

**Supplementary Table 2. Sensitivity analysis using a stringent sc-eQTL threshold of  $P < 5 \times 10^{-8}$**

| Gene-cell type pair                              | Original number of SNPs | Original MR method        | Original OR (95% CI) | Original $P$ value | Number of SNPs retained under $P < 5 \times 10^{-8}$ | Minimum sc-eQTL $P$ value | Mean F-statistic | Primary MR method under strict threshold | Strict-threshold number of SNPs used in MR | Strict-threshold OR (95% CI) | Strict-threshold $P$ value | Nominally significant under strict threshold | Direction compared with original analysis |
|--|-------------------------|---------------------------|----------------------|--------------------|--|---------------------------|------------------|--|--|------------------------------|----------------------------|--|---|
| dc__Dendritic Cell__AGER                         | 2                       | Inverse variance weighted | 0.749 (0.582-0.963)  | 0.024              | 2  | 3.71E-14                  | 47.702           | Inverse variance weighted                | 2  | 0.749 (0.582-0.963)          | 0.024                      | Yes  | Consistent                                |
| dc__Dendritic Cell__APOM                         | 5                       | Inverse variance weighted | 1.235 (1.000-1.525)  | 0.050              | 3  | 1.89E-16                  | 56.004           | Inverse variance weighted                | 3  | 1.196 (0.923-1.550)          | 0.177                      | No   | Consistent                                |
| bin__Naïve/Immature B Cell__EBPL                 | 2                       | Inverse variance weighted | 0.723 (0.523-1.000)  | 0.050              | 1  | 2.43E-15                  | 64.766           | Wald ratio                               | 1  | 0.763 (0.534-1.090)          | 0.137                      | No   | Consistent                                |
| nk__Natural Killer Cell__EIF2A                   | 2                       | Inverse variance weighted | 1.516 (1.055-2.180)  | 0.025              | 1  | 1.15E-09                  | 37.779           | Wald ratio                               | 1  | 1.436 (0.968-2.131)          | 0.072                      | No   | Consistent                                |
| cd8et__CD8 Effector memory__FBXO2                | 2                       | Inverse variance weighted | 1.796 (1.046-3.086)  | 0.034              | 1  | 7.04E-10                  | 38.775           | Wald ratio                               | 1  | 1.838 (0.990-3.413)          | 0.054                      | No   | Consistent                                |
| cd8et__CD8 Effector memory__HLA-DQA1             | 4                       | Inverse variance weighted | 1.162 (1.011-1.335)  | 0.035              | 2  | 2.51E-66                  | 188.664          | Inverse variance weighted                | 2  | 1.179 (0.984-1.412)          | 0.075                      | No   | Consistent                                |
| nkr__Natural Killer Recruiting Cell__HLA-DQA2    | 3                       | Inverse variance weighted | 1.225 (1.021-1.470)  | 0.029              | 3  | 8.54E-24                  | 71.439           | Inverse variance weighted                | 3  | 1.225 (1.021-1.470)          | 0.029                      | Yes  | Consistent                                |
| bin__Naïve/Immature B Cell__HLA-DQA2             | 6                       | Inverse variance weighted | 1.109 (1.013-1.215)  | 0.024              | 5  | 1.00E-200                 | 359.379          | Inverse variance weighted                | 5  | 1.101 (1.005-1.207)          | 0.039                      | Yes  | Consistent                                |
| cd4sox4__CD4 SOX4 T cell__HLA-DRB5               | 2                       | Inverse variance weighted | 0.717 (0.539-0.954)  | 0.022              | 2  | 1.58E-08                  | 36.465           | Inverse variance weighted                | 2  | 0.717 (0.539-0.954)          | 0.022                      | Yes  | Consistent                                |
| cd4nc__CD4 Naïve/Central memory T cell__MAST4    | 2                       | Inverse variance weighted | 1.533 (1.034-2.273)  | 0.033              | 1  | 3.28E-10                  | 40.328           | Wald ratio                               | 1  | 1.436 (0.845-2.442)          | 0.181                      | No   | Consistent                                |
| cd8nc__CD8 Naïve/Central memory T cell__PARP14   | 2                       | Inverse variance weighted | 0.653 (0.436-0.979)  | 0.039              | 0  |                           |                  |  |  | Not estimable                |                            | Not estimable                                | Not estimable                             |
| cd4nc__CD4 Naïve/Central memory T cell__POLR1D   | 2                       | Inverse variance weighted | 0.796 (0.635-0.999)  | 0.049              | 1  | 3.80E-100                 | 573.505          | Wald ratio                               | 1  | 0.783 (0.610-1.006)          | 0.055                      | No   | Consistent                                |
| cd8et__CD8 Effector memory__SLC25A29             | 2                       | Inverse variance weighted | 1.169 (1.006-1.358)  | 0.041              | 1  | 6.21E-119                 | 716.649          | Wald ratio                               | 1  | 1.168 (0.998-1.366)          | 0.053                      | No   | Consistent                                |
| nk__Natural Killer Cell__SLC25A29                | 2                       | Inverse variance weighted | 1.171 (1.006-1.364)  | 0.042              | 1  | 6.01E-117                 | 700.913          | Wald ratio                               | 1  | 1.171 (0.996-1.376)          | 0.056                      | No   | Consistent                                |
| cd4et__CD4 Effector memory/TEMRA__TMEM258        | 2                       | Inverse variance weighted | 0.730 (0.551-0.968)  | 0.029              | 1  | 3.16E-13                  | 54.600           | Wald ratio                               | 1  | 0.716 (0.509-1.006)          | 0.054                      | No   | Consistent                                |
| cd4nc__CD4 Naïve/Central memory T cell__TNFSF13B | 2                       | Inverse variance weighted | 1.273 (1.001-1.619)  | 0.049              | 1  | 4.90E-23                  | 102.775          | Wald ratio                               | 1  | 1.285 (0.997-1.655)          | 0.053                      | No   | Consistent                                |
| bin__Naïve/Immature B Cell__WARS                 | 2                       | Inverse variance weighted | 0.826 (0.696-0.979)  | 0.027              | 1  | 8.33E-57                  | 287.871          | Wald ratio                               | 1  | 0.845 (0.704-1.014)          | 0.070                      | No   | Consistent                                |
| cd8s100b__CD8 S100B T cell__ZBTB9                | 3                       | Inverse variance weighted | 0.773 (0.610-0.979)  | 0.033              | 2  | 6.47E-19                  | 73.346           | Inverse variance weighted                | 2  | 0.751 (0.579-0.974)          | 0.031                      | Yes  | Consistent                                |