**Supplementary Online Content**

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**Supplementary Table 1. Characteristics of selected SNPs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Exposure** | **SNP** | **CHR** | **POS** | **Closest Gene** | **EA** | **OA** | **EAF** | **F-statistic** | **BETA** | **SE** | **P-value** | **Ref(GX)** |
| FT4 | rs12033572 | 1 | 54369674 | DIO1 | C | G | 0.05 | 46 | 0.115 | 0.017 | 1.4E-11 | Teumer1 |
| FT4 | rs145019385 | 1 | 54252139 | DIO1 | T | C | 0.98 | 32 | 0.181 | 0.032 | 1.1E-08 | Teumer1 |
| FT4 | rs2235544 | 1 | 54375570 | DIO1 | A | C | 0.52 | 394 | 0.139 | 0.007 | 4.2E-101 | Teumer1 |
| FT4 | rs954878 | 1 | 54578401 | DIO1 | G | A | 0.55 | 69 | 0.058 | 0.007 | 4.8E-19 | Teumer1 |
| FT4 | rs4954192 | 2 | 135632981 | ACMSD | C | T | 0.57 | 30 | 0.033 | 0.006 | 9.3E−09 | Teumer1 |
| FT4 | rs6785807 | 3 | 181718601 | SOX2-OT | G | A | 0.85 | 40 | 0.057 | 0.009 | 6.9E−11 | Teumer1 |
| FT4 | rs6854291 | 4 | 181718601 | AADAT | A | G | 0.1 | 113 | 0.117 | 0.011 | 1.3E-24 | Teumer1 |
| FT4 | rs10946313 | 6 | 19381386 | ID4 | T | C | 0.63 | 54 | 0.044 | 0.006 | 6.2E−12 | Teumer1 |
| FT4 | rs17185536 | 6 | 100620931 | LOC728012 | T | C | 0.24 | 79 | 0.071 | 0.008 | 2.7E−20 | Teumer1 |
| FT4 | rs137964359 | 6 | 26001742 | SLC17A4 | C | T | 0.01 | 39 | 0.2 | 0.032 | 2.1E−10 | Teumer1 |
| FT4 | rs9356988 | 6 | 25777481 | SLC17A4 | G | A | 0.73 | 55 | 0.052 | 0.007 | 5.7E−14 | Teumer1 |
| FT4 | rs67583169 | 8 | 61212179 | CA8 | C | G | 0.86 | 47 | 0.062 | 0.009 | 7.1E−12 | Teumer1 |
| FT4 | rs10739496 | 9 | 100552559 | FOXE1 | T | C | 0.66 | 124 | 0.078 | 0.007 | 4.2E-30 | Teumer1 |
| FT4 | rs10984606 | 9 | 100739117 | FOXE1 | G | T | 0.5 | 33 | 0.04 | 0.007 | 1.2E-09 | Teumer1 |
| FT4 | rs10119187 | 9 | 4223660 | GLIS3 | T | C | 0.81 | 36 | 0.048 | 0.008 | 8.0E−10 | Teumer1 |
| FT4 | rs4842131 | 9 | 139092679 | LHX3 | C | T | 0.55 | 169 | 0.104 | 0.008 | 7.7E-44 | Teumer1 |
| FT4 | rs55679545 | 9 | 139122363 | LHX3 | A | G | 0.27 | 30 | 0.044 | 0.008 | 8.4E-09 | Teumer1 |
| FT4 | rs10818937 | 9 | 127015440 | NEK6 | C | T | 0.68 | 42 | 0.039 | 0.006 | 4.9E−11 | Teumer1 |
| FT4 | rs11039355 | 11 | 47737501 | FNBP4 | C | T | 0.34 | 31 | 0.039 | 0.007 | 3.5E−08 | Teumer1 |
| FT4 | rs4149056 | 12 | 21331549 | SLCO1B1 | C | T | 0.16 | 47 | 0.048 | 0.007 | 6.3E−11 | Teumer1 |
| FT4 | rs150816132 | 14 | 80464293 | DIO2 | G | A | 0.99 | 30 | 0.22 | 0.04 | 3.5E−08 | Teumer1 |
| FT4 | rs225014 | 14 | 80669580 | DIO2 | T | C | 0.64 | 61 | 0.047 | 0.006 | 4.6E−17 | Teumer1 |
| FT4 | rs978055 | 14 | 80534869 | DIO2 | A | T | 0.38 | 29 | 0.038 | 0.007 | 1.1E−08 | Teumer1 |
| FT4 | rs11626434 | 14 | 101998443 | DIO3OS | C | G | 0.36 | 57 | 0.053 | 0.007 | 1.7E−16 | Teumer1 |
| FT4 | rs12323871 | 14 | 101852075 | DIO3OS | C | T | 0.18 | 35 | 0.047 | 0.008 | 1.4E−08 | Teumer1 |
| FT4 | rs12907106 | 15 | 63873658 | USP3 | G | C | 0.73 | 31 | 0.039 | 0.007 | 3.7E−08 | Teumer1 |
| FT4 | rs8063103 | 16 | 12703395 | SNX29 | G | C | 0.15 | 32 | 0.051 | 0.009 | 7.8E−09 | Teumer1 |
| FT4 | rs11078333 | 17 | 16049626 | NCOR1 | A | T | 0.51 | 49 | 0.042 | 0.006 | 2.0E−12 | Teumer1 |
| FT4 | rs56069042 | 18 | 57914644 | MC4R | A | G | 0.95 | 34 | 0.099 | 0.017 | 3.6E−09 | Teumer1 |
| FT4 | rs1080094 | 18 | 29173795 | SLC25A52 | G | A | 0.4 | 36 | 0.042 | 0.007 | 4.1E-10 | Teumer1 |
| FT4 | rs113107469 | 18 | 29306737 | SLC25A52 | T | C | 0.03 | 83 | 0.2 | 0.022 | 1.0E-19 | Teumer1 |
| FT4 | rs28933981 | 18 | 29178610 | TTR | T | C | 0.001 | 100 | 1.7 | 0.17 | 3.9E-24 | Taylor2 |
| TSH | rs10917469 | 1 | 19843576 | CAPZB | A | G | 0.84 | 152 | 0.111 | 0.009 | 4.0E-39 | Teumer1 |
| TSH | rs12089835 | 1 | 19771438 | CAPZB | T | C | 0.35 | 109 | 0.073 | 0.007 | 1.3E-28 | Teumer1 |
| TSH | rs334725 | 1 | 61610049 | NFIA | A | G | 0.95 | 135 | 0.174 | 0.015 | 2.4E-32 | Teumer1 |
| TSH | rs17020122 | 1 | 108357391 | VAV3 | T | C | 0.09 | 89 | 0.104 | 0.011 | 5.3E-20 | Teumer1 |
| TSH | rs6724073 | 2 | 218236786 | DIRC3 | T | C | 0.74 | 41 | 0.051 | 0.008 | 1.3E-10 | Teumer1 |
| TSH | rs13015993 | 2 | 217625523 | IGFBP5 | A | G | 0.73 | 137 | 0.082 | 0.007 | 4.5E-32 | Teumer1 |
| TSH | rs16856540 | 2 | 217580413 | IGFBP5 | C | T | 0.16 | 47 | 0.055 | 0.008 | 7.8E-11 | Teumer1 |
| TSH | rs59381142 | 3 | 193916181 | HES1 | G | A | 0.76 | 53 | 0.058 | 0.008 | 1.7E-14 | Teumer1 |
| TSH | rs13100823 | 3 | 185514088 | IGF2BP2 | C | T | 0.69 | 34 | 0.041 | 0.007 | 6.8E-10 | Teumer1 |
| TSH | rs1663070 | 3 | 12239852 | SYN2 | C | T | 0.26 | 43 | 0.046 | 0.007 | 3.5E-11 | Teumer1 |
| TSH | rs28502438 | 3 | 149220109 | TM4SF4 | T | C | 0.57 | 32 | 0.034 | 0.006 | 3.7E-08 | Teumer1 |
| TSH | rs11732089 | 4 | 149665602 | NR3C2 | T | C | 0.8 | 207 | 0.115 | 0.008 | 1.7E-51 | Teumer1 |
| TSH | rs6535624 | 4 | 149587905 | NR3C2 | A | G | 0.44 | 49 | 0.042 | 0.006 | 1.6E-11 | Teumer1 |
| TSH | rs1119208 | 5 | 76488613 | PDE8B | T | C | 0.37 | 59 | 0.046 | 0.006 | 6.6E-13 | Teumer1 |
| TSH | rs113974964 | 5 | 76652403 | PDE8B | C | T | 0.95 | 68 | 0.124 | 0.015 | 2.1E-17 | Teumer1 |
| TSH | rs139149784 | 5 | 76660193 | PDE8B | A | G | 0.03 | 29 | 0.156 | 0.029 | 5.0E-08 | Teumer1 |
| TSH | rs139424329 | 5 | 76660193 | PDE8B | G | A | 0.99 | 39 | 0.2 | 0.032 | 5.1E-10 | Teumer1 |
| TSH | rs2127387 | 5 | 76532571 | PDE8B | A | G | 0.41 | 576 | 0.144 | 0.006 | 1.1E-117 | Teumer1 |
| TSH | rs62362610 | 5 | 76439961 | PDE8B | C | G | 0.08 | 37 | 0.073 | 0.012 | 7.7E-10 | Teumer1 |
| TSH | rs7702192 | 5 | 76554807 | PDE8B | A | C | 0.47 | 136 | 0.07 | 0.006 | 2.6E-30 | Teumer1 |
| TSH | rs1079418 | 6 | 166047034 | PDE10A | A | G | 0.69 | 208 | 0.101 | 0.007 | 8.2E-53 | Teumer1 |
| TSH | rs73022105 | 6 | 165973757 | PDE10A | T | C | 0.95 | 43 | 0.105 | 0.016 | 1.2E-11 | Teumer1 |
| TSH | rs1265091 | 6 | 31108129 | PSORS1C1 | T | C | 0.2 | 40 | 0.057 | 0.009 | 3.2E-11 | Teumer1 |
| TSH | rs9497965 | 6 | 148521292 | SASH1 | T | C | 0.4 | 54 | 0.044 | 0.006 | 9.8E-13 | Teumer1 |
| TSH | rs744103 | 6 | 43805362 | VEGFA/LOC100132354 | A | T | 0.69 | 173 | 0.092 | 0.007 | 6.7E-41 | Teumer1 |
| TSH | rs9381266 | 6 | 43905037 | VEGFA/LOC100132354 | T | C | 0.74 | 109 | 0.073 | 0.007 | 1.8E-25 | Teumer1 |
| TSH | rs2439301 | 8 | 32432369 | NRG1 | G | A | 0.77 | 54 | 0.059 | 0.008 | 8.2E-15 | Teumer1 |
| TSH | rs56009477 | 8 | 23356964 | SLC25A37 | A | G | 0.84 | 42 | 0.052 | 0.008 | 3.7E-10 | Teumer1 |
| TSH | rs10957494 | 8 | 70365025 | SULF1 | G | A | 0.31 | 33 | 0.04 | 0.007 | 1.1E-09 | Teumer1 |
| TSH | rs118039499 | 8 | 133771635 | TG | A | C | 0.98 | 59 | 0.184 | 0.024 | 2.0E-14 | Teumer1 |
| TSH | rs2739067 | 8 | 133951991 | TG | G | A | 0.4 | 49 | 0.042 | 0.006 | 2.4E-11 | Teumer1 |
| TSH | rs8176645 | 9 | 136149098 | ABO | A | T | 0.34 | 75 | 0.052 | 0.006 | 3.9E-16 | Teumer1 |
| TSH | rs9298749 | 9 | 16214340 | C9orf92 | C | A | 0.41 | 42 | 0.039 | 0.006 | 8.8E-10 | Teumer1 |
| TSH | rs10814915 | 9 | 4290544 | GLIS3 | T | C | 0.44 | 49 | 0.042 | 0.006 | 5.1E-12 | Teumer1 |
| TSH | rs11255790 | 10 | 8682180 | GATA3 | C | T | 0.7 | 34 | 0.041 | 0.007 | 6.8E-10 | Teumer1 |
| TSH | rs4933466 | 10 | 89849519 | PTEN | A | G | 0.6 | 44 | 0.04 | 0.006 | 5.1E-10 | Teumer1 |
| TSH | rs4445669 | 11 | 115045237 | CADM1 | C | T | 0.54 | 44 | 0.04 | 0.006 | 5.8E-11 | Teumer1 |
| TSH | rs12284404 | 11 | 45228686 | PRDM11 | G | A | 0.73 | 92 | 0.067 | 0.007 | 2.5E-22 | Teumer1 |
| TSH | rs7329958 | 13 | 24782080 | SPATA13 | C | T | 0.65 | 40 | 0.044 | 0.007 | 1.1E-11 | Teumer1 |
| TSH | rs8015085 | 14 | 93585331 | ITPK1 | A | G | 0.21 | 70 | 0.067 | 0.008 | 2.4E-18 | Teumer1 |
| TSH | rs2254613 | 14 | 36713154 | MBIP | G | T | 0.45 | 34 | 0.035 | 0.006 | 3.4E-08 | Teumer1 |
| TSH | rs398745 | 14 | 36536181 | MBIP | C | A | 0.41 | 75 | 0.052 | 0.006 | 4.0E-17 | Teumer1 |
| TSH | rs11159482 | 14 | 81490842 | TSHR | T | C | 0.09 | 43 | 0.085 | 0.013 | 6.3E-11 | Teumer1 |
| TSH | rs12893151 | 14 | 81619945 | TSHR | C | A | 0.78 | 60 | 0.062 | 0.008 | 1.0E-15 | Teumer1 |
| TSH | rs59334515 | 14 | 81594143 | TSHR | C | T | 0.78 | 60 | 0.054 | 0.007 | 1.1E-13 | Teumer1 |
| TSH | rs13329353 | 15 | 89113877 | DET1 | T | C | 0.68 | 76 | 0.061 | 0.007 | 5.2E-21 | Teumer1 |
| TSH | rs11639111 | 15 | 49749735 | FAM227B/FGF7 | T | C | 0.41 | 56 | 0.045 | 0.006 | 3.6E-13 | Teumer1 |
| TSH | rs17477923 | 15 | 49711185 | FAM227B/FGF7 | T | C | 0.74 | 141 | 0.083 | 0.007 | 2.6E-33 | Teumer1 |
| TSH | rs1045476 | 16 | 4015313 | ADCY9 | A | G | 0.18 | 38 | 0.049 | 0.008 | 2.4E-09 | Teumer1 |
| TSH | rs17767491 | 16 | 79745487 | MAF | A | G | 0.68 | 158 | 0.088 | 0.007 | 3.4E-42 | Teumer1 |
| TSH | rs30227 | 16 | 14405428 | MIR365A | C | T | 0.39 | 61 | 0.047 | 0.006 | 7.6E-14 | Teumer1 |
| TSH | rs1157994 | 17 | 59338574 | BCAS3 | G | A | 0.95 | 32 | 0.09 | 0.016 | 5.3E-09 | Teumer1 |
| TSH | rs1042673 | 17 | 70121339 | SOX9 | G | A | 0.48 | 84 | 0.055 | 0.006 | 3.6E-19 | Teumer1 |
| TSH | rs963384 | 17 | 70369758 | SOX9 | T | C | 0.46 | 34 | 0.035 | 0.006 | 2.8E-08 | Teumer1 |
| TSH | rs4804413 | 19 | 7222655 | INSR | T | C | 0.44 | 78 | 0.053 | 0.006 | 8.6E-18 | Teumer1 |
| TSH | rs1203944 | 20 | 22596879 | FOXA2 | C | T | 0.77 | 53 | 0.051 | 0.007 | 2.4E-12 | Teumer1 |
| TSH | rs74804879 |  1 | 19862320 | CAPZB | T | C | 0.35 | 51 | 0.05 | 0.007 | 1.2E-14 | Teumer1 |
| TSH | rs182873197 |  5 | 76773148 | PDE8B | C | T | 0.05 | 33 | 0.08 | 0.014 | 1.7E-08 | Teumer1 |
| TSH | rs200574439 |  10 | 101283330 | NKX2-3 | C | A | 0.42 | 61 | 0.047 | 0.006 | 3.7E-13 | Teumer1 |
| TSH | rs77819282 |  17 | 44762589 | NSF | A | G | 0.24 | 41 | 0.045 | 0.007 | 1.1E-19 | Teumer1 |
| TSH | rs12390237 |  X | 3612081 | PRKX | G | A | 0.38 | 43 | 0.046 | 0.007 | 1.7E-11 | Teumer1 |
| TPO | rs11675434 |  2 | 1407815 | TPO | T | C | 0.39 | 19 | 0.020 | 0.005 | 7.4E-13 | Medici3 |
| TPO | rs1230666 | 1 | 113974933 | MAGI3 | A | G | 0.16 | 20 | 0.027 | 0.006 | 1.8E-08 | Medici3 |
| TPO | rs2010099 | 3 | 124300257 | KALRN | C | T | 0.91 | 10 | 0.024 | 0.008 | 3.1E-08 | Medici3 |
| TPO | rs653178 | 12 | 112007756 | ATXN2[SH2B3] | C | T | 0.5 | 11 | 0.015 | 0.004 | 3.5E–10 | Schultheiss4 |
| TPO | rs9277555 | 6 | 33055605 | HLA-DPB1 | G | A | 0.74 | 15 | 0.02 | 0.005 | 3.9E–12 | Schultheiss4 |
| fT3/FT4 ratio | rs2235544 | 1 | 54375570 | DIO1 | C | A | 0.49 | 21 | 0.073 | 0.016 | 3.6E-13 | Panicker5 |

SNPs, single nucleotide polymorphisms; EA, effect allele; OA, other allele; EAF, EA frequency; BETA, change in standardized thyroid measure by allele; SE, standard error; Ref, reference.

**Supplementary Table 2. Mendelian randomization of thyroid function traits and lipid traits**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Items** | **Simple** |  | **Weighted** |  |  **Eagger-MR** |  |  **IVW** |  | **Intercept** |
|  | ***β*±SE** | ***P*** |  | ***β*±SE** | ***P*** |  | ***β*±SE** | ***P*** |  | ***β*±SE** | ***P*** |  | ***Beta (95%CI)*** |
| **FT4** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| HDL(mg/dL) | -0.001±0.032 | 0.965 |  | -0.002±0.030 | 0.940 |  | 0.025±0.060 | 0.684 |  | -0.013±0.024 | 0.597 |  | -0.003(-0.010,0.005) |
| LDL(mg/dL) | -0.089±0.040 | 0.026 |  | -0.051±0.034 | 0.138 |  | -0.048±0.109 | 0.668 |  | -0.060±0.044 | 0.174 |  | -0.001(-0.015,0.013) |
| TC(mg/dL) | -0.040±0.038 | 0.297 |  | -0.048±0.032 | 0.134 |  | -0.062±0.094 | 0.518 |  | -0.041±0.037 | 0.276 |  | 0.002(-0.010,0.013) |
| TG(mg/dL) | -0.001±0.032 | 0.966 |  | -0.001±0.026 | 0.982 |  | -0.025±0.086 | 0.771 |  | 0.009±0.035 | 0.801 |  | 0.002(-0.009,0.013) |
| **TSH** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| HDL(mg/dL) | -0.001±0.022 | 0.978 |  | 0.002±0.022 | 0.927 |  | -0.024±0.043 | 0.581 |  | -0.016±0.016 | 0.331 |  | 0.001(-0.005,0.006) |
| LDL(mg/dL) | 0.037±0.025 | 0.129 |  | 0.043±0.024 | 0.082 |  | 0.018±0.047 | 0.703 |  | 0.041±0.018 | 0.018 |  | 0.002(-0.004,0.008) |
| TC(mg/dL) | 0.044±0.026 | 0.085 |  | 0.049±0.024 | 0.041 |  | 0.039±0.044 | 0.384 |  | 0.051±0.017 | 0.002 |  | 0.001(-0.005,0.006) |
| TG(mg/dL) | 0.021±0.022 | 0.341 |  | 0.017±0.020 | 0.401 |  | -0.023±0.040 | 0.562 |  | 0.008±0.015 | 0.610 |  | 0.002(-0.003,0.007) |
| **TPOAb** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| HDL(mg/dL) | 0.135±0.175 | 0.947 |  | 0.143±0.164 | 0.476 |  | 3.385±1.025 | 0.107 |  | -0.310±0.423 | 0.342 |  | -0.018(-0.112,0.034) |
| LDL(mg/dL) | -0.065±0.245 | 0.790 |  | -0.047±0.223 | 0.835 |  | 2.859±0.627 | 0.020 |  | -0.448±0.359 | 0.212 |  | -0.066(-0.089,0.042) |
| TC(mg/dL) | -0.095±0.222 | 0.668 |  | -0.069±0.194 | 0.722 |  | 3.641±0.674 | 0.012 |  | -0.563±0.452 | 0.212 |  | -0.083(-0.109,0.057) |
| TG(mg/dL) | -0.085±0.186 | 0.648 |  | -0.126±0.153 | 0.413 |  | -1.533±0.594 | 0.082 |  |  0.035±0.194 | 0.855 |  |  0.031(0.008,0.054) |

TSH, thyrotropin; TPOAb, Thyroid peroxidase antibodies; TC, total cholesterol; TG, total triglyceride; HDL, high density lipoprotein; LDL, low density lipoprotein; IVW, inverse-variance weighted; SE, standard error.

**Supplementary Table 3. SNP thyroid function and SNP high density lipoprotein associations (per Effect Allele) of the instruments of thyroid function after data harmonization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Items** | **SNP** | **SNP- Thyroid Function** |  | **SNP-** **HDL** |
|  |  | **EA** | **OA** | **β+** | **SE** |  | **EA** | **OA** | **β** | **SE** |
| FT4 | rs10739496 | T | C | 0.078 | 0.007 |  | T | C | -0.006 | 0.004 |
| FT4 | rs10818937 | C | T | 0.039 | 0.006 |  | C | T | 0.000 | 0.004 |
| FT4 | rs10946313 | T | C | 0.044 | 0.006 |  | T | C | -0.002 | 0.005 |
| FT4 | rs12033572 | C | G | 0.115 | 0.017 |  | C | G | 0.019 | 0.013 |
| FT4 | rs12323871 | C | T | 0.047 | 0.008 |  | C | T | 0.005 | 0.007 |
| FT4 | rs17185536 | T | C | 0.071 | 0.008 |  | T | C | 0.000 | 0.006 |
| FT4 | rs2235544 | A | C | 0.139 | 0.007 |  | A | C | 0.000 | 0.005 |
| FT4 | rs225014 | T | C | 0.047 | 0.006 |  | T | C | -0.006 | 0.005 |
| FT4 | rs4149056 | C | T | 0.048 | 0.007 |  | C | T | 0.000 | 0.005 |
| FT4 | rs4954192 | C | T | 0.033 | 0.006 |  | C | T | -0.013 | 0.005 |
| FT4 | rs56069042 | A | G | 0.099 | 0.017 |  | A | G | 0.009 | 0.013 |
| FT4 | rs6785807 | G | A | 0.057 | 0.009 |  | G | A | 0.010 | 0.005 |
| FT4 | rs9356988 | G | A | 0.052 | 0.007 |  | G | A | 0.000 | 0.005 |
| FT4 | rs954878 | G | A | 0.058 | 0.007 |  | G | A | -0.006 | 0.005 |
| FT4 | rs978055 | A | T | 0.038 | 0.007 |  | A | T | 0.004 | 0.005 |
| TSH | rs1079418 | A | G | 0.101 | 0.007 |  | A | G | 0.003 | 0.005 |
| TSH | rs10814915 | T | C | 0.042 | 0.006 |  | T | C | 0.006 | 0.005 |
| TSH | rs10917469 | A | G | 0.111 | 0.009 |  | A | G | -0.003 | 0.007 |
| TSH | rs1119208 | T | C | 0.046 | 0.006 |  | T | C | 0.001 | 0.004 |
| TSH | rs11255790 | C | T | 0.041 | 0.007 |  | C | T | -0.003 | 0.005 |
| TSH | rs11639111 | T | C | 0.045 | 0.006 |  | T | C | 0.004 | 0.005 |
| TSH | rs11732089 | T | C | 0.115 | 0.008 |  | T | C | 0.000 | 0.006 |
| TSH | rs1203944 | C | T | 0.051 | 0.007 |  | C | T | 0.006 | 0.006 |
| TSH | rs13015993 | A | G | 0.082 | 0.007 |  | A | G | 0.000 | 0.005 |
| TSH | rs13329353 | T | C | 0.061 | 0.007 |  | T | C | -0.006 | 0.005 |
| TSH | rs1663070 | C | T | 0.046 | 0.007 |  | C | T | -0.007 | 0.006 |
| TSH | rs16856540 | C | T | 0.055 | 0.008 |  | C | T | -0.006 | 0.007 |
| TSH | rs17020122 | T | C | 0.104 | 0.011 |  | T | C | 0.007 | 0.008 |
| TSH | rs17477923 | T | C | 0.083 | 0.007 |  | T | C | 0.000 | 0.006 |
| TSH | rs17767491 | A | G | 0.088 | 0.007 |  | A | G | 0.002 | 0.005 |
| TSH | rs2254613 | G | T | 0.035 | 0.006 |  | G | T | -0.002 | 0.005 |
| TSH | rs30227 | C | T | 0.047 | 0.006 |  | C | T | -0.008 | 0.005 |
| TSH | rs334725 | A | G | 0.174 | 0.015 |  | A | G | -0.003 | 0.012 |
| TSH | rs398745 | C | A | 0.052 | 0.006 |  | C | A | -0.001 | 0.005 |
| TSH | rs4445669 | C | T | 0.040 | 0.006 |  | C | T | 0.003 | 0.005 |
| TSH | rs4933466 | A | G | 0.040 | 0.006 |  | A | G | 0.002 | 0.005 |
| TSH | rs6535624 | A | G | 0.042 | 0.006 |  | A | G | -0.003 | 0.005 |
| TSH | rs6724073 | T | C | 0.051 | 0.008 |  | T | C | -0.015 | 0.007 |
| TSH | rs744103 | A | T | 0.092 | 0.007 |  | A | T | -0.018 | 0.006 |
| TSH | rs7702192 | A | C | 0.070 | 0.006 |  | A | C | 0.001 | 0.005 |
| TSH | rs9298749 | C | A | 0.039 | 0.006 |  | C | A | 0.007 | 0.005 |
| TSH | rs9381266 | T | C | 0.073 | 0.007 |  | T | C | -0.003 | 0.006 |
| TSH | rs9497965 | T | C | 0.044 | 0.006 |  | T | C | 0.001 | 0.005 |
| TPOAb | rs11675434 | T | C | 0.020 | 0.005 |  | T | C | 0.003 | 0.005 |
| TPOAb | rs1230666 | A | G | 0.027 | 0.006 |  | A | G | 0.012 | 0.007 |
| TPOAb | rs2010099 | C | T | 0.024 | 0.008 |  | C | T | -0.003 | 0.008 |
| TPOAb | rs653178 | C | T | 0.015 | 0.004 |  | C | T | -0.026 | 0.004 |
| TPOAb | rs9277555 | G | A | 0.020 | 0.005 |  | G | A | 0.003 | 0.005 |
| FT3:FT4 ratio | rs2235544 | C | A | 0.073 | 0.016 |  | C | A | 0.000 | 0.005 |

SNP, single nucleotide polymorphism; HDL, high density lipoprotein; FT4, free thyroxine; FT3, free triiodothyronine; TSH, thyroid stimulating hormone; TPOAb, thyroid peroxidase antibody; EA, effect allele; OA, other allele; SE, standard error.

**Supplementary Table 4. SNP thyroid function and SNP low density lipoprotein associations (per Effect Allele) of the instruments of thyroid function after data harmonization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Items** | **SNP** | **SNP- Thyroid Function** |  | **SNP-** **LDL** |
|  |  | **EA** | **OA** | **β+** | **SE** |  | **EA** | **OA** | **β** | **SE** |
| FT4 | rs10739496 | T | C | 0.078 | 0.007 |  | T | C | 0.005 | 0.004 |
| FT4 | rs10818937 | C | T | 0.039 | 0.006 |  | C | T | 0.001 | 0.004 |
| FT4 | rs10946313 | T | C | 0.044 | 0.006 |  | T | C | -0.010 | 0.006 |
| FT4 | rs12033572 | C | G | 0.115 | 0.017 |  | C | G | 0.013 | 0.014 |
| FT4 | rs12323871 | C | T | 0.047 | 0.008 |  | C | T | -0.008 | 0.008 |
| FT4 | rs17185536 | T | C | 0.071 | 0.008 |  | T | C | -0.025 | 0.006 |
| FT4 | rs2235544 | A | C | 0.139 | 0.007 |  | A | C | -0.012 | 0.005 |
| FT4 | rs225014 | T | C | 0.047 | 0.006 |  | T | C | 0.002 | 0.006 |
| FT4 | rs4149056 | C | T | 0.048 | 0.007 |  | C | T | -0.008 | 0.005 |
| FT4 | rs4954192 | C | T | 0.033 | 0.006 |  | C | T | -0.021 | 0.005 |
| FT4 | rs56069042 | A | G | 0.099 | 0.017 |  | A | G | -0.028 | 0.013 |
| FT4 | rs6785807 | G | A | 0.057 | 0.009 |  | A | G | -0.028 | 0.013 |
| FT4 | rs9356988 | G | A | 0.052 | 0.007 |  | G | A | -0.009 | 0.005 |
| FT4 | rs954878 | G | A | 0.058 | 0.007 |  | G | A | 0.017 | 0.006 |
| FT4 | rs978055 | A | T | 0.038 | 0.007 |  | G | A | -0.001 | 0.005 |
| TSH | rs1079418 | A | G | 0.101 | 0.007 |  | A | G | 0.004 | 0.006 |
| TSH | rs10814915 | T | C | 0.042 | 0.006 |  | T | C | 0.003 | 0.005 |
| TSH | rs10917469 | A | G | 0.111 | 0.009 |  | A | G | 0.003 | 0.007 |
| TSH | rs1119208 | T | C | 0.046 | 0.006 |  | T | C | 0.006 | 0.004 |
| TSH | rs11255790 | C | T | 0.041 | 0.007 |  | C | T | 0.001 | 0.006 |
| TSH | rs11639111 | T | C | 0.045 | 0.006 |  | T | C | -0.007 | 0.005 |
| TSH | rs11732089 | T | C | 0.115 | 0.008 |  | T | C | 0.008 | 0.007 |
| TSH | rs1203944 | C | T | 0.051 | 0.007 |  | C | T | 0.013 | 0.006 |
| TSH | rs13015993 | A | G | 0.082 | 0.007 |  | A | G | 0.006 | 0.006 |
| TSH | rs13329353 | T | C | 0.061 | 0.007 |  | T | C | 0.019 | 0.006 |
| TSH | rs1663070 | C | T | 0.046 | 0.007 |  | C | T | 0.008 | 0.006 |
| TSH | rs16856540 | C | T | 0.055 | 0.008 |  | C | T | 0.007 | 0.007 |
| TSH | rs17020122 | T | C | 0.104 | 0.011 |  | T | C | 0.008 | 0.009 |
| TSH | rs17477923 | T | C | 0.083 | 0.007 |  | T | C | -0.008 | 0.006 |
| TSH | rs17767491 | A | G | 0.088 | 0.007 |  | A | G | 0.000 | 0.006 |
| TSH | rs2254613 | G | T | 0.035 | 0.006 |  | G | T | 0.004 | 0.005 |
| TSH | rs30227 | C | T | 0.047 | 0.006 |  | C | T | 0.001 | 0.006 |
| TSH | rs334725 | A | G | 0.174 | 0.015 |  | A | G | -0.014 | 0.013 |
| TSH | rs398745 | C | A | 0.052 | 0.006 |  | C | A | -0.004 | 0.005 |
| TSH | rs4445669 | C | T | 0.040 | 0.006 |  | C | T | 0.000 | 0.005 |
| TSH | rs4933466 | A | G | 0.040 | 0.006 |  | A | G | 0.004 | 0.006 |
| TSH | rs6535624 | A | G | 0.042 | 0.006 |  | A | G | 0.000 | 0.005 |
| TSH | rs6724073 | T | C | 0.051 | 0.008 |  | T | C | 0.002 | 0.007 |
| TSH | rs744103 | A | T | 0.092 | 0.007 |  | A | T | 0.011 | 0.006 |
| TSH | rs7702192 | A | C | 0.070 | 0.006 |  | A | C | -0.001 | 0.005 |
| TSH | rs9298749 | C | A | 0.039 | 0.006 |  | C | A | -0.001 | 0.005 |
| TSH | rs9381266 | T | C | 0.073 | 0.007 |  | T | C | 0.004 | 0.006 |
| TSH | rs9497965 | T | C | 0.044 | 0.006 |  | T | C | -0.003 | 0.005 |
| TPOAb | rs11675434 | T | C | 0.020 | 0.005 |  | T | C | -0.001 | 0.005 |
| TPOAb | rs1230666 | A | G | 0.027 | 0.006 |  | A | G | 0.013 | 0.008 |
| TPOAb | rs2010099 | C | T | 0.024 | 0.008 |  | C | T | 0.000 | 0.008 |
| TPOAb | rs653178 | C | T | 0.015 | 0.004 |  | C | T | -0.023 | 0.004 |
| TPOAb | rs9277555 | G | A | 0.020 | 0.005 |  | G | A | -0.014 | 0.006 |
| FT3:FT4 ratio | rs2235544 | C | A | 0.073 | 0.016 |  | C | A | 0.012 | 0.005 |

SNP, single nucleotide polymorphism; LDL, low density lipoprotein; FT4, free thyroxine; FT3, free triiodothyronine; TSH, thyroid stimulating hormone; TPOAb, thyroid peroxidase antibody; EA, effect allele; OA, other allele; SE, standard error.

**Supplementary Table 5. SNP thyroid function and SNP total cholesterol associations (per Effect Allele) of the instruments of thyroid function after data harmonization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Items** | **SNP** | **SNP- Thyroid Function** |  | **SNP-** **TC** |
|  |  | **EA** | **OA** | **β+** | **SE** |  | **EA** | **OA** | **β** | **SE** |
| FT4 | rs10739496 | T | C | 0.078 | 0.007 |  | T | C | 0.002 | 0.004 |
| FT4 | rs10818937 | C | T | 0.039 | 0.006 |  | C | T | -0.001 | 0.004 |
| FT4 | rs10946313 | T | C | 0.044 | 0.006 |  | T | C | -0.005 | 0.006 |
| FT4 | rs12033572 | C | G | 0.115 | 0.017 |  | C | G | 0.012 | 0.014 |
| FT4 | rs12323871 | C | T | 0.047 | 0.008 |  | C | T | -0.005 | 0.008 |
| FT4 | rs17185536 | T | C | 0.071 | 0.008 |  | T | C | -0.023 | 0.006 |
| FT4 | rs2235544 | A | C | 0.139 | 0.007 |  | A | C | -0.012 | 0.005 |
| FT4 | rs225014 | T | C | 0.047 | 0.006 |  | T | C | 0.005 | 0.005 |
| FT4 | rs4149056 | C | T | 0.048 | 0.007 |  | C | T | -0.002 | 0.005 |
| FT4 | rs4954192 | C | T | 0.033 | 0.006 |  | C | T | -0.019 | 0.005 |
| FT4 | rs56069042 | A | G | 0.099 | 0.017 |  | A | G | -0.004 | 0.013 |
| FT4 | rs6785807 | G | A | 0.057 | 0.009 |  | G | A | -0.004 | 0.005 |
| FT4 | rs9356988 | G | A | 0.052 | 0.007 |  | G | A | 0.017 | 0.006 |
| FT4 | rs954878 | G | A | 0.058 | 0.007 |  | G | A | -0.002 | 0.005 |
| FT4 | rs978055 | A | T | 0.038 | 0.007 |  | A | T | 0.007 | 0.005 |
| TSH | rs1079418 | A | G | 0.101 | 0.007 |  | A | G | 0.009 | 0.006 |
| TSH | rs10814915 | T | C | 0.042 | 0.006 |  | T | C | 0.002 | 0.005 |
| TSH | rs10917469 | A | G | 0.111 | 0.009 |  | A | G | -0.001 | 0.007 |
| TSH | rs1119208 | T | C | 0.046 | 0.006 |  | T | C | 0.008 | 0.004 |
| TSH | rs11255790 | C | T | 0.041 | 0.007 |  | C | T | -0.002 | 0.006 |
| TSH | rs11639111 | T | C | 0.045 | 0.006 |  | T | C | -0.005 | 0.005 |
| TSH | rs11732089 | T | C | 0.115 | 0.008 |  | T | C | 0.014 | 0.006 |
| TSH | rs1203944 | C | T | 0.051 | 0.007 |  | C | T | 0.012 | 0.006 |
| TSH | rs13015993 | A | G | 0.082 | 0.007 |  | A | G | 0.008 | 0.006 |
| TSH | rs13329353 | T | C | 0.061 | 0.007 |  | T | C | 0.016 | 0.006 |
| TSH | rs1663070 | C | T | 0.046 | 0.007 |  | C | T | 0.006 | 0.006 |
| TSH | rs16856540 | C | T | 0.055 | 0.008 |  | C | T | 0.002 | 0.007 |
| TSH | rs17020122 | T | C | 0.104 | 0.011 |  | T | C | 0.005 | 0.009 |
| TSH | rs17477923 | T | C | 0.083 | 0.007 |  | T | C | -0.008 | 0.006 |
| TSH | rs17767491 | A | G | 0.088 | 0.007 |  | A | G | -0.002 | 0.006 |
| TSH | rs2254613 | G | T | 0.035 | 0.006 |  | G | T | 0.003 | 0.005 |
| TSH | rs30227 | C | T | 0.047 | 0.006 |  | C | T | 0.004 | 0.005 |
| TSH | rs334725 | A | G | 0.174 | 0.015 |  | A | G | -0.005 | 0.012 |
| TSH | rs398745 | C | A | 0.052 | 0.006 |  | C | A | -0.004 | 0.005 |
| TSH | rs4445669 | C | T | 0.040 | 0.006 |  | C | T | 0.002 | 0.005 |
| TSH | rs4933466 | A | G | 0.040 | 0.006 |  | A | G | 0.004 | 0.005 |
| TSH | rs6535624 | A | G | 0.042 | 0.006 |  | A | G | 0.000 | 0.005 |
| TSH | rs6724073 | T | C | 0.051 | 0.008 |  | T | C | 0.001 | 0.007 |
| TSH | rs744103 | A | T | 0.092 | 0.007 |  | A | T | 0.010 | 0.006 |
| TSH | rs7702192 | A | C | 0.070 | 0.006 |  | A | C | 0.003 | 0.005 |
| TSH | rs9298749 | C | A | 0.039 | 0.006 |  | C | A | 0.003 | 0.005 |
| TSH | rs9381266 | T | C | 0.073 | 0.007 |  | T | C | 0.003 | 0.006 |
| TSH | rs9497965 | T | C | 0.044 | 0.006 |  | T | C | -0.003 | 0.005 |
| TPOAb | rs11675434 | T | C | 0.020 | 0.005 |  | T | C | -0.002 | 0.005 |
| TPOAb | rs1230666 | A | G | 0.027 | 0.006 |  | A | G | 0.010 | 0.008 |
| TPOAb | rs2010099 | C | T | 0.024 | 0.008 |  | C | T | 0.000 | 0.008 |
| TPOAb | rs653178 | C | T | 0.015 | 0.004 |  | C | T | -0.031 | 0.004 |
| TPOAb | rs9277555 | G | A | 0.020 | 0.005 |  | G | A | -0.010 | 0.006 |
| FT3:FT4 ratio | rs2235544 | C | A | 0.073 | 0.016 |  | C | A | 0.012 | 0.005 |

SNP, single nucleotide polymorphism; TC, total cholesterol; FT4, free thyroxine; FT3, free triiodothyronine; TSH, thyroid stimulating hormone; TPOAb, thyroid peroxidase antibody; EA, effect allele; OA, other allele; SE, standard error.

**Supplementary Table 6. SNP thyroid function and SNP total triglyceride associations (per Effect Allele) of the instruments of thyroid function after data harmonization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Items** | **SNP** | **SNP- Thyroid Function** |  | **SNP-** **TG** |
|  |  | **EA** | **OA** | **β+** | **SE** |  | **EA** | **OA** | **β** | **SE** |
| FT4 | rs10739496 | T | C | 0.078 | 0.007 |  | T | C | 0.004 | 0.004 |
| FT4 | rs10818937 | C | T | 0.039 | 0.006 |  | C | T | -0.002 | 0.004 |
| FT4 | rs10946313 | T | C | 0.044 | 0.006 |  | T | C | -0.003 | 0.005 |
| FT4 | rs12033572 | C | G | 0.115 | 0.017 |  | C | G | 0.006 | 0.012 |
| FT4 | rs12323871 | C | T | 0.047 | 0.008 |  | C | T | -0.013 | 0.007 |
| FT4 | rs17185536 | T | C | 0.071 | 0.008 |  | T | C | -0.006 | 0.006 |
| FT4 | rs2235544 | A | C | 0.139 | 0.007 |  | A | C | 0.000 | 0.005 |
| FT4 | rs225014 | T | C | 0.047 | 0.006 |  | T | C | 0.000 | 0.005 |
| FT4 | rs4149056 | C | T | 0.048 | 0.007 |  | C | T | 0.024 | 0.005 |
| FT4 | rs4954192 | C | T | 0.033 | 0.006 |  | C | T | 0.006 | 0.005 |
| FT4 | rs56069042 | A | G | 0.099 | 0.017 |  | A | G | -0.012 | 0.013 |
| FT4 | rs6785807 | G | A | 0.057 | 0.009 |  | G | A | -0.013 | 0.005 |
| FT4 | rs9356988 | G | A | 0.052 | 0.007 |  | G | A | 0.006 | 0.005 |
| FT4 | rs954878 | G | A | 0.058 | 0.007 |  | G | A | -0.001 | 0.005 |
| FT4 | rs978055 | A | T | 0.038 | 0.007 |  | A | T | 0.002 | 0.005 |
| TSH | rs1079418 | A | G | 0.101 | 0.007 |  | A | G | 0.003 | 0.005 |
| TSH | rs10814915 | T | C | 0.042 | 0.006 |  | T | C | 0.001 | 0.005 |
| TSH | rs10917469 | A | G | 0.111 | 0.009 |  | A | G | -0.005 | 0.007 |
| TSH | rs1119208 | T | C | 0.046 | 0.006 |  | T | C | 0.001 | 0.003 |
| TSH | rs11255790 | C | T | 0.041 | 0.007 |  | C | T | 0.003 | 0.005 |
| TSH | rs11639111 | T | C | 0.045 | 0.006 |  | T | C | 0.002 | 0.005 |
| TSH | rs11732089 | T | C | 0.115 | 0.008 |  | T | C | -0.003 | 0.006 |
| TSH | rs1203944 | C | T | 0.051 | 0.007 |  | C | T | 0.002 | 0.006 |
| TSH | rs13015993 | A | G | 0.082 | 0.007 |  | A | G | 0.004 | 0.005 |
| TSH | rs13329353 | T | C | 0.061 | 0.007 |  | T | C | 0.011 | 0.005 |
| TSH | rs1663070 | C | T | 0.046 | 0.007 |  | C | T | 0.006 | 0.006 |
| TSH | rs16856540 | C | T | 0.055 | 0.008 |  | C | T | -0.004 | 0.007 |
| TSH | rs17020122 | T | C | 0.104 | 0.011 |  | T | C | 0.004 | 0.008 |
| TSH | rs17477923 | T | C | 0.083 | 0.007 |  | T | C | -0.004 | 0.005 |
| TSH | rs17767491 | A | G | 0.088 | 0.007 |  | A | G | -0.010 | 0.005 |
| TSH | rs2254613 | G | T | 0.035 | 0.006 |  | G | T | 0.004 | 0.005 |
| TSH | rs30227 | C | T | 0.047 | 0.006 |  | C | T | 0.007 | 0.005 |
| TSH | rs334725 | A | G | 0.174 | 0.015 |  | A | G | 0.003 | 0.011 |
| TSH | rs398745 | C | A | 0.052 | 0.006 |  | C | A | -0.005 | 0.005 |
| TSH | rs4445669 | C | T | 0.040 | 0.006 |  | C | T | -0.002 | 0.005 |
| TSH | rs4933466 | A | G | 0.040 | 0.006 |  | A | G | -0.004 | 0.005 |
| TSH | rs6535624 | A | G | 0.042 | 0.006 |  | A | G | 0.001 | 0.005 |
| TSH | rs6724073 | T | C | 0.051 | 0.008 |  | T | C | -0.003 | 0.007 |
| TSH | rs744103 | A | T | 0.092 | 0.007 |  | A | T | 0.007 | 0.005 |
| TSH | rs7702192 | A | C | 0.070 | 0.006 |  | A | C | 0.000 | 0.005 |
| TSH | rs9298749 | C | A | 0.039 | 0.006 |  | C | A | -0.001 | 0.005 |
| TSH | rs9381266 | T | C | 0.073 | 0.007 |  | T | C | 0.002 | 0.006 |
| TSH | rs9497965 | T | C | 0.044 | 0.006 |  | T | C | 0.002 | 0.005 |
| TPOAb | rs11675434 | T | C | 0.020 | 0.005 |  | T | C | -0.006 | 0.005 |
| TPOAb | rs1230666 | A | G | 0.027 | 0.006 |  | A | G | -0.009 | 0.007 |
| TPOAb | rs2010099 | C | T | 0.024 | 0.008 |  | C | T | 0.002 | 0.007 |
| TPOAb | rs653178 | C | T | 0.015 | 0.004 |  | C | T | 0.010 | 0.003 |
| TPOAb | rs9277555 | G | A | 0.020 | 0.005 |  | G | A | -0.002 | 0.005 |
| FT3:FT4 ratio | rs2235544 | C | A | 0.073 | 0.016 |  | C | A | 0.000 | 0.005 |

SNP, single nucleotide polymorphism; TG, total triglyceride; FT4, free thyroxine; FT3, free triiodothyronine; TSH, thyroid stimulating hormone; TPOAb, thyroid peroxidase antibody; EA, effect allele; OA, other allele; SE, standard error.