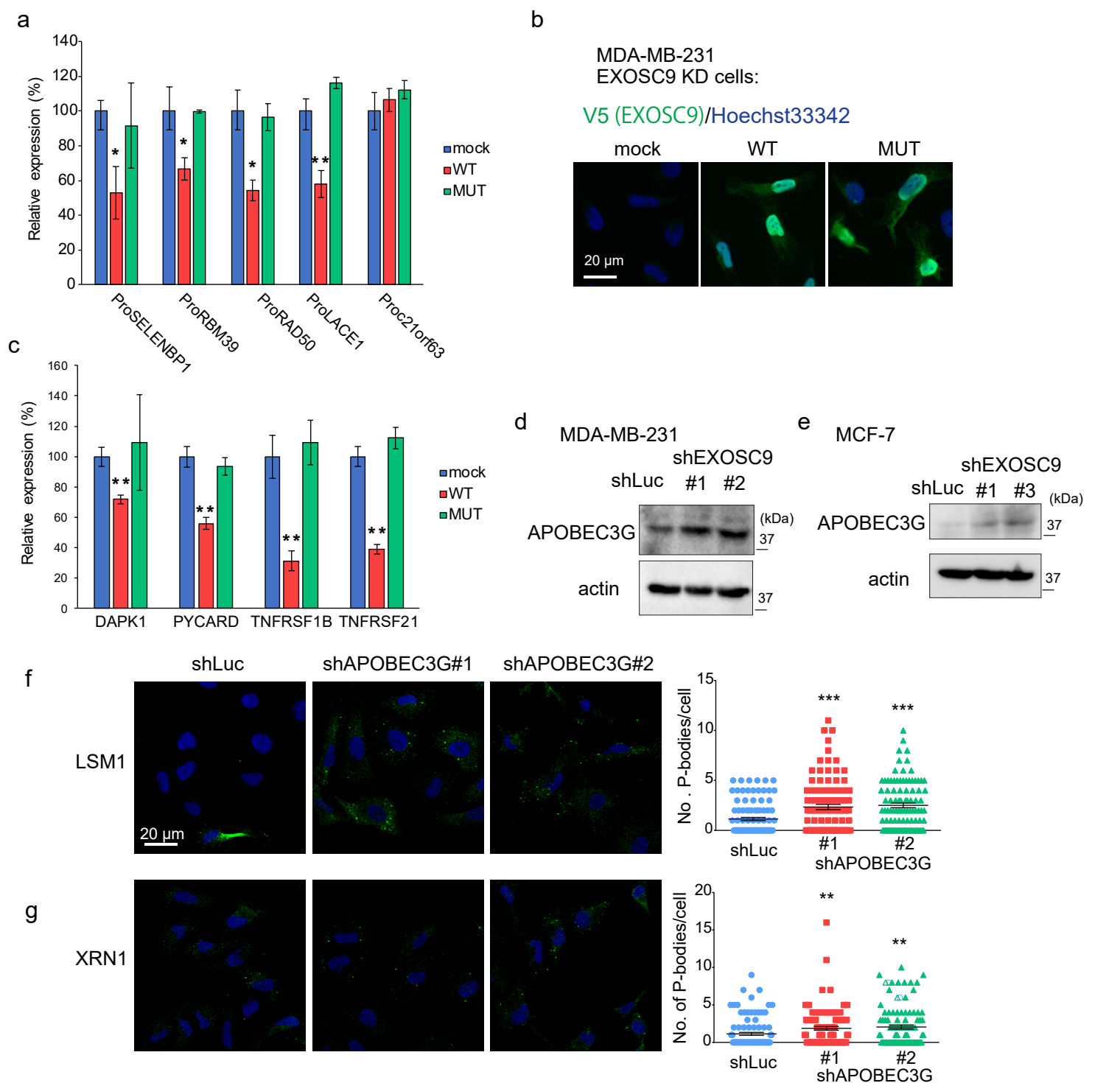
**(a–d)** Immunostaining for the P-body markers EDC4 **(a)**, DCP1a **(b)**, LSM1 **(c)**, and XRN1 **(d)** in control (shLuc) and EXOSC9-depleted (shEXOSC9#1, #3) MCF-7 cells. (Left) representative photos. (Right) the number of indicated P-body marker-positive granules in a cell was counted. n = 100 per group. Data represent mean  $\pm$  SEM. \*\*\* p < 0.001 by Mann-Whitney U-test.

HeLa



**Supplementary Figure S5. EXOSC9 is necessary for P-body formation in HeLa cells.**

**(a–d)** Immunostaining for the P-body markers EDC4 **(a)**, DCP1a **(b)**, LSM1 **(c)**, and XRN1 **(d)** in control (shLuc) and EXOSC9-depleted (shEXOSC9#1, #3) HeLa cells. (Left) representative photos. (Right) the number of indicated P-body marker-positive granules in a cell was counted. n = 100 per group. Data represent mean ± SEM. \*\*\* p < 0.001 by Mann-Whitney U-test.



**Supplementary Figure S6. APOBEC3G depletion restores P-body formation in EXOSC9-depleted MDA-MB-231 cells.**

(a) Expression of PROMPTs in mock, WT and MUT EXOSC9-expressing EXOSC9 KD MDA-MB-231 cells.

(b) Immunostaining of V5-tagged wild-type (WT) and mutant (MUT) EXOSC9 in EXOSC9 knockdown (KD) cells.

(c) Expression of stress/cell death-related genes in mock, WT and MUT EXOSC9-expressing EXOSC9 KD MDA-MB-231 cells.

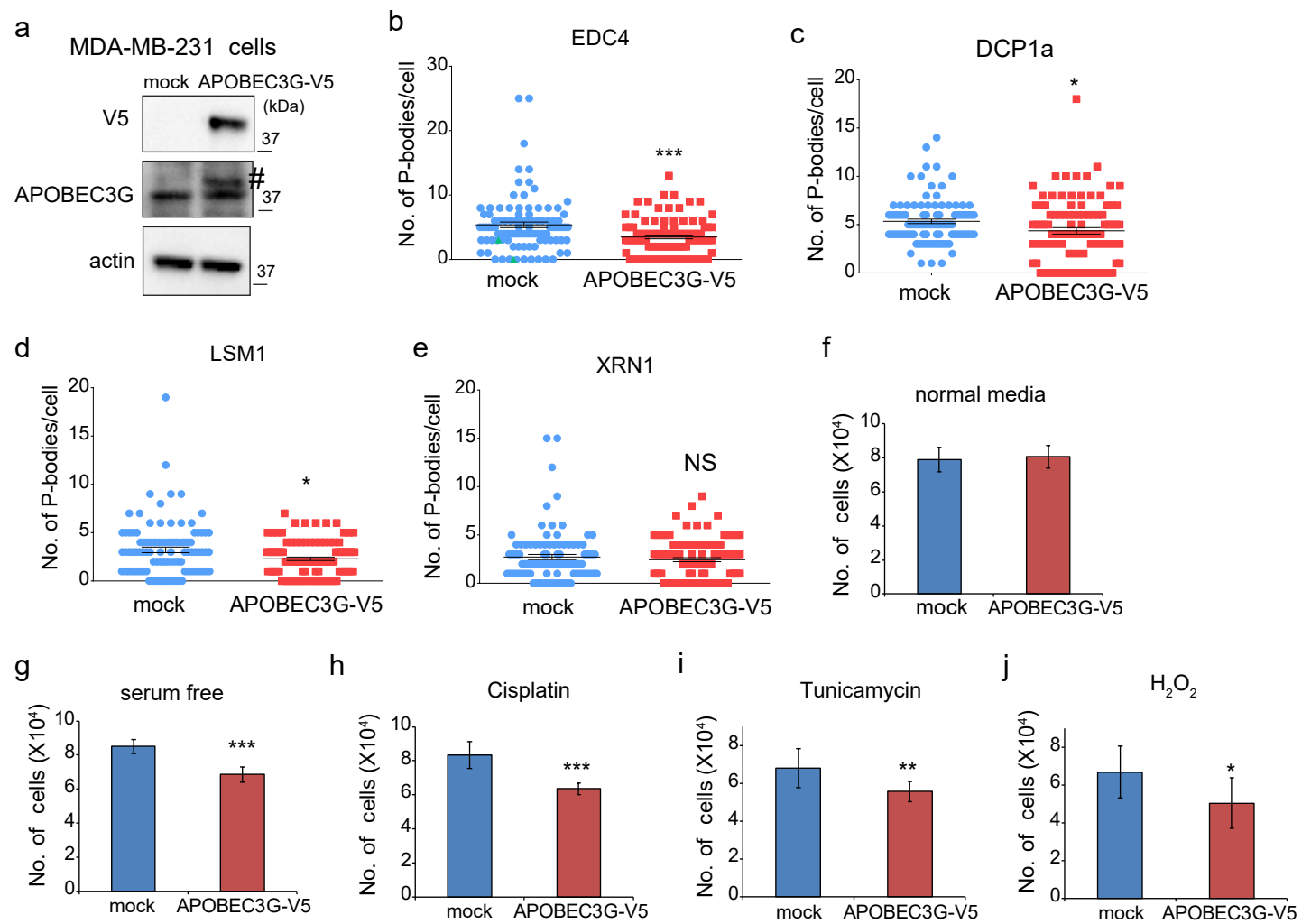
(d) APOBEC3G protein expression in control (shLuc) and EXOSC9-depleted (shEXOSC9#1, #2) MDA-MB-231 cells.

(e) APOBEC3G protein expression in control (shLuc) and EXOSC9-depleted (shEXOSC9#1, #3) MCF-7 cells.

(f, g) Immunostaining of P-body markers LSM1 (f), and XRN1 (g) in control (shLuc) and APOBEC3G-depleted (shAPOBEC3G#1, #2) EXOSC9 KD MDA-MB-231 cells. (Left) representative photos. (Right) the number of indicated P-body marker-positive granules in a cell was counted.  $n = 100$  per group. Data represent mean  $\pm$  SEM. \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  by Mann-Whitney U-test.

In a and c,  $n = 3$ . Data represent mean  $\pm$  SD. \*  $p < 0.05$ , \*\*  $p < 0.01$  as determined by Student's t-test.





**Supplementary Figure S7. Moderate expression of exogenous APOBEC3G affects P-body formation and stress resistance in MDA-MB-231 cells**

**(a)** Expression of endogenous and exogenous APOBEC3G in mock and V5-tagged APOBEC3G-expressing MDA-MB-231 cells. # indicates V5-tagged exogenous APOBEC3G.

**(b-e)** Indicated P-body markers were stained in mock and V5-tagged APOBEC3G expressing MDA-MB-231 cells. The number of P-body marker foci in a cell was counted.  $n = 100$ . Data represent mean  $\pm$  SEM. \*  $p < 0.05$ , \*\*\*  $p < 0.001$  as determined by Mann-Whitney U-test. NS, not significant.

**(f-j)** APOBEC3G depletion restored cell proliferation under indicated stress conditions in EXOSC9 KD MDA-MB-231 cells.  $n = 9$  from three independent experiments. Data represent mean  $\pm$  SD. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  as determined by Student's t-tests.



Fig 1a

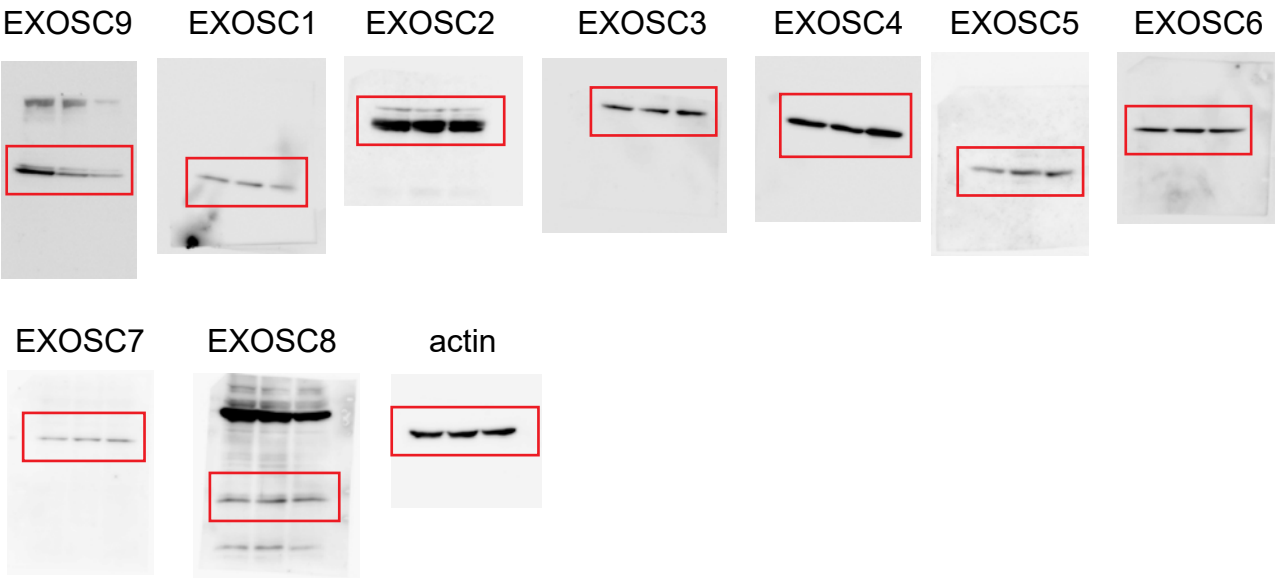


Fig 2e

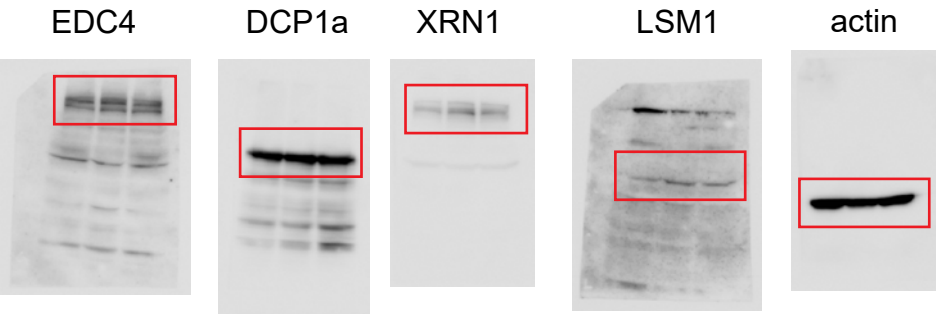


Fig 5b

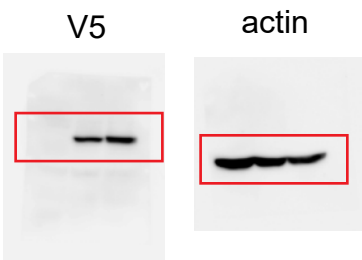


Fig 4a

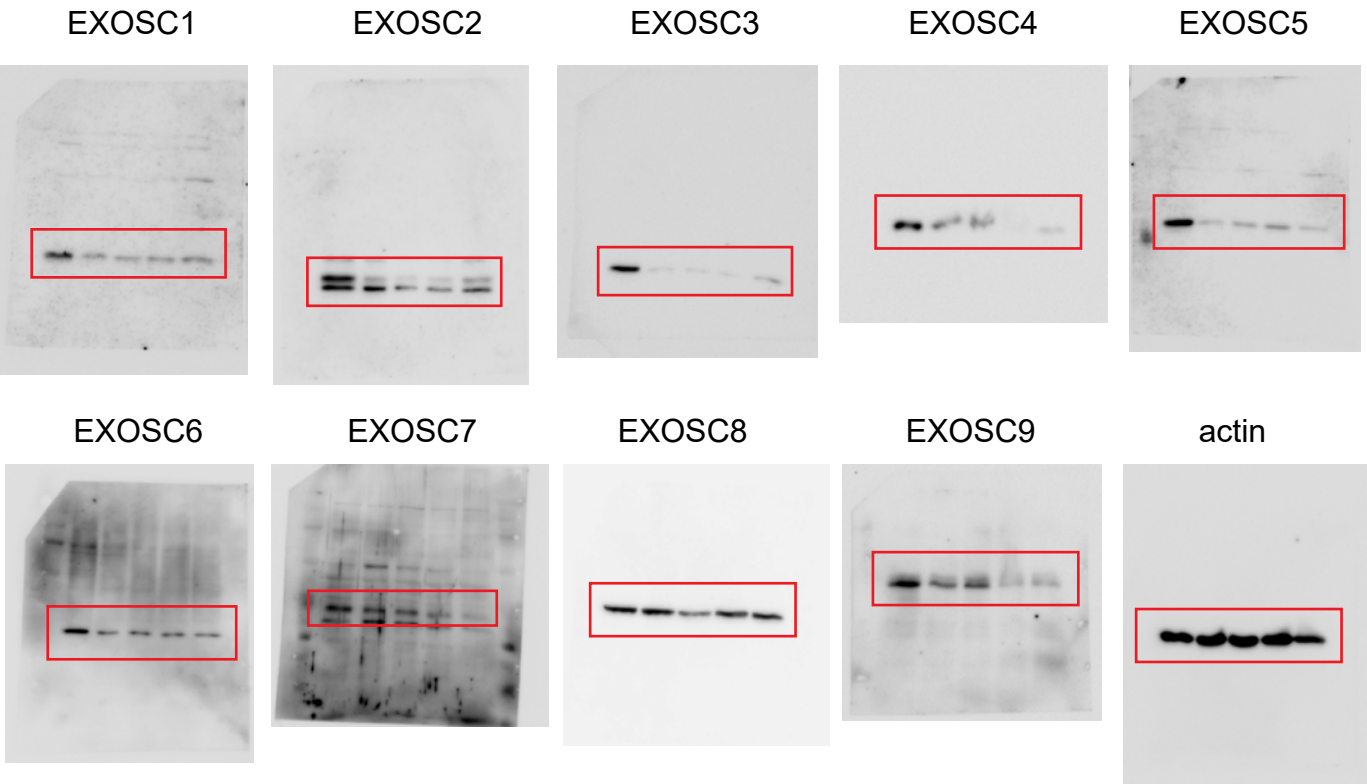


Fig 6c

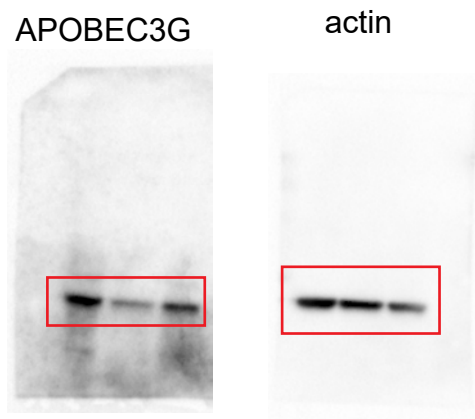


Fig 6e

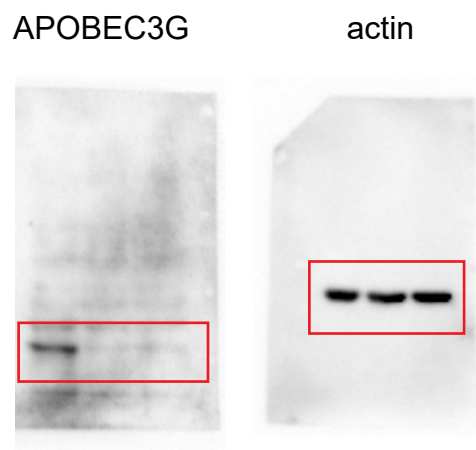


Fig. S1a

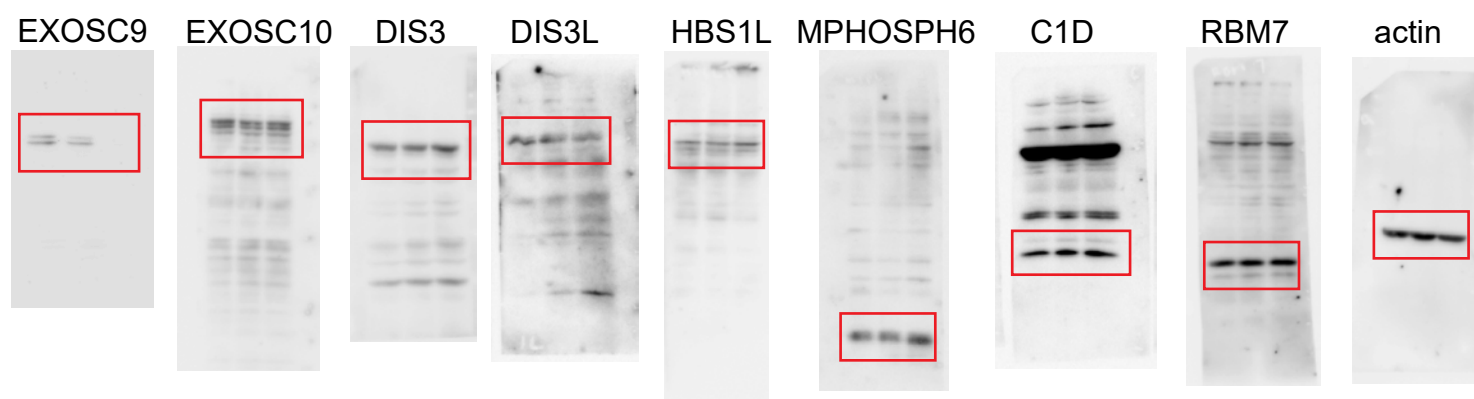


Fig. S2a  
EXOSC9

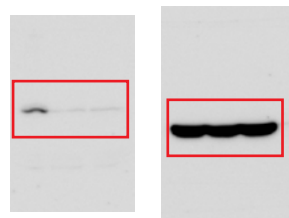


Fig. S2g  
EXOSC9

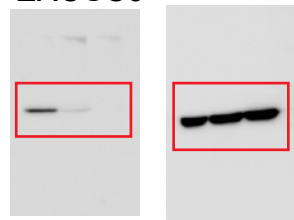


Fig. S3a  
EDC4

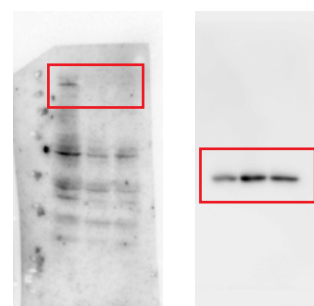


Fig. S6d

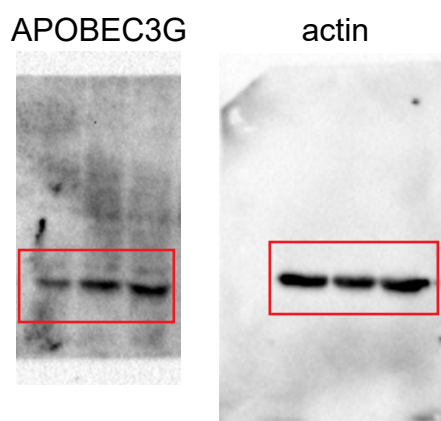


Fig. S6e

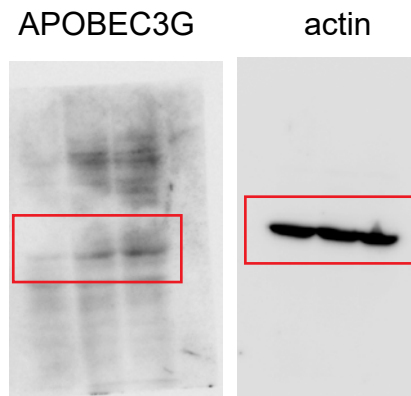
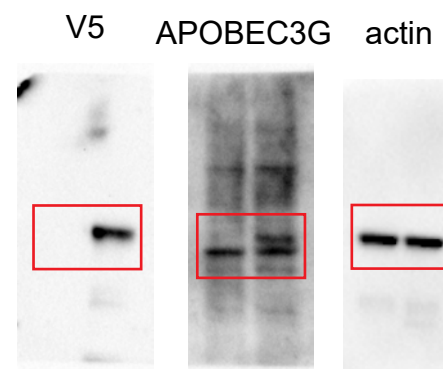


Fig. S7a



| Rank | gene     | mock#1<br>(rpkm) | mock#2<br>(rpkm) | mock#3<br>(rpkm) | WT#1<br>(rpkm) | WT#2<br>(rpkm) | WT#3<br>(rpkm) | MUT#1<br>(rpkm) | MUT#2<br>(rpkm) | MUT#3<br>(rpkm) | log2FC<br>(WT/mock) | log2FC<br>(MUT/mock) | adjusted p value<br>(mock vs WT) |  |
|------|----------|------------------|------------------|------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|---------------------|----------------------|----------------------------------|--|
| 1    | CTAG2    | 0.08             | 0.06             | 0.05             | 51.56          | 33.69          | 32.93          | 0.06            | 0.02            | 0.09            | 9.28077077          | -0.160464672         | 4.74E-63                         |  |
| 2    | GRM8     | 0.03             | 0.02             | 0.01             | 0.08           | 0.17           | 0.16           | 0.01            | 0.02            | 0.02            | 2.772589504         | -0.263034406         | 0.001885215                      |  |
| 3    | TEK      | 0.01             | 0.02             | 0.01             | 0.06           | 0.09           | 0.07           | 0.02            | 0.01            | 0.01            | 2.459431619         | 0                    | 0.016068817                      |  |
| 4    | COX7B2   | 0.29             | 0.11             | 0.33             | 1.04           | 1.17           | 1.8            | 0.23            | 0.27            | 0.38            | 2.457633868         | 0.26960706           | 0.000199703                      |  |
| 5    | PRKG1    | 0.05             | 0.04             | 0.03             | 0.16           | 0.24           | 0.24           | 0.04            | 0.05            | 0.06            | 2.415037499         | 0.321928095          | 1.90E-08                         |  |
| 6    | KCNH5    | 0.13             | 0.05             | 0.04             | 0.24           | 0.59           | 0.34           | 0.02            | 0.05            | 0.07            | 2.410933101         | -0.652076697         | 0.00024599                       |  |
| 7    | GPR87    | 0.33             | 0.3              | 0.28             | 1.19           | 1.54           | 1.88           | 0.36            | 0.34            | 0.4             | 2.3408283           | 0.273565073          | 1.13E-11                         |  |
| 8    | PDGFB    | 0.48             | 0.46             | 0.53             | 2.81           | 2.47           | 1.93           | 0.72            | 0.59            | 0.74            | 2.294183104         | 0.479807755          | 1.96E-25                         |  |
| 9    | CST1     | 13.76            | 14.53            | 15.48            | 95.68          | 58.72          | 50.09          | 16.39           | 14.64           | 12.98           | 2.224016005         | 0.007888988          | 5.32E-17                         |  |
| 10   | GTSF1    | 5.09             | 4.67             | 5.17             | 26.6           | 18.41          | 21.34          | 7.3             | 6.23            | 6.03            | 2.1518823           | 0.389692205          | 2.18E-29                         |  |
| 11   | NCAM2    | 0.11             | 0.05             | 0.07             | 0.29           | 0.37           | 0.36           | 0.1             | 0.06            | 0.07            | 2.148863386         | 0                    | 3.43E-08                         |  |
| 12   | MMP9     | 0.62             | 0.53             | 0.58             | 3.52           | 2.27           | 1.61           | 0.95            | 0.89            | 0.72            | 2.096753233         | 0.565371772          | 1.96E-09                         |  |
| 13   | EYA1     | 0.02             | 0.03             | 0.02             | 0.07           | 0.12           | 0.1            | 0.04            | 0.03            | 0.03            | 2.050626073         | 0.514573173          | 0.008551394                      |  |
| 14   | PMEPA1   | 1.6              | 1.76             | 1.66             | 6.73           | 6.94           | 6.15           | 1.92            | 1.98            | 1.98            | 1.981197693         | 0.228128791          | 2.12E-65                         |  |
| 15   | CST4     | 9.52             | 8.7              | 9.18             | 51             | 30.14          | 26.8           | 9.29            | 7.74            | 7.94            | 1.977981794         | -0.133980072         | 1.04E-12                         |  |
| 16   | KRTAP2-4 | 5.06             | 4.3              | 5.66             | 23.52          | 17.5           | 16.6           | 7.1             | 6.06            | 6.66            | 1.939684848         | 0.40007215           | 6.08E-20                         |  |
| 17   | KRTAP2-1 | 3.86             | 3.91             | 4.99             | 20.51          | 14.43          | 12.05          | 6.94            | 5.62            | 6.17            | 1.880725439         | 0.55372257           | 7.38E-13                         |  |
| 18   | CST2     | 3.94             | 4.39             | 4.32             | 20.24          | 13.78          | 11.38          | 5.11            | 4.65            | 3.05            | 1.843554913         | 0.018133091          | 4.24E-12                         |  |
| 19   | ZFPM2    | 0.19             | 0.28             | 0.14             | 0.5            | 0.8            | 0.88           | 0.2             | 0.21            | 0.34            | 1.837446987         | 0.298081353          | 2.14E-06                         |  |
| 20   | DHRS3    | 0.26             | 0.19             | 0.16             | 1.05           | 0.59           | 0.53           | 0.13            | 0.22            | 0.2             | 1.830813895         | -0.149377624         | 0.000553958                      |  |
| 21   | AKR1C1   | 0.5              | 0.57             | 0.55             | 2.11           | 1.56           | 1.61           | 0.79            | 0.65            | 0.63            | 1.704544116         | 0.353636955          | 5.97E-09                         |  |
| 22   | ARHGAP44 | 0.28             | 0.31             | 0.31             | 0.82           | 0.98           | 0.96           | 0.34            | 0.25            | 0.34            | 1.61667136          | 0.047305715          | 6.99E-14                         |  |
| 23   | AKR1C2   | 0.16             | 0.13             | 0.17             | 0.59           | 0.33           | 0.49           | 0.21            | 0.25            | 0.21            | 1.615989396         | 0.542527234          | 2.41E-05                         |  |
| 24   | ADTRP    | 0.76             | 0.99             | 1.08             | 2.88           | 2.84           | 2.87           | 1.37            | 1.2             | 1.18            | 1.601856078         | 0.406088543          | 1.61E-15                         |  |
| 25   | VNN1     | 0.35             | 0.43             | 0.4              | 1.22           | 1.06           | 1.29           | 0.57            | 0.5             | 0.62            | 1.597137215         | 0.518236387          | 4.87E-14                         |  |
| 26   | MAP3K7CL | 0.89             | 0.71             | 0.75             | 2.19           | 2.09           | 2.54           | 1.04            | 1.01            | 1.26            | 1.537110982         | 0.49417046           | 2.40E-17                         |  |
| 27   | AKR1C3   | 0.93             | 0.76             | 1.11             | 3.04           | 2.25           | 2.51           | 1.01            | 1.22            | 1.02            | 1.478047297         | 0.215012891          | 1.27E-09                         |  |
| 28   | TNFSF15  | 0.46             | 0.59             | 0.44             | 1.18           | 1.51           | 1.41           | 0.57            | 0.78            | 0.61            | 1.460311579         | 0.395541324          | 2.00E-13                         |  |
| 29   | MATK     | 0.18             | 0.26             | 0.21             | 0.75           | 0.5            | 0.53           | 0.28            | 0.35            | 0.27            | 1.453365618         | 0.469485283          | 0.000299853                      |  |
| 30   | PRAME    | 4.47             | 3.98             | 4.3              | 11.87          | 11.3           | 11.37          | 5.91            | 5               | 5.81            | 1.437770836         | 0.3910776            | 4.84E-42                         |  |
| 31   | NOS3     | 0.16             | 0.17             | 0.2              | 0.58           | 0.44           | 0.39           | 0.25            | 0.23            | 0.22            | 1.411630898         | 0.401362562          | 6.64E-06                         |  |
| 32   | RFPL4AL1 | 4.14             | 4.2              | 4.07             | 12.7           | 9.81           | 9.96           | 2.97            | 2.75            | 2.59            | 1.387604269         | -0.578582733         | 2.83E-14                         |  |
| 33   | UCN2     | 20.45            | 22.06            | 22.26            | 72.48          | 51.94          | 44.9           | 26.79           | 24.34           | 21.11           | 1.386354745         | 0.157472149          | 9.91E-11                         |  |
| 34   | KRT34    | 0.29             | 0.37             | 0.22             | 1.05           | 0.49           | 0.74           | 0.42            | 0.47            | 0.3             | 1.373458396         | 0.435386145          | 0.01224426                       |  |
| 35   | MAGEA11  | 1.31             | 1.21             | 1.15             | 3.24           | 2.88           | 3.31           | 1.82            | 1.73            | 1.58            | 1.361477708         | 0.483178763          | 5.29E-15                         |  |
| 36   | MYO16    | 0.19             | 0.16             | 0.16             | 0.45           | 0.37           | 0.47           | 0.21            | 0.16            | 0.2             | 1.338801913         | 0.160464672          | 1.01E-07                         |  |
| 37   | RFPL4A   | 4.55             | 4.47             | 4.59             | 12.75          | 10.31          | 11.06          | 3.37            | 2.89            | 2.66            | 1.32595058          | -0.609551452         | 8.77E-17                         |  |
| 38   | ARHGAP6  | 0.25             | 0.25             | 0.22             | 0.47           | 0.68           | 0.64           | 0.36            | 0.3             | 0.34            | 1.313890776         | 0.473931188          | 2.90E-07                         |  |
| 39   | TMEM204  | 0.94             | 0.92             | 0.74             | 2.55           | 1.86           | 2.03           | 1.14            | 0.78            | 0.9             | 1.308549065         | 0.117183539          | 1.39E-07                         |  |
| 40   | ANGPTL4  | 1.38             | 1.46             | 1.4              | 5.1            | 2.71           | 2.69           | 1.94            | 1.77            | 1.54            | 1.308253158         | 0.308253158          | 0.000178111                      |  |
| 41   | RND1     | 0.25             | 0.37             | 0.22             | 0.79           | 0.64           | 0.6            | 0.31            | 0.4             | 0.46            | 1.273018494         | 0.478047297          | 0.005641222                      |  |
| 42   | BHLHE40  | 8.91             | 9.06             | 8.49             | 21.48          | 22.91          | 19.01          | 9.8             | 10.72           | 9.64            | 1.260669779         | 0.188823367          | 2.90E-26                         |  |
| 43   | GABRB3   | 0.05             | 0.08             | 0.06             | 0.14           | 0.15           | 0.16           | 0.06            | 0.1             | 0.06            | 1.243925583         | 0.211504105          | 0.010304097                      |  |
| 44   | VCX3A    | 1.31             | 0.92             | 1.14             | 3.19           | 1.96           | 2.69           | 0.78            | 0.81            | 0.77            | 1.218105063         | -0.513961732         | 0.000404281                      |  |
| 45   | TFF2     | 2.22             | 2.39             | 2.41             | 8              | 3.77           | 4.48           | 2.56            | 1.57            | 2.12            | 1.210896782         | -0.167614841         | 0.002965771                      |  |
| 46   | FABP4    | 0.56             | 0.27             | 0.73             | 1.36           | 0.97           | 1.22           | 0.58            | 0.78            | 0.79            | 1.186272996         | 0.462790631          | 0.042418092                      |  |
| 47   | ZNF883   | 1.11             | 1.13             | 1.21             | 2.61           | 2.4            | 2.79           | 1.37            | 1.23            | 1.39            | 1.176877762         | 0.209792385          | 1.17E-11                         |  |
| 48   | AMH      | 3.82             | 3.35             | 4.23             | 11.54          | 6.81           | 6.93           | 4.87            | 4.14            | 4.55            | 1.148962639         | 0.250323354          | 7.73E-05                         |  |
| 49   | ACOT11   | 0.6              | 0.45             | 0.49             | 1.27           | 1.09           | 1.05           | 0.73            | 0.55            | 0.7             | 1.146841388         | 0.362570079          | 1.05E-06                         |  |
| 50   | VCX      | 2.52             | 2.03             | 2.99             | 6.3            | 4.96           | 5.4            | 2               | 1.41            | 1.52            | 1.143751972         | -0.612976877         | 1.39E-06                         |  |
| 51   | PTHLH    | 0.28             | 0.26             | 0.35             | 0.57           | 0.7            | 0.68           | 0.5             | 0.39            | 0.39            | 1.131596883         | 0.524266569          | 0.000640848                      |  |
| 52   | SHROOM4  | 0.05             | 0.06             | 0.05             | 0.08           | 0.13           | 0.14           | 0.06            | 0.06            | 0.06            | 1.129283017         | 0.169925001          | 0.018485977                      |  |
| 53   | SPTB     | 0.29             | 0.35             | 0.3              | 0.66           | 0.81           | 0.54           | 0.34            | 0.32            | 0.34            | 1.09646284          | 0.089267338          | 5.29E-06                         |  |
| 54   | DNAJC12  | 0.58             | 0.77             | 0.58             | 1.39           | 1.53           | 1.15           | 0.64            | 0.88            | 0.91            | 1.076427947         | 0.332355466          | 0.000943572                      |  |
| 55   | SERPINF2 | 0.43             | 0.48             | 0.45             | 1.17           | 0.92           | 0.75           | 0.66            | 0.52            | 0.41            | 1.062284278         | 0.225420114          | 0.001564986                      |  |
| 56   | RAB38    | 6.64             | 6.05             | 5.71             | 14.32          | 11.31          | 12.76          | 7.46            | 6.65            | 7.67            | 1.061024794         | 0.243298188          | 2.53E-11                         |  |
| 57   | ENG      | 6.48             | 7.08             | 7.81             | 17.4           | 13.8           | 12.48          | 10.34           | 9.26            | 9.47            | 1.031385948         | 0.443944163          | 2.88E-08                         |  |
| 58   | AKAP12   | 24.94            | 26.09            | 21.26            | 29.92          | 64.38          | 53.13          | 22.81           | 29.14           | 27.09           | 1.028162128         | 0.128786856          | 0.002689417                      |  |
| 59   | CDS1     | 0.13             | 0.21             | 0.18             | 0.29           | 0.38           | 0.39           | 0.24            | 0.23            | 0.15            | 1.027480736         | 0.253756592          | 0.010860132                      |  |
| 60   | HIC1     | 0.3              | 0.32             | 0.34             | 0.78           | 0.6            | 0.57           | 0.48            | 0.5             | 0.36            | 1.022367813         | 0.48112669           | 0.001255956                      |  |
| 61   | GRM5     | 0.16             | 0.18             | 0.16             | 0.21           | 0.42           | 0.38           | 0.17            | 0.17            | 0.14            | 1.014355293         | -0.058893689         | 0.016248543                      |  |
| 62   | SIRPB1   | 0.22             | 0.21             | 0.15             | 0.39           | 0.36           | 0.41           | 0.19            | 0.29            | 0.21            | 1                   | 0.250543462          | 0.004533277                      |  |
| 63   | MYOM3    | 0.14             | 0.14             | 0.08             | 0.23           | 0.26           | 0.23           | 0.12            | 0.14            | 0.15            | 1                   | 0.187627003          | 0.015855845                      |  |
| 64   | HIST1H3C | 1.63             | 1.39             | 1.56             | 3.94           | 2.81           | 2.37           | 2.28            | 1.67            | 1.83            | 0.993686226         | 0.335721894          | 0.02629922                       |  |
| 65   | PAX9     | 0.94             | 0.82             | 0.66             | 1.36           | 1.81           | 1.62           | 0.63            | 0.8             | 0.82            | 0.985018608         | -0.105082046         | 7.90E-05                         |  |
| 66   | BCL11A   | 0.66             | 0.59             | 0.68             | 1.17           | 1.36           | 1.23           | 0.76            | 0.77            | 0.84            | 0.962131814         | 0.296286212          | 6.18E-10                         |  |
| 67   | ASGR1    | 0.97             | 1.18             | 1.18             | 2.65           | 2.04           | 1.78           | 1.45            | 1.49            | 1.29            | 0.958243535         | 0.345135486          | 0.001291302                      |  |
| 68   | SBSN     | 1.82             | 1.92             | 2.3              | 4.98           | 3.49           | 3.14           | 2.89            | 2.5             | 2.2             | 0.942747518         | 0.329551336          | 0.000827365                      |  |
| 69   | TPGS1    | 2.71             | 3.66             | 3.88             | 8.88           | 5.38           | 5.12           | 3.94            | 3.26            | 3.85            | 0.                  |                      |                                  |  |

|     |           |        |        |        |         |         |         |         |        |        |             |              |             |
|-----|-----------|--------|--------|--------|---------|---------|---------|---------|--------|--------|-------------|--------------|-------------|
| 80  | BRICD5    | 0.79   | 0.6    | 0.79   | 1.63    | 1.25    | 1.09    | 1.1     | 0.67   | 0.87   | 0.864810872 | 0.276209795  | 0.049397465 |
| 81  | VCX3B     | 1.77   | 1.35   | 2.38   | 3.88    | 2.96    | 3.14    | 0.97    | 1.02   | 0.98   | 0.859608197 | -0.888968688 | 0.011355619 |
| 82  | FSTL3     | 5.28   | 5.23   | 6.08   | 12.16   | 9.04    | 8.9     | 6.32    | 5.02   | 5.52   | 0.859449601 | 0.02329065   | 1.70E-05    |
| 83  | PIK3IP1   | 0.37   | 0.37   | 0.33   | 0.76    | 0.63    | 0.55    | 0.39    | 0.34   | 0.27   | 0.858445856 | -0.097610797 | 0.019104258 |
| 84  | TMEM145   | 1.81   | 2.11   | 2.09   | 4.5     | 3.24    | 3.14    | 2.59    | 2.32   | 2.47   | 0.856241661 | 0.296255825  | 0.000663763 |
| 85  | GNB3      | 1.16   | 0.84   | 1.57   | 2.51    | 2.01    | 1.94    | 1.48    | 1.22   | 1.31   | 0.855610091 | 0.167678162  | 0.017602005 |
| 86  | LRRC26    | 3.12   | 3.75   | 4.14   | 9.58    | 5.28    | 5.06    | 3.96    | 2.3    | 3.37   | 0.855403179 | -0.193206766 | 0.033880969 |
| 87  | TNNI3     | 1.33   | 1.27   | 1.37   | 3.04    | 2.37    | 1.75    | 2.02    | 1.4    | 1.62   | 0.85082058  | 0.344284726  | 0.033723155 |
| 88  | TIMP1     | 123.73 | 123.82 | 134.68 | 302.8   | 196.16  | 188.82  | 159.6   | 140.3  | 135.32 | 0.847506149 | 0.18730384   | 0.000852037 |
| 89  | PTPRR     | 1.13   | 0.91   | 1.11   | 1.89    | 1.77    | 2       | 1.19    | 1.21   | 1.21   | 0.845450224 | 0.196647008  | 2.40E-06    |
| 90  | PRSS3     | 25.34  | 26.98  | 28.16  | 61.39   | 40.91   | 40.83   | 35.17   | 31.95  | 30.32  | 0.830623882 | 0.275883828  | 0.000426953 |
| 91  | DHRS2     | 3.26   | 3.26   | 4.07   | 7.4     | 5.84    | 5.56    | 4.43    | 4.35   | 3.97   | 0.828030073 | 0.267794658  | 0.000140656 |
| 92  | C4orf48   | 12.75  | 14.53  | 13.53  | 34.42   | 17.77   | 19.55   | 16.64   | 12.42  | 17.03  | 0.813855035 | 0.175531057  | 0.000979619 |
| 93  | BMF       | 0.28   | 0.23   | 0.23   | 0.39    | 0.46    | 0.45    | 0.29    | 0.24   | 0.22   | 0.812914447 | 0.019365325  | 0.008513871 |
| 94  | ADM5      | 1.49   | 1.95   | 2.1    | 4.37    | 2.65    | 2.66    | 2.22    | 2.31   | 2.23   | 0.805121071 | 0.28713727   | 0.028970797 |
| 95  | TRIML2    | 2.46   | 2.2    | 2.38   | 4.06    | 4.11    | 4.07    | 3.14    | 3.15   | 3.23   | 0.797956224 | 0.435386145  | 2.76E-07    |
| 96  | G0S2      | 183.85 | 182.68 | 199.16 | 399.42  | 286.4   | 294.91  | 253.38  | 221.34 | 234.79 | 0.793844342 | 0.32681135   | 3.09E-05    |
| 97  | LBH       | 0.99   | 1.1    | 0.98   | 1.63    | 1.92    | 1.76    | 0.75    | 0.99   | 0.89   | 0.790473205 | -0.223175856 | 3.21E-05    |
| 98  | MTSS1     | 0.34   | 0.3    | 0.28   | 0.42    | 0.54    | 0.63    | 0.26    | 0.32   | 0.23   | 0.789320999 | -0.183711953 | 0.013908554 |
| 99  | TFFI2     | 16.44  | 15.74  | 17.86  | 29.67   | 28.01   | 28.73   | 19.35   | 18.91  | 19.87  | 0.788116492 | 0.216201119  | 3.76E-14    |
| 100 | FOSB      | 1.02   | 1.05   | 1.01   | 2.01    | 1.77    | 1.51    | 1.71    | 1.25   | 1.15   | 0.780337371 | 0.416208043  | 0.000121842 |
| 101 | CTSS      | 2.71   | 2.81   | 2.66   | 4.14    | 4.58    | 5.23    | 3.55    | 3.47   | 3.51   | 0.770092374 | 0.364332688  | 3.69E-07    |
| 102 | MARCKSL1  | 54.14  | 50.44  | 59.47  | 111.16  | 82.61   | 85.15   | 64.69   | 58.55  | 61.37  | 0.765715793 | 0.17034511   | 3.92E-05    |
| 103 | TAGLN3    | 9.21   | 9.33   | 11.25  | 20.34   | 15.24   | 15.06   | 12.19   | 11.1   | 11.73  | 0.765449281 | 0.23335096   | 0.00030725  |
| 104 | RAC3      | 16.16  | 17.22  | 18.73  | 40.21   | 25.18   | 23.16   | 20.65   | 19.61  | 18.17  | 0.764932052 | 0.165149035  | 0.013673719 |
| 105 | C19orf24  | 27.88  | 26.93  | 33.51  | 70.25   | 42.05   | 37.54   | 34.72   | 29.17  | 31.78  | 0.762610727 | 0.115326426  | 0.032580656 |
| 106 | RBPMS     | 2.1    | 1.92   | 1.96   | 4       | 3.19    | 2.92    | 2.44    | 2.12   | 2.45   | 0.757565608 | 0.22926896   | 0.000149417 |
| 107 | ARID3A    | 2.66   | 2.64   | 3.03   | 5.34    | 4.63    | 4.06    | 2.86    | 2.64   | 2.74   | 0.752126608 | -0.015672158 | 4.71E-05    |
| 108 | LINC00458 | 0.91   | 1.29   | 0.99   | 2.12    | 1.54    | 1.68    | 1.46    | 1.48   | 1.35   | 0.743283318 | 0.427421224  | 0.0330059   |
| 109 | PRR22     | 1.73   | 2.01   | 2.19   | 4.46    | 2.88    | 2.58    | 2.66    | 2.49   | 2.54   | 0.742308016 | 0.374951493  | 0.046614469 |
| 110 | VGF       | 3.23   | 2.96   | 3.49   | 6.87    | 4.63    | 4.67    | 3.83    | 3.48   | 3.43   | 0.740240726 | 0.149915041  | 0.004285166 |
| 111 | MAGEB2    | 1.12   | 1.11   | 1.01   | 1.71    | 1.82    | 1.87    | 1.49    | 1.58   | 1.48   | 0.736965594 | 0.489872732  | 0.002419228 |
| 112 | APC2      | 0.5    | 0.47   | 0.5    | 0.95    | 0.77    | 0.72    | 0.5     | 0.46   | 0.46   | 0.731064993 | -0.049925225 | 0.000310951 |
| 113 | ABHD17A   | 40.14  | 42.17  | 46.94  | 97.44   | 58.62   | 58.42   | 50.48   | 39.98  | 44.27  | 0.730678844 | 0.059906847  | 0.017484275 |
| 114 | PNPLA7    | 0.18   | 0.25   | 0.24   | 0.39    | 0.38    | 0.34    | 0.24    | 0.17   | 0.22   | 0.728326676 | -0.088809267 | 0.048529823 |
| 115 | CISH      | 0.73   | 0.88   | 0.71   | 1.55    | 1.2     | 1.09    | 1.01    | 0.92   | 1.02   | 0.726981506 | 0.346590149  | 0.021635201 |
| 116 | GBP5      | 1.19   | 1.46   | 1.22   | 2.12    | 2.02    | 2.26    | 1.21    | 1.3    | 1.23   | 0.725738339 | -0.049295296 | 3.79E-05    |
| 117 | MCOLN3    | 0.94   | 0.91   | 0.83   | 1.11    | 1.52    | 1.78    | 1.05    | 1.17   | 1.2    | 0.718545655 | 0.351763324  | 0.021923963 |
| 118 | LSM7      | 83.21  | 88.76  | 90.44  | 193.59  | 119.23  | 118.48  | 104.63  | 89.15  | 95.17  | 0.716869016 | 0.13899717   | 0.013801188 |
| 119 | IFFO1     | 0.65   | 0.55   | 0.62   | 1.18    | 0.88    | 0.93    | 0.83    | 0.81   | 0.76   | 0.716207034 | 0.399095955  | 0.017767416 |
| 120 | RNF126P1  | 2.04   | 1.74   | 1.78   | 3.32    | 2.7     | 3.09    | 2.04    | 1.47   | 2.01   | 0.712366171 | -0.010416616 | 0.002468004 |
| 121 | SPSB1     | 5.71   | 6.07   | 6.21   | 11.08   | 8.98    | 9.3     | 6.86    | 6.11   | 6.81   | 0.706656782 | 0.13684724   | 2.01E-06    |
| 122 | ADAT3     | 2.53   | 3.18   | 3.31   | 6.55    | 4.14    | 3.97    | 3.5     | 2.63   | 3.15   | 0.700685765 | 0.040997372  | 0.047483629 |
| 123 | CD96      | 0.67   | 0.52   | 0.51   | 0.93    | 0.87    | 0.96    | 0.42    | 0.56   | 0.49   | 0.699133521 | -0.209718591 | 0.004003881 |
| 124 | RGCC      | 4.45   | 4.45   | 4.7    | 9.06    | 5.82    | 7.18    | 4.45    | 4.8    | 4.66   | 0.697826139 | 0.032515768  | 0.007883837 |
| 125 | RAP1GAP2  | 5.41   | 5.68   | 5.17   | 8.11    | 9.71    | 8.49    | 6.02    | 5.86   | 5.9    | 0.694283991 | 0.128928067  | 5.79E-08    |
| 126 | HES1      | 6.09   | 6.46   | 5.97   | 10.73   | 9.68    | 9.54    | 7.27    | 7.22   | 6.98   | 0.693471904 | 0.213238093  | 2.21E-07    |
| 127 | RPS15     | 859.15 | 864.38 | 957.21 | 1949.51 | 1171.46 | 1214.23 | 1026.42 | 874.57 | 911.8  | 0.69346725  | 0.069370545  | 0.019487126 |
| 128 | SLC39A3   | 8.56   | 9.01   | 9.54   | 19.61   | 12.25   | 11.94   | 10.1    | 8.64   | 9.17   | 0.692105757 | 0.01957011   | 0.019295674 |
| 129 | OCIAD2    | 55.21  | 52.56  | 57.91  | 101.56  | 75.93   | 89.33   | 66.52   | 65.66  | 62.16  | 0.687467352 | 0.230183415  | 4.16E-05    |
| 130 | CPNE5     | 1.43   | 1.51   | 1.52   | 2.8     | 2.24    | 2.14    | 2.13    | 1.84   | 1.89   | 0.686940134 | 0.393856955  | 0.000640071 |
| 131 | NDUFS7    | 48.51  | 50.24  | 55.71  | 112.55  | 69.56   | 66.46   | 62.83   | 50.8   | 53.47  | 0.686418911 | 0.113478457  | 0.028680275 |
| 132 | SUN3      | 2.37   | 1.98   | 2.24   | 3.67    | 3.34    | 3.56    | 3.13    | 2.51   | 2.2    | 0.681625006 | 0.250575189  | 0.003096019 |
| 133 | HIST1H2BL | 7.59   | 8.63   | 7.77   | 14.81   | 11.61   | 11.98   | 11.74   | 11.92  | 10.28  | 0.678673153 | 0.500553407  | 0.002025465 |
| 134 | JUNB      | 31.44  | 31.26  | 33.88  | 63.81   | 45.09   | 45.12   | 39.66   | 35.67  | 34.9   | 0.673321333 | 0.19072055   | 0.001868363 |
| 135 | TFR2      | 1.62   | 1.7    | 1.91   | 3.38    | 2.58    | 2.38    | 2.07    | 1.69   | 1.83   | 0.673236437 | 0.096037337  | 0.0055459   |
| 136 | HHIP      | 1.76   | 1.69   | 1.6    | 2.63    | 2.77    | 2.64    | 1.51    | 1.91   | 1.58   | 0.670912114 | -0.014355293 | 2.01E-06    |
| 137 | FURIN     | 14.34  | 14.48  | 14.54  | 25.58   | 22.6    | 20.69   | 17.46   | 16.21  | 16.58  | 0.66751092  | 0.21275884   | 2.81E-07    |
| 138 | GPR85     | 0.26   | 0.24   | 0.3    | 0.45    | 0.47    | 0.35    | 0.41    | 0.37   | 0.38   | 0.666756592 | 0.5360529    | 0.038915525 |
| 139 | HMGN3     | 11.28  | 10.94  | 12.34  | 19.17   | 17.76   | 17.86   | 16.76   | 15.97  | 15.76  | 0.664809386 | 0.488584036  | 2.34E-08    |
| 140 | ARRB2     | 14.65  | 14.98  | 15.81  | 27.82   | 21.66   | 22.34   | 19.45   | 17.25  | 18.01  | 0.660422818 | 0.267841721  | 5.40E-05    |
| 141 | TRIM9     | 0.42   | 0.48   | 0.41   | 0.65    | 0.71    | 0.71    | 0.61    | 0.5    | 0.6    | 0.660063956 | 0.384429513  | 0.001471101 |
| 142 | BCL2A1    | 16.1   | 15.12  | 16.71  | 27.28   | 21.68   | 26.63   | 16.16   | 16.8   | 18.75  | 0.657266449 | 0.109514365  | 6.10E-05    |
| 143 | DUSP2     | 4.02   | 3.94   | 4.55   | 8.29    | 5.43    | 5.98    | 4.6     | 4.18   | 4.75   | 0.65511384  | 0.11308005   | 0.015682208 |
| 144 | LOC154761 | 0.64   | 0.64   | 0.6    | 0.88    | 1.12    | 0.96    | 0.84    | 0.51   | 0.81   | 0.654864514 | 0.20029865   | 0.024593877 |
| 145 | BTBD2     | 19.46  | 19.4   | 21.26  | 40.91   | 27.97   | 25.72   | 23.16   | 20.21  | 21.55  | 0.653995174 | 0.110817991  | 0.013801188 |
| 146 | MFSD12    | 22.72  | 24.47  | 24.74  | 47.07   | 33.96   | 32.09   | 27.25   | 24.31  | 25.33  | 0.653188516 | 0.096202375  | 0.003718725 |
| 147 | SLC25A45  | 0.56   | 0.58   | 0.69   | 0.98    | 1.01    | 0.88    | 0.74    | 0.76   | 0.65   | 0.649207088 | 0.232493011  | 0.007994589 |
| 148 | DOHH      | 13.92  | 14.42  | 15.74  | 29.82   | 20.52   | 18.79   | 19.31   | 14.62  | 14.93  | 0.649187702 | 0.14852964   | 0.016017801 |
| 149 | CACNA2D4  | 3.56   | 3.55   | 3.66   | 6.48    | 5.2     | 5.21    | 4.42    | 3.95   | 3.96   | 0.649151078 | 0.19515455   | 3.98E-05    |
| 150 | CXCL16    | 1.51   | 1.62   | 1.55   | 2.68    | 2.41    | 2.24    | 1.59    | 1.38   | 1.43   | 0.647304669 | -0.089005006 | 0.000653656 |
| 151 | RNF126    | 50.19  | 49.2   | 54.76  | 103     | 71.67   | 66.45   | 59.38   | 49.59  | 54.07  | 0.645416433 | 0.080891067  | 0.010848219 |
| 152 | CDC34     | 43.2   | 45.82  | 47.96  | 89.98   | 61.89   | 61.18   | 52.8    | 44.87  | 48.51  | 0.637226786 | 0.093780673  | 0.007975195 |
| 153 | QPCT      | 3.57   | 3.62   | 3.77   | 6.15    | 5.7     | 5.16    | 3.63    | 3.87   | 4.35   | 0.634135343 | 0.112639261  | 6.55E-05    |
| 154 | SPHK1     | 20.06  | 20.08  | 22.16  | 41.98   | 27.71   | 26.87   | 24.5    | 20.93  | 23.23  | 0.632193513 | 0.140237694  | 0.020847052 |
| 155 | SYTL3     | 0.83   | 0.97   | 0.9    | 1.41    | 1.52    | 1.25    | 1.08    | 1.08   | 1.12   | 0.630543535 | 0.280736408  | 0.007365423 |
| 156 | ZNF775    | 1.25   | 1.52   | 1.2    | 2.36    | 2.01    | 1.77    | 1.67    | 1.45   | 1.49   | 0.629099648 | 0.215627743  | 0.018405655 |
| 157 | CASC8     | 14.55  | 13.93  | 15.95  | 28.66   | 19.59   | 20.28   | 14.38   | 14.05  | 15.24  | 0.625201546 | -0.02489161  | 0.009581627 |
| 158 | CDKN1A    | 44.06  | 45.22  | 47.11  | 81.45   | 64.72   | 64.13   | 53.66   | 50.78  | 51.13  | 0.624710979 | 0.189826008  | 8.07E-05    |
| 159 | MBD3      | 57.25  | 60.03  | 65.11  | 122.2   | 81.16   | 77.75   | 69.56   | 58.71  | 63.24  | 0.624108144 | 0.070393095  | 0.023170856 |
| 160 | EFNB3     | 1.14   | 1.3    | 1.18   | 2.05    | 1.86    | 1.65    | 1.42    | 1.13   | 1.36   | 0.619095186 | 0.11117891   | 0.002830918 |

|     |             |         |         |         |         |         |         |         |         |         |             |              |             |
|-----|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------------|--------------|-------------|
| 161 | CSNK1G2     | 29.43   | 28.87   | 31.03   | 54.9    | 40.5    | 41.66   | 33.62   | 30.38   | 32.31   | 0.617590925 | 0.108540841  | 0.001170477 |
| 162 | SMAD7       | 1.3     | 1.34    | 1.3     | 2.22    | 2.03    | 1.78    | 1.69    | 1.79    | 1.75    | 0.613962372 | 0.408615317  | 0.001205722 |
| 163 | PLAU        | 105.79  | 110.8   | 108.59  | 175.76  | 161.29  | 159.36  | 116.23  | 112.19  | 114.18  | 0.61029365  | 0.075286623  | 1.01E-10    |
| 164 | NUMBL       | 10.44   | 10.62   | 11.46   | 20.11   | 15.64   | 13.89   | 10.97   | 11.02   | 10.7    | 0.610175858 | 0.00752212   | 0.004270247 |
| 165 | NR4A1       | 1.89    | 1.95    | 2.07    | 3.23    | 3       | 2.79    | 2.12    | 2.16    | 2.15    | 0.609969303 | 0.121660607  | 3.84E-05    |
| 166 | R3HDM4      | 32.05   | 30.8    | 32.11   | 58.37   | 43.29   | 43.25   | 36.33   | 34.14   | 33.04   | 0.609765316 | 0.124378312  | 0.001723877 |
| 167 | GSG1        | 0.62    | 0.68    | 0.61    | 1.05    | 0.84    | 1.02    | 0.7     | 0.77    | 0.74    | 0.607446515 | 0.210473731  | 0.029722324 |
| 168 | TNFSF13     | 1.38    | 1.47    | 1.64    | 2.48    | 2.35    | 1.99    | 1.81    | 1.73    | 1.77    | 0.603056294 | 0.241996416  | 0.007338021 |
| 169 | POLRMT      | 22.3    | 22.82   | 23.88   | 42.75   | 32.59   | 29.43   | 26.05   | 21.95   | 23.95   | 0.602557406 | 0.060398325  | 0.004663571 |
| 170 | MTRNR2L6    | 5.37    | 4.53    | 4.73    | 8.13    | 6       | 8       | 6.2     | 5.44    | 4.56    | 0.597073682 | 0.147064044  | 0.011353806 |
| 171 | UQCR11      | 51.06   | 53.06   | 53.76   | 100.07  | 67.71   | 70.89   | 60.08   | 48.53   | 52.57   | 0.596188812 | 0.029844314  | 0.011388067 |
| 172 | PLA2G4A     | 1.79    | 2.04    | 1.9     | 2.54    | 2.98    | 3.13    | 2.16    | 1.99    | 2.06    | 0.594164994 | 0.116058129  | 0.001640586 |
| 173 | EMBP1       | 1.45    | 1.29    | 1.47    | 1.92    | 2.13    | 2.3     | 1.58    | 1.68    | 1.72    | 0.592936359 | 0.242325509  | 0.000779023 |
| 174 | C9orf116    | 5.59    | 5.44    | 6.06    | 10.47   | 7.63    | 7.63    | 5.29    | 5.16    | 5.12    | 0.59029906  | -0.134383453 | 0.02399303  |
| 175 | BSG         | 219.18  | 219.08  | 235.52  | 425.52  | 291.87  | 295.01  | 255.03  | 226.4   | 228.08  | 0.587429902 | 0.074545413  | 0.013673719 |
| 176 | HMG20B      | 27.67   | 31.12   | 32.6    | 57.73   | 39.94   | 39.58   | 34.09   | 30.17   | 31.02   | 0.586697932 | 0.060137101  | 0.021505329 |
| 177 | HAPLN3      | 4.4     | 5.37    | 5.02    | 8.92    | 6.94    | 6.33    | 5.94    | 5.25    | 5.75    | 0.585287615 | 0.195811822  | 0.015647757 |
| 178 | MEX3D       | 10.59   | 10.28   | 10.99   | 18.79   | 14.31   | 14.69   | 11.05   | 9.86    | 11      | 0.584962501 | 0.002262342  | 0.00123693  |
| 179 | NEDD9       | 0.31    | 0.27    | 0.32    | 0.42    | 0.49    | 0.44    | 0.38    | 0.36    | 0.33    | 0.584962501 | 0.24961389   | 0.040434293 |
| 180 | HHIP-AS1    | 1.81    | 1.76    | 2.1     | 2.77    | 2.61    | 3.12    | 2.78    | 2.12    | 2.13    | 0.584114106 | 0.310175954  | 0.025874693 |
| 181 | PIGL        | 4.34    | 4.01    | 4.65    | 7.23    | 6.05    | 6.18    | 5.55    | 4.78    | 4.63    | 0.582000087 | 0.202598552  | 0.002406321 |
| 182 | MT2A        | 1261.74 | 1186.94 | 1394.58 | 2483.69 | 1629.88 | 1635.22 | 1624.89 | 1471.81 | 1485.01 | 0.580927752 | 0.253555567  | 0.037076793 |
| 183 | MRPS2       | 116.23  | 116.83  | 133.9   | 234.57  | 160.1   | 153.73  | 140.64  | 123.09  | 123.33  | 0.579605759 | 0.07693441   | 0.031906264 |
| 184 | CEBPA       | 2.55    | 2.76    | 2.63    | 4.73    | 3.41    | 3.72    | 3.02    | 2.47    | 2.88    | 0.578893097 | 0.076088615  | 0.010050509 |
| 185 | RGS7        | 1.87    | 1.56    | 1.39    | 2.26    | 2.49    | 2.44    | 1.62    | 1.68    | 1.97    | 0.576958624 | 0.128769815  | 0.010050509 |
| 186 | IER2        | 37.91   | 39.11   | 40.55   | 66.29   | 54.72   | 54.26   | 44.08   | 41.9    | 43.96   | 0.5760591   | 0.144325632  | 6.55E-05    |
| 187 | TM4SF1      | 71.91   | 70.33   | 75.67   | 114.22  | 98.73   | 111.18  | 74.51   | 73.16   | 73.84   | 0.572840152 | 0.023639426  | 9.85E-07    |
| 188 | SERTAD4-AS1 | 8.44    | 8.92    | 9.52    | 16.56   | 10.6    | 12.82   | 10.6    | 9.37    | 9.76    | 0.572745334 | 0.145386325  | 0.041309984 |
| 189 | DNAJB2      | 5.84    | 6.29    | 6.28    | 10.89   | 8.5     | 7.99    | 7.27    | 6.79    | 6.96    | 0.57263282  | 0.191273043  | 0.004292891 |
| 190 | DHRS7       | 6.83    | 6.86    | 6.53    | 10.85   | 9.48    | 9.72    | 6.94    | 7.32    | 7.71    | 0.571581994 | 0.119751873  | 5.07E-05    |
| 191 | SGTA        | 82.68   | 81.21   | 91.94   | 152.83  | 115.27  | 111.82  | 97.96   | 85.14   | 86.03   | 0.570510209 | 0.073117765  | 0.005434029 |
| 192 | HEY1        | 0.79    | 0.79    | 0.81    | 1.1     | 1.06    | 1.38    | 0.81    | 0.96    | 0.84    | 0.566738742 | 0.127039189  | 0.046522399 |
| 193 | PPAP2C      | 9.11    | 9.09    | 9.72    | 16.82   | 11.97   | 12.47   | 11.35   | 10.68   | 10.3    | 0.56344488  | 0.211574566  | 0.012923899 |
| 194 | MIER2       | 9.95    | 10.62   | 11.18   | 19.26   | 14.26   | 13.36   | 12.04   | 11.11   | 10.99   | 0.562215978 | 0.104706466  | 0.015413671 |
| 195 | NR1D1       | 4.96    | 4.64    | 5.1     | 8.5     | 7.07    | 6.13    | 5.74    | 5.19    | 5.14    | 0.561878888 | 0.128553774  | 0.006224803 |
| 196 | NRARP       | 7.04    | 7.06    | 7.13    | 10.95   | 9.79    | 10.54   | 7.39    | 7.21    | 7.23    | 0.559136141 | 0.040207759  | 9.12E-07    |

Supplementary Table S1. 196 overrepresented genes in WT EXOSC9-expressing EXOSC9 KD MDA-MB-231.

| Rank | gene     | mock#1<br>(rpkm) | mock#2<br>(rpkm) | mock#3<br>(rpkm) | WT#1<br>(rpkm) | WT#2<br>(rpkm) | WT#3<br>(rpkm) | MUT#1<br>(rpkm) | MUT#2<br>(rpkm) | MUT#3<br>(rpkm) | log2FC<br>(WT/mock) | log2FC<br>(MUT/mock) | adjusted p value<br>(mock vs WT) |
|------|----------|------------------|------------------|------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|---------------------|----------------------|----------------------------------|
| 1    | ALDH1A1  | 0.1              | 0.07             | 0.11             | 0              | 0              | 0              | 0.1             | 0.11            | 0.12            | -infinity           | 0.237039197          | 0.008104523                      |
| 1    | RNF43    | 0.05             | 0.05             | 0.03             | 0              | 0              | 0              | 0.03            | 0.04            | 0.03            | -infinity           | -0.378511623         | 0.021923963                      |
| 1    | ZCCHC5   | 0.08             | 0.12             | 0.03             | 0              | 0              | 0              | 0.04            | 0.04            | 0.09            | -infinity           | -0.436099115         | 0.002364035                      |
| 1    | ZSCAN23  | 0.08             | 0.03             | 0.07             | 0              | 0              | 0              | 0.04            | 0.06            | 0.03            | -infinity           | -0.469485283         | 0.018970747                      |
| 5    | KLHL29   | 12.85            | 12.74            | 11.47            | 7.03           | 8.67           | 8.54           | 10.83           | 11.23           | 11.09           | -0.612473183        | -0.160854011         | 0.000298912                      |
| 6    | CELSR2   | 3.34             | 3.29             | 2.65             | 1.7            | 2.38           | 1.98           | 2.52            | 2.35            | 2.51            | -0.614807012        | -0.330503989         | 0.016708655                      |
| 7    | ZNF669   | 4.88             | 4.98             | 4.27             | 2.55           | 3.16           | 3.51           | 3.92            | 4.42            | 4.4             | -0.61592281         | -0.149396188         | 0.012458474                      |
| 8    | NRG1     | 10.03            | 10.4             | 9                | 5.94           | 6.74           | 6.51           | 7.27            | 7.94            | 7.78            | -0.616932831        | -0.356281076         | 1.02E-05                         |
| 9    | MAMLD1   | 8.08             | 8.62             | 7.64             | 4.22           | 6.07           | 5.58           | 7.22            | 7.33            | 7.35            | -0.61702704         | -0.152398298         | 0.009292423                      |
| 10   | HTRA3    | 1.69             | 1.67             | 1.83             | 1.37           | 1.12           | 0.89           | 1.81            | 1.43            | 1.62            | -0.618711292        | -0.094778225         | 0.043596164                      |
| 11   | PIR      | 2.99             | 3.35             | 3.43             | 2.42           | 1.94           | 2              | 2.83            | 3.39            | 3.07            | -0.619331797        | -0.072679966         | 0.013685768                      |
| 12   | SLCO3A1  | 1.95             | 2.15             | 1.83             | 1.25           | 1.32           | 1.29           | 1.6             | 1.58            | 1.57            | -0.619431257        | -0.320104591         | 0.00021271                       |
| 13   | NR1H3    | 2.49             | 2.85             | 2.86             | 2.08           | 1.68           | 1.56           | 3.07            | 2.67            | 2.4             | -0.624197664        | -0.010595115         | 0.01585845                       |
| 14   | OSR1     | 3.92             | 3.87             | 3.91             | 2.84           | 2.23           | 2.52           | 3.47            | 3.12            | 2.87            | -0.624336739        | -0.306596441         | 0.002664848                      |
| 15   | GNE      | 8.36             | 8.88             | 7.81             | 4.5            | 5.78           | 5.94           | 7               | 7.4             | 7.35            | -0.627036784        | -0.203795202         | 0.001784259                      |
| 16   | ARMCX2   | 10.07            | 10.66            | 11.73            | 6.78           | 7.33           | 6.83           | 11.17           | 12.76           | 11.83           | -0.632401558        | 0.139683737          | 5.93E-06                         |
| 17   | TCEAL8   | 8.21             | 8.37             | 8.44             | 5.33           | 5.11           | 5.7            | 9.15            | 9.11            | 9.52            | -0.632441211        | 0.15096481           | 5.26E-05                         |
| 18   | ANKRD1   | 469.11           | 457.55           | 490.59           | 269.95         | 309.49         | 334.02         | 423.51          | 439.75          | 449.97          | -0.633680809        | -0.109974656         | 1.48E-05                         |
| 19   | TMC5     | 1.1              | 1.03             | 1.16             | 0.56           | 0.82           | 0.74           | 0.76            | 0.92            | 0.78            | -0.634023319        | -0.419429268         | 0.02384625                       |
| 20   | IL2RB    | 3.03             | 3.56             | 3.57             | 2.15           | 2.45           | 1.94           | 3.63            | 3.52            | 3.15            | -0.635537861        | 0.019743935          | 0.001911731                      |
| 21   | SCIN     | 1.19             | 1.25             | 1.04             | 0.7            | 0.74           | 0.8            | 0.93            | 0.99            | 1.01            | -0.635588574        | -0.248186641         | 0.015047984                      |
| 22   | CLIP4    | 8.47             | 8.5              | 7.36             | 3.89           | 5.83           | 5.94           | 6.3             | 6.87            | 6.79            | -0.635652108        | -0.2856246           | 0.028695056                      |
| 23   | SPTLC2   | 11.14            | 11.09            | 9.3              | 5.25           | 7.65           | 7.37           | 8.17            | 9.36            | 9.51            | -0.637379081        | -0.221630018         | 0.016042454                      |
| 24   | OAS3     | 11.79            | 12.26            | 10.75            | 6.44           | 8.41           | 7.51           | 10.61           | 10.99           | 10.56           | -0.638167118        | -0.1138199           | 0.000436835                      |
| 25   | CPS1     | 0.62             | 0.67             | 0.61             | 0.35           | 0.4            | 0.47           | 0.56            | 0.54            | 0.58            | -0.639118271        | -0.177538186         | 0.02409331                       |
| 26   | ZFYVE28  | 1.28             | 1.35             | 1.22             | 0.92           | 0.8            | 0.75           | 1.09            | 1.19            | 1.02            | -0.640347404        | -0.222392421         | 0.001471101                      |
| 27   | DPF3     | 1.2              | 1.35             | 1.16             | 0.79           | 0.83           | 0.76           | 0.95            | 1               | 1.11            | -0.640457613        | -0.277887534         | 0.001724457                      |
| 28   | SUSD1    | 6                | 6.25             | 5.86             | 3.71           | 4.07           | 3.83           | 5.13            | 5.81            | 5.12            | -0.641418574        | -0.173314653         | 8.62E-07                         |
| 29   | OPN3     | 4.77             | 4.84             | 3.95             | 2.5            | 3.26           | 2.93           | 3.4             | 4.03            | 4.14            | -0.641929096        | -0.228968314         | 0.004686538                      |
| 30   | PARDB6B  | 1.54             | 1.51             | 1.29             | 0.85           | 0.91           | 1.02           | 1.39            | 1.31            | 1.3             | -0.64261016         | -0.117695043         | 0.003904483                      |
| 31   | NPC1     | 20.73            | 20.52            | 18.55            | 10.64          | 14.91          | 12.73          | 17.88           | 18.34           | 18.14           | -0.643554655        | -0.137600028         | 0.002232276                      |
| 32   | LAMA5    | 12.47            | 13.31            | 11.94            | 8.53           | 8.34           | 7.26           | 11.49           | 10.7            | 10.75           | -0.64450176         | -0.195489121         | 3.33E-06                         |
| 33   | CPA4     | 2.81             | 3.09             | 2.87             | 1.68           | 1.7            | 2.23           | 2.86            | 2.52            | 2.74            | -0.644576072        | -0.111097115         | 0.007867639                      |
| 34   | CADM1    | 9.27             | 9.3              | 8.2              | 4.17           | 6.61           | 6.34           | 7.27            | 8.73            | 8.03            | -0.644934437        | -0.155780491         | 0.032216496                      |
| 35   | PPAPDC1  | 6.94             | 5.89             | 7.51             | 5.21           | 3.83           | 3.96           | 6.18            | 5.37            | 5.85            | -0.645808056        | -0.225232373         | 0.018405655                      |
| 36   | P3H2     | 32.28            | 31.6             | 32.04            | 18.88          | 20.41          | 21.92          | 29.25           | 29.21           | 31.25           | -0.648064291        | -0.096562847         | 2.95E-08                         |
| 37   | EVI2A    | 11.99            | 11.88            | 13.48            | 7.77           | 7.49           | 8.56           | 9.88            | 10.67           | 10.49           | -0.64893483         | -0.266979685         | 8.48E-06                         |
| 38   | FAM133A  | 1.28             | 1.12             | 1.16             | 0.7            | 0.76           | 0.81           | 1.02            | 1.15            | 1.19            | -0.649184944        | -0.083416008         | 0.008625393                      |
| 39   | TMEM38A  | 6.65             | 6.28             | 7.08             | 4.36           | 3.81           | 4.58           | 5.57            | 4.99            | 5.84            | -0.65022392         | -0.287025352         | 0.000372187                      |
| 40   | SHC3     | 2.92             | 2.95             | 2.33             | 1.33           | 2.08           | 1.8            | 2.19            | 2.5             | 2.36            | -0.654340537        | -0.218000652         | 0.030979619                      |
| 41   | BDNF     | 1.22             | 1.33             | 1.31             | 0.73           | 0.8            | 0.92           | 1.29            | 1.19            | 1.29            | -0.655819098        | -0.034036324         | 0.000680567                      |
| 42   | TNK1     | 0.85             | 0.91             | 0.84             | 0.55           | 0.55           | 0.55           | 0.87            | 0.69            | 0.81            | -0.656045599        | -0.133624564         | 0.026045804                      |
| 43   | BMP4     | 10.34            | 10.96            | 12.06            | 8.21           | 6.67           | 6.29           | 11.35           | 10.25           | 10.68           | -0.656098019        | -0.04747871          | 0.00137471                       |
| 44   | IFIT3    | 23.02            | 23.17            | 22.8             | 14.86          | 13.31          | 15.6           | 19.63           | 20.73           | 19.2            | -0.656444877        | -0.212043507         | 2.16E-07                         |
| 45   | MTUS1    | 2.06             | 1.98             | 1.79             | 0.95           | 1.51           | 1.23           | 1.45            | 1.86            | 1.75            | -0.659875067        | -0.204358499         | 0.020581834                      |
| 46   | HIP1     | 2.59             | 2.81             | 2.47             | 1.27           | 2.03           | 1.68           | 2.26            | 2.54            | 2.41            | -0.660217893        | -0.126364376         | 0.0218192                        |
| 47   | DISC1    | 0.88             | 0.77             | 0.66             | 0.39           | 0.57           | 0.5            | 0.63            | 0.71            | 0.63            | -0.661924483        | -0.229697222         | 0.031914427                      |
| 48   | BAHCC1   | 3.73             | 3.94             | 3.63             | 2.25           | 2.57           | 2.31           | 3.52            | 3.39            | 3.3             | -0.664348791        | -0.146339906         | 2.08E-07                         |
| 49   | ADAP2    | 0.95             | 0.89             | 1.1              | 0.64           | 0.64           | 0.57           | 1.06            | 1.09            | 0.98            | -0.668290884        | 0.090346502          | 0.033028653                      |
| 50   | CASZ1    | 0.8              | 0.72             | 0.74             | 0.52           | 0.46           | 0.44           | 0.64            | 0.6             | 0.57            | -0.670431843        | -0.320333075         | 0.000886749                      |
| 51   | KCNN3    | 0.6              | 0.58             | 0.54             | 0.36           | 0.38           | 0.34           | 0.47            | 0.53            | 0.42            | -0.671377253        | -0.276517635         | 0.000163856                      |
| 52   | SH3TC1   | 0.71             | 0.88             | 0.8              | 0.51           | 0.58           | 0.41           | 0.63            | 0.55            | 0.6             | -0.672048117        | -0.425133377         | 0.043778122                      |
| 53   | IDS      | 28.69            | 28.85            | 26.32            | 13.93          | 19.95          | 18.72          | 23.62           | 26.87           | 25.34           | -0.672920031        | -0.145214107         | 0.002386028                      |
| 54   | HCAR1    | 1.69             | 1.88             | 1.78             | 0.93           | 1.09           | 1.33           | 1.52            | 1.62            | 1.66            | -0.675377796        | -0.156504486         | 0.011869898                      |
| 55   | SPEG     | 0.36             | 0.33             | 0.38             | 0.26           | 0.19           | 0.22           | 0.29            | 0.34            | 0.31            | -0.675377796        | -0.186878135         | 0.013783708                      |
| 56   | MORC4    | 9.35             | 9.32             | 9.31             | 5.05           | 6.06           | 6.41           | 7.33            | 7.49            | 7.86            | -0.675393188        | -0.302975322         | 2.32E-05                         |
| 57   | GPC1     | 9.39             | 10.1             | 10.81            | 7.63           | 5.9            | 5.41           | 10.36           | 8.82            | 8.86            | -0.677881463        | -0.111831444         | 0.003002709                      |
| 58   | LINC0070 | 1.91             | 1.63             | 1.87             | 1.13           | 1.06           | 1.19           | 1.56            | 1.71            | 1.69            | -0.678605348        | -0.125288473         | 0.00181528                       |
| 59   | TRIM61   | 2.64             | 2.86             | 2.77             | 1.51           | 1.73           | 1.92           | 2.44            | 2.07            | 2.65            | -0.680516264        | -0.207927742         | 0.005352545                      |
| 60   | GAREM    | 0.48             | 0.4              | 0.47             | 0.23           | 0.31           | 0.3            | 0.4             | 0.45            | 0.41            | -0.684498174        | -0.099535674         | 0.034526204                      |
| 61   | PCNXL2   | 3.24             | 3.15             | 2.61             | 1.43           | 2.18           | 1.98           | 2.53            | 2.83            | 2.75            | -0.687076718        | -0.150223087         | 0.014845298                      |
| 62   | MX1      | 6.16             | 6.18             | 5.83             | 3.57           | 4.1            | 3.61           | 5.78            | 5.78            | 5.68            | -0.687791352        | -0.075798645         | 4.35E-07                         |
| 63   | GPRC5A   | 39.55            | 38.02            | 34.14            | 21.5           | 25.55          | 22.18          | 27.75           | 29.38           | 30.59           | -0.690289085        | -0.348780621         | 3.83E-06                         |
| 64   | TFAP2C   | 7.93             | 8.53             | 7.52             | 4.52           | 5.23           | 5.1            | 7.2             | 7.15            | 6.9             | -0.691368728        | -0.174368818         | 2.77E-06                         |
| 65   | MEGF6    | 2.72             | 2.89             | 2.88             | 1.71           | 1.79           | 1.75           | 2.41            | 2.27            | 2.32            | -0.693447131        | -0.278409632         | 5.13E-09                         |
| 66   | IQQC     | 0.99             | 1.24             | 1.15             | 0.72           | 0.61           | 0.76           | 1.25            | 1.01            | 0.88            | -0.693520304        | -0.106258687         | 0.03863255                       |
| 67   | DENND5E  | 2.05             | 2.24             | 1.52             | 0.92           | 1.35           | 1.32           | 1.36            | 1.78            | 1.63            | -0.69455432         | -0.284548897         | 0.036818784                      |
| 68   | SPTBN5   | 0.37             | 0.45             | 0.41             | 0.26           | 0.27           | 0.23           | 0.43            | 0.39            | 0.37            | -0.694586992        | -0.047696742         | 0.002965771                      |
| 69   | ID4      | 1.14             | 0.96             | 1.17             | 0.71           | 0.59           | 0.72           | 0.9             | 0.89            | 0.95            | -0.694935343        | -0.255114743         | 0.009263528                      |
| 70   | TNFRSF2  | 39.28            | 39.45            | 36.55            | 19.46          | 26.66          | 25.03          | 33.75           | 36.51           | 36.81           | -0.696206579        | -0.106587933         | 0.000310951                      |

|     |          |       |       |       |       |       |       |       |       |       |              |              |             |
|-----|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|--------------|-------------|
| 71  | RNF213   | 3.53  | 3.61  | 2.7   | 1.46  | 2.57  | 2.02  | 2.33  | 2.95  | 2.72  | -0.701723173 | -0.298658316 | 0.049903295 |
| 72  | PRDM11   | 0.57  | 0.56  | 0.53  | 0.32  | 0.38  | 0.32  | 0.56  | 0.52  | 0.49  | -0.702614089 | -0.080418682 | 0.00051338  |
| 73  | SIDT1    | 2.07  | 1.77  | 1.62  | 0.88  | 1.21  | 1.26  | 1.31  | 1.75  | 1.72  | -0.704739856 | -0.191890333 | 0.010905653 |
| 74  | ZCCHC24  | 6.73  | 6.64  | 5.93  | 3.5   | 4.26  | 4.07  | 5.32  | 5.51  | 5.12  | -0.706150774 | -0.275044424 | 8.65E-06    |
| 75  | FAM107B  | 16.23 | 15.72 | 15.33 | 7.71  | 10.57 | 10.69 | 13.21 | 13.65 | 14.11 | -0.706670351 | -0.206662143 | 0.000663763 |
| 76  | AJUBA    | 29.36 | 29.86 | 28.77 | 16.83 | 18.72 | 18.28 | 26.05 | 26.01 | 27.41 | -0.708929146 | -0.146929227 | 2.33E-12    |
| 77  | WNT5A    | 0.89  | 0.91  | 0.74  | 0.37  | 0.62  | 0.56  | 0.68  | 0.76  | 0.8   | -0.712560281 | -0.181329765 | 0.044335242 |
| 78  | SNTB1    | 1.71  | 2.16  | 1.79  | 1     | 1.34  | 1.11  | 1.39  | 1.77  | 1.67  | -0.714205691 | -0.228778864 | 0.003904483 |
| 79  | ANKEF1   | 3.43  | 3.43  | 3.01  | 1.58  | 2.13  | 2.3   | 2.4   | 2.86  | 3     | -0.715685094 | -0.256908303 | 0.003717286 |
| 80  | CELSR1   | 3.05  | 3.42  | 2.55  | 1.55  | 2.24  | 1.7   | 2.46  | 2.62  | 2.39  | -0.716321284 | -0.27201919  | 0.008280919 |
| 81  | PIR-FIGF | 1.37  | 1.46  | 1.48  | 0.98  | 0.87  | 0.77  | 1.22  | 1.62  | 1.35  | -0.718121058 | -0.040737625 | 0.005241058 |
| 82  | ERBB3    | 1.13  | 1.27  | 1.16  | 0.51  | 0.88  | 0.77  | 1.01  | 1.07  | 1.02  | -0.720845929 | -0.199609026 | 0.034712221 |
| 83  | PYROXD2  | 2.21  | 2.12  | 2.29  | 1.46  | 1.37  | 1.18  | 1.85  | 1.93  | 1.92  | -0.72322898  | -0.215869298 | 0.001502991 |
| 84  | ID2      | 2.91  | 2.78  | 3.4   | 2.03  | 1.7   | 1.77  | 3.13  | 3.03  | 2.74  | -0.724848676 | -0.030474958 | 0.004603773 |
| 85  | FAM109B  | 2.45  | 2.74  | 3.05  | 1.99  | 1.44  | 1.55  | 3.09  | 2.61  | 2.62  | -0.726498595 | 0.013939191  | 0.007255598 |
| 86  | EEF1A2   | 20.44 | 20.93 | 22.81 | 16.63 | 11.2  | 10.94 | 21.81 | 18.34 | 18.95 | -0.727183055 | -0.118965659 | 0.0080412   |
| 87  | TGFB2-O1 | 5.89  | 5.75  | 7.66  | 3.37  | 3.45  | 4.83  | 5.91  | 5.88  | 6.1   | -0.728270893 | -0.10944746  | 0.021585935 |
| 88  | ESRP2    | 1.13  | 1.11  | 1.19  | 0.85  | 0.55  | 0.67  | 1.06  | 1.1   | 1.09  | -0.728577809 | -0.077768858 | 0.014281083 |
| 89  | CPT1A    | 7.26  | 7.55  | 6.93  | 3.93  | 4.65  | 4.48  | 5.81  | 6.36  | 6.03  | -0.735197043 | -0.25641349  | 5.49E-08    |
| 90  | CECR2    | 0.24  | 0.25  | 0.21  | 0.12  | 0.15  | 0.15  | 0.16  | 0.23  | 0.19  | -0.736965594 | -0.271302022 | 0.016042454 |
| 91  | PPP1R3C  | 1.01  | 0.8   | 0.89  | 0.49  | 0.5   | 0.63  | 0.67  | 0.75  | 1     | -0.736965594 | -0.15795236  | 0.036704437 |
| 92  | GLTSCR1  | 4.36  | 4.56  | 3.75  | 1.72  | 3.01  | 2.87  | 3.27  | 4.01  | 3.75  | -0.737345201 | -0.199893734 | 0.0330059   |
| 93  | CPT1C    | 1.28  | 1.32  | 1.45  | 0.97  | 0.74  | 0.71  | 1.47  | 1.69  | 1.36  | -0.74291486  | 0.158400865  | 0.00779262  |
| 94  | MITF     | 12.8  | 12.69 | 11.92 | 5.62  | 8.59  | 8.1   | 10.1  | 11.68 | 11.11 | -0.745733452 | -0.185774958 | 0.002367926 |
| 95  | GPR137C  | 1.07  | 1.07  | 0.97  | 0.49  | 0.79  | 0.57  | 0.85  | 0.92  | 0.87  | -0.74938931  | -0.236376651 | 0.021665655 |
| 96  | ACSS1    | 3.04  | 3.24  | 3.35  | 1.95  | 1.97  | 1.79  | 2.53  | 2.86  | 2.52  | -0.754045052 | -0.283858103 | 2.03E-07    |
| 97  | NUP210   | 19.31 | 19.58 | 17.12 | 8.67  | 13.45 | 11.06 | 17.18 | 18.23 | 17.59 | -0.755370542 | -0.079692069 | 0.002041407 |
| 98  | AMPH     | 12.64 | 12.41 | 12.8  | 7.07  | 7.61  | 7.69  | 11.58 | 12.23 | 12.15 | -0.758728044 | -0.073900279 | 3.91E-13    |
| 99  | TLR2     | 1.28  | 1.28  | 1.42  | 0.79  | 0.83  | 0.73  | 1.11  | 1.2   | 1.06  | -0.760107674 | -0.240019839 | 0.000404281 |
| 100 | MOXD1    | 1.86  | 1.95  | 1.95  | 0.91  | 1.07  | 1.42  | 1.63  | 1.76  | 1.6   | -0.760534065 | -0.207028996 | 0.008433798 |
| 101 | SAMD4A   | 14.48 | 15.16 | 11.87 | 5.5   | 10.3  | 8.64  | 10.56 | 13.3  | 12.51 | -0.764214647 | -0.190710006 | 0.034175451 |
| 102 | SUSD5    | 2.78  | 2.64  | 2.48  | 1.07  | 2     | 1.57  | 1.94  | 2.22  | 2.41  | -0.767727848 | -0.265959283 | 0.02648858  |
| 103 | IFIT2    | 9.88  | 9.65  | 8.23  | 4.31  | 5.75  | 6.22  | 7.11  | 8.12  | 7.28  | -0.769906868 | -0.302441511 | 0.001034871 |
| 104 | TNS3     | 13.02 | 13.53 | 10.99 | 5.24  | 9.37  | 7.4   | 9.99  | 10.71 | 10.06 | -0.770269505 | -0.287373147 | 0.017619392 |
| 105 | MYBL1    | 8.72  | 8.33  | 7.29  | 3.06  | 5.91  | 5.25  | 5.66  | 7.5   | 7.44  | -0.775407703 | -0.240684831 | 0.037076793 |
| 106 | PXDN     | 46.64 | 48.33 | 39.75 | 19.02 | 32.87 | 26.79 | 38.16 | 42.19 | 39.38 | -0.775895181 | -0.170179359 | 0.010344345 |
| 107 | SOGA1    | 6.93  | 7.32  | 5.37  | 2.6   | 4.95  | 3.89  | 4.96  | 5.66  | 5.32  | -0.778237989 | -0.299673412 | 0.040045182 |
| 108 | CACNB4   | 1.08  | 1.04  | 0.91  | 0.39  | 0.76  | 0.61  | 0.65  | 0.89  | 0.92  | -0.783742365 | -0.300659478 | 0.037487186 |
| 109 | PNMA2    | 3.99  | 3.97  | 3.45  | 1.63  | 2.62  | 2.34  | 2.77  | 3.05  | 3.28  | -0.791948421 | -0.326360341 | 0.003831472 |
| 110 | PER3     | 0.84  | 0.7   | 0.59  | 0.39  | 0.44  | 0.4   | 0.59  | 0.6   | 0.62  | -0.792195115 | -0.234863733 | 0.004135451 |
| 111 | SYTL2    | 1.96  | 2.2   | 2.11  | 1.04  | 1.28  | 1.3   | 1.88  | 1.98  | 1.91  | -0.792475746 | -0.119894124 | 1.82E-05    |
| 112 | SYNE1    | 0.56  | 0.54  | 0.39  | 0.22  | 0.34  | 0.3   | 0.35  | 0.48  | 0.4   | -0.792903766 | -0.276654015 | 0.010050509 |
| 113 | SLC12A7  | 2.86  | 3.09  | 2.88  | 1.85  | 1.8   | 1.44  | 2.94  | 2.78  | 2.61  | -0.794747782 | -0.084096942 | 6.72E-06    |
| 114 | PDE7B    | 0.98  | 1     | 0.85  | 0.52  | 0.54  | 0.57  | 0.65  | 0.87  | 0.87  | -0.795930089 | -0.243791435 | 0.000175603 |
| 115 | TIMP3    | 16.41 | 15.42 | 15.47 | 9.25  | 9.09  | 8.89  | 12.86 | 13.48 | 12.78 | -0.796643201 | -0.273933813 | 2.12E-17    |
| 116 | SCN5A    | 2.54  | 2.66  | 2.37  | 1.5   | 1.48  | 1.37  | 2.34  | 2.31  | 2.26  | -0.799277899 | -0.13160759  | 7.71E-10    |
| 117 | CRABP2   | 16.73 | 17.48 | 18.33 | 13.19 | 8.51  | 8.47  | 22.39 | 18.07 | 16.91 | -0.800301504 | 0.126880318  | 0.00492919  |
| 118 | CDC42BP  | 8.57  | 8.7   | 7.08  | 3.11  | 5.83  | 5.01  | 5.94  | 7.31  | 6.85  | -0.80365665  | -0.276726271 | 0.021821617 |
| 119 | CCBE1    | 4.97  | 4.78  | 4.73  | 2.32  | 2.95  | 3.02  | 3.82  | 4.53  | 4.26  | -0.804617596 | -0.199493327 | 2.40E-06    |
| 120 | NTN4     | 14.91 | 14.17 | 14.48 | 6.6   | 8.96  | 9.36  | 10.51 | 11.59 | 12.07 | -0.805699886 | -0.350273706 | 6.62E-05    |
| 121 | APOL6    | 1.79  | 1.71  | 1.4   | 0.69  | 1.19  | 0.92  | 1.17  | 1.44  | 1.39  | -0.807354922 | -0.292781749 | 0.011869898 |
| 122 | STXBP2   | 3.27  | 3.63  | 4.25  | 2.56  | 1.99  | 1.82  | 5.17  | 4.02  | 4.18  | -0.807678433 | 0.261955755  | 0.002853259 |
| 123 | PLEKHA2  | 2.47  | 2.37  | 1.99  | 1.03  | 1.53  | 1.34  | 1.66  | 2     | 1.88  | -0.808411455 | -0.301999602 | 0.001302201 |
| 124 | FAM174B  | 2.68  | 2.56  | 2.73  | 1.38  | 1.55  | 1.61  | 1.93  | 1.93  | 2.27  | -0.811887427 | -0.37869265  | 4.46E-06    |
| 125 | JDP2     | 0.47  | 0.57  | 0.54  | 0.37  | 0.27  | 0.26  | 0.31  | 0.46  | 0.37  | -0.811927652 | -0.470890734 | 0.030176625 |
| 126 | PCSK5    | 0.45  | 0.46  | 0.41  | 0.19  | 0.3   | 0.26  | 0.32  | 0.39  | 0.41  | -0.815575429 | -0.237039197 | 0.003144886 |
| 127 | KCNIP3   | 3.77  | 3.92  | 3.77  | 2.95  | 1.86  | 1.69  | 3.84  | 2.99  | 3.13  | -0.818095421 | -0.202389397 | 0.013673719 |
| 128 | ANXA8L1  | 1.6   | 1.79  | 1.92  | 1.07  | 1     | 0.94  | 1.31  | 1.4   | 1.7   | -0.818948374 | -0.267933205 | 0.00057818  |
| 129 | DAPK1    | 1.16  | 1.23  | 1.07  | 0.53  | 0.71  | 0.72  | 1.25  | 1.45  | 1.35  | -0.819918384 | 0.22714987   | 0.000291904 |
| 130 | RAB27B   | 1.58  | 1.62  | 1.38  | 0.62  | 1.04  | 0.93  | 1.06  | 1.43  | 1.19  | -0.8223955   | -0.315641832 | 0.006248113 |
| 131 | TNS1     | 1.73  | 1.89  | 1.77  | 1.02  | 1.08  | 0.94  | 1.72  | 1.79  | 1.72  | -0.826213949 | -0.043474327 | 8.97E-10    |
| 132 | HES2     | 0.41  | 0.45  | 0.47  | 0.26  | 0.23  | 0.26  | 0.42  | 0.31  | 0.33  | -0.826463745 | -0.327361981 | 0.014088308 |
| 133 | DDX60    | 1.3   | 1.27  | 1     | 0.53  | 0.77  | 0.71  | 0.87  | 0.99  | 1     | -0.828728573 | -0.319908927 | 0.002996398 |
| 134 | EREG     | 8.21  | 8.53  | 7.47  | 3.05  | 5.23  | 5.35  | 6.17  | 7.49  | 7.27  | -0.828817517 | -0.210030768 | 0.010050509 |
| 135 | CFH      | 1.19  | 1.08  | 1.25  | 0.51  | 0.72  | 0.75  | 0.93  | 1.13  | 1.1   | -0.830074999 | -0.15565087  | 0.002853259 |
| 136 | LOC10050 | 0.91  | 1.19  | 1.11  | 0.57  | 0.67  | 0.56  | 0.74  | 0.68  | 0.78  | -0.834576391 | -0.545069774 | 0.03367169  |
| 137 | DLX3     | 1.68  | 1.53  | 1.73  | 0.94  | 0.99  | 0.84  | 1.68  | 1.44  | 1.42  | -0.834625066 | -0.121818744 | 0.000177752 |
| 138 | RASD1    | 1.45  | 1.56  | 2.04  | 1.19  | 0.86  | 0.78  | 1.59  | 1.22  | 1.38  | -0.835481335 | -0.269333144 | 0.031461214 |
| 139 | SALL2    | 1.88  | 1.65  | 1.56  | 0.76  | 1.07  | 1.02  | 1.9   | 1.67  | 1.77  | -0.836703737 | 0.069174086  | 0.000436835 |
| 140 | DIP2C    | 1.76  | 1.91  | 1.51  | 0.73  | 1.15  | 1.02  | 1.25  | 1.53  | 1.44  | -0.836899198 | -0.295709099 | 0.002561344 |
| 141 | PCNX     | 7.36  | 7.5   | 5.15  | 2.41  | 4.93  | 3.85  | 4.45  | 6.01  | 5.49  | -0.838511131 | -0.327164743 | 0.046614469 |
| 142 | TBC1D12  | 3.93  | 3.85  | 3.25  | 1.59  | 2.31  | 2.26  | 2.9   | 3.16  | 3.06  | -0.840430535 | -0.274327061 | 0.000534788 |
| 143 | ZNF813   | 0.68  | 0.63  | 0.59  | 0.26  | 0.48  | 0.32  | 0.48  | 0.68  | 0.63  | -0.841935154 | -0.086039831 | 0.042971585 |



|     |          |        |        |       |       |       |       |       |       |       |              |              |             |
|-----|----------|--------|--------|-------|-------|-------|-------|-------|-------|-------|--------------|--------------|-------------|
| 144 | C4BPB    | 2.61   | 2.87   | 2.9   | 1.81  | 1.15  | 1.7   | 3.01  | 2.57  | 2.41  | -0.846620289 | -0.068754741 | 0.008454808 |
| 145 | COL8A1   | 10.25  | 10.43  | 9.04  | 4.14  | 6.83  | 5.55  | 9.01  | 9.52  | 8.7   | -0.847220429 | -0.126237133 | 0.001471101 |
| 146 | LAMA3    | 2.36   | 2.4    | 1.83  | 0.9   | 1.53  | 1.23  | 1.78  | 1.97  | 1.82  | -0.848434817 | -0.242601138 | 0.00651738  |
| 147 | PLCE1    | 3.48   | 3.41   | 2.84  | 1.29  | 2.29  | 1.82  | 2.26  | 2.73  | 2.47  | -0.849480398 | -0.383264175 | 0.005780552 |
| 148 | NALCN    | 2.81   | 2.69   | 2.33  | 1.04  | 1.77  | 1.51  | 1.75  | 2.14  | 1.95  | -0.857980995 | -0.423043938 | 0.003002709 |
| 149 | FGF13    | 3.82   | 4.07   | 4.11  | 2.01  | 2.33  | 2.28  | 3.05  | 2.87  | 3.07  | -0.858131284 | -0.416641385 | 3.82E-09    |
| 150 | MAN1A1   | 1.63   | 1.61   | 1.37  | 0.53  | 0.98  | 1.03  | 1.23  | 1.51  | 1.45  | -0.859938254 | -0.137816507 | 0.02873461  |
| 151 | ADRBK2   | 0.77   | 0.81   | 0.71  | 0.39  | 0.46  | 0.41  | 0.65  | 0.75  | 0.84  | -0.861923865 | -0.031848866 | 3.53E-06    |
| 152 | ELOVL7   | 1.58   | 1.7    | 1.36  | 0.65  | 0.88  | 1.01  | 1.41  | 1.75  | 1.73  | -0.869296308 | 0.07570966   | 0.002232586 |
| 153 | ZSCAN18  | 2.24   | 2.33   | 2.43  | 1.52  | 1.19  | 1.12  | 2.8   | 2.38  | 2.54  | -0.87001053  | 0.141245925  | 7.01E-05    |
| 154 | TRERF1   | 8.03   | 7.88   | 6.56  | 2.96  | 5.12  | 4.17  | 6     | 6.75  | 6.35  | -0.875218375 | -0.234427486 | 0.002747545 |
| 155 | MBP      | 10.23  | 10.28  | 9.12  | 3.88  | 6.38  | 5.89  | 7.18  | 8.53  | 8.31  | -0.875524461 | -0.302822475 | 0.001074721 |
| 156 | APH1B    | 0.86   | 0.8    | 0.8   | 0.33  | 0.47  | 0.54  | 0.66  | 0.79  | 0.75  | -0.876425315 | -0.161154792 | 0.004932428 |
| 157 | CSPG4    | 2.17   | 2.4    | 1.96  | 1.28  | 1.2   | 1.07  | 2.15  | 2.05  | 1.99  | -0.879263967 | -0.077143582 | 1.50E-07    |
| 158 | ZNF594   | 0.8    | 0.88   | 0.73  | 0.3   | 0.43  | 0.58  | 0.8   | 0.84  | 0.88  | -0.879466335 | 0.064390587  | 0.02384625  |
| 159 | RAB9B    | 1.38   | 1.35   | 1.26  | 0.71  | 0.62  | 0.83  | 0.99  | 1.31  | 1.27  | -0.885357434 | -0.160464672 | 0.00010372  |
| 160 | ISM1     | 1.84   | 1.61   | 1.45  | 0.72  | 0.86  | 1.07  | 1.5   | 1.5   | 1.48  | -0.88678939  | -0.129283017 | 0.002395981 |
| 161 | PARD3B   | 0.97   | 0.84   | 0.89  | 0.32  | 0.67  | 0.47  | 0.65  | 0.83  | 0.77  | -0.886991038 | -0.263034406 | 0.025627712 |
| 162 | ARID5B   | 1.31   | 1.23   | 1.09  | 0.63  | 0.71  | 0.62  | 1.04  | 1.15  | 1.05  | -0.889115894 | -0.163975735 | 3.34E-07    |
| 163 | LYST     | 0.71   | 0.73   | 0.58  | 0.25  | 0.46  | 0.38  | 0.45  | 0.53  | 0.48  | -0.890027158 | -0.468386924 | 0.009581627 |
| 164 | NDRG2    | 2      | 2.15   | 2.06  | 1.41  | 0.91  | 1.03  | 2.19  | 2.03  | 2.11  | -0.890432173 | 0.027612231  | 0.000880982 |
| 165 | FRAS1    | 1.8    | 1.91   | 1.29  | 0.55  | 1.18  | 0.96  | 1.12  | 1.41  | 1.24  | -0.894321922 | -0.407363571 | 0.039868013 |
| 166 | HIST2H2E | 3.26   | 3.49   | 3.2   | 1.55  | 1.94  | 1.86  | 2.67  | 2.4   | 2.31  | -0.895157634 | -0.431075709 | 0.010905653 |
| 167 | RDM1     | 1.23   | 1.17   | 1.1   | 0.84  | 0.57  | 0.47  | 0.91  | 1.07  | 1.1   | -0.89662226  | -0.184424571 | 0.046224293 |
| 168 | KANSL1L  | 0.48   | 0.56   | 0.46  | 0.16  | 0.3   | 0.34  | 0.43  | 0.55  | 0.41  | -0.906890596 | -0.109877618 | 0.04608645  |
| 169 | TMEM229  | 1.06   | 0.94   | 0.96  | 0.65  | 0.47  | 0.45  | 0.82  | 0.85  | 0.88  | -0.914832617 | -0.215099929 | 0.001068721 |
| 170 | ADM      | 17.56  | 17.22  | 18.96 | 10.94 | 8.52  | 9.04  | 23.77 | 19.38 | 20.91 | -0.915034402 | 0.253427477  | 2.84E-08    |
| 171 | APOBEC3  | 1.35   | 1.79   | 1.35  | 0.84  | 0.79  | 0.75  | 1.47  | 1.15  | 1.11  | -0.915753871 | -0.267539814 | 0.002896664 |
| 172 | SERINC2  | 2.62   | 2.74   | 3.18  | 1.9   | 1.32  | 1.3   | 3.41  | 3.05  | 2.89  | -0.917913297 | 0.130730295  | 0.00042979  |
| 173 | CHST4    | 1.14   | 1.38   | 1.25  | 0.76  | 0.69  | 0.54  | 0.88  | 0.98  | 0.9   | -0.921796093 | -0.449896256 | 0.001911731 |
| 174 | STYK1    | 1.31   | 1.33   | 1.13  | 0.55  | 0.71  | 0.73  | 1.13  | 1.18  | 1.39  | -0.921796093 | -0.027039253 | 0.000368742 |
| 175 | MYOF     | 104.34 | 103.18 | 87.54 | 36.63 | 64.28 | 54.58 | 70.78 | 84.21 | 78.34 | -0.924186555 | -0.338636543 | 0.001300566 |
| 176 | GSTM1    | 10.06  | 10.43  | 10.71 | 6.67  | 4.74  | 5.01  | 11.32 | 9.72  | 9.74  | -0.926091902 | -0.019552797 | 9.88E-06    |
| 177 | GPR1     | 0.82   | 0.79   | 1.02  | 0.46  | 0.46  | 0.46  | 0.65  | 0.59  | 0.8   | -0.930394533 | -0.366493647 | 0.002948985 |
| 178 | RAB37    | 0.61   | 0.61   | 0.44  | 0.38  | 0.28  | 0.21  | 0.56  | 0.39  | 0.43  | -0.932095935 | -0.266514975 | 0.036987866 |
| 179 | ARNT2    | 4.31   | 4.37   | 3.9   | 1.69  | 2.71  | 2.19  | 3.55  | 3.64  | 3.54  | -0.932781552 | -0.229481846 | 0.000101879 |
| 180 | RELN     | 4.65   | 4.69   | 3.6   | 1.47  | 2.77  | 2.52  | 3.31  | 3.92  | 4.1   | -0.936742466 | -0.191689756 | 0.007200677 |
| 181 | RUNX2    | 5.53   | 5.29   | 4.89  | 1.8   | 3.28  | 3.11  | 4.23  | 5.06  | 4.47  | -0.939747824 | -0.191202711 | 0.002960291 |
| 182 | PAG1     | 2.13   | 2.05   | 1.53  | 0.57  | 1.32  | 1.08  | 1.13  | 1.72  | 1.5   | -0.943027815 | -0.392475345 | 0.037012215 |
| 183 | LOC10049 | 0.47   | 0.45   | 0.37  | 0.17  | 0.24  | 0.26  | 0.42  | 0.41  | 0.39  | -0.945138065 | -0.080489918 | 0.006207759 |
| 184 | TGFBR3   | 4.93   | 5.23   | 4.04  | 1.49  | 3.3   | 2.58  | 3.2   | 4.21  | 4.18  | -0.946154405 | -0.293010363 | 0.019777106 |
| 185 | AIM1     | 5.91   | 5.59   | 4.45  | 1.77  | 3.38  | 3.12  | 3.73  | 4.52  | 4.67  | -0.947597189 | -0.303950354 | 0.008146389 |
| 186 | C10orf35 | 1.42   | 2.03   | 1.22  | 0.95  | 0.82  | 0.65  | 1.53  | 1.69  | 1.49  | -0.948415502 | 0.01230451   | 0.046702478 |
| 187 | FAM20C   | 6.84   | 7.77   | 7.85  | 4.73  | 3.57  | 3.32  | 6.42  | 5.99  | 5.76  | -0.950747859 | -0.305799508 | 8.73E-06    |
| 188 | COLGALT  | 2.07   | 1.91   | 1.72  | 0.86  | 1.08  | 1     | 1.4   | 1.4   | 1.37  | -0.955145764 | -0.450914536 | 1.45E-07    |
| 189 | CREB5    | 2.07   | 2.28   | 1.84  | 0.73  | 1.27  | 1.19  | 1.49  | 1.88  | 1.83  | -0.956382985 | -0.251427786 | 0.001784259 |
| 190 | NMNAT2   | 2.48   | 2.41   | 1.98  | 1.08  | 1.37  | 1.09  | 2.21  | 2.08  | 2.01  | -0.956560739 | -0.12495827  | 2.14E-06    |
| 191 | NEK11    | 0.76   | 0.74   | 0.83  | 0.36  | 0.39  | 0.45  | 0.7   | 0.81  | 0.86  | -0.957295549 | 0.024557104  | 0.000787209 |
| 192 | PAOX     | 1.53   | 1.5    | 1.33  | 1.07  | 0.64  | 0.52  | 1.04  | 1.16  | 1.38  | -0.967284425 | -0.284368548 | 0.027308833 |
| 193 | C4orf19  | 1.11   | 1.1    | 0.88  | 0.51  | 0.51  | 0.56  | 0.96  | 0.96  | 1.01  | -0.96768228  | -0.076706173 | 6.89E-05    |
| 194 | GPR64    | 0.71   | 0.64   | 0.57  | 0.26  | 0.35  | 0.37  | 0.5   | 0.57  | 0.55  | -0.970252657 | -0.245112498 | 0.001204394 |
| 195 | FAT1     | 21.64  | 22.03  | 14.13 | 5.86  | 13.36 | 10.26 | 13.25 | 16.64 | 15.1  | -0.971332968 | -0.361465126 | 0.033653289 |
| 196 | ARMCX4   | 0.41   | 0.37   | 0.32  | 0.15  | 0.23  | 0.18  | 0.38  | 0.45  | 0.43  | -0.974004791 | 0.19592021   | 0.005842095 |
| 197 | GPC4     | 2.67   | 2.59   | 2.62  | 1.14  | 1.59  | 1.28  | 2.73  | 3     | 2.91  | -0.974593393 | 0.132835683  | 4.92E-07    |
| 198 | SATB1    | 0.82   | 0.85   | 0.67  | 0.28  | 0.48  | 0.43  | 0.61  | 0.83  | 0.61  | -0.975546956 | -0.19088462  | 0.003124523 |
| 199 | GPR37    | 0.42   | 0.44   | 0.44  | 0.24  | 0.19  | 0.23  | 0.42  | 0.53  | 0.32  | -0.977973694 | -0.033683126 | 0.005780552 |
| 200 | DENND2A  | 2.5    | 2.51   | 2.55  | 1.27  | 1.26  | 1.29  | 2.24  | 1.77  | 1.83  | -0.984813596 | -0.372417865 | 1.94E-11    |
| 201 | C8orf46  | 0.63   | 0.64   | 0.67  | 0.32  | 0.32  | 0.34  | 0.4   | 0.53  | 0.57  | -0.985202998 | -0.371094152 | 0.000492473 |
| 202 | HFE      | 1.96   | 2.02   | 1.53  | 0.63  | 1.13  | 1.02  | 1.62  | 1.5   | 1.56  | -0.986967436 | -0.235543789 | 0.005723495 |
| 203 | AHNAK    | 28.02  | 30.32  | 17.86 | 7.08  | 17.46 | 13.59 | 17.24 | 21.98 | 20.18 | -0.998864467 | -0.359328067 | 0.047888028 |
| 204 | FSIP2    | 0.14   | 0.11   | 0.09  | 0.04  | 0.06  | 0.07  | 0.09  | 0.11  | 0.08  | -1           | -0.280107919 | 0.016248543 |
| 205 | PTPRS    | 6.61   | 6.47   | 5.9   | 2.98  | 3.34  | 3.17  | 5.38  | 5.46  | 5.28  | -1           | -0.235628248 | 3.97E-17    |
| 206 | SAA2     | 0.51   | 0.57   | 0.64  | 0.27  | 0.26  | 0.33  | 0.55  | 0.55  | 0.56  | -1           | -0.051225323 | 0.016459946 |
| 207 | NTNG2    | 0.68   | 0.61   | 0.62  | 0.38  | 0.26  | 0.31  | 0.59  | 0.55  | 0.51  | -1.00757322  | -0.211106614 | 0.002876875 |
| 208 | GPR116   | 16.76  | 17.01  | 14.04 | 4.87  | 10.16 | 8.71  | 12.11 | 15.03 | 14.54 | -1.009992471 | -0.197957128 | 0.005014023 |
| 209 | ZNF114   | 2.38   | 2.28   | 2.71  | 1.27  | 1.27  | 1.1   | 2.16  | 2.39  | 2.62  | -1.017726169 | -0.0396915   | 1.06E-07    |
| 210 | MST1R    | 0.68   | 0.76   | 0.85  | 0.36  | 0.4   | 0.37  | 0.72  | 0.66  | 0.62  | -1.019024826 | -0.195347598 | 1.66E-05    |
| 211 | DYNC1H1  | 77.31  | 81.15  | 56.31 | 26.82 | 44.46 | 34.53 | 52.09 | 59.13 | 56.81 | -1.021316504 | -0.354073651 | 0.000481181 |
| 212 | ILDR2    | 1.1    | 1.13   | 1     | 0.37  | 0.66  | 0.55  | 0.78  | 0.92  | 0.88  | -1.031609607 | -0.324163099 | 0.00035164  |
| 213 | CMPK2    | 0.52   | 0.59   | 0.59  | 0.27  | 0.29  | 0.27  | 0.47  | 0.46  | 0.39  | -1.034351505 | -0.364996817 | 0.000352633 |
| 214 | ABI3BP   | 1.2    | 1.34   | 1.25  | 0.46  | 0.6   | 0.79  | 1.06  | 1.31  | 1.37  | -1.034672578 | -0.019159578 | 0.00038639  |
| 215 | L1CAM    | 0.66   | 0.79   | 0.59  | 0.38  | 0.33  | 0.28  | 0.62  | 0.45  | 0.53  | -1.043068722 | -0.350497247 | 0.000310951 |
| 216 | ANK1     | 2.19   | 2.32   | 2.03  | 0.91  | 1.22  | 1.04  | 1.7   | 1.81  | 1.67  | -1.044807795 | -0.336338538 | 2.43E-09    |

|     |          |       |       |       |       |       |       |       |       |       |              |              |             |
|-----|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|--------------|-------------|
| 217 | PTPRJ    | 8.48  | 8.67  | 6.91  | 3     | 4.7   | 3.96  | 5.36  | 6.43  | 5.96  | -1.045068854 | -0.438817618 | 1.21E-05    |
| 218 | UTRN     | 5.19  | 5.67  | 3.64  | 1.24  | 3.23  | 2.53  | 2.95  | 4.2   | 3.76  | -1.050626073 | -0.410401799 | 0.033723155 |
| 219 | VAMP8    | 19.54 | 20.3  | 23.28 | 12.5  | 9.14  | 8.82  | 24.85 | 22.13 | 22.47 | -1.051181264 | 0.137877489  | 1.57E-06    |
| 220 | CRIM1    | 92.66 | 91.81 | 73.92 | 22.69 | 55.64 | 46.21 | 60.11 | 74.32 | 72.74 | -1.052941053 | -0.318735134 | 0.014633364 |
| 221 | OBSCN    | 0.25  | 0.28  | 0.2   | 0.12  | 0.13  | 0.1   | 0.22  | 0.2   | 0.2   | -1.060541542 | -0.235628248 | 3.42E-06    |
| 222 | MYLK     | 3.54  | 3.64  | 2.89  | 1.15  | 2.02  | 1.62  | 2.64  | 2.87  | 2.66  | -1.071966122 | -0.3016557   | 0.000151118 |
| 223 | PTPRM    | 7.48  | 7.7   | 6.37  | 2.48  | 4.03  | 3.73  | 5.69  | 6.47  | 6.03  | -1.073472154 | -0.244542326 | 2.26E-05    |
| 224 | LHFPL4   | 0.58  | 0.69  | 0.74  | 0.36  | 0.27  | 0.32  | 0.72  | 0.68  | 0.62  | -1.081196083 | 0.007159792  | 8.02E-05    |
| 225 | CADPS2   | 0.6   | 0.7   | 0.5   | 0.23  | 0.29  | 0.33  | 0.56  | 0.61  | 0.65  | -1.08246216  | 0.015941544  | 0.000290473 |
| 226 | FHDC1    | 0.19  | 0.18  | 0.16  | 0.07  | 0.09  | 0.09  | 0.11  | 0.16  | 0.11  | -1.084064265 | -0.479992941 | 0.024974271 |
| 227 | APBA1    | 0.21  | 0.22  | 0.23  | 0.08  | 0.14  | 0.09  | 0.15  | 0.16  | 0.17  | -1.090197809 | -0.459431619 | 0.014845298 |
| 228 | PCDH7    | 0.2   | 0.21  | 0.21  | 0.07  | 0.1   | 0.12  | 0.22  | 0.18  | 0.22  | -1.096215315 | 0            | 0.00303984  |
| 229 | HEG1     | 17.02 | 17.92 | 13.06 | 4.45  | 9.93  | 8.03  | 10.73 | 13.81 | 12.96 | -1.098891757 | -0.35614381  | 0.004906209 |
| 230 | FAM49A   | 2.09  | 2.22  | 2.04  | 0.91  | 1.13  | 0.92  | 1.74  | 1.99  | 1.73  | -1.101159416 | -0.217855641 | 7.74E-11    |
| 231 | SAA1     | 2.54  | 2.46  | 1.83  | 1.21  | 0.97  | 1     | 2.4   | 2.77  | 2.52  | -1.102858813 | 0.17109802   | 0.005014023 |
| 232 | EPAS1    | 5.18  | 5.45  | 4.81  | 1.95  | 2.9   | 2.32  | 4.21  | 4.91  | 4.68  | -1.106627729 | -0.162004486 | 4.60E-08    |
| 233 | KAZN     | 0.94  | 1.07  | 1.17  | 0.48  | 0.54  | 0.45  | 0.86  | 1.05  | 0.95  | -1.11321061  | -0.153011619 | 1.83E-09    |
| 234 | SUCLG2-A | 2.21  | 2.28  | 1.87  | 0.75  | 1.07  | 1.12  | 1.49  | 1.55  | 1.54  | -1.11321061  | -0.473679167 | 1.37E-05    |
| 235 | ATP10A   | 2.02  | 2.07  | 1.78  | 0.86  | 0.96  | 0.89  | 1.39  | 1.29  | 1.38  | -1.115067652 | -0.531880776 | 1.81E-12    |
| 236 | VSTM2L   | 0.93  | 1.06  | 1     | 0.52  | 0.39  | 0.47  | 1.13  | 0.95  | 1.2   | -1.115477217 | 0.13355033   | 0.000544343 |
| 237 | CXCR4    | 4.87  | 4.68  | 5.4   | 2.61  | 2.09  | 2.16  | 3.99  | 3.88  | 4.63  | -1.123865003 | -0.25821739  | 2.98E-10    |
| 238 | IL11     | 40.15 | 41.73 | 44.35 | 23.33 | 17.01 | 17.58 | 45.17 | 40.31 | 42.04 | -1.123921316 | 0.01466871   | 6.15E-10    |
| 239 | LHPP     | 1.05  | 1.46  | 1.41  | 0.71  | 0.44  | 0.64  | 1.24  | 0.93  | 1.06  | -1.130894067 | -0.279319489 | 0.00321219  |
| 240 | IL7R     | 9.1   | 9.02  | 8.5   | 3.31  | 4.38  | 4.46  | 7.75  | 8.4   | 9.03  | -1.131554257 | -0.080232288 | 2.79E-11    |
| 241 | CPE      | 3.65  | 3.74  | 3.97  | 1.62  | 1.66  | 1.89  | 3.64  | 3.43  | 3.41  | -1.135726649 | -0.116324118 | 1.27E-12    |
| 242 | C3       | 4.54  | 4.98  | 4.35  | 1.98  | 2.3   | 1.89  | 5.78  | 6.03  | 5.14  | -1.168625393 | 0.289317486  | 1.91E-15    |
| 243 | GSTM2    | 2.92  | 2.85  | 3.09  | 1.53  | 1.21  | 1.2   | 2.84  | 2.76  | 2.67  | -1.169111069 | -0.099419369 | 3.46E-09    |
| 244 | KCTD4    | 0.55  | 0.36  | 0.62  | 0.26  | 0.19  | 0.23  | 0.58  | 0.54  | 0.61  | -1.169925001 | 0.177240385  | 0.032580656 |
| 245 | SORL1    | 0.17  | 0.15  | 0.11  | 0.04  | 0.07  | 0.08  | 0.16  | 0.17  | 0.15  | -1.178337241 | 0.158697746  | 0.011648345 |
| 246 | CYTL1    | 0.98  | 1.35  | 1.32  | 0.48  | 0.6   | 0.53  | 1.18  | 1.24  | 1.4   | -1.180835776 | 0.065676174  | 0.007579516 |
| 247 | ARRDC4   | 0.89  | 0.97  | 0.93  | 0.26  | 0.41  | 0.56  | 0.79  | 0.75  | 0.81  | -1.181606806 | -0.247604365 | 0.001808953 |
| 248 | NXF5     | 1.02  | 1.12  | 0.81  | 0.53  | 0.32  | 0.45  | 1.2   | 0.96  | 0.92  | -1.182203331 | 0.062215396  | 0.00409563  |
| 249 | SERPINB9 | 2.14  | 2.11  | 1.88  | 0.73  | 1.07  | 0.9   | 1.53  | 1.83  | 1.8   | -1.182927667 | -0.248516008 | 2.84E-08    |
| 250 | FBP1     | 9.37  | 9.38  | 10.01 | 5.18  | 3.44  | 4.03  | 8.14  | 7.46  | 8.22  | -1.184926291 | -0.271890263 | 1.12E-08    |
| 251 | OLFML2A  | 0.92  | 0.9   | 0.91  | 0.46  | 0.34  | 0.4   | 0.61  | 0.65  | 0.64  | -1.185866545 | -0.522901533 | 1.31E-09    |
| 252 | DNAH2    | 1.65  | 1.7   | 1.35  | 0.53  | 0.84  | 0.69  | 1.1   | 1.2   | 1.05  | -1.190016419 | -0.488499661 | 7.68E-07    |
| 253 | HLA-DMA  | 2.29  | 2.28  | 2.26  | 1.18  | 1     | 0.81  | 2.48  | 2.15  | 2.21  | -1.191740094 | 0.002110747  | 2.41E-05    |
| 254 | FAT4     | 0.64  | 0.73  | 0.42  | 0.12  | 0.37  | 0.29  | 0.35  | 0.47  | 0.41  | -1.198413558 | -0.541301272 | 0.036749206 |
| 255 | EVI2B    | 21.79 | 19.24 | 22.48 | 9.12  | 8.57  | 9.96  | 17.26 | 18.4  | 16.91 | -1.19970429  | -0.272744035 | 1.39E-18    |
| 256 | CRISPLD2 | 4.51  | 4.24  | 3.75  | 1.47  | 2.16  | 1.81  | 2.93  | 3.45  | 3.11  | -1.200249538 | -0.397448103 | 4.63E-09    |
| 257 | PITPNM3  | 0.74  | 0.81  | 0.69  | 0.35  | 0.37  | 0.25  | 0.62  | 0.65  | 0.61  | -1.20744208  | -0.25276607  | 7.01E-07    |
| 258 | CDH11    | 39.33 | 40.17 | 36.87 | 13.46 | 18.87 | 17.41 | 36.27 | 39.01 | 38.24 | -1.226240769 | -0.035772687 | 1.16E-12    |
| 259 | CCDC180  | 0.32  | 0.33  | 0.31  | 0.1   | 0.17  | 0.14  | 0.36  | 0.31  | 0.29  | -1.227410496 | 0            | 0.001085611 |
| 260 | COL4A5   | 0.22  | 0.23  | 0.16  | 0.08  | 0.08  | 0.1   | 0.19  | 0.23  | 0.21  | -1.230297619 | 0.046542586  | 0.004292891 |
| 261 | NPR3     | 0.27  | 0.23  | 0.26  | 0.11  | 0.11  | 0.1   | 0.27  | 0.27  | 0.26  | -1.247927513 | 0.074000581  | 8.42E-05    |
| 262 | NEURL1   | 0.4   | 0.18  | 0.3   | 0.15  | 0.12  | 0.1   | 0.23  | 0.22  | 0.21  | -1.249978253 | -0.415037499 | 0.041308531 |
| 263 | MUC15    | 0.44  | 0.3   | 0.31  | 0.14  | 0.12  | 0.18  | 0.35  | 0.39  | 0.43  | -1.254813899 | 0.156119202  | 0.007878913 |
| 264 | SP140    | 4.08  | 3.64  | 3.86  | 1.42  | 1.69  | 1.74  | 3.28  | 3.12  | 3.3   | -1.255578601 | -0.255578601 | 8.79E-16    |
| 265 | DST      | 9.72  | 10.15 | 6.8   | 2.32  | 4.72  | 4.12  | 5.63  | 7.52  | 6.73  | -1.256880798 | -0.423900068 | 0.000436835 |
| 266 | BMPER    | 2.45  | 2.35  | 2.37  | 0.82  | 1.18  | 0.99  | 2.09  | 2.07  | 2.23  | -1.261827635 | -0.166157188 | 1.65E-11    |
| 267 | SELENBP  | 0.77  | 0.55  | 0.84  | 0.28  | 0.33  | 0.29  | 1.02  | 0.94  | 0.72  | -1.263034406 | 0.311201688  | 0.002596456 |
| 268 | MATN2    | 0.76  | 0.67  | 0.61  | 0.21  | 0.33  | 0.3   | 0.56  | 0.44  | 0.58  | -1.280107919 | -0.368644594 | 1.85E-05    |
| 269 | FCGBP    | 0.12  | 0.18  | 0.12  | 0.06  | 0.07  | 0.04  | 0.11  | 0.12  | 0.08  | -1.304854582 | -0.438121112 | 0.003124523 |
| 270 | AMIGO1   | 1.16  | 0.94  | 0.97  | 0.29  | 0.5   | 0.44  | 0.87  | 0.67  | 0.83  | -1.31958034  | -0.373351596 | 6.13E-05    |
| 271 | KIF6     | 0.21  | 0.2   | 0.24  | 0.1   | 0.12  | 0.04  | 0.29  | 0.23  | 0.21  | -1.321928095 | 0.167456746  | 0.032632116 |
| 272 | TNFRSF14 | 0.99  | 1.06  | 1.12  | 0.45  | 0.36  | 0.45  | 1.16  | 1.03  | 1.16  | -1.331059107 | 0.079678255  | 8.68E-09    |
| 273 | B3GALT5  | 0.81  | 0.92  | 0.72  | 0.24  | 0.38  | 0.35  | 0.33  | 0.71  | 0.61  | -1.336725097 | -0.570315725 | 3.66E-05    |
| 274 | SLFN13   | 0.47  | 0.38  | 0.42  | 0.15  | 0.17  | 0.18  | 0.31  | 0.34  | 0.37  | -1.344828497 | -0.316259345 | 2.07E-08    |
| 275 | KLHL4    | 2.4   | 2.27  | 2.19  | 0.63  | 1.06  | 1.01  | 1.45  | 1.76  | 1.69  | -1.345249169 | -0.485426827 | 6.12E-08    |
| 276 | CNIH3    | 1.47  | 1.67  | 1.18  | 0.62  | 0.59  | 0.49  | 1.16  | 1.17  | 1.21  | -1.345496566 | -0.287281952 | 1.42E-06    |
| 277 | ACOT4    | 0.37  | 0.57  | 0.41  | 0.19  | 0.18  | 0.16  | 0.26  | 0.37  | 0.28  | -1.348895142 | -0.569020957 | 0.030499796 |
| 278 | CTSW     | 0.6   | 0.66  | 0.87  | 0.4   | 0.3   | 0.13  | 0.51  | 0.6   | 0.44  | -1.359670189 | -0.458585215 | 0.043708    |
| 279 | USP44    | 0.46  | 0.41  | 0.4   | 0.14  | 0.18  | 0.17  | 0.43  | 0.36  | 0.31  | -1.373974843 | -0.207324973 | 3.00E-05    |
| 280 | ZDHHC22  | 0.49  | 0.47  | 0.37  | 0.21  | 0.22  | 0.08  | 0.51  | 0.46  | 0.5   | -1.382857094 | 0.144389909  | 0.008876575 |
| 281 | SLC52A3  | 0.74  | 0.5   | 0.67  | 0.21  | 0.27  | 0.25  | 0.66  | 0.47  | 0.53  | -1.387604269 | -0.202389397 | 0.000231483 |
| 282 | SEMA3B   | 1.77  | 2.01  | 2.22  | 0.96  | 0.64  | 0.67  | 1.63  | 1.53  | 1.48  | -1.402270203 | -0.370837695 | 1.63E-08    |
| 283 | SLC16A2  | 1.64  | 1.84  | 1.8   | 0.66  | 0.67  | 0.66  | 1.5   | 1.34  | 1.31  | -1.407769499 | -0.347426593 | 1.81E-17    |
| 284 | CFB      | 0.49  | 0.57  | 0.54  | 0.16  | 0.2   | 0.24  | 0.41  | 0.43  | 0.33  | -1.415037499 | -0.451563375 | 0.000222482 |
| 285 | FAM65C   | 0.7   | 0.92  | 0.78  | 0.32  | 0.31  | 0.26  | 0.89  | 0.69  | 0.78  | -1.431157165 | -0.024247546 | 1.10E-08    |
| 286 | SLAMF7   | 3.92  | 3.61  | 4.06  | 1.28  | 1.44  | 1.56  | 3.53  | 3.47  | 3.41  | -1.437197865 | -0.154910498 | 8.35E-20    |
| 287 | ARHGEF6  | 0.14  | 0.19  | 0.19  | 0.06  | 0.07  | 0.06  | 0.15  | 0.15  | 0.14  | -1.452512205 | -0.2410081   | 0.003109694 |
| 288 | LTB      | 1.64  | 1.46  | 1.76  | 0.86  | 0.61  | 0.3   | 1.74  | 1.48  | 1.15  | -1.457206954 | -0.153323034 | 0.004932428 |
| 289 | ATP8A1   | 0.36  | 0.35  | 0.23  | 0.05  | 0.15  | 0.14  | 0.23  | 0.29  | 0.26  | -1.46712601  | -0.269186633 | 0.010050509 |

|     |          |      |      |      |      |      |      |      |      |      |              |              |             |
|-----|----------|------|------|------|------|------|------|------|------|------|--------------|--------------|-------------|
| 290 | LOXL4    | 1.34 | 1.38 | 1.31 | 0.58 | 0.45 | 0.41 | 0.94 | 0.83 | 0.97 | -1.484711027 | -0.556603946 | 9.76E-12    |
| 291 | RIMBP2   | 0.89 | 1.1  | 1.04 | 0.37 | 0.35 | 0.36 | 0.7  | 0.68 | 0.7  | -1.488286481 | -0.542734265 | 9.87E-15    |
| 292 | SAA2-SAA | 0.52 | 0.64 | 1.09 | 0.18 | 0.25 | 0.35 | 0.6  | 0.64 | 0.58 | -1.528378972 | -0.305986551 | 0.049818246 |
| 293 | ZBTB7C   | 0.18 | 0.19 | 0.24 | 0.04 | 0.11 | 0.06 | 0.16 | 0.16 | 0.17 | -1.538419915 | -0.316027493 | 0.010657676 |
| 294 | WT1      | 0.33 | 0.32 | 0.43 | 0.19 | 0.09 | 0.09 | 0.32 | 0.17 | 0.26 | -1.545434137 | -0.526068812 | 0.004645583 |
| 295 | SCG2     | 0.32 | 0.34 | 0.34 | 0.12 | 0.14 | 0.08 | 0.38 | 0.3  | 0.3  | -1.556393349 | -0.029146346 | 0.002828283 |
| 296 | THRB     | 0.48 | 0.52 | 0.45 | 0.13 | 0.17 | 0.19 | 0.32 | 0.42 | 0.39 | -1.565199246 | -0.359730128 | 4.79E-10    |
| 297 | IL1RL2   | 0.7  | 0.82 | 0.77 | 0.2  | 0.25 | 0.32 | 0.8  | 0.57 | 0.74 | -1.572417247 | -0.118104599 | 3.27E-05    |
| 298 | COL7A1   | 4.55 | 5.36 | 4.61 | 1.56 | 1.8  | 1.49 | 4.92 | 4.91 | 4.27 | -1.581984801 | -0.042346291 | 4.43E-28    |
| 299 | KCNE1    | 0.31 | 0.33 | 0.35 | 0.1  | 0.1  | 0.13 | 0.26 | 0.33 | 0.27 | -1.584962501 | -0.203091865 | 4.16E-05    |
| 300 | VAT1L    | 2.53 | 2.33 | 2.07 | 0.75 | 0.78 | 0.78 | 1.59 | 1.77 | 1.92 | -1.584962501 | -0.392317423 | 2.28E-20    |
| 301 | BZRAP1   | 0.1  | 0.08 | 0.09 | 0.02 | 0.03 | 0.04 | 0.14 | 0.09 | 0.1  | -1.584962501 | 0.289506617  | 0.010959844 |
| 302 | SLC4A4   | 0.65 | 0.53 | 0.45 | 0.13 | 0.18 | 0.23 | 0.39 | 0.43 | 0.46 | -1.593840652 | -0.348728154 | 2.53E-07    |
| 303 | PBX1     | 0.43 | 0.41 | 0.3  | 0.11 | 0.15 | 0.11 | 0.28 | 0.32 | 0.27 | -1.623436649 | -0.389946518 | 2.53E-07    |
| 304 | SERPINF1 | 0.39 | 0.33 | 0.33 | 0.17 | 0.11 | 0.06 | 0.34 | 0.26 | 0.32 | -1.626782676 | -0.190683562 | 0.032646911 |
| 305 | ANO2     | 0.26 | 0.19 | 0.18 | 0.07 | 0.07 | 0.06 | 0.16 | 0.18 | 0.17 | -1.655351829 | -0.304854582 | 0.002443006 |
| 306 | CIITA    | 0.57 | 0.7  | 0.57 | 0.19 | 0.21 | 0.18 | 0.48 | 0.46 | 0.52 | -1.665580961 | -0.333737397 | 4.92E-10    |
| 307 | GPR133   | 0.15 | 0.28 | 0.22 | 0.07 | 0.05 | 0.08 | 0.23 | 0.22 | 0.26 | -1.700439718 | 0.127379306  | 0.001724457 |
| 308 | SHANK2   | 0.42 | 0.41 | 0.44 | 0.09 | 0.16 | 0.14 | 0.36 | 0.48 | 0.43 | -1.703282468 | 0            | 2.57E-10    |
| 309 | HAS2     | 2.72 | 2.84 | 2.39 | 0.57 | 0.96 | 0.9  | 2.06 | 2.39 | 2.15 | -1.709998547 | -0.268488836 | 6.22E-12    |
| 310 | GRIK4    | 0.39 | 0.39 | 0.41 | 0.07 | 0.16 | 0.12 | 0.25 | 0.29 | 0.3  | -1.765534746 | -0.502500341 | 2.90E-07    |
| 311 | SPTLC3   | 2.54 | 2.57 | 2.74 | 0.54 | 0.84 | 0.9  | 1.76 | 2.19 | 2.07 | -1.78365883  | -0.382929167 | 6.08E-15    |
| 312 | CACNA1C  | 0.06 | 0.06 | 0.02 | 0.02 | 0.01 | 0.01 | 0.05 | 0.04 | 0.03 | -1.807354922 | -0.222392421 | 0.039054146 |
| 313 | IL24     | 6.8  | 6.85 | 7.25 | 2.21 | 1.77 | 1.97 | 5.57 | 4.41 | 5.04 | -1.812541369 | -0.476618129 | 1.07E-33    |
| 314 | LINC0144 | 2.17 | 2.05 | 1.9  | 0.68 | 0.38 | 0.66 | 2.04 | 1.67 | 1.28 | -1.831123088 | -0.294491837 | 2.01E-06    |
| 315 | PTGS1    | 0.2  | 0.31 | 0.28 | 0.08 | 0.08 | 0.06 | 0.23 | 0.23 | 0.27 | -1.84434913  | -0.113956189 | 1.38E-05    |
| 316 | DAAM2    | 1.9  | 1.9  | 1.76 | 0.57 | 0.52 | 0.44 | 1.8  | 1.85 | 1.72 | -1.86155323  | -0.050162795 | 3.34E-30    |
| 317 | RCSD1    | 2.84 | 2.91 | 2.47 | 0.72 | 0.75 | 0.77 | 2.01 | 2.16 | 1.97 | -1.875639662 | -0.420899738 | 2.68E-27    |
| 318 | FAT3     | 0.63 | 0.52 | 0.51 | 0.09 | 0.17 | 0.19 | 0.4  | 0.48 | 0.43 | -1.883186335 | -0.34161643  | 2.07E-10    |
| 319 | MAL2     | 2.83 | 2.34 | 2.32 | 0.56 | 0.74 | 0.7  | 1.85 | 2.29 | 1.98 | -1.904965719 | -0.291434066 | 4.71E-20    |
| 320 | DIO2     | 0.34 | 0.45 | 0.43 | 0.09 | 0.11 | 0.12 | 0.36 | 0.39 | 0.34 | -1.930737338 | -0.162553013 | 9.35E-11    |
| 321 | MGAT5B   | 2.86 | 2.92 | 3.08 | 0.79 | 0.88 | 0.63 | 3    | 2.3  | 2.55 | -1.945672838 | -0.174614045 | 1.01E-29    |
| 322 | ZNF415   | 0.3  | 0.19 | 0.18 | 0.02 | 0.09 | 0.06 | 0.16 | 0.28 | 0.27 | -1.978626349 | 0.083657929  | 0.013801188 |
| 323 | TP53I11  | 0.45 | 0.7  | 0.51 | 0.15 | 0.2  | 0.07 | 0.4  | 0.44 | 0.43 | -1.982722009 | -0.386354745 | 2.26E-05    |
| 324 | HECW1    | 0.29 | 0.34 | 0.23 | 0.03 | 0.09 | 0.09 | 0.22 | 0.25 | 0.23 | -2.033947332 | -0.296981738 | 6.38E-06    |
| 325 | HLA-DMB  | 1.17 | 1.04 | 1.13 | 0.27 | 0.22 | 0.3  | 0.94 | 0.82 | 1.03 | -2.079923544 | -0.259582981 | 1.19E-08    |
| 326 | SMPD3    | 0.32 | 0.32 | 0.29 | 0.07 | 0.07 | 0.07 | 0.26 | 0.2  | 0.21 | -2.146841388 | -0.473069621 | 1.69E-09    |
| 327 | CYB5R2   | 1.05 | 1.08 | 0.98 | 0.29 | 0.23 | 0.18 | 1.12 | 1.03 | 0.94 | -2.151487753 | -0.009307742 | 8.14E-11    |
| 328 | LOC10050 | 0.27 | 0.3  | 0.28 | 0.03 | 0.09 | 0.07 | 0.23 | 0.24 | 0.17 | -2.161463423 | -0.409390936 | 5.69E-06    |
| 329 | MARVELD  | 0.45 | 0.61 | 0.33 | 0    | 0.12 | 0.17 | 0.37 | 0.4  | 0.43 | -2.260960078 | -0.212050477 | 0.047549771 |
| 330 | PI3      | 0.68 | 0.34 | 0.68 | 0.16 | 0.07 | 0.1  | 0.84 | 0.57 | 0.57 | -2.364996817 | 0.219965684  | 0.035348369 |
| 331 | LINC0090 | 0.19 | 0.24 | 0.21 | 0.02 | 0.09 | 0.01 | 0.24 | 0.18 | 0.17 | -2.415037499 | -0.117356951 | 0.016777885 |
| 332 | AR       | 0.41 | 0.48 | 0.31 | 0.07 | 0.07 | 0.08 | 0.3  | 0.36 | 0.25 | -2.447458977 | -0.399095955 | 5.37E-18    |
| 333 | SLCO4C1  | 0.13 | 0.09 | 0.06 | 0    | 0.03 | 0.02 | 0.07 | 0.07 | 0.12 | -2.485426827 | -0.106915204 | 0.043088392 |
| 334 | PYCARD   | 0.73 | 0.94 | 0.63 | 0.16 | 0.16 | 0.02 | 0.8  | 0.49 | 0.55 | -2.75802721  | -0.321928095 | 0.000663763 |
| 335 | GCNT4    | 0.11 | 0.13 | 0.11 | 0    | 0.03 | 0.02 | 0.09 | 0.11 | 0.12 | -2.807354922 | -0.129283017 | 0.019989364 |
| 336 | HLA-DPB  | 0.22 | 0.2  | 0.18 | 0.02 | 0.01 | 0.05 | 0.2  | 0.14 | 0.17 | -2.906890596 | -0.234465254 | 6.34E-06    |
| 337 | TRIM29   | 0.09 | 0.11 | 0.11 | 0.02 | 0    | 0.02 | 0.14 | 0.07 | 0.06 | -2.95419631  | -0.199308808 | 0.025992991 |
| 338 | RCN3     | 0.4  | 0.55 | 0.36 | 0.05 | 0.09 | 0.02 | 1.12 | 1.14 | 1.14 | -3.033423002 | 1.375967935  | 1.09E-05    |
| 339 | HLA-DPA  | 3.39 | 3.34 | 3.14 | 0.38 | 0.39 | 0.43 | 2.78 | 2.66 | 2.37 | -3.040015679 | -0.337727536 | 4.29E-43    |
| 340 | YPEL3    | 0.26 | 0.18 | 0.23 | 0.05 | 0.02 | 0.01 | 0.2  | 0.16 | 0.14 | -3.06608919  | -0.422233001 | 0.004674547 |
| 341 | NCKAP1L  | 0.34 | 0.38 | 0.33 | 0.04 | 0.03 | 0.05 | 0.4  | 0.51 | 0.33 | -3.129283017 | 0.239950793  | 3.04E-11    |
| 342 | HLA-DRA  | 1.52 | 1.83 | 1.59 | 0.21 | 0.03 | 0.23 | 1.18 | 0.98 | 1.24 | -3.39377838  | -0.538976295 | 1.27E-12    |
| 343 | ZNF671   | 0.09 | 0.06 | 0.1  | 0    | 0.01 | 0.01 | 0.14 | 0.13 | 0.15 | -3.64385619  | 0.748461233  | 0.043738368 |

Supplementary Table S2. 343 underrepresented genes in WT EXOSC9-expressing EXOSC9 KD MDA-MB-231.

**shRNAs**

|                 |                                                 |
|-----------------|-------------------------------------------------|
| shLuc (control) | GCAUCACGUACGCGGAAUACCGAAGUAUUCCGCGUACGUGAUG     |
| shEXOSC9#1      | GCAAAUACGUGUAGACCUACACGAAUGUAGGUCUACACGUUUUUGC  |
| shEXOSC9#2      | GCGUGAUCCUGUACCAUUAAGCGAACUUAUUGGUACAGGAUCACGC  |
| shEXOSC9#3      | GCCUUAUGUCAUUUCCGAAGACGAAUCUUCGGAAAUGACAUAAAGGC |
| shEXOSC2#1      | GCCUCAGUGAUUCUCGGUAACCGAAGUUACCGAGAAUCACUGAGGC  |
| shEXOSC2#2      | GCUGAAGAAUGUGAGAAUUCGGAAGGAAUUCUCACAUUCUUCAGC   |
| shEXOSC4#1      | GGCCCUAGUGAACUGUCAAUACGAAUAUUGACAGUUCACUAGGGCC  |
| shEXOSC4#2      | GCUCCCAGAUUGAUUAUCUAUGCGAACAUAGAUAUCAAUCUGGGAGC |
| shAPOBEC3G#1    | GGACCAGGACUACAGGGUUACCGAAGUAACCCUGUAGUCCUGGUCC  |
| shAPOBEC3G#2    | GCAAUGCACUCCUGACCAAGUCGAAACUUGGUCAGGAGUGCAUUGC  |

**siRNAs**

|                 |                     |
|-----------------|---------------------|
| siLuc (control) | GAUCUACUGGUCUGCCUAA |
| siEDC4#1        | CAUAUCACCUGCUGCAGCA |
| siEDC4#2        | CCCAUAUCCUGCAGCUGCU |

**Supplementary Table S3. List of shRNA and siRNA sequences used in this study**

| antigen                              | host species | company                   | catalogue number | dilution                              |
|--------------------------------------|--------------|---------------------------|------------------|---------------------------------------|
| EXOSC9                               | mouse        | BIO MATRIX RESERCH        | BMR00566         | 1:250 (WB)                            |
| EXOSC1                               | rabbit       | Proteintech               | 12585-1-AP       | 1:1000 (WB)                           |
| EXOSC2                               | rabbit       | Abcam                     | ab185235         | 1:1000 (WB)                           |
| EXOSC3                               | mouse        | Santa Cruz Biotechnology  | sc-166568        | 1:1000 (WB)                           |
| EXOSC4                               | mouse        | Santa Cruz Biotechnology  | SC-166772        | 1:1000 (WB)                           |
| EXOSC5                               | rabbit       | Proteintech               | 15627-1-AP       | 1:1000 (WB)                           |
| EXOSC6                               | goat         | Santa Cruz Biotechnology  | sc-107536        | 1:500 (WB)                            |
| EXOSC7                               | rabbit       | Santa Cruz Biotechnology  | sc-133570        | 1:1000 (WB)                           |
| EXOSC8                               | rabbit       | Santa Cruz Biotechnology  | sc-84108         | 1:1000 (WB)                           |
| EDC4                                 | rabbit       | GeneTex                   | GTX115745        | 1:200 (IFA/cell), 1:500 (WB)          |
| Dcp1a                                | mouse        | Abcam                     | ab57654          | 1:400 (IFA/cell), 1:1000 (WB)         |
| Lsm1                                 | rabbit       | LifeSpan BioSciences      | LS-C97364        | 1:200 (IFA/cell), 1:500 (WB)          |
| Xrn1                                 | mouse        | Santa Cruz Biotechnology  | SC-165985        | 1:100 (IFA/cell, WB)                  |
| eIF4G1                               | rabbit       | Bethyl Laboratories       | A300-502A        | 1:200 (IFA/cell)                      |
| V5                                   | mouse        | Thermo Fischer Scientific | R960-25          | 1:5000 (WB), 1:1000 (IFA)             |
| APOBEC3G                             | rabbit       | CST                       | #43584S          | 1:500 (WB)                            |
| actin                                | mouse        | Wako                      | 0111-24554       | 1:2000 (WB)                           |
| EXOSC10                              | rabbit       | Proteintech               | 16731-1-AP       | 1:1000 (WB)                           |
| DIS3                                 | rabbit       | Proteintech               | 14689-1-AP       | 1:500 (WB)                            |
| DIS3L                                | rabbit       | AVIVA SYSTEMS BIOLOGY     | OAAB03025        | 1:500 (WB)                            |
| HBS1L                                | rabbit       | Proteintech               | 10359-1-AP       | 1:1000 (WB)                           |
| MPHOSPH6                             | rabbit       | Proteintech               | 10695-1-AP       | 1:1000 (WB)                           |
| C1D                                  | rabbit       | Abcam                     | AB166897         | 1:1000 (WB)                           |
| RBM7                                 | rabbit       | Proteintech               | 21896-1-AP       | 1:1000 (WB)                           |
| Cleaved caspase-3                    | rabbit       | CST                       | 9665             | 1:100 (IFA/tissue)                    |
| Anti-rabbit IgG, HRP linked whole Ab | donkey       | GE Helthcare              | NA934V           | 1:3000(WB)                            |
| Anti-mouse IgG, HRP- linked whole Ab | sheep        | GE Helthcare              | NA931V           | 1:3000 (WB)                           |
| Anti-Goat IgG HRP antibody           | rabbit       | Sigma                     | A5420            | 1:5000 (WB)                           |
| Anti-mouse IgG, Alexa Fluor 488      | goat         | Thermo Fischer Scientific | A-11029          | 1:1000 (IFA/cell)                     |
| Anti-rabbit IgG, Alexa Fluor 488     | goat         | Thermo Fischer Scientific | A-11034          | 1:1000 (IFA/cell), 1:500 (IFA/tissue) |
| Anti-rabbit IgG, Alexa Fluor 594     | goat         | Thermo Fischer Scientific | A-11037          | 1:1000 (IFA/cell)                     |

**Supplementary Table S4. List of antibodies used in this study.**

|             |             |                              |
|-------------|-------------|------------------------------|
| ACTB        | Forward (f) | 5'- GAGCTTCCGGAAGAGACCAG -3' |
|             | Reverse (r) | 5'- GGATCTCGAAGCTGTCATCG -3' |
| APOBEC3G    | f           | TTTGTTGCCCCGCCTCTACTAC       |
|             | r           | TTGGCTGTACACGAACCTTGC        |
| ProSELENBP1 | f           | AGGCATCAAAGAGAGTCTTG         |
|             | r           | GTGAGTGGAGGTAGTCAGGA         |
| ProRBM39    | f           | GGAAATAGTGGAGAAAAGCA         |
|             | r           | CATTTTTGAAGGAACGGTAG         |
| ProRAD50    | f           | CAGGCAGAGGCAAATTATAC         |
|             | r           | CACATTTAAGGGCCTAGAGA         |
| ProLACE1    | f           | TACCCTTCGGATACACTGTC         |
|             | r           | GGTACGCACTCAAATGTTTT         |
| Proc21orf63 | f           | TAACACACTTTTCCCCAGAC         |
|             | r           | ACCACCTAGTACTCCAGCAA         |
| DAPK1       | f           | GAGAGATTGCTCCCAGTGAGG        |
|             | r           | CATCAGTCTCCAGTCCTCCAG        |
| PYCARD      | f           | TCTACCTGGAGACCTACGGC         |
|             | r           | TCCAGAGCCCTGGTGC             |
| TNFRSF1B    | f           | CGCCCAGGTGGCATTTACA          |
|             | r           | GCACATCTGAGCTGTCTGGT         |
| TNFRSF21    | f           | CCCAAAGGCATGAACTCAACA        |
|             | r           | CCTGAAGGTTTGGGAGGGTC         |

**Supplementary Table S5. qPCR primer sequences used in this study.**

Table of data for Fig. 1b

|            |      |      |     |      |      |      |      |      |     |
|------------|------|------|-----|------|------|------|------|------|-----|
| shLuc      | 7.5  | 7.4  | 7.3 | 7.4  | 7.45 | 7.85 | 6.95 | 7.3  | 6.8 |
| shEXOSC9#1 | 8.5  | 7.95 | 7.3 | 7.95 | 7.4  | 6.6  | 7.35 | 7.45 | 7.6 |
| shEXOSC9#2 | 7.65 | 7.2  | 7.2 | 8.15 | 7.25 | 6.55 | 7.1  | 7.4  | 7   |

Table of data for Fig. 1c

|            |      |      |      |      |      |     |      |      |     |
|------------|------|------|------|------|------|-----|------|------|-----|
| shLuc      | 6.75 | 7.5  | 7.7  | 6.65 | 6.75 | 6.8 | 7.2  | 7.7  | 7.3 |
| shEXOSC9#1 | 5.3  | 4.85 | 4.85 | 5.4  | 4.85 | 5.2 | 4.95 | 5.65 | 4.8 |
| shEXOSC9#2 | 4.5  | 4.55 | 3.6  | 4.5  | 5.15 | 4.3 | 5    | 4.65 | 4.2 |

Table of data for Fig. 1d

|            |      |      |      |      |      |     |      |      |     |
|------------|------|------|------|------|------|-----|------|------|-----|
| shLuc      | 4.15 | 5.1  | 5.1  | 4.65 | 5.2  | 4.9 | 4.8  | 5.2  | 4.7 |
| shEXOSC9#1 | 3.65 | 3.15 | 3.25 | 3.65 | 3.2  | 3.6 | 2.8  | 3.15 | 3.8 |
| shEXOSC9#2 | 2.15 | 2.6  | 2.8  | 1.75 | 2.35 | 3.4 | 2.25 | 2.3  | 3.1 |

Table of data for Fig. 1e

|            |      |      |      |      |      |      |      |     |      |
|------------|------|------|------|------|------|------|------|-----|------|
| shLuc      | 4.05 | 4.3  | 4.85 | 3.65 | 4.45 | 3.9  | 3.55 | 4.6 | 3.95 |
| shEXOSC9#1 | 2.35 | 3.25 | 2.8  | 2.35 | 3.4  | 2.85 | 2.7  | 3.4 | 2.55 |
| shEXOSC9#2 | 2.25 | 3.05 | 2.35 | 2.4  | 2.9  | 2.45 | 1.7  | 3.3 | 2.55 |

Table of data for Fig. 1f

|            |      |      |      |      |      |      |      |      |      |
|------------|------|------|------|------|------|------|------|------|------|
| shLuc      | 5.65 | 6.85 | 6.65 | 5.6  | 6.05 | 7.85 | 5.45 | 7.8  | 7.1  |
| shEXOSC9#1 | 3.2  | 3.6  | 3.55 | 2.95 | 3.85 | 4.15 | 3.05 | 3.3  | 4.75 |
| shEXOSC9#2 | 3.1  | 3.35 | 3.85 | 2.8  | 3.55 | 4.5  | 4    | 3.25 | 4.65 |

Table of data for Fig. 1h

normal media

|            |    |    |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|----|----|
| shLuc      | 19 | 16 | 16 | 14 | 16 | 6  | 32 | 26 | 23 |
| shEXOSC9#1 | 17 | 20 | 15 | 21 | 19 | 14 | 34 | 29 | 32 |
| shEXOSC9#2 | 17 | 22 | 20 | 19 | 16 | 25 | 31 | 27 | 29 |

H2O2 (4 h)

|            |     |     |     |     |     |     |     |     |     |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| shLuc      | 130 | 163 | 209 | 157 | 128 | 201 | 96  | 111 | 104 |
| shEXOSC9#1 | 233 | 239 | 252 | 230 | 273 | 237 | 170 | 192 | 267 |
| shEXOSC9#2 | 249 | 352 | 228 | 205 | 225 | 194 | 259 | 162 | 237 |

Serum free (24 h)

|            |     |     |     |     |     |     |     |     |     |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| shLuc      | 114 | 232 | 159 | 126 | 129 | 101 | 94  | 92  | 118 |
| shEXOSC9#1 | 447 | 634 | 436 | 244 | 243 | 318 | 262 | 241 | 141 |
| shEXOSC9#2 | 922 | 620 | 348 | 247 | 283 | 242 | 148 | 203 | 237 |

Table of data for Fig. 2a

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 8     | 2          | 0          |
| 7     | 0          | 0          |
| 3     | 1          | 7          |
| 1     | 4          | 0          |
| 0     | 3          | 0          |
| 0     | 0          | 2          |
| 4     | 1          | 0          |
| 0     | 3          | 0          |
| 9     | 2          | 0          |
| 2     | 7          | 0          |
| 7     | 0          | 0          |
| 2     | 2          | 4          |
| 8     | 0          | 0          |
| 3     | 0          | 10         |
| 3     | 8          | 0          |
| 1     | 0          | 4          |
| 8     | 4          | 7          |
| 2     | 8          | 0          |
| 1     | 2          | 0          |
| 0     | 5          | 0          |
| 5     | 0          | 0          |
| 5     | 7          | 0          |
| 4     | 2          | 0          |
| 0     | 5          | 0          |
| 4     | 4          | 4          |
| 4     | 2          | 0          |
| 9     | 0          | 0          |
| 0     | 7          | 0          |
| 3     | 8          | 0          |

|    |    |   |   |   |   |
|----|----|---|---|---|---|
| 4  | 6  | 0 | 4 | 8 | 1 |
| 2  | 0  | 4 | 4 | 0 | 0 |
| 0  | 1  | 0 | 0 | 0 | 0 |
| 1  | 0  | 0 | 0 | 0 | 0 |
| 3  | 0  | 3 | 0 | 0 | 5 |
| 4  | 1  | 6 | 0 | 0 | 6 |
| 0  | 3  | 0 | 0 | 0 | 1 |
| 2  | 3  | 0 | 0 | 0 | 4 |
| 4  | 4  | 9 | 0 | 0 | 2 |
| 6  | 7  | 0 | 1 | 2 | 5 |
| 3  | 0  | 2 | 5 | 2 | 0 |
| 1  | 4  | 0 | 0 | 0 | 0 |
| 4  | 2  | 0 | 0 | 0 | 0 |
| 3  | 4  | 0 | 0 | 0 | 0 |
| 11 | 0  | 6 | 0 | 0 | 0 |
| 0  | 0  | 0 | 5 | 5 | 5 |
| 1  | 7  | 0 | 0 | 3 | 2 |
| 3  | 1  | 0 | 7 | 0 | 6 |
| 0  | 13 | 7 | 4 | 0 | 0 |
| 16 | 4  | 1 | 0 | 0 | 0 |
| 0  | 0  | 0 | 3 | 0 | 0 |

Table of data for Fig. 2b

| shLuc |   | shEXOSC9#1 |   | shEXOSC9#2 |   |
|-------|---|------------|---|------------|---|
| 0     | 4 | 2          | 0 | 3          | 0 |
| 0     | 1 | 1          | 3 | 0          | 8 |
| 14    | 3 | 0          | 1 | 4          | 0 |
| 1     | 3 | 0          | 0 | 1          | 3 |
| 0     | 2 | 0          | 1 | 0          | 7 |
| 0     | 0 | 3          | 0 | 0          | 0 |
| 0     | 0 | 0          | 0 | 5          | 0 |
| 2     | 1 | 7          | 0 | 0          | 5 |
| 1     | 0 | 1          | 0 | 0          | 0 |
| 6     | 3 | 0          | 3 | 0          | 0 |
| 4     | 6 | 0          | 0 | 0          | 0 |
| 0     | 0 | 0          | 0 | 0          | 0 |
| 0     | 1 | 0          | 0 | 0          | 0 |
| 0     | 7 | 0          | 0 | 0          | 1 |
| 2     | 0 | 0          | 6 | 0          | 3 |
| 7     | 3 | 0          | 9 | 0          | 2 |
| 0     | 4 | 0          | 0 | 0          | 0 |
| 0     | 4 | 1          | 1 | 2          | 0 |
| 13    | 5 | 0          | 0 | 2          | 1 |
| 0     | 0 | 0          | 0 | 0          | 3 |
| 0     | 0 | 0          | 3 | 4          | 5 |
| 5     | 0 | 0          | 0 | 0          | 3 |
| 2     | 0 | 1          | 4 | 0          | 0 |
| 0     | 3 | 2          | 0 | 0          | 0 |
| 0     | 1 | 0          | 0 | 0          | 2 |
| 0     | 4 | 0          | 0 | 3          | 0 |
| 5     | 1 | 1          | 0 | 0          | 3 |
| 0     | 0 | 8          | 1 | 3          | 0 |
| 3     | 0 | 0          | 0 | 0          | 0 |
| 0     | 0 | 0          | 0 | 0          | 0 |
| 6     | 4 | 3          | 0 | 0          | 3 |
| 4     | 4 | 0          | 0 | 0          | 0 |
| 0     | 3 | 5          | 1 | 0          | 0 |
| 4     | 4 | 3          | 3 | 1          | 4 |
| 0     | 0 | 10         | 0 | 0          | 0 |
| 0     | 4 | 1          | 0 | 0          | 0 |
| 0     | 0 | 3          | 0 | 0          | 0 |
| 4     | 3 | 0          | 0 | 0          | 3 |
| 0     | 4 | 0          | 0 | 0          | 1 |
| 10    | 5 | 0          | 0 | 5          | 0 |
| 2     | 6 | 4          | 3 | 0          | 0 |
| 1     | 2 | 0          | 0 | 0          | 0 |
| 2     | 0 | 0          | 0 | 0          | 0 |
| 0     | 2 | 3          | 5 | 0          | 0 |
| 0     | 4 | 0          | 0 | 0          | 4 |
| 0     | 6 | 0          | 0 | 0          | 0 |
| 3     | 2 | 0          | 0 | 0          | 0 |
| 2     | 0 | 0          | 0 | 0          | 9 |



|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 2 | 6 |
| 6 | 0 | 1 | 3 | 4 | 4 |

Table of data for Fig. 2c

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 4     | 0          | 0          |
| 0     | 4          | 0          |
| 0     | 3          | 2          |
| 3     | 9          | 6          |
| 4     | 3          | 0          |
| 4     | 1          | 0          |
| 1     | 8          | 1          |
| 5     | 0          | 0          |
| 1     | 0          | 1          |
| 0     | 3          | 1          |
| 2     | 3          | 4          |
| 0     | 3          | 0          |
| 0     | 7          | 5          |
| 4     | 4          | 4          |
| 0     | 0          | 0          |
| 2     | 2          | 0          |
| 0     | 1          | 0          |
| 6     | 1          | 0          |
| 3     | 0          | 0          |
| 5     | 0          | 0          |
| 4     | 4          | 0          |
| 3     | 1          | 0          |
| 4     | 0          | 2          |
| 0     | 2          | 0          |
| 2     | 0          | 0          |
| 4     | 3          | 4          |
| 4     | 2          | 1          |
| 4     | 5          | 0          |
| 1     | 4          | 0          |
| 4     | 0          | 0          |
| 0     | 0          | 0          |
| 1     | 5          | 0          |
| 0     | 2          | 0          |
| 0     | 1          | 0          |
| 4     | 2          | 1          |
| 0     | 3          | 0          |
| 2     | 2          | 0          |
| 2     | 0          | 0          |
| 3     | 0          | 0          |
| 0     | 4          | 0          |
| 5     | 0          | 0          |
| 4     | 3          | 0          |
| 0     | 0          | 1          |
| 5     | 5          | 0          |
| 1     | 4          | 2          |
| 6     | 0          | 4          |
| 3     | 0          | 1          |
| 4     | 2          | 0          |
| 0     | 6          | 0          |
| 8     | 2          | 0          |

Table of data for Fig. 2d

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 0     | 0          | 0          |
| 5     | 7          | 0          |
| 0     | 0          | 0          |
| 3     | 0          | 0          |
| 0     | 3          | 0          |
| 0     | 0          | 0          |
| 0     | 3          | 0          |
| 0     | 0          | 3          |
| 6     | 2          | 0          |
| 0     | 6          | 2          |
| 0     | 5          | 0          |
| 2     | 2          | 1          |
| 1     | 0          | 10         |
| 2     | 2          | 0          |
| 5     | 4          | 0          |

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 3 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 4 | 0 | 4 | 3 | 0 |
| 1 | 4 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 8 | 0 |
| 4 | 5 | 0 | 5 | 0 | 0 |
| 1 | 0 | 0 | 0 | 3 | 6 |
| 6 | 3 | 0 | 0 | 1 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 4 | 0 | 1 |
| 9 | 0 | 0 | 0 | 1 | 0 |
| 0 | 2 | 0 | 0 | 0 | 6 |
| 0 | 4 | 0 | 0 | 0 | 2 |
| 0 | 2 | 0 | 0 | 0 | 1 |
| 5 | 3 | 0 | 2 | 0 | 0 |
| 0 | 2 | 0 | 0 | 0 | 0 |
| 0 | 2 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 4 | 2 |
| 4 | 6 | 2 | 0 | 4 | 6 |
| 4 | 2 | 4 | 0 | 0 | 3 |
| 2 | 1 | 0 | 4 | 0 | 0 |
| 1 | 2 | 4 | 3 | 0 | 2 |
| 2 | 5 | 0 | 0 | 0 | 0 |
| 0 | 7 | 1 | 0 | 0 | 0 |
| 2 | 2 | 0 | 0 | 4 | 3 |
| 0 | 2 | 0 | 0 | 0 | 0 |
| 1 | 0 | 5 | 0 | 0 | 0 |
| 2 | 0 | 1 | 0 | 5 | 3 |
| 5 | 0 | 0 | 4 | 0 | 4 |
| 2 | 0 | 3 | 0 | 0 | 0 |
| 1 | 2 | 0 | 0 | 0 | 2 |
| 4 | 2 | 3 | 1 | 0 | 0 |
| 2 | 1 | 0 | 4 | 0 | 0 |
| 7 | 2 | 0 | 0 | 4 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 |

Table of data for Fig. 3a

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 0     | 4          | 0          |
| 3     | 1          | 0          |
| 3     | 0          | 0          |
| 1     | 0          | 0          |
| 4     | 6          | 0          |
| 2     | 3          | 0          |
| 3     | 0          | 0          |
| 9     | 2          | 3          |
| 4     | 3          | 0          |
| 1     | 1          | 0          |
| 3     | 3          | 10         |
| 2     | 2          | 0          |
| 4     | 10         | 4          |
| 4     | 0          | 0          |
| 4     | 0          | 0          |
| 3     | 3          | 3          |
| 2     | 2          | 0          |
| 1     | 6          | 0          |
| 5     | 3          | 0          |
| 3     | 4          | 0          |
| 4     | 2          | 1          |
| 5     | 2          | 4          |
| 8     | 3          | 3          |
| 2     | 4          | 0          |
| 0     | 6          | 0          |
| 0     | 3          | 0          |
| 1     | 5          | 0          |
| 3     | 3          | 2          |
| 3     | 0          | 0          |
| 0     | 1          | 0          |
| 1     | 0          | 0          |
| 5     | 4          | 1          |
| 2     | 5          | 0          |
| 1     | 2          | 1          |
| 3     | 0          | 0          |

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 2 | 0 | 0 | 0 | 1 | 2 |
| 4 | 5 | 4 | 0 | 0 | 0 |
| 5 | 6 | 5 | 0 | 0 | 0 |
| 1 | 2 | 0 | 1 | 0 | 3 |
| 8 | 5 | 2 | 1 | 0 | 0 |
| 3 | 1 | 0 | 1 | 0 | 2 |
| 1 | 5 | 0 | 1 | 0 | 0 |
| 1 | 3 | 0 | 0 | 0 | 0 |
| 4 | 2 | 1 | 0 | 0 | 0 |
| 2 | 2 | 3 | 1 | 0 | 0 |
| 5 | 7 | 0 | 0 | 0 | 0 |
| 5 | 1 | 4 | 2 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 3 | 0 | 5 |
| 4 | 6 | 0 | 0 | 0 | 0 |

Table of data for Fig. 3b

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 1     | 11         | 3          |
| 5     | 4          | 2          |
| 3     | 5          | 0          |
| 6     | 6          | 2          |
| 0     | 9          | 3          |
| 3     | 5          | 0          |
| 0     | 1          | 0          |
| 0     | 0          | 0          |
| 9     | 3          | 0          |
| 6     | 0          | 0          |
| 0     | 5          | 1          |
| 3     | 3          | 6          |
| 5     | 4          | 0          |
| 0     | 4          | 0          |
| 6     | 6          | 0          |
| 2     | 0          | 0          |
| 7     | 9          | 5          |
| 3     | 2          | 0          |
| 1     | 2          | 1          |
| 2     | 5          | 0          |
| 2     | 8          | 4          |
| 12    | 6          | 0          |
| 8     | 0          | 1          |
| 3     | 0          | 1          |
| 5     | 4          | 3          |
| 8     | 5          | 0          |
| 0     | 4          | 0          |
| 6     | 4          | 0          |
| 0     | 3          | 0          |
| 0     | 0          | 0          |
| 4     | 0          | 5          |
| 3     | 0          | 0          |
| 6     | 0          | 0          |
| 9     | 4          | 0          |
| 0     | 5          | 0          |
| 9     | 0          | 0          |
| 1     | 7          | 0          |
| 0     | 0          | 0          |
| 0     | 2          | 0          |
| 0     | 5          | 0          |
| 3     | 4          | 0          |
| 0     | 12         | 3          |
| 4     | 16         | 0          |
| 0     | 9          | 0          |
| 7     | 1          | 0          |
| 4     | 6          | 0          |
| 2     | 5          | 0          |
| 11    | 8          | 0          |
| 0     | 7          | 0          |
| 6     | 4          | 0          |

Table of data for Fig. 3c

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 0     | 2          | 0          |
| 2     | 0          | 0          |

|    |   |   |   |   |   |
|----|---|---|---|---|---|
| 0  | 2 | 0 | 2 | 0 | 3 |
| 0  | 0 | 1 | 0 | 0 | 0 |
| 2  | 0 | 0 | 0 | 1 | 0 |
| 4  | 2 | 0 | 0 | 5 | 0 |
| 0  | 1 | 0 | 0 | 0 | 0 |
| 0  | 0 | 0 | 0 | 0 | 0 |
| 3  | 0 | 0 | 0 | 0 | 0 |
| 2  | 0 | 0 | 1 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 |
| 0  | 0 | 0 | 0 | 0 | 0 |
| 0  | 0 | 0 | 2 | 1 | 0 |
| 2  | 0 | 0 | 0 | 0 | 1 |
| 7  | 1 | 0 | 0 | 8 | 0 |
| 3  | 0 | 0 | 0 | 0 | 0 |
| 0  | 3 | 3 | 0 | 0 | 0 |
| 0  | 0 | 0 | 1 | 0 | 0 |
| 3  | 0 | 0 | 0 | 0 | 0 |
| 0  | 0 | 0 | 1 | 0 | 0 |
| 0  | 0 | 0 | 0 | 7 | 0 |
| 0  | 0 | 2 | 0 | 0 | 2 |
| 0  | 0 | 1 | 0 | 0 | 1 |
| 10 | 2 | 3 | 2 | 4 | 0 |
| 0  | 0 | 0 | 0 | 1 | 0 |
| 1  | 2 | 0 | 0 | 0 | 1 |
| 0  | 0 | 0 | 0 | 0 | 1 |
| 3  | 0 | 1 | 0 | 5 | 1 |
| 0  | 0 | 0 | 0 | 0 | 0 |
| 0  | 0 | 0 | 0 | 3 | 4 |
| 1  | 0 | 2 | 0 | 0 | 0 |
| 0  | 0 | 0 | 0 | 0 | 1 |
| 0  | 0 | 2 | 0 | 0 | 0 |
| 1  | 1 | 0 | 0 | 0 | 0 |
| 0  | 1 | 0 | 0 | 0 | 0 |
| 2  | 0 | 0 | 0 | 1 | 0 |
| 0  | 0 | 0 | 0 | 0 | 0 |
| 6  | 0 | 0 | 0 | 0 | 0 |
| 0  | 0 | 3 | 0 | 0 | 2 |
| 1  | 0 | 0 | 2 | 0 | 0 |
| 2  | 2 | 0 | 0 | 0 | 0 |
| 0  | 2 | 0 | 0 | 0 | 0 |
| 7  | 0 | 0 | 0 | 0 | 0 |
| 0  | 4 | 0 | 0 | 0 | 0 |
| 2  | 3 | 0 | 0 | 0 | 1 |
| 3  | 3 | 4 | 0 | 0 | 0 |
| 0  | 0 | 0 | 0 | 1 | 0 |
| 2  | 4 | 0 | 0 | 0 | 0 |
| 0  | 2 | 0 | 0 | 1 | 1 |
| 2  | 0 | 0 | 0 | 0 | 0 |

Table of data for Fig. 3d

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 2     | 2          | 7          |
| 11    | 13         | 0          |
| 3     | 4          | 0          |
| 4     | 4          | 0          |
| 0     | 2          | 4          |
| 3     | 0          | 9          |
| 1     | 7          | 1          |
| 2     | 4          | 0          |
| 5     | 0          | 1          |
| 0     | 4          | 9          |
| 5     | 3          | 4          |
| 10    | 9          | 0          |
| 7     | 6          | 0          |
| 3     | 1          | 3          |
| 0     | 0          | 0          |
| 10    | 4          | 0          |
| 7     | 4          | 5          |
| 15    | 2          | 2          |
| 8     | 5          | 0          |
| 8     | 11         | 1          |
| 9     | 4          | 0          |
| 0     | 0          | 0          |

|    |    |   |    |   |   |
|----|----|---|----|---|---|
| 5  | 6  | 4 | 0  | 0 | 2 |
| 12 | 5  | 0 | 0  | 6 | 5 |
| 7  | 3  | 0 | 4  | 0 | 1 |
| 5  | 8  | 0 | 1  | 3 | 1 |
| 4  | 31 | 0 | 7  | 0 | 7 |
| 8  | 4  | 0 | 7  | 0 | 4 |
| 5  | 8  | 0 | 4  | 0 | 0 |
| 7  | 3  | 0 | 0  | 0 | 2 |
| 17 | 5  | 3 | 2  | 7 | 0 |
| 6  | 7  | 9 | 0  | 0 | 3 |
| 0  | 0  | 0 | 0  | 2 | 0 |
| 5  | 7  | 3 | 3  | 2 | 3 |
| 10 | 0  | 0 | 9  | 0 | 0 |
| 10 | 3  | 1 | 2  | 0 | 0 |
| 4  | 8  | 6 | 0  | 1 | 0 |
| 5  | 7  | 0 | 0  | 3 | 8 |
| 6  | 9  | 3 | 14 | 1 | 0 |
| 5  | 3  | 2 | 0  | 0 | 0 |
| 4  | 5  | 0 | 0  | 0 | 4 |
| 4  | 5  | 2 | 12 | 0 | 0 |
| 7  | 7  | 1 | 4  | 0 | 1 |
| 4  | 4  | 0 | 0  | 0 | 0 |
| 11 | 4  | 0 | 0  | 4 | 0 |
| 0  | 22 | 3 | 0  | 8 | 1 |
| 0  | 5  | 3 | 0  | 0 | 0 |
| 2  | 5  | 0 | 0  | 0 | 0 |
| 7  | 12 | 0 | 2  | 8 | 4 |
| 0  | 35 | 0 | 0  | 0 | 0 |

Table of data for Fig. 3f

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 13    | 10         | 7          |
| 12    | 16         | 0          |
| 14    | 7          | 2          |
| 22    | 18         | 8          |
| 20    | 11         | 8          |
| 4     | 9          | 0          |
| 16    | 12         | 8          |
| 0     | 15         | 7          |
| 5     | 0          | 0          |
| 8     | 7          | 10         |
| 7     | 9          | 7          |
| 10    | 9          | 5          |
| 9     | 8          | 0          |
| 14    | 19         | 8          |
| 7     | 10         | 5          |
| 16    | 15         | 6          |
| 14    | 13         | 5          |
| 0     | 6          | 0          |
| 14    | 12         | 0          |
| 0     | 20         | 4          |
| 5     | 8          | 0          |
| 12    | 11         | 6          |
| 5     | 11         | 0          |
| 14    | 14         | 6          |
| 4     | 15         | 4          |
| 4     | 14         | 5          |
| 0     | 5          | 0          |
| 11    | 24         | 4          |
| 13    | 14         | 0          |
| 9     | 12         | 8          |
| 9     | 17         | 4          |
| 12    | 8          | 6          |
| 8     | 18         | 0          |
| 8     | 12         | 0          |
| 11    | 18         | 0          |
| 0     | 9          | 5          |
| 17    | 19         | 7          |
| 12    | 20         | 7          |
| 15    | 17         | 5          |
| 15    | 16         | 5          |
| 14    | 0          | 0          |
| 10    | 9          | 6          |

|    |    |   |   |   |    |
|----|----|---|---|---|----|
| 0  | 20 | 0 | 8 | 4 | 3  |
| 8  | 15 | 9 | 7 | 6 | 9  |
| 10 | 9  | 4 | 5 | 0 | 8  |
| 13 | 17 | 5 | 0 | 5 | 6  |
| 8  | 21 | 9 | 5 | 0 | 11 |
| 0  | 6  | 7 | 7 | 6 | 8  |
| 10 | 30 | 4 | 7 | 7 | 14 |
| 5  | 15 | 0 | 7 | 8 | 14 |

Table of data for Fig. 3g

| shLuc |    | shEXOSC9#1 |    | shEXOSC9#2 |    |
|-------|----|------------|----|------------|----|
| 0     | 3  | 10         | 12 | 7          | 10 |
| 23    | 0  | 8          | 8  | 0          | 10 |
| 18    | 0  | 9          | 2  | 10         | 4  |
| 0     | 8  | 8          | 3  | 8          | 7  |
| 4     | 33 | 8          | 4  | 7          | 6  |
| 17    | 12 | 8          | 5  | 9          | 10 |
| 3     | 16 | 4          | 0  | 8          | 7  |
| 22    | 11 | 5          | 6  | 14         | 8  |
| 8     | 1  | 7          | 17 | 0          | 4  |
| 5     | 0  | 4          | 5  | 44         | 8  |
| 3     | 2  | 5          | 4  | 6          | 6  |
| 16    | 4  | 7          | 6  | 6          | 11 |
| 8     | 16 | 0          | 7  | 6          | 16 |
| 6     | 18 | 4          | 16 | 11         | 6  |
| 13    | 4  | 8          | 13 | 13         | 8  |
| 4     | 4  | 0          | 3  | 7          | 9  |
| 10    | 0  | 11         | 0  | 6          | 14 |
| 11    | 0  | 10         | 8  | 3          | 12 |
| 1     | 6  | 0          | 0  | 8          | 0  |
| 7     | 12 | 8          | 11 | 6          | 12 |
| 26    | 13 | 8          | 3  | 5          | 5  |
| 7     | 4  | 5          | 3  | 9          | 25 |
| 12    | 9  | 10         | 4  | 5          | 11 |
| 10    | 18 | 6          | 12 | 3          | 8  |
| 1     | 21 | 9          | 9  | 9          | 7  |
| 8     | 10 | 0          | 10 | 6          | 12 |
| 11    | 10 | 6          | 12 | 5          | 6  |
| 0     | 0  | 16         | 5  | 8          | 4  |
| 0     | 11 | 0          | 8  | 5          | 8  |
| 16    | 3  | 8          | 9  | 14         | 16 |
| 0     | 6  | 6          | 5  | 16         | 10 |
| 6     | 3  | 4          | 3  | 13         | 5  |
| 10    | 7  | 6          | 23 | 14         | 11 |
| 0     | 0  | 4          | 12 | 14         | 5  |
| 8     | 10 | 16         | 19 | 8          | 11 |
| 8     | 12 | 10         | 7  | 14         | 6  |
| 5     | 14 | 4          | 5  | 7          | 12 |
| 20    | 4  | 10         | 6  | 10         | 9  |
| 12    | 5  | 3          | 9  | 5          | 8  |
| 14    | 4  | 5          | 0  | 8          | 0  |
| 9     | 0  | 8          | 0  | 6          | 0  |
| 12    | 17 | 5          | 5  | 24         | 10 |
| 8     | 2  | 10         | 5  | 0          | 18 |
| 7     | 0  | 8          | 14 | 16         | 10 |
| 8     | 16 | 0          | 4  | 8          | 18 |
| 12    | 8  | 6          | 10 | 11         | 9  |
| 12    | 7  | 8          | 7  | 0          | 10 |
| 6     | 14 | 8          | 5  | 12         | 22 |
| 15    | 5  | 3          | 8  | 4          | 8  |
| 8     | 6  | 15         | 9  | 7          | 8  |

Table of data for Fig. 4b

|            |     |      |     |     |      |      |     |      |      |
|------------|-----|------|-----|-----|------|------|-----|------|------|
| shLuc      | 8.2 | 7.3  | 7.2 | 8.2 | 8.05 | 7.45 | 7.3 | 7.65 | 7.45 |
| shEXOSC2#1 | 5.8 | 5.9  | 6.5 | 6.1 | 5.9  | 6.45 | 6.8 | 6.3  | 6.75 |
| shEXOSC2#2 | 6.2 | 5.15 | 6.5 | 6.3 | 6.3  | 6.3  | 6.8 | 6.3  | 6.45 |
| shEXOSC4#1 | 4.8 | 5.15 | 6.3 | 4.6 | 4.5  | 5.85 | 4.8 | 4.7  | 5.85 |
| shEXOSC4#2 | 6   | 5.15 | 4.5 | 6.2 | 4.95 | 5.15 | 5.8 | 4.05 | 4.95 |

Table of data for Fig. 4c

|            |     |      |      |     |     |      |     |     |      |
|------------|-----|------|------|-----|-----|------|-----|-----|------|
| shLuc      | 7.2 | 7.65 | 7.45 | 7.6 | 6.3 | 6.3  | 7.8 | 6.9 | 6.1  |
| shEXOSC2#1 | 3.6 | 4.25 | 3.85 | 4.6 | 4.5 | 5.15 | 4.2 | 3.6 | 4.25 |
| shEXOSC2#2 | 4.8 | 3.15 | 4.05 | 4.6 | 4.7 | 4.5  | 5.6 | 5.4 | 4.25 |
| shEXOSC4#1 | 2.2 | 2.95 | 4.5  | 2.2 | 2.7 | 4.25 | 3.4 | 3.6 | 4.3  |
| shEXOSC4#2 | 3.6 | 4.05 | 4.05 | 5   | 2.9 | 3.8  | 4.4 | 2.9 | 3.6  |

Table of data for Fig. 4d

|            |     |      |      |     |      |      |     |      |      |
|------------|-----|------|------|-----|------|------|-----|------|------|
| shLuc      | 6.8 | 6.95 | 7.9  | 7.6 | 7.95 | 7.45 | 7.2 | 6.9  | 7.65 |
| shEXOSC2#1 | 4.6 | 5.5  | 5.85 | 5.2 | 4.5  | 5.15 | 4.4 | 4.75 | 4.7  |
| shEXOSC2#2 | 5.2 | 5.25 | 6.05 | 4.8 | 4.5  | 5.15 | 5.6 | 4.5  | 4.95 |
| shEXOSC4#1 | 2.4 | 3    | 4.7  | 2.8 | 4    | 4.5  | 3.4 | 4.5  | 4.7  |
| shEXOSC4#2 | 5   | 4.5  | 4.5  | 4.6 | 3.5  | 3.35 | 4.2 | 3.75 | 3.8  |

Table of data for Fig. 4e

|            |     |      |      |     |      |      |     |      |      |
|------------|-----|------|------|-----|------|------|-----|------|------|
| shLuc      | 3.6 | 3.25 | 4.3  | 3.4 | 3.5  | 4.25 | 3.2 | 3.75 | 4.4  |
| shEXOSC2#1 | 1.6 | 1.5  | 2.7  | 1   | 1.75 | 3.15 | 1.4 | 1.75 | 3.35 |
| shEXOSC2#2 | 2.6 | 2    | 2.25 | 2   | 1.5  | 2.5  | 2   | 2.5  | 2.25 |
| shEXOSC4#1 | 1.6 | 1    | 2.05 | 1.8 | 1.5  | 1.8  | 1.6 | 1.25 | 2.45 |
| shEXOSC4#2 | 1.6 | 2.25 | 1.8  | 1.8 | 0.75 | 1.6  | 2.2 | 1.5  | 1.65 |

Table of data for Fig. 4f

|            |     |      |      |     |      |      |     |      |      |
|------------|-----|------|------|-----|------|------|-----|------|------|
| shLuc      | 8   | 7.25 | 5.4  | 6.8 | 9.45 | 6.55 | 7   | 9    | 6.6  |
| shEXOSC2#1 | 5   | 4.7  | 4.05 | 5.4 | 3.8  | 3.6  | 5.2 | 2.7  | 3.35 |
| shEXOSC2#2 | 4.4 | 4.95 | 4.5  | 5.2 | 5.85 | 4.25 | 5.8 | 4.95 | 4.05 |
| shEXOSC4#1 | 4   | 4.5  | 4.05 | 3.2 | 3.8  | 2.95 | 2.6 | 3.6  | 3.85 |
| shEXOSC4#2 | 4.4 | 4.5  | 4.05 | 5.6 | 3.8  | 3.35 | 4.6 | 4.95 | 3.15 |

Table of data for Fig. 4g

| shLuc |    | shEXOSC2#1 |   | shEXOSC2#2 |   | shEXOSC4#1 |    | shEXOSC4#2 |    |
|-------|----|------------|---|------------|---|------------|----|------------|----|
| 9     | 0  | 4          | 2 | 2          | 0 | 5          | 2  | 3          | 2  |
| 0     | 1  | 4          | 4 | 3          | 0 | 0          | 0  | 0          | 0  |
| 1     | 2  | 3          | 9 | 2          | 3 | 3          | 0  | 0          | 1  |
| 0     | 14 | 3          | 1 | 0          | 1 | 0          | 3  | 3          | 1  |
| 3     | 8  | 4          | 0 | 3          | 1 | 5          | 0  | 0          | 0  |
| 0     | 0  | 1          | 5 | 2          | 2 | 2          | 0  | 0          | 1  |
| 3     | 0  | 2          | 5 | 1          | 1 | 2          | 4  | 0          | 2  |
| 2     | 21 | 0          | 2 | 0          | 0 | 4          | 2  | 1          | 1  |
| 5     | 0  | 2          | 4 | 2          | 2 | 2          | 3  | 0          | 1  |
| 5     | 1  | 0          | 2 | 0          | 0 | 6          | 2  | 0          | 0  |
| 36    | 0  | 2          | 3 | 0          | 0 | 0          | 5  | 0          | 4  |
| 10    | 1  | 0          | 4 | 1          | 4 | 0          | 2  | 0          | 2  |
| 9     | 4  | 0          | 0 | 0          | 0 | 5          | 0  | 0          | 0  |
| 4     | 4  | 0          | 0 | 2          | 0 | 0          | 0  | 2          | 1  |
| 4     | 1  | 3          | 4 | 2          | 2 | 3          | 0  | 1          | 4  |
| 0     | 4  | 2          | 2 | 4          | 4 | 2          | 0  | 0          | 1  |
| 3     | 14 | 3          | 3 | 5          | 1 | 2          | 24 | 0          | 1  |
| 3     | 6  | 2          | 1 | 2          | 4 | 1          | 3  | 1          | 2  |
| 0     | 4  | 0          | 6 | 2          | 0 | 0          | 0  | 0          | 4  |
| 5     | 3  | 0          | 0 | 0          | 0 | 4          | 0  | 1          | 0  |
| 3     | 2  | 3          | 4 | 0          | 0 | 0          | 2  | 1          | 2  |
| 4     | 0  | 0          | 0 | 2          | 1 | 1          | 1  | 0          | 0  |
| 4     | 2  | 3          | 1 | 3          | 2 | 1          | 0  | 3          | 2  |
| 2     | 3  | 5          | 0 | 2          | 0 | 2          | 4  | 0          | 0  |
| 3     | 0  | 0          | 0 | 0          | 0 | 5          | 6  | 1          | 0  |
| 5     | 3  | 3          | 5 | 6          | 2 | 0          | 3  | 3          | 2  |
| 3     | 3  | 0          | 2 | 2          | 4 | 3          | 4  | 4          | 1  |
| 9     | 3  | 0          | 2 | 0          | 3 | 2          | 4  | 15         | 2  |
| 5     | 4  | 1          | 2 | 2          | 0 | 4          | 3  | 0          | 0  |
| 0     | 3  | 3          | 0 | 2          | 2 | 2          | 1  | 4          | 0  |
| 6     | 6  | 3          | 0 | 0          | 5 | 0          | 1  | 0          | 1  |
| 4     | 2  | 2          | 2 | 2          | 6 | 1          | 2  | 3          | 0  |
| 4     | 3  | 0          | 0 | 2          | 5 | 0          | 2  | 3          | 1  |
| 5     | 4  | 0          | 0 | 2          | 0 | 2          | 3  | 4          | 4  |
| 2     | 3  | 0          | 0 | 3          | 0 | 0          | 5  | 4          | 11 |
| 12    | 0  | 0          | 0 | 3          | 2 | 1          | 0  | 3          | 3  |
| 4     | 3  | 0          | 0 | 8          | 0 | 2          | 3  | 0          | 0  |
| 3     | 4  | 2          | 0 | 2          | 0 | 4          | 1  | 0          | 0  |
| 0     | 4  | 0          | 0 | 0          | 0 | 4          | 0  | 1          | 3  |
| 6     | 4  | 2          | 0 | 0          | 0 | 0          | 0  | 2          | 4  |

|    |    |   |   |    |   |   |   |    |   |
|----|----|---|---|----|---|---|---|----|---|
| 5  | 8  | 4 | 0 | 4  | 0 | 2 | 0 | 2  | 4 |
| 24 | 4  | 0 | 1 | 0  | 0 | 1 | 4 | 0  | 0 |
| 4  | 4  | 0 | 0 | 3  | 0 | 0 | 1 | 2  | 6 |
| 19 | 0  | 0 | 2 | 0  | 0 | 2 | 0 | 0  | 1 |
| 4  | 1  | 2 | 1 | 5  | 1 | 0 | 0 | 4  | 0 |
| 0  | 4  | 1 | 2 | 0  | 2 | 5 | 2 | 0  | 3 |
| 5  | 28 | 0 | 2 | 3  | 2 | 0 | 4 | 0  | 0 |
| 7  | 3  | 1 | 0 | 0  | 1 | 3 | 3 | 1  | 0 |
| 4  | 2  | 0 | 4 | 0  | 2 | 0 | 3 | 27 | 1 |
| 2  | 0  | 0 | 1 | 14 | 0 | 3 | 2 | 0  | 1 |

Table of data for Fig. 5c

|      |      |      |      |      |      |      |      |      |     |
|------|------|------|------|------|------|------|------|------|-----|
| mock | 7.4  | 7    | 7.05 | 7.3  | 8.05 | 8.45 | 6.85 | 7.25 | 8.4 |
| WT   | 6.75 | 7.4  | 7.1  | 6.4  | 7.85 | 7.4  | 7.9  | 7.3  | 8.6 |
| MUT  | 7.2  | 7.35 | 8.6  | 8.15 | 7.5  | 7.9  | 7.3  | 7.55 | 8.6 |

Table of data for Fig. 5d

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| mock | 3.8  | 4.75 | 5.35 | 4    | 4.85 | 5.15 | 3.65 | 4.5  | 4.8  |
| WT   | 5.75 | 6.5  | 6.95 | 6.25 | 7.25 | 7    | 5.5  | 6.65 | 6.85 |
| MUT  | 4    | 3.7  | 4.3  | 3.8  | 4.65 | 4.95 | 4.2  | 3.95 | 4.5  |

Table of data for Fig. 5e

|      |     |      |      |      |     |      |      |      |      |
|------|-----|------|------|------|-----|------|------|------|------|
| mock | 3.5 | 4.25 | 3.3  | 3.55 | 4.2 | 2.95 | 2.85 | 4.55 | 3.05 |
| WT   | 6.3 | 6.4  | 4.55 | 5.25 | 6.7 | 4.4  | 6.55 | 7.15 | 4.45 |
| MUT  | 3   | 4    | 3.15 | 3.2  | 5.3 | 2.8  | 3.4  | 4.35 | 3.2  |

Table of data for Fig. 5f

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| mock | 3.75 | 3.35 | 3.8  | 3.65 | 3.5  | 3.3  | 3.8  | 3.8  | 3.25 |
| WT   | 5.7  | 4.05 | 5.25 | 5.75 | 5.25 | 5.05 | 5.95 | 5.15 | 4.4  |
| MUT  | 3.95 | 2.7  | 2.9  | 3.4  | 2.85 | 3.2  | 4.95 | 3.45 | 3.4  |

Table of data for Fig. 5g

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| mock | 4.45 | 4.35 | 4.25 | 4.1  | 3.7  | 3.75 | 3.65 | 4.55 | 3.5  |
| WT   | 7.35 | 5.15 | 4.85 | 6.2  | 5.85 | 5.75 | 6.4  | 5.85 | 6.15 |
| MUT  | 3.75 | 3.3  | 3.75 | 4.35 | 3.25 | 3.8  | 3.6  | 4.25 | 4.4  |

Table of data for Fig. 5h

| mock |   | WT |   | MUT |   |
|------|---|----|---|-----|---|
| 6    | 0 | 0  | 0 | 0   | 3 |
| 0    | 6 | 3  | 5 | 0   | 1 |
| 0    | 0 | 0  | 5 | 0   | 0 |
| 0    | 0 | 2  | 0 | 0   | 0 |
| 1    | 0 | 9  | 3 | 0   | 0 |
| 0    | 5 | 0  | 0 | 0   | 0 |
| 2    | 4 | 4  | 3 | 0   | 0 |
| 3    | 5 | 11 | 2 | 0   | 0 |
| 0    | 2 | 0  | 1 | 0   | 0 |
| 5    | 2 | 8  | 4 | 0   | 0 |
| 2    | 4 | 16 | 0 | 0   | 6 |
| 0    | 0 | 2  | 0 | 0   | 0 |
| 1    | 4 | 0  | 5 | 0   | 0 |
| 4    | 0 | 5  | 0 | 0   | 0 |
| 0    | 5 | 0  | 4 | 4   | 0 |
| 0    | 0 | 4  | 2 | 0   | 5 |
| 3    | 3 | 0  | 2 | 0   | 0 |
| 0    | 8 | 1  | 0 | 0   | 0 |
| 0    | 0 | 9  | 8 | 0   | 0 |
| 0    | 0 | 0  | 0 | 4   | 2 |
| 0    | 4 | 7  | 6 | 2   | 0 |
| 0    | 1 | 5  | 0 | 7   | 0 |
| 0    | 0 | 4  | 1 | 1   | 0 |
| 0    | 0 | 0  | 0 | 4   | 9 |
| 0    | 0 | 5  | 0 | 7   | 0 |
| 4    | 4 | 0  | 0 | 8   | 3 |
| 0    | 0 | 0  | 5 | 2   | 1 |
| 2    | 0 | 0  | 0 | 0   | 3 |
| 0    | 3 | 19 | 2 | 0   | 0 |
| 0    | 0 | 10 | 2 | 12  | 0 |
| 2    | 0 | 4  | 1 | 7   | 1 |
| 8    | 0 | 0  | 7 | 0   | 0 |
| 1    | 1 | 0  | 5 | 0   | 0 |
| 0    | 3 | 4  | 0 | 0   | 3 |



|   |   |   |    |   |   |
|---|---|---|----|---|---|
| 0 | 0 | 0 | 0  | 4 | 1 |
| 0 | 0 | 0 | 3  | 0 | 0 |
| 2 | 3 | 4 | 0  | 0 | 2 |
| 0 | 3 | 0 | 0  | 0 | 0 |
| 4 | 4 | 0 | 2  | 0 | 0 |
| 2 | 4 | 0 | 6  | 0 | 0 |
| 0 | 3 | 0 | 2  | 0 | 0 |
| 3 | 4 | 4 | 1  | 0 | 0 |
| 6 | 0 | 5 | 1  | 2 | 0 |
| 0 | 1 | 2 | 0  | 0 | 1 |
| 0 | 0 | 3 | 5  | 0 | 0 |
| 0 | 2 | 5 | 7  | 0 | 0 |
| 0 | 0 | 0 | 11 | 0 | 0 |
| 3 | 0 | 6 | 2  | 0 | 0 |
| 0 | 0 | 4 | 6  | 1 | 0 |
| 0 | 0 | 5 | 5  | 0 | 0 |

Table of data for Fig. 5i

| mock |    | WT |    | MUT |   |
|------|----|----|----|-----|---|
| 0    | 5  | 0  | 5  | 3   | 4 |
| 0    | 0  | 4  | 8  | 0   | 0 |
| 0    | 0  | 3  | 3  | 3   | 1 |
| 0    | 2  | 4  | 6  | 0   | 0 |
| 0    | 7  | 1  | 1  | 3   | 0 |
| 0    | 0  | 5  | 0  | 3   | 0 |
| 6    | 0  | 15 | 5  | 0   | 0 |
| 3    | 2  | 12 | 10 | 0   | 4 |
| 0    | 8  | 0  | 5  | 0   | 0 |
| 0    | 3  | 1  | 0  | 2   | 0 |
| 0    | 0  | 1  | 8  | 0   | 2 |
| 0    | 0  | 4  | 3  | 3   | 7 |
| 0    | 0  | 3  | 5  | 0   | 0 |
| 4    | 4  | 2  | 0  | 0   | 0 |
| 0    | 0  | 0  | 7  | 0   | 5 |
| 0    | 0  | 3  | 1  | 6   | 4 |
| 0    | 0  | 9  | 0  | 0   | 0 |
| 4    | 0  | 7  | 3  | 0   | 4 |
| 5    | 6  | 0  | 0  | 3   | 4 |
| 0    | 0  | 4  | 1  | 0   | 0 |
| 0    | 0  | 8  | 0  | 2   | 0 |
| 0    | 2  | 1  | 0  | 0   | 4 |
| 0    | 2  | 0  | 2  | 1   | 0 |
| 0    | 10 | 0  | 0  | 0   | 0 |
| 0    | 4  | 0  | 0  | 0   | 1 |
| 0    | 6  | 0  | 2  | 0   | 8 |
| 0    | 10 | 9  | 0  | 0   | 7 |
| 8    | 1  | 0  | 3  | 2   | 0 |
| 0    | 2  | 0  | 0  | 0   | 0 |
| 0    | 5  | 3  | 0  | 0   | 0 |
| 0    | 0  | 12 | 0  | 5   | 2 |
| 1    | 0  | 12 | 1  | 0   | 0 |
| 4    | 5  | 4  | 14 | 0   | 0 |
| 0    | 0  | 0  | 0  | 0   | 1 |
| 0    | 2  | 0  | 6  | 1   | 0 |
| 0    | 0  | 13 | 9  | 2   | 0 |
| 2    | 0  | 0  | 0  | 4   | 0 |
| 2    | 2  | 8  | 6  | 6   | 2 |
| 0    | 0  | 0  | 11 | 0   | 0 |
| 0    | 1  | 2  | 1  | 7   | 4 |
| 0    | 0  | 2  | 16 | 1   | 1 |
| 0    | 3  | 9  | 0  | 0   | 0 |
| 0    | 6  | 0  | 8  | 2   | 0 |
| 0    | 0  | 1  | 19 | 0   | 0 |
| 5    | 0  | 0  | 10 | 0   | 3 |
| 0    | 3  | 0  | 0  | 0   | 4 |
| 0    | 3  | 11 | 3  | 0   | 1 |
| 0    | 0  | 0  | 0  | 0   | 0 |
| 0    | 0  | 5  | 0  | 2   | 0 |
| 0    | 0  | 0  | 3  | 0   | 0 |

Table of data for Fig. 5j

| mock |   | WT |   | MUT |   |
|------|---|----|---|-----|---|
| 4    | 0 | 0  | 2 | 0   | 0 |

|   |   |    |   |   |   |
|---|---|----|---|---|---|
| 0 | 0 | 0  | 6 | 4 | 0 |
| 2 | 0 | 0  | 2 | 0 | 0 |
| 2 | 0 | 4  | 4 | 0 | 1 |
| 0 | 0 | 4  | 0 | 0 | 0 |
| 1 | 0 | 2  | 0 | 0 | 0 |
| 3 | 5 | 9  | 0 | 0 | 3 |
| 0 | 3 | 0  | 0 | 1 | 0 |
| 0 | 0 | 4  | 0 | 0 | 0 |
| 0 | 1 | 0  | 0 | 0 | 0 |
| 2 | 0 | 0  | 0 | 0 | 1 |
| 0 | 0 | 5  | 0 | 0 | 0 |
| 2 | 1 | 4  | 3 | 0 | 0 |
| 2 | 0 | 0  | 0 | 0 | 0 |
| 0 | 1 | 0  | 0 | 2 | 0 |
| 0 | 0 | 1  | 2 | 5 | 0 |
| 3 | 0 | 0  | 0 | 4 | 0 |
| 0 | 1 | 0  | 4 | 0 | 4 |
| 0 | 2 | 4  | 1 | 0 | 5 |
| 0 | 0 | 3  | 4 | 5 | 0 |
| 0 | 0 | 1  | 0 | 0 | 0 |
| 0 | 0 | 4  | 0 | 0 | 0 |
| 0 | 4 | 0  | 3 | 0 | 4 |
| 0 | 0 | 0  | 0 | 0 | 0 |
| 0 | 0 | 0  | 0 | 0 | 0 |
| 3 | 0 | 0  | 0 | 0 | 3 |
| 2 | 0 | 0  | 0 | 0 | 0 |
| 2 | 0 | 0  | 0 | 0 | 0 |
| 0 | 0 | 4  | 7 | 0 | 1 |
| 3 | 4 | 12 | 0 | 0 | 0 |
| 0 | 0 | 0  | 0 | 1 | 0 |
| 0 | 3 | 0  | 2 | 0 | 0 |
| 1 | 0 | 0  | 0 | 4 | 1 |
| 0 | 0 | 0  | 0 | 0 | 2 |
| 0 | 0 | 0  | 0 | 0 | 0 |
| 0 | 0 | 7  | 0 | 4 | 0 |
| 0 | 0 | 0  | 0 | 0 | 0 |
| 0 | 0 | 0  | 1 | 0 | 3 |
| 0 | 3 | 3  | 5 | 0 | 0 |
| 0 | 1 | 0  | 9 | 0 | 0 |
| 0 | 0 | 1  | 5 | 0 | 0 |
| 1 | 0 | 0  | 2 | 2 | 0 |
| 0 | 1 | 5  | 2 | 0 | 0 |
| 3 | 1 | 4  | 0 | 0 | 0 |
| 0 | 0 | 0  | 0 | 0 | 0 |
| 0 | 1 | 6  | 0 | 1 | 0 |
| 1 | 0 | 0  | 3 | 0 | 0 |
| 0 | 0 | 0  | 3 | 0 | 5 |
| 0 | 0 | 0  | 0 | 0 | 0 |
| 2 | 0 | 0  | 2 | 0 | 3 |

Table of data for Fig. 5k

| mock | WT |   | MUT |   |
|------|----|---|-----|---|
| 0    | 0  | 0 | 1   | 6 |
| 0    | 1  | 0 | 0   | 2 |
| 0    | 0  | 4 | 5   | 0 |
| 3    | 0  | 5 | 0   | 1 |
| 0    | 0  | 3 | 0   | 0 |
| 2    | 0  | 3 | 3   | 0 |
| 0    | 0  | 0 | 6   | 0 |
| 0    | 0  | 3 | 0   | 0 |
| 0    | 0  | 7 | 4   | 0 |
| 0    | 0  | 4 | 7   | 0 |
| 0    | 0  | 3 | 0   | 0 |
| 0    | 4  | 4 | 3   | 0 |
| 4    | 0  | 1 | 3   | 0 |
| 0    | 0  | 0 | 0   | 0 |
| 4    | 4  | 0 | 0   | 0 |
| 0    | 0  | 0 | 1   | 0 |
| 1    | 0  | 0 | 3   | 2 |
| 0    | 2  | 3 | 0   | 1 |
| 0    | 0  | 0 | 6   | 4 |
| 0    | 0  | 0 | 2   | 1 |

|   |   |    |    |   |   |
|---|---|----|----|---|---|
| 0 | 0 | 4  | 0  | 0 | 0 |
| 5 | 2 | 0  | 2  | 0 | 0 |
| 0 | 0 | 0  | 5  | 0 | 0 |
| 5 | 0 | 0  | 5  | 0 | 0 |
| 0 | 0 | 0  | 0  | 0 | 0 |
| 0 | 2 | 4  | 5  | 0 | 0 |
| 0 | 0 | 1  | 0  | 0 | 0 |
| 0 | 0 | 1  | 0  | 0 | 0 |
| 0 | 4 | 0  | 0  | 0 | 0 |
| 4 | 4 | 6  | 1  | 3 | 0 |
| 0 | 0 | 0  | 8  | 0 | 0 |
| 4 | 0 | 0  | 0  | 0 | 0 |
| 0 | 0 | 1  | 4  | 0 | 3 |
| 2 | 0 | 6  | 0  | 0 | 1 |
| 3 | 1 | 0  | 0  | 0 | 5 |
| 0 | 2 | 0  | 0  | 0 | 0 |
| 0 | 0 | 0  | 2  | 4 | 0 |
| 0 | 6 | 2  | 0  | 2 | 8 |
| 0 | 1 | 20 | 5  | 0 | 0 |
| 3 | 0 | 0  | 0  | 0 | 3 |
| 0 | 1 | 3  | 2  | 0 | 4 |
| 0 | 0 | 0  | 6  | 0 | 0 |
| 6 | 0 | 0  | 7  | 0 | 0 |
| 0 | 0 | 3  | 0  | 0 | 0 |
| 1 | 5 | 0  | 0  | 0 | 0 |
| 0 | 0 | 0  | 0  | 8 | 5 |
| 0 | 3 | 5  | 0  | 0 | 0 |
| 0 | 0 | 0  | 4  | 0 | 0 |
| 0 | 0 | 0  | 13 | 0 | 0 |
| 0 | 0 | 0  | 0  | 4 | 0 |

Table of data for Fig. 6a

|      |       |        |       |
|------|-------|--------|-------|
| mock | 97.26 | 103.60 | 99.14 |
| WT   | 35.49 | 29.63  | 41.05 |
| MUT  | 99.44 | 82.35  | 82.52 |

Table of data for Fig. 6c

|      | APOBEC3G |         |         | ACTB    |         |         |
|------|----------|---------|---------|---------|---------|---------|
| mock | 0.00278  | 0.00253 | 0.00283 | 0.00296 | 0.00180 | 0.00194 |
| WT   | 0.01007  | 0.00988 | 0.01148 | 0.00193 | 0.00222 | 0.00196 |
| MUT  | 0.00242  | 0.00341 | 0.00351 | 0.00291 | 0.00272 | 0.00290 |

Table of data for Fig. 6d

|      | 0      | 1      | 2      | 4      | 8 (h) |
|------|--------|--------|--------|--------|-------|
| mock | 130.79 | 87.56  | 90.04  | 43.91  | 24.14 |
|      | 93.54  | 55.86  | 144.41 | 92.79  | 42.75 |
|      | 75.67  | 109.25 | 78.90  | 84.00  | 23.50 |
| WT   | 79.57  | 77.19  | 65.83  | 7.00   | 5.76  |
|      | 91.93  | 93.00  | 28.20  | 31.31  | 3.59  |
|      | 128.50 | 92.06  | 71.35  | 47.77  | 1.24  |
| MUT  | 85.57  | 90.94  | 88.94  | 79.39  | 22.80 |
|      | 106.56 | 111.20 | 72.38  | 111.25 | 34.71 |
|      | 107.87 | 65.84  | 61.86  | 77.07  | 17.60 |

Table of data for Fig. 6f

|              |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|
| shLuc        | 7.35 | 8.5  | 8.4  | 8.05 | 8.05 | 8.5  | 7.1  | 7.45 | 7.55 |
| shAPOBEC3G#1 | 7.7  | 7.75 | 7.45 | 7.1  | 7.7  | 8    | 7.65 | 9.3  | 7.1  |
| shAPOBEC3G#2 | 7.9  | 7.35 | 7.5  | 7    | 9.45 | 8.15 | 7.45 | 7.55 | 7.15 |

Table of data for Fig. 6g

|              |      |     |      |      |      |      |      |      |      |
|--------------|------|-----|------|------|------|------|------|------|------|
| shLuc        | 4.95 | 5.1 | 5.35 | 5.65 | 5.9  | 5.15 | 6.1  | 5.75 | 5.35 |
| shAPOBEC3G#1 | 8.35 | 8.3 | 7.5  | 8.05 | 7.65 | 6.5  | 7.2  | 7.75 | 7.5  |
| shAPOBEC3G#2 | 7.6  | 7.3 | 6.5  | 8.3  | 8    | 8.15 | 8.05 | 7.8  | 7.35 |

Table of data for Fig. 6h

|              |      |      |      |      |      |      |      |     |      |
|--------------|------|------|------|------|------|------|------|-----|------|
| shLuc        | 5.7  | 5.45 | 4.95 | 5.55 | 5.9  | 5.35 | 5.85 | 6.1 | 5.35 |
| shAPOBEC3G#1 | 7.75 | 9.25 | 6.5  | 7.75 | 8.25 | 5.8  | 7.3  | 8.8 | 6.55 |
| shAPOBEC3G#2 | 6.7  | 7.7  | 7.3  | 7    | 8.45 | 7.75 | 7.2  | 8   | 7.2  |

Table of data for Fig. 6i

|              |      |      |      |     |     |      |      |     |      |
|--------------|------|------|------|-----|-----|------|------|-----|------|
| shLuc        | 3.05 | 3.5  | 2.6  | 3.7 | 4.1 | 2.95 | 2.95 | 3.7 | 3.05 |
| shAPOBEC3G#1 | 4.6  | 5.5  | 3.8  | 5.1 | 6.3 | 3.75 | 4.6  | 5.7 | 4.65 |
| shAPOBEC3G#2 | 4.9  | 5.55 | 4.05 | 5.3 | 5.5 | 4.8  | 4.5  | 5.4 | 3.65 |

Table of data for Fig. 6j

|              |      |      |      |      |      |      |      |      |     |
|--------------|------|------|------|------|------|------|------|------|-----|
| shLuc        | 4.5  | 4.3  | 5.05 | 4.75 | 4.05 | 5.15 | 4.5  | 4.3  | 4.9 |
| shAPOBEC3G#1 | 6.25 | 6.7  | 8.15 | 5.4  | 6    | 6.3  | 6.55 | 6.25 | 6.7 |
| shAPOBEC3G#2 | 7.75 | 7.15 | 6.05 | 6.8  | 7.05 | 6.95 | 6.95 | 8.4  | 6.9 |

Table of data for Fig. 6k

| shLuc | shAPOBEC3G#1 | shAPOBEC3G#2 |
|-------|--------------|--------------|
| 1     | 0            | 3            |
| 4     | 3            | 7            |
| 0     | 0            | 10           |
| 1     | 0            | 4            |
| 0     | 2            | 0            |
| 0     | 0            | 8            |
| 0     | 2            | 0            |
| 0     | 2            | 1            |
| 0     | 4            | 4            |
| 5     | 0            | 5            |
| 4     | 4            | 3            |
| 0     | 0            | 4            |
| 4     | 0            | 3            |
| 4     | 1            | 2            |
| 0     | 0            | 1            |
| 0     | 0            | 5            |
| 0     | 3            | 2            |
| 0     | 0            | 0            |
| 1     | 0            | 5            |
| 0     | 3            | 0            |
| 1     | 0            | 4            |
| 0     | 4            | 5            |
| 2     | 0            | 2            |
| 0     | 0            | 2            |
| 1     | 0            | 8            |
| 0     | 3            | 2            |
| 1     | 0            | 4            |
| 2     | 0            | 2            |
| 0     | 1            | 5            |
| 0     | 0            | 1            |
| 0     | 4            | 2            |
| 0     | 0            | 6            |
| 0     | 0            | 1            |
| 0     | 5            | 4            |
| 0     | 1            | 2            |
| 0     | 0            | 9            |
| 6     | 0            | 2            |
| 0     | 6            | 5            |
| 2     | 3            | 10           |
| 2     | 1            | 0            |
| 10    | 3            | 7            |
| 0     | 3            | 2            |
| 0     | 4            | 1            |
| 0     | 0            | 2            |
| 10    | 0            | 5            |
| 1     | 0            | 0            |
| 5     | 0            | 7            |
| 0     | 0            | 4            |
| 0     | 0            | 6            |
| 2     | 0            | 4            |

Table of data for Fig. 6l

| shLuc | shAPOBEC3G#1 | shAPOBEC3G#2 |
|-------|--------------|--------------|
| 2     | 0            | 0            |
| 0     | 0            | 15           |
| 0     | 3            | 3            |
| 2     | 5            | 2            |
| 3     | 2            | 8            |
| 0     | 3            | 4            |
| 0     | 3            | 0            |

|   |   |   |    |    |    |
|---|---|---|----|----|----|
| 4 | 4 | 0 | 3  | 3  | 0  |
| 3 | 0 | 3 | 12 | 2  | 1  |
| 1 | 0 | 7 | 5  | 4  | 0  |
| 4 | 0 | 0 | 4  | 3  | 5  |
| 0 | 0 | 0 | 7  | 3  | 10 |
| 3 | 0 | 0 | 3  | 3  | 4  |
| 4 | 1 | 4 | 6  | 10 | 1  |
| 6 | 0 | 3 | 0  | 9  | 3  |
| 4 | 0 | 5 | 4  | 1  | 0  |
| 2 | 3 | 5 | 0  | 5  | 4  |
| 1 | 3 | 4 | 3  | 3  | 2  |
| 0 | 4 | 0 | 2  | 3  | 1  |
| 0 | 1 | 2 | 11 | 4  | 10 |
| 0 | 2 | 0 | 2  | 2  | 2  |
| 0 | 0 | 6 | 3  | 0  | 12 |
| 0 | 3 | 0 | 3  | 4  | 4  |
| 2 | 2 | 0 | 4  | 0  | 0  |
| 3 | 0 | 1 | 2  | 4  | 6  |
| 1 | 0 | 4 | 5  | 3  | 4  |
| 0 | 3 | 4 | 7  | 1  | 1  |
| 0 | 3 | 3 | 9  | 2  | 8  |
| 3 | 0 | 1 | 0  | 0  | 4  |
| 6 | 3 | 8 | 1  | 3  | 2  |
| 0 | 0 | 2 | 7  | 0  | 0  |
| 0 | 1 | 0 | 4  | 3  | 7  |
| 5 | 0 | 8 | 4  | 4  | 8  |
| 1 | 3 | 0 | 1  | 1  | 5  |
| 1 | 2 | 3 | 5  | 0  | 5  |
| 0 | 1 | 1 | 5  | 3  | 5  |
| 3 | 3 | 4 | 7  | 7  | 3  |
| 0 | 0 | 4 | 4  | 10 | 6  |
| 0 | 7 | 1 | 4  | 4  | 4  |
| 0 | 2 | 2 | 0  | 0  | 0  |
| 1 | 2 | 0 | 6  | 2  | 3  |
| 0 | 6 | 3 | 3  | 5  | 3  |
| 3 | 2 | 3 | 0  | 5  | 2  |
| 0 | 0 | 5 | 2  | 6  | 5  |
| 0 | 0 | 1 | 5  | 0  | 3  |
| 0 | 0 | 1 | 3  | 0  | 8  |
| 0 | 0 | 0 | 2  | 2  | 4  |
| 0 | 1 | 4 | 8  | 0  | 0  |
| 1 | 2 | 1 | 4  | 0  | 12 |
| 3 | 0 | 1 | 4  | 5  | 5  |

Table of data for Fig. 7b

|            | 7        | 10       | 13       | 16       | 19       | 22       | 25 (days) |
|------------|----------|----------|----------|----------|----------|----------|-----------|
| shLuc      | 52.06679 | 182.0008 | 359.4345 | 514.9783 | 768.9692 | 958.8326 | 1179.402  |
|            | 22.10229 | 61.26152 | 85.44859 | 114.6882 | 235.8726 | 324.9891 | 458.6422  |
|            | 72.41717 | 260.6718 | 521.0163 | 626.9756 | 877.1388 | 913.8016 | 1213.927  |
|            | 67.89837 | 251.8894 | 417.2656 | 535.3892 | 873.8857 | 1104.88  | 1533.634  |
|            | 60.26922 | 262.1868 | 585.5123 | 774.2688 | 875.2304 | 1115.697 | 1543.514  |
|            | 53.55137 | 181.0106 | 326.6328 | 511.5433 | 721.2328 | 1026.98  | 1388.779  |
| shEXOSC9#1 | 43.1695  | 49.59111 | 59.73757 | 153.6601 | 192.5949 | 308.8315 | 466.5113  |
|            | 63.24912 | 131.933  | 179.6819 | 312.8265 | 498.9993 | 489.2626 | 745.1766  |
|            | 43.09633 | 44.16281 | 60.81709 | 149.3394 | 170.333  | 281.0801 | 412.2891  |
|            | 38.72555 | 36.11611 | 44.41886 | 117.8472 | 160.2493 | 253.5076 | 320.845   |
|            | 17.89841 | 34.84888 | 28.04342 | 86.53449 | 125.9766 | 236.6217 | 327.8267  |
|            | 57.71248 | 90.91446 | 72.9944  | 235.0878 | 332.0133 | 424.5544 | 538.361   |
| shEXOSC9#2 | 34.17925 | 33.76    | 61.70494 | 105.5115 | 173.051  | 261.2003 | 366.0971  |
|            | 24.65157 | 10.49748 | 8.593272 | 18.75346 | 19.15866 | 20.43844 | 39.25881  |
|            | 24.02221 | 3.15751  | 5.334701 | 6.37445  | 14.3971  | 8.793663 | 22.11458  |
|            | 29.602   | 20.70263 | 23.06491 | 58.97912 | 96.28325 | 152.3743 | 169.3786  |
|            | 32.68698 | 28.15    | 42.65462 | 89.7449  | 98.06782 | 165.6036 | 233.7188  |
|            | 12.74    | 2.454232 | 8.8218   | 11.2408  | 15.94611 | 30.8183  | 59.6781   |

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 0.235 | 0.792      | 0.992      |
| 0.185 | 2.091      | 1.259      |
| 0.254 | 1.191      | 0.99       |
| 0.774 | 1.522      | 1.06       |
| 0.309 | 0.932      | 1.641      |
| 0.438 | 0.6        | 1.001      |

|       |       |       |
|-------|-------|-------|
| 0.055 | 1.543 | 0.902 |
| 0.142 | 2.669 | 0.314 |
| 0.082 | 2.06  | 1.307 |
| 0.125 | 1.205 | 0.402 |
| 0.085 | 1.002 | 0.959 |
| 0.013 | 0.907 | 0.219 |
| 0.263 | 0.64  | 0.45  |
| 0.029 | 2     | 0.471 |
| 0.029 | 0.504 | 0.709 |
| 0.265 | 2.536 | 0.082 |
| 0.072 | 4.358 | 0.114 |
| 0.152 | 0.555 | 0.108 |

Table of data for Fig. 7f

|      | 7        | 10       | 13       | 16       | 19       | 22       | 25 (days) |
|------|----------|----------|----------|----------|----------|----------|-----------|
| mock | 24.23645 | 17.74094 | 20.71035 | 46.78701 | 109.2359 | 153.9727 | 169.3639  |
|      | 27.36229 | 18.28928 | 46.17128 | 49.9753  | 191.785  | 332.4012 | 312.8294  |
|      | 31.73615 | 17.6967  | 16.58704 | 42.98875 | 55.30383 | 47.57746 | 109.3448  |
|      | 20.24756 | 8.825195 | 6.1017   | 16.26834 | 31.07707 | 261.1541 | 274.5293  |
|      | 34.6357  | 46.97837 | 56.6766  | 167.8199 | 201.9809 | 356.911  | 346.1328  |
| WT   | 25.53086 | 15.63581 | 7.961526 | 32.80726 | 63.42077 | 129.4015 | 138.8778  |
|      | 53.77039 | 58.03983 | 91.14147 | 155.7957 | 219.4168 | 384.7142 | 571.1652  |
|      | 64.84604 | 219.4672 | 193.3464 | 329.9115 | 475.8702 | 688.4089 | 1061.941  |
|      | 62.5128  | 62.03051 | 169.0049 | 204.3116 | 362.3162 | 686.6718 | 905.3322  |
|      | 55.9793  | 106.2894 | 183.419  | 629.7701 | 1120.201 | 1744.216 | 2128.033  |
| MUT  | 54.30407 | 95.1217  | 94.1453  | 170.8093 | 317.4303 | 498.8143 | 592       |
|      | 38.19902 | 35.23801 | 91.63265 | 189.3984 | 344.64   | 385.1986 | 400.7591  |
|      | 33.3234  | 25.34515 | 47.7224  | 106.5184 | 170.8374 | 250.2636 | 377.4531  |
|      | 26.54949 | 6.734988 | 27.06165 | 57.76013 | 118.366  | 174.1822 | 229.3018  |
|      | 37.52518 | 38.7198  | 54.19632 | 118.3964 | 167.9238 | 268.9505 | 300.734   |
|      | 34.09175 | 47.57731 | 74.9331  | 122.423  | 177.1629 | 286.5332 | 413.0334  |
|      | 28.2437  | 16.4344  | 30.74125 | 80.75875 | 145.8583 | 219.3101 | 284.8488  |
|      | 16.14225 | 34.56707 | 41.85544 | 98.49666 | 153.9187 | 232.8382 | 323.8748  |

Table of data for Fig. S1b

|            | ProSELENBP1 |        |        | ProRBM39 |        |        | ProRAD50 |        |        | ProLACE1 |        |        | Proc21orf63 |        |        |
|------------|-------------|--------|--------|----------|--------|--------|----------|--------|--------|----------|--------|--------|-------------|--------|--------|
| shLuc      | 87.35       | 84.01  | 128.64 | 89.42    | 96.34  | 114.24 | 74.65    | 101.88 | 123.46 | 94.20    | 109.45 | 96.35  | 102.36      | 101.16 | 96.48  |
| shEXOSC9#1 | 110.50      | 187.77 | 153.28 | 141.28   | 129.03 | 130.30 | 184.96   | 169.77 | 248.20 | 135.84   | 172.20 | 145.33 | 101.76      | 117.41 | 70.11  |
| shEXOSC9#2 | 167.13      | 167.37 | 147.41 | 130.29   | 133.96 | 136.68 | 243.68   | 178.68 | 181.63 | 152.35   | 148.77 | 151.78 | 91.24       | 89.98  | 102.46 |
| shEXOSC2#1 | 741.42      | 492.18 | 508.51 | 246.42   | 324.65 | 333.94 | 705.62   | 723.05 | 863.37 | 246.96   | 316.97 | 244.10 | 140.51      | 109.11 | 139.31 |
| shEXOSC4#1 | 511.30      | 406.30 | 382.76 | 215.89   | 183.22 | 222.03 | 287.30   | 321.42 | 381.34 | 218.09   | 213.19 | 218.47 | 129.80      | 118.71 | 109.75 |

Table of data for Fig. S2b

|            |      |      |     |     |      |      |      |      |      |
|------------|------|------|-----|-----|------|------|------|------|------|
| shLuc      | 7.3  | 6.5  | 7.8 | 8.2 | 7.2  | 7.15 | 8.7  | 7.8  | 6.75 |
| shEXOSC9#1 | 7.9  | 8    | 6.9 | 8.4 | 7.4  | 8.1  | 8.1  | 6.8  | 8    |
| shEXOSC9#2 | 8.65 | 8.05 | 7.6 | 8   | 6.95 | 8.05 | 8.15 | 7.95 | 6.95 |

Table of data for Fig. S2c

|            |     |      |      |      |      |      |      |      |      |
|------------|-----|------|------|------|------|------|------|------|------|
| shLuc      | 7.3 | 6.15 | 6.85 | 7.25 | 7.5  | 6.75 | 7.9  | 7.8  | 7.85 |
| shEXOSC9#1 | 5.6 | 4.25 | 4.75 | 5.45 | 5.45 | 5.7  | 5.25 | 5.7  | 5.75 |
| shEXOSC9#2 | 5.1 | 4.6  | 5.4  | 5.1  | 5    | 5.75 | 4.4  | 5.75 | 5.2  |

Table of data for Fig. S2d

|            |      |      |      |      |     |      |      |      |      |
|------------|------|------|------|------|-----|------|------|------|------|
| shLuc      | 6.4  | 5.9  | 5.85 | 5.75 | 6.2 | 6.7  | 6.1  | 6.5  | 5.8  |
| shEXOSC9#1 | 4    | 5.2  | 4.4  | 4.5  | 4   | 4.95 | 4.6  | 4.55 | 3.95 |
| shEXOSC9#2 | 4.35 | 3.85 | 4.7  | 3.8  | 4.2 | 5.2  | 4.75 | 5.1  | 4.7  |

Table of data for Fig. S2e

|            |      |      |      |     |      |      |      |      |      |
|------------|------|------|------|-----|------|------|------|------|------|
| shLuc      | 5.85 | 5.5  | 5.65 | 4.6 | 5.8  | 5.2  | 5.5  | 5.35 | 5.95 |
| shEXOSC9#1 | 3.9  | 3.15 | 3.7  | 3.7 | 3.85 | 4.65 | 3.75 | 3.6  | 3.55 |
| shEXOSC9#2 | 3.75 | 3.55 | 4.65 | 4.3 | 3.65 | 3.55 | 3.45 | 4    | 3.5  |

Table of data for Fig. S2f

|            |      |      |     |      |      |      |      |     |      |
|------------|------|------|-----|------|------|------|------|-----|------|
| shLuc      | 6.05 | 6.85 | 6.1 | 6.7  | 6.4  | 6.45 | 5.75 | 6.6 | 6.35 |
| shEXOSC9#1 | 4.45 | 4.35 | 4.3 | 4.95 | 4.65 | 5.15 | 5.1  | 4.2 | 4.2  |
| shEXOSC9#2 | 4.8  | 4.6  | 4.8 | 4.9  | 4.8  | 3.95 | 4.65 | 4.8 | 3.9  |

Table of data for Fig. S2h

|            |     |      |      |      |     |      |      |     |      |
|------------|-----|------|------|------|-----|------|------|-----|------|
| shLuc      | 6.9 | 6.35 | 7.1  | 6.35 | 7.3 | 7.75 | 6.95 | 6.7 | 8.25 |
| shEXOSC9#1 | 6.4 | 6.1  | 8.15 | 6.5  | 7.5 | 6.6  | 7.6  | 7.2 | 7.4  |

|            |      |     |     |     |     |   |     |   |     |
|------------|------|-----|-----|-----|-----|---|-----|---|-----|
| shEXOSC9#2 | 6.55 | 7.5 | 8.1 | 6.4 | 7.2 | 8 | 7.5 | 6 | 7.3 |
|------------|------|-----|-----|-----|-----|---|-----|---|-----|

Table of data for Fig. S2i

|            |      |     |      |      |      |      |      |      |      |
|------------|------|-----|------|------|------|------|------|------|------|
| shLuc      | 6    | 6.7 | 7.05 | 6.2  | 7    | 7.95 | 6.05 | 5.2  | 8    |
| shEXOSC9#1 | 4.15 | 4.2 | 5.05 | 4.45 | 4.8  | 4.55 | 4.35 | 3.65 | 5.3  |
| shEXOSC9#2 | 3.9  | 3.7 | 4.3  | 4.25 | 4.15 | 5.95 | 4.8  | 3.6  | 5.25 |

Table of data for Fig. S2j

|            |      |      |      |      |      |      |      |      |     |
|------------|------|------|------|------|------|------|------|------|-----|
| shLuc      | 4.3  | 3.9  | 4.9  | 4.15 | 4.85 | 4.95 | 4.55 | 5.05 | 4.7 |
| shEXOSC9#1 | 2.4  | 3.1  | 2.75 | 2.85 | 3.25 | 3.25 | 3.15 | 3.15 | 2.9 |
| shEXOSC9#2 | 2.55 | 3.15 | 3.55 | 2.4  | 2.95 | 2.8  | 2.85 | 3.2  | 2.8 |

Table of data for Fig. S2k

|            |     |      |      |      |      |      |      |     |      |
|------------|-----|------|------|------|------|------|------|-----|------|
| shLuc      | 4.6 | 4.5  | 4.95 | 4.95 | 4.65 | 5.6  | 5.55 | 4.8 | 6.85 |
| shEXOSC9#1 | 3.1 | 3.3  | 4.3  | 3.15 | 3.35 | 3.75 | 3.75 | 3.2 | 4.15 |
| shEXOSC9#2 | 3.4 | 2.85 | 4.15 | 2.8  | 3.15 | 4.15 | 2.75 | 2.6 | 3.4  |

Table of data for Fig. S2l

|            |      |      |      |      |      |      |      |      |      |
|------------|------|------|------|------|------|------|------|------|------|
| shLuc      | 5.15 | 4.65 | 5.4  | 4.75 | 4.75 | 5.3  | 4.35 | 4.65 | 6.05 |
| shEXOSC9#1 | 3.1  | 2.95 | 3.2  | 2.75 | 3.45 | 3.85 | 2.6  | 2.8  | 3.9  |
| shEXOSC9#2 | 2.75 | 2.75 | 3.15 | 3.1  | 2.65 | 3.4  | 2.9  | 2.75 | 3.55 |

Table of data for Fig. S3b

| siLuc | siEDC4#1 |   | siEDC4#2 |   |
|-------|----------|---|----------|---|
| 5     | 3        | 0 | 0        | 0 |
| 2     | 0        | 0 | 0        | 0 |
| 0     | 2        | 0 | 0        | 0 |
| 5     | 0        | 1 | 0        | 0 |
| 1     | 4        | 1 | 0        | 0 |
| 0     | 4        | 0 | 0        | 0 |
| 2     | 1        | 0 | 0        | 0 |
| 0     | 1        | 0 | 0        | 0 |
| 1     | 0        | 3 | 1        | 0 |
| 0     | 2        | 2 | 0        | 0 |
| 1     | 0        | 0 | 0        | 0 |
| 2     | 0        | 0 | 0        | 0 |
| 5     | 0        | 0 | 1        | 0 |
| 3     | 3        | 0 | 1        | 0 |
| 0     | 1        | 0 | 0        | 0 |
| 0     | 4        | 0 | 0        | 0 |
| 5     | 7        | 0 | 0        | 0 |
| 2     | 0        | 0 | 0        | 0 |
| 0     | 0        | 0 | 0        | 0 |
| 0     | 0        | 0 | 2        | 0 |
| 2     | 1        | 2 | 1        | 2 |
| 4     | 0        | 0 | 0        | 1 |
| 3     | 0        | 0 | 0        | 4 |
| 1     | 0        | 0 | 0        | 1 |
| 0     | 3        | 0 | 0        | 0 |
| 4     | 8        | 4 | 0        | 4 |
| 0     | 1        | 0 | 0        | 6 |
| 3     | 5        | 3 | 0        | 1 |
| 3     | 1        | 1 | 2        | 2 |
| 1     | 3        | 0 | 2        | 0 |
| 3     | 8        | 0 | 0        | 0 |
| 4     | 1        | 0 | 3        | 0 |
| 6     | 0        | 0 | 0        | 0 |
| 0     | 0        | 0 | 0        | 0 |
| 3     | 0        | 0 | 0        | 0 |
| 1     | 3        | 3 | 0        | 0 |
| 6     | 2        | 2 | 0        | 0 |
| 3     | 4        | 4 | 0        | 0 |
| 8     | 4        | 3 | 0        | 0 |
| 0     | 0        | 0 | 2        | 0 |
| 4     | 0        | 0 | 2        | 3 |
| 8     | 2        | 0 | 0        | 3 |
| 1     | 3        | 0 | 0        | 3 |
| 4     | 0        | 2 | 0        | 2 |
| 2     | 7        | 1 | 0        | 3 |
| 4     | 1        | 0 | 2        | 3 |
| 0     | 6        | 0 | 0        | 4 |
| 1     | 1        | 0 | 0        | 0 |
| 1     | 0        | 3 | 0        | 0 |

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 2 | 0 | 0 | 0 | 0 | 2 |
|---|---|---|---|---|---|

Table of data for Fig. S3c

| siLuc | siEDC4#1 |   | siEDC4#2 |   |
|-------|----------|---|----------|---|
| 0     | 2        | 0 | 0        | 3 |
| 0     | 2        | 1 | 0        | 0 |
| 1     | 0        | 0 | 0        | 0 |
| 1     | 3        | 0 | 0        | 2 |
| 0     | 2        | 0 | 2        | 3 |
| 2     | 0        | 0 | 0        | 2 |
| 0     | 2        | 0 | 1        | 3 |
| 0     | 3        | 0 | 0        | 1 |
| 7     | 1        | 0 | 0        | 0 |
| 1     | 3        | 0 | 0        | 2 |
| 0     | 2        | 3 | 1        | 0 |
| 4     | 4        | 0 | 0        | 0 |
| 0     | 3        | 3 | 0        | 1 |
| 6     | 4        | 0 | 0        | 0 |
| 4     | 9        | 0 | 0        | 1 |
| 0     | 0        | 1 | 0        | 2 |
| 4     | 2        | 0 | 1        | 0 |
| 2     | 2        | 0 | 0        | 3 |
| 2     | 5        | 0 | 0        | 0 |
| 3     | 0        | 3 | 0        | 0 |
| 2     | 2        | 0 | 2        | 1 |
| 0     | 0        | 1 | 1        | 0 |
| 0     | 4        | 0 | 0        | 1 |
| 5     | 0        | 2 | 0        | 0 |
| 2     | 0        | 3 | 1        | 2 |
| 15    | 5        | 0 | 0        | 3 |
| 2     | 0        | 0 | 0        | 0 |
| 4     | 0        | 2 | 1        | 0 |
| 0     | 3        | 1 | 0        | 2 |
| 0     | 0        | 0 | 2        | 3 |
| 2     | 0        | 0 | 0        | 1 |
| 0     | 0        | 1 | 0        | 0 |
| 1     | 3        | 0 | 0        | 1 |
| 1     | 1        | 0 | 0        | 0 |
| 1     | 4        | 0 | 0        | 3 |
| 0     | 1        | 1 | 0        | 2 |
| 1     | 4        | 0 | 0        | 0 |
| 0     | 5        | 0 | 0        | 0 |
| 2     | 0        | 0 | 2        | 0 |
| 2     | 1        | 0 | 1        | 1 |
| 1     | 3        | 0 | 0        | 0 |
| 0     | 1        | 0 | 0        | 0 |
| 0     | 4        | 0 | 0        | 2 |
| 4     | 0        | 2 | 0        | 0 |
| 3     | 4        | 2 | 0        | 3 |
| 2     | 4        | 4 | 0        | 0 |
| 3     | 1        | 1 | 0        | 0 |
| 7     | 0        | 0 | 0        | 0 |
| 3     | 4        | 0 | 2        | 0 |
| 4     | 2        | 0 | 1        | 0 |

Table of data for Fig. S3d

| siLuc | siEDC4#1 |   | siEDC4#2 |   |
|-------|----------|---|----------|---|
| 0     | 0        | 1 | 0        | 0 |
| 2     | 0        | 3 | 0        | 0 |
| 0     | 0        | 3 | 0        | 0 |
| 3     | 0        | 1 | 2        | 0 |
| 0     | 2        | 3 | 0        | 0 |
| 3     | 1        | 1 | 0        | 0 |
| 3     | 2        | 0 | 0        | 0 |
| 0     | 0        | 0 | 0        | 0 |
| 1     | 3        | 0 | 0        | 0 |
| 1     | 0        | 0 | 0        | 0 |
| 0     | 0        | 0 | 0        | 1 |
| 0     | 0        | 0 | 0        | 0 |
| 0     | 0        | 0 | 3        | 0 |
| 2     | 1        | 0 | 0        | 0 |



|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 2 | 3 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 3 |
| 4 | 2 | 0 | 3 | 0 | 4 |
| 0 | 1 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 2 | 0 | 0 |
| 0 | 2 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 4 | 0 |
| 0 | 3 | 0 | 0 | 0 | 0 |
| 4 | 2 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 2 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 2 |
| 2 | 4 | 0 | 0 | 0 | 1 |
| 3 | 1 | 0 | 0 | 0 | 0 |
| 2 | 2 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 3 | 0 |
| 0 | 2 | 2 | 0 | 1 | 0 |
| 0 | 3 | 0 | 0 | 0 | 2 |
| 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 2 | 0 | 1 | 3 | 0 |
| 1 | 0 | 3 | 0 | 3 | 0 |
| 3 | 1 | 0 | 0 | 1 | 0 |
| 2 | 3 | 0 | 0 | 0 | 0 |
| 3 | 2 | 0 | 0 | 0 | 0 |
| 5 | 3 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 3 | 0 |
| 0 | 0 | 0 | 0 | 2 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 2 | 0 | 0 |
| 0 | 1 | 2 | 0 | 0 | 2 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 |

Table of data for Fig. S3e

|          |      |     |     |      |      |      |      |      |      |
|----------|------|-----|-----|------|------|------|------|------|------|
| siLuc    | 6.45 | 7.7 | 7.4 | 8.55 | 8.05 | 7.65 | 7.2  | 7    | 7.95 |
| siEDC4#1 | 6.45 | 8.4 | 7.8 | 7.95 | 7    | 8.55 | 6.75 | 7.35 | 7.25 |
| siEDC4#2 | 7.65 | 7.7 | 8   | 7.05 | 7.7  | 7.6  | 6.6  | 8.05 | 7.75 |

Table of data for Fig. S3f

|          |      |      |      |      |      |      |      |      |      |
|----------|------|------|------|------|------|------|------|------|------|
| siLuc    | 7.35 | 7.35 | 7.6  | 6    | 7.35 | 7.2  | 7.05 | 7.7  | 7.6  |
| siEDC4#1 | 4.5  | 4.2  | 3.6  | 3.6  | 3.85 | 3.65 | 3.75 | 3.15 | 4.25 |
| siEDC4#2 | 4.2  | 3.85 | 4.05 | 4.05 | 4.9  | 4.1  | 3.45 | 3.85 | 4.65 |

Table of data for Fig. S3g

|          |      |      |      |      |     |      |      |     |      |
|----------|------|------|------|------|-----|------|------|-----|------|
| siLuc    | 7.65 | 7.7  | 8.1  | 6.75 | 7   | 7.55 | 6    | 7.7 | 7.45 |
| siEDC4#1 | 4.95 | 4.9  | 4.15 | 5.55 | 4.2 | 3.95 | 3.75 | 4.9 | 4.6  |
| siEDC4#2 | 5.4  | 4.55 | 3.95 | 3.85 | 4.2 | 3.55 | 4.8  | 3.5 | 4.4  |

Table of data for Fig. S3h

|          |      |      |      |      |      |      |      |      |      |
|----------|------|------|------|------|------|------|------|------|------|
| siLuc    | 4.95 | 4.2  | 5.15 | 6.55 | 4.55 | 4.1  | 4.95 | 3.85 | 4.45 |
| siEDC4#1 | 3.75 | 1.75 | 2.1  | 4.7  | 2.1  | 1.95 | 3.3  | 1.75 | 1.65 |
| siEDC4#2 | 3.75 | 1.4  | 1.55 | 3.45 | 2.45 | 1.15 | 2.85 | 2.1  | 2.4  |

Table of data for Fig. S3i

|          |      |      |      |      |      |      |      |      |      |
|----------|------|------|------|------|------|------|------|------|------|
| siLuc    | 4.95 | 5.25 | 5.45 | 7.05 | 5.4  | 6.05 | 4.95 | 4.9  | 5.6  |
| siEDC4#1 | 3.75 | 2.45 | 1.9  | 5.1  | 3.15 | 2.8  | 3.3  | 2.8  | 2.45 |
| siEDC4#2 | 3.75 | 3.15 | 2.75 | 3.45 | 2.8  | 2.35 | 2.85 | 1.75 | 2.15 |

Table of data for Fig. S4a

|       |   |            |    |            |   |
|-------|---|------------|----|------------|---|
| shLuc |   | shEXOSC9#1 |    | shEXOSC9#2 |   |
| 0     | 9 | 0          | 3  | 0          | 0 |
| 15    | 8 | 0          | 4  | 0          | 0 |
| 0     | 0 | 0          | 0  | 1          | 3 |
| 4     | 5 | 4          | 0  | 2          | 9 |
| 6     | 5 | 5          | 12 | 2          | 5 |
| 12    | 8 | 0          | 5  | 0          | 0 |
| 11    | 8 | 3          | 8  | 0          | 0 |
| 4     | 8 | 0          | 0  | 0          | 0 |

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 3  | 2  | 0  | 0  | 0  | 3  |
| 0  | 0  | 4  | 2  | 0  | 3  |
| 13 | 8  | 3  | 5  | 3  | 4  |
| 6  | 4  | 0  | 7  | 3  | 3  |
| 10 | 6  | 3  | 11 | 2  | 0  |
| 0  | 0  | 3  | 1  | 0  | 5  |
| 5  | 6  | 6  | 3  | 6  | 0  |
| 7  | 14 | 6  | 0  | 0  | 0  |
| 8  | 0  | 4  | 3  | 0  | 1  |
| 12 | 13 | 9  | 0  | 0  | 14 |
| 0  | 10 | 5  | 0  | 5  | 0  |
| 0  | 10 | 2  | 0  | 5  | 0  |
| 5  | 9  | 2  | 0  | 1  | 0  |
| 7  | 6  | 0  | 11 | 0  | 0  |
| 5  | 7  | 0  | 3  | 11 | 3  |
| 10 | 12 | 2  | 0  | 0  | 1  |
| 0  | 7  | 0  | 1  | 9  | 0  |
| 9  | 3  | 3  | 1  | 1  | 6  |
| 5  | 7  | 0  | 0  | 0  | 0  |
| 6  | 0  | 1  | 5  | 7  | 4  |
| 7  | 12 | 6  | 0  | 0  | 0  |
| 5  | 2  | 8  | 0  | 0  | 0  |
| 5  | 0  | 0  | 2  | 4  | 0  |
| 12 | 6  | 1  | 0  | 5  | 1  |
| 7  | 7  | 2  | 1  | 2  | 2  |
| 0  | 21 | 0  | 3  | 2  | 3  |
| 6  | 3  | 6  | 1  | 4  | 2  |
| 4  | 5  | 0  | 0  | 0  | 0  |
| 7  | 0  | 0  | 1  | 0  | 0  |
| 0  | 6  | 1  | 0  | 2  | 5  |
| 0  | 16 | 8  | 2  | 5  | 4  |
| 12 | 7  | 4  | 2  | 5  | 0  |
| 5  | 3  | 3  | 2  | 0  | 0  |
| 10 | 4  | 0  | 5  | 0  | 0  |
| 17 | 6  | 4  | 2  | 1  | 2  |
| 14 | 0  | 3  | 6  | 3  | 0  |
| 8  | 5  | 2  | 5  | 0  | 5  |
| 0  | 11 | 12 | 0  | 6  | 0  |
| 12 | 0  | 0  | 4  | 2  | 2  |
| 7  | 1  | 2  | 3  | 3  | 4  |
| 14 | 2  | 0  | 3  | 3  | 4  |
| 6  | 15 | 0  | 2  | 2  | 2  |

Table of data for Fig. S4b

| shLuc |    | shEXOSC9#1 |    | shEXOSC9#2 |    |
|-------|----|------------|----|------------|----|
| 10    | 0  | 0          | 4  | 0          | 2  |
| 4     | 8  | 6          | 0  | 0          | 5  |
| 0     | 5  | 6          | 2  | 0          | 1  |
| 8     | 0  | 2          | 5  | 0          | 0  |
| 0     | 2  | 5          | 0  | 9          | 0  |
| 0     | 0  | 4          | 5  | 0          | 0  |
| 2     | 13 | 3          | 2  | 0          | 0  |
| 7     | 9  | 0          | 0  | 0          | 12 |
| 0     | 10 | 0          | 0  | 7          | 2  |
| 13    | 0  | 5          | 3  | 0          | 0  |
| 5     | 0  | 2          | 7  | 0          | 3  |
| 0     | 5  | 6          | 2  | 3          | 0  |
| 3     | 6  | 0          | 0  | 2          | 4  |
| 8     | 12 | 0          | 0  | 0          | 3  |
| 0     | 13 | 0          | 10 | 0          | 0  |
| 7     | 12 | 5          | 1  | 0          | 0  |
| 7     | 5  | 0          | 1  | 0          | 5  |
| 0     | 0  | 0          | 0  | 0          | 0  |
| 0     | 0  | 0          | 0  | 0          | 5  |
| 4     | 4  | 0          | 0  | 0          | 8  |
| 0     | 5  | 8          | 0  | 0          | 0  |
| 0     | 10 | 0          | 0  | 0          | 0  |
| 5     | 3  | 0          | 0  | 5          | 0  |
| 8     | 0  | 8          | 3  | 0          | 0  |
| 6     | 0  | 1          | 0  | 0          | 2  |
| 4     | 11 | 0          | 5  | 0          | 4  |
| 4     | 0  | 0          | 1  | 0          | 1  |
| 5     | 12 | 2          | 1  | 0          | 0  |

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 0 | 3  | 4  | 2 | 0 | 7 |
| 2 | 5  | 0  | 0 | 0 | 0 |
| 3 | 0  | 0  | 6 | 0 | 2 |
| 2 | 5  | 0  | 3 | 6 | 0 |
| 6 | 6  | 0  | 0 | 6 | 0 |
| 3 | 6  | 0  | 0 | 0 | 0 |
| 0 | 4  | 2  | 2 | 4 | 0 |
| 2 | 5  | 10 | 7 | 1 | 2 |
| 5 | 0  | 3  | 0 | 2 | 0 |
| 6 | 0  | 2  | 0 | 0 | 5 |
| 9 | 0  | 0  | 0 | 3 | 0 |
| 4 | 13 | 5  | 0 | 0 | 2 |
| 0 | 6  | 0  | 0 | 3 | 4 |
| 4 | 9  | 3  | 0 | 2 | 0 |
| 2 | 6  | 0  | 6 | 0 | 0 |
| 3 | 7  | 0  | 0 | 2 | 1 |
| 7 | 0  | 0  | 0 | 6 | 0 |
| 7 | 10 | 0  | 1 | 1 | 3 |
| 0 | 0  | 3  | 0 | 0 | 7 |
| 7 | 2  | 7  | 0 | 0 | 0 |
| 8 | 7  | 3  | 0 | 0 | 5 |
| 5 | 4  | 2  | 0 | 5 | 0 |

Table of data for Fig. S4c

| shLuc |    | shEXOSC9#1 |   | shEXOSC9#2 |   |
|-------|----|------------|---|------------|---|
| 0     | 0  | 1          | 0 | 0          | 5 |
| 3     | 0  | 0          | 3 | 6          | 3 |
| 5     | 0  | 0          | 0 | 0          | 0 |
| 10    | 0  | 0          | 0 | 1          | 0 |
| 5     | 3  | 0          | 0 | 2          | 1 |
| 1     | 7  | 1          | 5 | 1          | 3 |
| 0     | 4  | 0          | 1 | 7          | 1 |
| 1     | 5  | 1          | 0 | 1          | 0 |
| 0     | 0  | 3          | 0 | 0          | 0 |
| 3     | 0  | 2          | 1 | 0          | 0 |
| 0     | 8  | 0          | 5 | 1          | 0 |
| 2     | 2  | 3          | 1 | 8          | 0 |
| 5     | 0  | 1          | 3 | 0          | 0 |
| 5     | 6  | 2          | 0 | 2          | 3 |
| 1     | 5  | 0          | 0 | 0          | 4 |
| 0     | 2  | 1          | 0 | 4          | 0 |
| 0     | 1  | 3          | 4 | 3          | 0 |
| 2     | 3  | 0          | 0 | 0          | 3 |
| 5     | 4  | 3          | 1 | 0          | 2 |
| 6     | 5  | 0          | 0 | 2          | 0 |
| 6     | 0  | 1          | 0 | 0          | 0 |
| 0     | 3  | 0          | 0 | 0          | 0 |
| 0     | 8  | 0          | 1 | 1          | 1 |
| 0     | 4  | 0          | 2 | 0          | 7 |
| 2     | 6  | 1          | 3 | 0          | 0 |
| 4     | 2  | 0          | 0 | 6          | 0 |
| 4     | 3  | 1          | 2 | 3          | 5 |
| 4     | 4  | 5          | 2 | 5          | 4 |
| 2     | 0  | 1          | 0 | 1          | 1 |
| 0     | 5  | 1          | 0 | 0          | 0 |
| 0     | 6  | 0          | 0 | 0          | 0 |
| 2     | 8  | 0          | 5 | 0          | 2 |
| 2     | 4  | 2          | 2 | 0          | 3 |
| 0     | 6  | 0          | 3 | 0          | 0 |
| 5     | 0  | 0          | 2 | 5          | 7 |
| 5     | 0  | 0          | 1 | 2          | 0 |
| 8     | 2  | 0          | 0 | 6          | 8 |
| 2     | 11 | 0          | 3 | 4          | 1 |
| 0     | 0  | 1          | 0 | 1          | 0 |
| 0     | 0  | 0          | 0 | 0          | 1 |
| 4     | 5  | 6          | 0 | 0          | 1 |
| 6     | 0  | 0          | 0 | 3          | 0 |
| 2     | 1  | 0          | 0 | 4          | 0 |
| 1     | 3  | 0          | 0 | 1          | 0 |
| 0     | 9  | 0          | 0 | 0          | 0 |
| 6     | 5  | 6          | 3 | 4          | 1 |
| 9     | 0  | 4          | 5 | 1          | 0 |
| 0     | 0  | 1          | 0 | 4          | 4 |

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 0 | 6 | 3 | 2 | 5 | 0 |
| 3 | 0 | 6 | 2 | 1 | 1 |

Table of data for Fig. S4d

| shLuc |   | shEXOSC9#1 |    | shEXOSC9#2 |   |
|-------|---|------------|----|------------|---|
| 5     | 2 | 5          | 0  | 4          | 3 |
| 0     | 0 | 5          | 0  | 2          | 0 |
| 5     | 0 | 0          | 2  | 0          | 0 |
| 11    | 7 | 0          | 1  | 0          | 0 |
| 5     | 8 | 3          | 4  | 0          | 0 |
| 1     | 0 | 0          | 3  | 3          | 0 |
| 0     | 3 | 10         | 3  | 4          | 0 |
| 3     | 9 | 5          | 0  | 5          | 0 |
| 0     | 5 | 0          | 1  | 0          | 0 |
| 6     | 7 | 0          | 2  | 2          | 0 |
| 0     | 2 | 0          | 0  | 0          | 0 |
| 0     | 3 | 3          | 0  | 0          | 0 |
| 2     | 4 | 0          | 12 | 0          | 0 |
| 4     | 1 | 0          | 6  | 1          | 3 |
| 3     | 2 | 0          | 0  | 0          | 0 |
| 0     | 6 | 1          | 5  | 0          | 0 |
| 5     | 3 | 3          | 0  | 0          | 7 |
| 0     | 6 | 0          | 4  | 2          | 0 |
| 6     | 2 | 0          | 0  | 0          | 0 |
| 8     | 2 | 1          | 3  | 0          | 0 |
| 2     | 0 | 0          | 0  | 0          | 3 |
| 0     | 0 | 1          | 0  | 0          | 0 |
| 5     | 3 | 0          | 0  | 0          | 0 |
| 0     | 0 | 0          | 2  | 0          | 0 |
| 4     | 3 | 0          | 0  | 0          | 0 |
| 0     | 5 | 0          | 4  | 0          | 0 |
| 5     | 5 | 0          | 0  | 0          | 0 |
| 5     | 3 | 4          | 5  | 0          | 0 |
| 2     | 0 | 0          | 3  | 7          | 0 |
| 8     | 0 | 0          | 0  | 0          | 7 |
| 3     | 0 | 0          | 0  | 8          | 0 |
| 4     | 4 | 0          | 3  | 0          | 0 |
| 5     | 3 | 2          | 1  | 4          | 0 |
| 5     | 0 | 5          | 0  | 0          | 0 |
| 2     | 0 | 0          | 10 | 0          | 0 |
| 0     | 3 | 3          | 0  | 6          | 0 |
| 4     | 0 | 0          | 0  | 0          | 4 |
| 4     | 0 | 0          | 6  | 3          | 0 |
| 6     | 0 | 0          | 1  | 0          | 0 |
| 0     | 1 | 0          | 0  | 0          | 0 |
| 0     | 0 | 2          | 4  | 2          | 1 |
| 7     | 6 | 0          | 0  | 0          | 6 |
| 3     | 4 | 0          | 0  | 0          | 0 |
| 0     | 0 | 8          | 0  | 0          | 0 |
| 3     | 4 | 0          | 5  | 0          | 0 |
| 0     | 3 | 0          | 3  | 5          | 0 |
| 0     | 2 | 0          | 2  | 0          | 0 |
| 2     | 0 | 0          | 0  | 4          | 4 |
| 2     | 4 | 2          | 6  | 3          | 0 |
| 0     | 2 | 0          | 0  | 0          | 0 |

Table of data for Fig. S5a

| shLuc |    | shEXOSC9#1 |    | shEXOSC9#2 |    |
|-------|----|------------|----|------------|----|
| 11    | 13 | 6          | 0  | 0          | 2  |
| 13    | 24 | 4          | 0  | 8          | 10 |
| 10    | 12 | 0          | 12 | 4          | 0  |
| 12    | 9  | 3          | 4  | 0          | 0  |
| 14    | 10 | 5          | 3  | 1          | 9  |
| 29    | 14 | 8          | 8  | 7          | 0  |
| 14    | 9  | 0          | 7  | 0          | 1  |
| 16    | 12 | 0          | 0  | 4          | 3  |
| 6     | 5  | 0          | 8  | 0          | 1  |
| 4     | 0  | 7          | 0  | 5          | 0  |
| 3     | 3  | 2          | 4  | 5          | 8  |
| 3     | 0  | 0          | 1  | 9          | 10 |
| 9     | 12 | 2          | 5  | 0          | 0  |
| 9     | 12 | 0          | 6  | 0          | 4  |
| 19    | 16 | 0          | 0  | 0          | 5  |

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 16 | 11 | 7  | 8  | 1  | 0  |
| 17 | 3  | 2  | 0  | 10 | 4  |
| 23 | 0  | 0  | 9  | 2  | 3  |
| 5  | 16 | 1  | 2  | 6  | 4  |
| 2  | 13 | 4  | 0  | 0  | 12 |
| 16 | 3  | 24 | 4  | 0  | 0  |
| 8  | 10 | 0  | 5  | 0  | 4  |
| 15 | 12 | 6  | 7  | 3  | 0  |
| 0  | 12 | 2  | 3  | 0  | 0  |
| 19 | 33 | 0  | 4  | 9  | 0  |
| 17 | 24 | 0  | 3  | 5  | 0  |
| 17 | 3  | 4  | 3  | 1  | 2  |
| 11 | 18 | 0  | 0  | 0  | 1  |
| 15 | 8  | 0  | 0  | 7  | 4  |
| 6  | 2  | 1  | 12 | 0  | 0  |
| 6  | 11 | 0  | 0  | 13 | 2  |
| 3  | 10 | 3  | 0  | 3  | 0  |
| 15 | 2  | 5  | 9  | 10 | 5  |
| 8  | 19 | 3  | 0  | 0  | 0  |
| 5  | 6  | 4  | 3  | 3  | 5  |
| 4  | 8  | 4  | 0  | 3  | 0  |
| 0  | 8  | 0  | 3  | 7  | 2  |
| 12 | 3  | 2  | 3  | 0  | 6  |
| 14 | 10 | 4  | 1  | 6  | 0  |
| 12 | 4  | 0  | 0  | 6  | 0  |
| 7  | 8  | 2  | 2  | 4  | 0  |
| 4  | 8  | 4  | 2  | 4  | 6  |
| 9  | 14 | 4  | 3  | 5  | 5  |
| 5  | 5  | 7  | 0  | 8  | 5  |
| 8  | 15 | 0  | 0  | 0  | 0  |
| 8  | 6  | 0  | 8  | 0  | 2  |
| 7  | 22 | 0  | 0  | 1  | 0  |
| 14 | 15 | 0  | 0  | 0  | 11 |
| 16 | 17 | 0  | 0  | 0  | 3  |
| 4  | 7  | 0  | 3  | 4  | 3  |

Table of data for Fig. S5b

| shLuc | shEXOSC9#1 | shEXOSC9#2 |
|-------|------------|------------|
| 9     | 14         | 7          |
| 0     | 8          | 6          |
| 8     | 6          | 0          |
| 8     | 11         | 5          |
| 8     | 9          | 7          |
| 4     | 10         | 7          |
| 7     | 10         | 4          |
| 10    | 20         | 1          |
| 15    | 12         | 5          |
| 7     | 8          | 4          |
| 0     | 15         | 2          |
| 0     | 8          | 0          |
| 36    | 0          | 4          |
| 10    | 5          | 0          |
| 8     | 10         | 3          |
| 8     | 8          | 0          |
| 5     | 7          | 2          |
| 21    | 7          | 1          |
| 25    | 9          | 0          |
| 17    | 3          | 6          |
| 4     | 6          | 7          |
| 8     | 16         | 0          |
| 0     | 7          | 0          |
| 10    | 2          | 17         |
| 11    | 9          | 0          |
| 10    | 18         | 0          |
| 12    | 6          | 4          |
| 7     | 5          | 0          |
| 14    | 6          | 7          |
| 16    | 6          | 0          |
| 0     | 5          | 3          |
| 9     | 9          | 0          |
| 8     | 4          | 0          |
| 6     | 10         | 0          |
| 12    | 8          | 0          |

|    |    |   |   |    |   |
|----|----|---|---|----|---|
| 11 | 8  | 0 | 0 | 4  | 1 |
| 8  | 10 | 0 | 0 | 4  | 3 |
| 6  | 7  | 0 | 0 | 5  | 0 |
| 11 | 11 | 4 | 0 | 12 | 0 |
| 0  | 14 | 0 | 6 | 6  | 0 |
| 16 | 13 | 0 | 6 | 0  | 0 |
| 5  | 19 | 3 | 1 | 0  | 0 |
| 6  | 0  | 1 | 3 | 0  | 7 |
| 7  | 8  | 0 | 0 | 3  | 3 |
| 8  | 6  | 4 | 2 | 5  | 4 |
| 9  | 0  | 0 | 0 | 3  | 0 |
| 14 | 6  | 4 | 0 | 4  | 0 |
| 12 | 0  | 1 | 0 | 6  | 0 |
| 9  | 0  | 6 | 3 | 8  | 4 |
| 3  | 4  | 5 | 0 | 0  | 5 |

Table of data for Fig. S5c

| shLuc | shEXOSC9#1 |   | shEXOSC9#2 |   |
|-------|------------|---|------------|---|
| 5     | 2          | 0 | 1          | 2 |
| 0     | 2          | 0 | 3          | 2 |
| 4     | 6          | 0 | 3          | 0 |
| 3     | 8          | 0 | 3          | 2 |
| 1     | 2          | 0 | 3          | 4 |
| 8     | 6          | 0 | 2          | 5 |
| 2     | 4          | 0 | 3          | 1 |
| 0     | 6          | 4 | 1          | 5 |
| 12    | 6          | 0 | 0          | 6 |
| 7     | 2          | 1 | 0          | 0 |
| 0     | 6          | 0 | 2          | 0 |
| 11    | 1          | 1 | 0          | 2 |
| 2     | 1          | 0 | 0          | 0 |
| 6     | 0          | 2 | 1          | 1 |
| 7     | 3          | 0 | 2          | 0 |
| 7     | 7          | 0 | 3          | 0 |
| 4     | 9          | 1 | 0          | 1 |
| 2     | 4          | 0 | 0          | 5 |
| 6     | 0          | 0 | 0          | 0 |
| 10    | 0          | 0 | 0          | 1 |
| 0     | 4          | 0 | 0          | 0 |
| 0     | 2          | 1 | 0          | 0 |
| 5     | 5          | 0 | 0          | 0 |
| 4     | 0          | 0 | 0          | 7 |
| 2     | 3          | 1 | 0          | 1 |
| 2     | 4          | 0 | 0          | 0 |
| 3     | 7          | 0 | 1          | 2 |
| 3     | 4          | 0 | 0          | 1 |
| 0     | 3          | 1 | 1          | 5 |
| 3     | 2          | 0 | 0          | 0 |
| 3     | 5          | 3 | 0          | 0 |
| 0     | 8          | 0 | 8          | 0 |
| 6     | 0          | 2 | 1          | 6 |
| 10    | 0          | 0 | 1          | 0 |
| 3     | 7          | 0 | 0          | 0 |
| 4     | 0          | 0 | 0          | 0 |
| 0     | 6          | 0 | 0          | 3 |
| 3     | 0          | 0 | 0          | 1 |
| 2     | 1          | 0 | 0          | 0 |
| 4     | 7          | 0 | 1          | 0 |
| 3     | 3          | 1 | 0          | 4 |
| 3     | 4          | 0 | 0          | 2 |
| 7     | 4          | 1 | 0          | 0 |
| 12    | 0          | 1 | 0          | 0 |
| 16    | 5          | 0 | 1          | 0 |
| 9     | 0          | 0 | 3          | 0 |
| 5     | 8          | 3 | 1          | 5 |
| 3     | 6          | 1 | 1          | 0 |
| 1     | 2          | 0 | 1          | 0 |
| 4     | 1          | 0 | 0          | 1 |

Table of data for Fig. S5d

| shLuc | shEXOSC9#1 |   | shEXOSC9#2 |   |
|-------|------------|---|------------|---|
| 6     | 0          | 5 | 1          | 0 |
| 4     | 4          | 0 | 0          | 0 |

|    |   |    |   |    |    |
|----|---|----|---|----|----|
| 2  | 0 | 0  | 4 | 0  | 3  |
| 7  | 4 | 0  | 0 | 0  | 0  |
| 1  | 1 | 0  | 3 | 0  | 1  |
| 5  | 0 | 0  | 4 | 1  | 0  |
| 2  | 5 | 0  | 0 | 0  | 0  |
| 0  | 0 | 1  | 1 | 8  | 0  |
| 5  | 2 | 0  | 0 | 1  | 3  |
| 7  | 4 | 0  | 4 | 3  | 0  |
| 1  | 0 | 0  | 3 | 0  | 0  |
| 3  | 3 | 3  | 0 | 0  | 2  |
| 2  | 0 | 0  | 1 | 2  | 0  |
| 7  | 5 | 0  | 0 | 4  | 4  |
| 0  | 7 | 0  | 6 | 3  | 0  |
| 2  | 8 | 0  | 0 | 0  | 1  |
| 3  | 0 | 0  | 3 | 0  | 0  |
| 13 | 1 | 0  | 0 | 0  | 1  |
| 2  | 4 | 0  | 3 | 4  | 0  |
| 8  | 6 | 0  | 1 | 2  | 2  |
| 5  | 3 | 2  | 0 | 0  | 0  |
| 1  | 8 | 2  | 0 | 0  | 0  |
| 0  | 7 | 0  | 3 | 0  | 0  |
| 5  | 5 | 0  | 0 | 3  | 0  |
| 10 | 0 | 0  | 0 | 0  | 5  |
| 0  | 5 | 0  | 0 | 0  | 0  |
| 3  | 7 | 0  | 4 | 0  | 4  |
| 6  | 2 | 2  | 0 | 0  | 16 |
| 3  | 7 | 0  | 2 | 0  | 0  |
| 3  | 0 | 3  | 0 | 0  | 3  |
| 0  | 5 | 0  | 0 | 1  | 4  |
| 3  | 0 | 0  | 0 | 3  | 4  |
| 0  | 8 | 0  | 1 | 0  | 0  |
| 5  | 4 | 13 | 0 | 0  | 0  |
| 5  | 0 | 0  | 0 | 1  | 8  |
| 3  | 2 | 0  | 0 | 0  | 2  |
| 2  | 4 | 0  | 5 | 0  | 0  |
| 4  | 3 | 1  | 4 | 0  | 4  |
| 1  | 0 | 0  | 0 | 0  | 0  |
| 3  | 0 | 0  | 0 | 0  | 0  |
| 5  | 4 | 0  | 0 | 8  | 0  |
| 4  | 4 | 0  | 0 | 0  | 0  |
| 4  | 3 | 3  | 0 | 0  | 0  |
| 0  | 0 | 0  | 1 | 3  | 0  |
| 0  | 4 | 0  | 0 | 0  | 3  |
| 1  | 3 | 4  | 0 | 0  | 3  |
| 0  | 4 | 4  | 3 | 0  | 0  |
| 0  | 0 | 0  | 4 | 13 | 0  |
| 1  | 0 | 0  | 1 | 4  | 2  |
| 5  | 4 | 0  | 0 | 0  | 0  |

Table of data for Fig. S1b

|      | ProSELENBP1 |        |        | ProRBM39 |        |        | ProRAD50 |       |        | ProLACE1 |        |        | Proc21orf63 |        |        |
|------|-------------|--------|--------|----------|--------|--------|----------|-------|--------|----------|--------|--------|-------------|--------|--------|
| mock | 93.91       | 105.94 | 100.15 | 94.32    | 115.73 | 89.95  | 111.51   | 87.60 | 100.89 | 107.32   | 93.45  | 99.23  | 101.14      | 110.33 | 88.53  |
| WT   | 53.78       | 67.62  | 37.18  | 72.63    | 59.99  | 67.43  | 58.14    | 47.58 | 57.26  | 67.03    | 52.92  | 54.17  | 114.10      | 103.21 | 102.32 |
| MUT  | 119.76      | 75.18  | 79.78  | 98.79    | 100.02 | 100.42 | 94.33    | 89.80 | 105.01 | 116.04   | 113.40 | 119.86 | 115.88      | 114.69 | 106.34 |

Table of data for Fig. S1c

|      | DAPK1  |        |        | PYCARD |        |        | TNFRSF1B |        |        | TNFRSF21 |        |        |
|------|--------|--------|--------|--------|--------|--------|----------|--------|--------|----------|--------|--------|
| mock | 106.90 | 98.76  | 94.34  | 92.26  | 102.78 | 104.96 | 105.72   | 83.84  | 110.45 | 94.52    | 98.30  | 107.19 |
| WT   | 73.03  | 68.57  | 73.96  | 57.94  | 58.42  | 51.41  | 28.20    | 38.71  | 26.60  | 42.78    | 37.34  | 37.10  |
| MUT  | 72.96  | 126.39 | 128.90 | 92.83  | 99.94  | 88.37  | 97.42    | 104.54 | 125.85 | 120.28   | 109.06 | 107.26 |

Table of data for Fig. S6f

|   | shLuc | shAPOBEC3G#1 | shAPOBEC3G#2 |
|---|-------|--------------|--------------|
| 0 | 3     | 4            | 1            |
| 0 | 0     | 0            | 0            |
| 2 | 3     | 2            | 1            |
| 0 | 1     | 0            | 4            |
| 0 | 5     | 1            | 3            |
| 0 | 0     | 2            | 3            |
| 0 | 1     | 9            | 1            |
| 0 | 0     | 0            | 2            |
| 0 | 3     | 0            | 2            |
| 0 | 4     | 7            | 3            |

|   |   |   |   |   |    |
|---|---|---|---|---|----|
| 4 | 0 | 5 | 2 | 0 | 0  |
| 0 | 1 | 1 | 0 | 4 | 0  |
| 3 | 0 | 0 | 6 | 0 | 2  |
| 0 | 0 | 0 | 0 | 0 | 2  |
| 1 | 4 | 1 | 2 | 2 | 4  |
| 0 | 0 | 3 | 9 | 2 | 1  |
| 7 | 0 | 3 | 5 | 2 | 0  |
| 0 | 0 | 0 | 8 | 4 | 0  |
| 2 | 5 | 1 | 1 | 3 | 6  |
| 0 | 2 | 3 | 0 | 1 | 4  |
| 4 | 1 | 2 | 3 | 0 | 0  |
| 0 | 0 | 0 | 7 | 8 | 4  |
| 0 | 0 | 0 | 6 | 4 | 3  |
| 0 | 0 | 4 | 1 | 2 | 5  |
| 0 | 0 | 0 | 0 | 0 | 0  |
| 0 | 1 | 2 | 0 | 5 | 0  |
| 0 | 0 | 0 | 9 | 0 | 0  |
| 0 | 0 | 9 | 4 | 4 | 0  |
| 1 | 0 | 3 | 2 | 2 | 0  |
| 0 | 0 | 4 | 0 | 1 | 4  |
| 0 | 0 | 4 | 0 | 4 | 0  |
| 2 | 0 | 1 | 3 | 8 | 6  |
| 8 | 0 | 1 | 4 | 0 | 7  |
| 0 | 0 | 1 | 5 | 0 | 1  |
| 5 | 0 | 0 | 2 | 7 | 0  |
| 4 | 0 | 4 | 5 | 0 | 0  |
| 0 | 0 | 1 | 0 | 1 | 9  |
| 0 | 0 | 0 | 0 | 5 | 7  |
| 0 | 0 | 4 | 4 | 2 | 0  |
| 1 | 1 | 4 | 4 | 5 | 0  |
| 0 | 0 | 0 | 3 | 1 | 7  |
| 0 | 0 | 0 | 0 | 0 | 15 |
| 0 | 0 | 3 | 2 | 4 | 0  |
| 2 | 0 | 2 | 0 | 7 | 0  |
| 0 | 0 | 6 | 1 | 5 | 6  |
| 0 | 0 | 2 | 3 | 0 | 3  |
| 3 | 3 | 0 | 4 | 2 | 5  |
| 2 | 0 | 7 | 2 | 0 | 6  |
| 0 | 0 | 3 | 4 | 0 | 0  |
| 0 | 0 | 3 | 2 | 5 | 4  |

Table of data for Fig. S6g

| shLuc | shAPOBEC3G#1 | shAPOBEC3G#2 |
|-------|--------------|--------------|
| 2     | 1            | 0            |
| 1     | 0            | 4            |
| 0     | 0            | 4            |
| 2     | 0            | 0            |
| 0     | 0            | 1            |
| 3     | 0            | 0            |
| 1     | 4            | 6            |
| 0     | 3            | 3            |
| 0     | 1            | 0            |
| 0     | 1            | 0            |
| 4     | 1            | 2            |
| 5     | 0            | 0            |
| 0     | 0            | 2            |
| 4     | 3            | 0            |
| 0     | 0            | 0            |
| 3     | 3            | 3            |
| 0     | 2            | 1            |
| 0     | 0            | 3            |
| 0     | 0            | 3            |
| 3     | 1            | 0            |
| 0     | 0            | 3            |
| 0     | 0            | 4            |
| 3     | 0            | 1            |
| 0     | 0            | 1            |
| 0     | 0            | 8            |
| 0     | 0            | 0            |
| 3     | 0            | 3            |
| 1     | 2            | 0            |
| 2     | 4            | 3            |
| 0     | 0            | 3            |



|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 2 | 0 | 0 | 3 | 4 | 0 |
| 6 | 0 | 3 | 1 | 3 | 0 |
| 2 | 1 | 1 | 1 | 0 | 3 |
| 0 | 0 | 1 | 3 | 3 | 0 |
| 4 | 2 | 0 | 1 | 1 | 3 |
| 1 | 0 | 3 | 0 | 0 | 0 |
| 0 | 4 | 0 | 2 | 0 | 1 |
| 3 | 4 | 1 | 4 | 0 | 3 |
| 0 | 0 | 3 | 3 | 1 | 4 |
| 0 | 0 | 0 | 2 | 4 | 3 |
| 3 | 1 | 2 | 6 | 3 | 6 |
| 0 | 1 | 2 | 2 | 2 | 0 |
| 1 | 1 | 3 | 1 | 2 | 0 |
| 5 | 1 | 0 | 2 | 2 | 1 |
| 2 | 2 | 0 | 0 | 3 | 4 |
| 0 | 2 | 4 | 1 | 3 | 2 |
| 0 | 0 | 2 | 0 | 0 | 2 |
| 3 | 2 | 0 | 3 | 4 | 0 |
| 0 | 0 | 5 | 2 | 1 | 3 |
| 4 | 2 | 0 | 3 | 0 | 2 |

Table of data for Fig. S7b

|             |      |      |     |      |      |     |      |      |      |
|-------------|------|------|-----|------|------|-----|------|------|------|
| mock        | 6.6  | 7.65 | 8   | 7.45 | 7.55 | 8.2 | 7.95 | 8.95 | 8.75 |
| APOBEC3G-V5 | 7.35 | 9    | 8.1 | 7.9  | 8.05 | 7.9 | 7.05 | 8.2  | 9    |

Table of data for Fig. S7c

|             |      |     |     |      |     |      |     |      |     |
|-------------|------|-----|-----|------|-----|------|-----|------|-----|
| mock        | 8    | 8.4 | 8.9 | 8    | 8.3 | 9.15 | 8.5 | 8.3  | 9   |
| APOBEC3G-V5 | 6.55 | 6.8 | 6.4 | 6.75 | 7.9 | 6.65 | 6.6 | 7.25 | 6.8 |

Table of data for Fig. S7d

|             |      |     |     |      |      |      |      |     |     |
|-------------|------|-----|-----|------|------|------|------|-----|-----|
| mock        | 7.45 | 8.5 | 8.4 | 7.85 | 9.2  | 9.7  | 7.65 | 8.8 | 7.5 |
| APOBEC3G-V5 | 6.5  | 6.4 | 6.5 | 6.55 | 6.55 | 6.55 | 6.2  | 6.5 | 5.5 |

Table of data for Fig. S7e

|             |      |      |     |      |      |     |     |      |     |
|-------------|------|------|-----|------|------|-----|-----|------|-----|
| mock        | 6.35 | 6.65 | 9   | 5.5  | 6.8  | 7.4 | 5.6 | 6.85 | 7.1 |
| APOBEC3G-V5 | 5.3  | 5.75 | 6.6 | 5.35 | 5.35 | 6.2 | 5.2 | 5.45 | 4.9 |

Table of data for Fig. S7f

|             |      |      |     |      |     |     |      |      |     |
|-------------|------|------|-----|------|-----|-----|------|------|-----|
| mock        | 7.15 | 7.95 | 5.4 | 6.65 | 8.4 | 4.3 | 6.9  | 7.95 | 5.5 |
| APOBEC3G-V5 | 5.55 | 6.15 | 3.4 | 5.7  | 6.6 | 3.4 | 5.75 | 5.7  | 3.1 |

Table of data for Fig. S7g

| mock | APOBEC3G-V5 |
|------|-------------|
| 8    | 0           |
| 0    | 5           |
| 5    | 8           |
| 0    | 5           |
| 4    | 5           |
| 6    | 0           |
| 7    | 25          |
| 5    | 6           |
| 0    | 0           |
| 4    | 6           |
| 2    | 4           |
| 5    | 0           |
| 6    | 5           |
| 6    | 3           |
| 5    | 5           |
| 4    | 7           |
| 10   | 8           |
| 3    | 6           |
| 8    | 8           |
| 4    | 6           |
| 4    | 3           |
| 12   | 8           |
| 0    | 5           |
| 6    | 3           |
| 1    | 14          |
| 8    | 4           |
| 5    | 7           |
| 5    | 6           |
| 4    | 3           |
| 9    | 6           |

|    |    |    |    |
|----|----|----|----|
| 1  | 3  | 2  | 0  |
| 4  | 8  | 4  | 2  |
| 18 | 4  | 3  | 4  |
| 6  | 10 | 6  | 0  |
| 12 | 0  | 2  | 9  |
| 25 | 4  | 7  | 9  |
| 2  | 14 | 3  | 3  |
| 3  | 6  | 0  | 3  |
| 5  | 5  | 6  | 4  |
| 4  | 7  | 10 | 3  |
| 4  | 6  | 2  | 4  |
| 5  | 3  | 2  | 5  |
| 3  | 8  | 1  | 4  |
| 2  | 2  | 0  | 3  |
| 4  | 1  | 0  | 5  |
| 3  | 3  | 0  | 2  |
| 4  | 4  | 6  | 5  |
| 7  | 2  | 5  | 4  |
| 11 | 4  | 4  | 10 |
| 3  | 1  | 2  | 0  |

Table of data for Fig. S7h

| mock | APOBEC3G-V5 |    |    |
|------|-------------|----|----|
| 6    | 3           | 8  | 4  |
| 5    | 10          | 4  | 2  |
| 6    | 4           | 4  | 6  |
| 11   | 5           | 8  | 6  |
| 7    | 3           | 8  | 0  |
| 7    | 4           | 4  | 0  |
| 5    | 4           | 2  | 10 |
| 4    | 1           | 1  | 3  |
| 10   | 8           | 5  | 0  |
| 4    | 4           | 0  | 4  |
| 4    | 3           | 5  | 5  |
| 6    | 3           | 3  | 8  |
| 1    | 14          | 6  | 4  |
| 7    | 9           | 6  | 8  |
| 4    | 7           | 9  | 3  |
| 6    | 4           | 8  | 3  |
| 4    | 11          | 6  | 4  |
| 7    | 4           | 3  | 1  |
| 5    | 4           | 7  | 5  |
| 5    | 6           | 0  | 18 |
| 5    | 4           | 10 | 7  |
| 3    | 7           | 0  | 0  |
| 3    | 7           | 0  | 0  |
| 6    | 4           | 3  | 0  |
| 7    | 7           | 0  | 4  |
| 3    | 6           | 4  | 5  |
| 6    | 4           | 9  | 8  |
| 4    | 8           | 5  | 6  |
| 5    | 6           | 7  | 7  |
| 6    | 5           | 6  | 7  |
| 3    | 6           | 6  | 5  |
| 4    | 1           | 0  | 0  |
| 10   | 5           | 11 | 5  |
| 4    | 4           | 4  | 5  |
| 4    | 4           | 3  | 3  |
| 5    | 9           | 4  | 2  |
| 6    | 7           | 4  | 5  |
| 4    | 5           | 5  | 4  |
| 6    | 7           | 6  | 7  |
| 3    | 5           | 0  | 6  |
| 3    | 2           | 6  | 1  |
| 7    | 6           | 1  | 0  |
| 2    | 5           | 4  | 0  |
| 3    | 6           | 0  | 0  |
| 6    | 6           | 10 | 0  |
| 5    | 6           | 5  | 7  |
| 5    | 13          | 0  | 6  |
| 5    | 6           | 9  | 3  |
| 5    | 3           | 3  | 0  |
| 4    | 3           | 10 | 7  |

Table of data for Fig. S7i

| mock | APOBEC3G-V5 |   |   |
|------|-------------|---|---|
| 0    | 1           | 2 | 0 |
| 9    | 3           | 3 | 2 |
| 7    | 3           | 0 | 3 |
| 1    | 0           | 0 | 5 |
| 1    | 1           | 0 | 2 |
| 5    | 1           | 4 | 1 |
| 3    | 8           | 3 | 2 |
| 1    | 1           | 2 | 0 |
| 4    | 5           | 0 | 2 |
| 4    | 4           | 4 | 2 |
| 3    | 6           | 4 | 1 |
| 19   | 3           | 1 | 0 |
| 9    | 4           | 5 | 1 |
| 0    | 7           | 4 | 6 |
| 5    | 6           | 3 | 2 |
| 4    | 2           | 5 | 4 |
| 3    | 5           | 2 | 0 |
| 1    | 3           | 1 | 2 |
| 3    | 3           | 0 | 2 |
| 7    | 1           | 1 | 2 |
| 4    | 0           | 2 | 1 |
| 4    | 5           | 5 | 3 |
| 2    | 2           | 1 | 6 |
| 3    | 1           | 3 | 1 |
| 3    | 3           | 0 | 4 |
| 3    | 3           | 3 | 0 |
| 1    | 0           | 4 | 0 |
| 5    | 0           | 3 | 3 |
| 1    | 9           | 0 | 4 |
| 1    | 0           | 3 | 2 |
| 1    | 0           | 0 | 6 |
| 2    | 6           | 1 | 6 |
| 1    | 2           | 4 | 4 |
| 4    | 3           | 2 | 3 |
| 1    | 0           | 2 | 3 |
| 5    | 12          | 0 | 0 |
| 3    | 0           | 1 | 1 |
| 1    | 1           | 1 | 3 |
| 2    | 6           | 4 | 7 |
| 1    | 4           | 5 | 1 |
| 5    | 3           | 4 | 3 |
| 5    | 3           | 3 | 2 |
| 2    | 4           | 3 | 2 |
| 6    | 4           | 2 | 2 |
| 3    | 4           | 3 | 0 |
| 0    | 0           | 2 | 0 |
| 4    | 0           | 5 | 0 |
| 2    | 5           | 2 | 0 |
| 2    | 1           | 0 | 5 |
| 4    | 4           | 1 | 6 |

Table of data for Fig. S7j

| mock | APOBEC3G-V5 |   |   |
|------|-------------|---|---|
| 5    | 4           | 5 | 0 |
| 0    | 1           | 1 | 0 |
| 1    | 2           | 6 | 3 |
| 1    | 2           | 1 | 7 |
| 2    | 0           | 0 | 1 |
| 4    | 0           | 5 | 2 |
| 3    | 2           | 0 | 3 |
| 0    | 3           | 2 | 3 |
| 8    | 1           | 5 | 2 |
| 3    | 1           | 1 | 6 |
| 9    | 3           | 4 | 2 |
| 3    | 4           | 0 | 4 |
| 2    | 1           | 2 | 3 |
| 0    | 0           | 4 | 0 |
| 3    | 1           | 4 | 1 |
| 2    | 15          | 4 | 1 |
| 3    | 0           | 0 | 3 |

|    |    |   |   |
|----|----|---|---|
| 0  | 1  | 0 | 3 |
| 4  | 0  | 3 | 3 |
| 6  | 3  | 7 | 4 |
| 5  | 4  | 1 | 3 |
| 2  | 1  | 3 | 3 |
| 2  | 3  | 2 | 4 |
| 4  | 2  | 2 | 0 |
| 5  | 2  | 6 | 3 |
| 4  | 2  | 3 | 3 |
| 4  | 3  | 1 | 2 |
| 2  | 2  | 3 | 0 |
| 12 | 0  | 0 | 5 |
| 1  | 3  | 4 | 0 |
| 1  | 2  | 0 | 0 |
| 2  | 3  | 0 | 1 |
| 4  | 1  | 0 | 1 |
| 2  | 0  | 4 | 0 |
| 0  | 15 | 0 | 4 |
| 2  | 4  | 2 | 5 |
| 2  | 3  | 0 | 0 |
| 1  | 1  | 4 | 3 |
| 1  | 4  | 3 | 0 |
| 0  | 2  | 5 | 0 |
| 2  | 4  | 1 | 3 |
| 6  | 4  | 4 | 8 |
| 2  | 1  | 1 | 4 |
| 1  | 1  | 5 | 9 |
| 2  | 6  | 5 | 5 |
| 1  | 2  | 0 | 0 |
| 5  | 3  | 5 | 0 |
| 5  | 0  | 0 | 1 |
| 4  | 1  | 0 | 3 |
| 4  | 2  | 2 | 3 |

Supplementary Table S6. Original data of graphs shown in figures