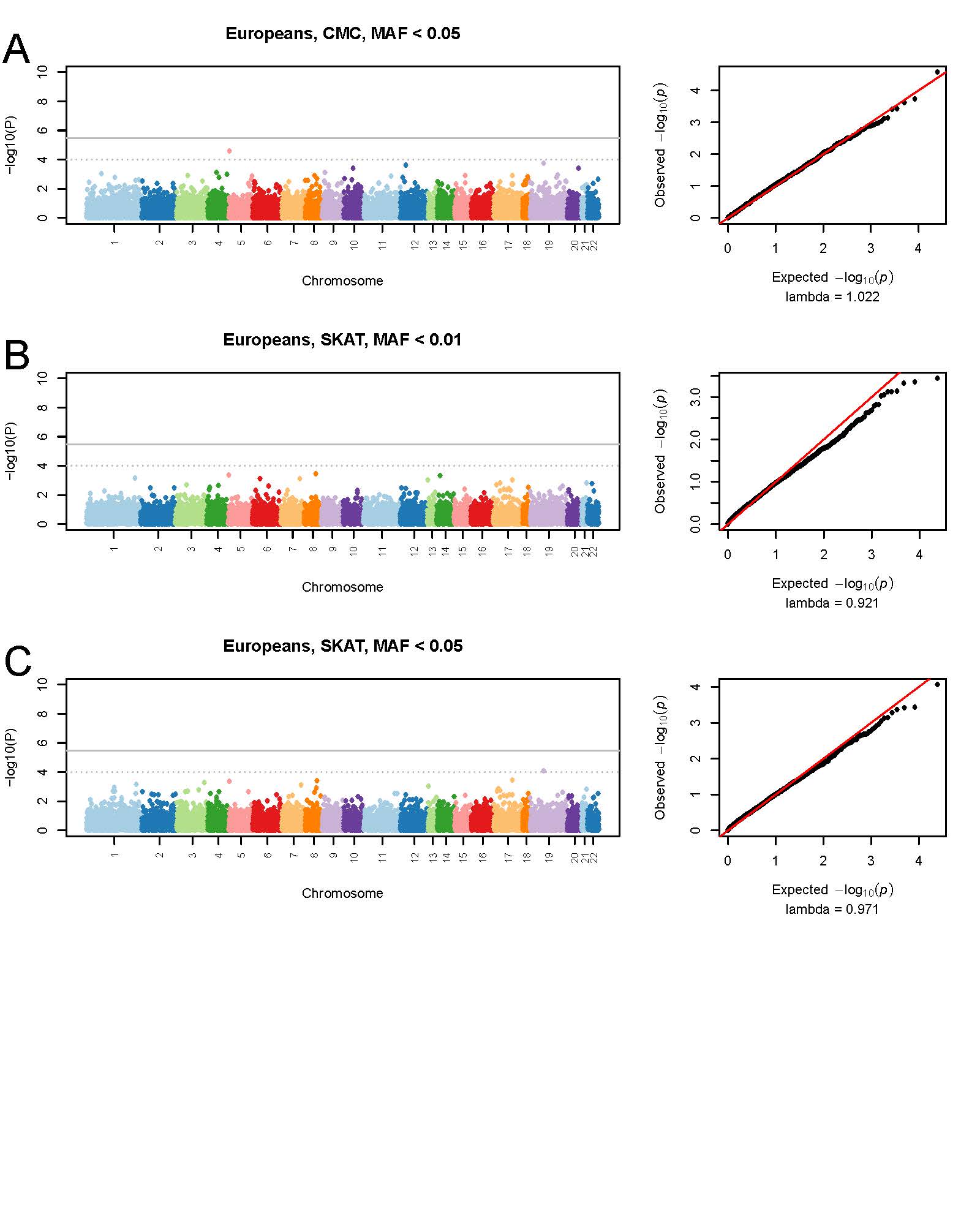
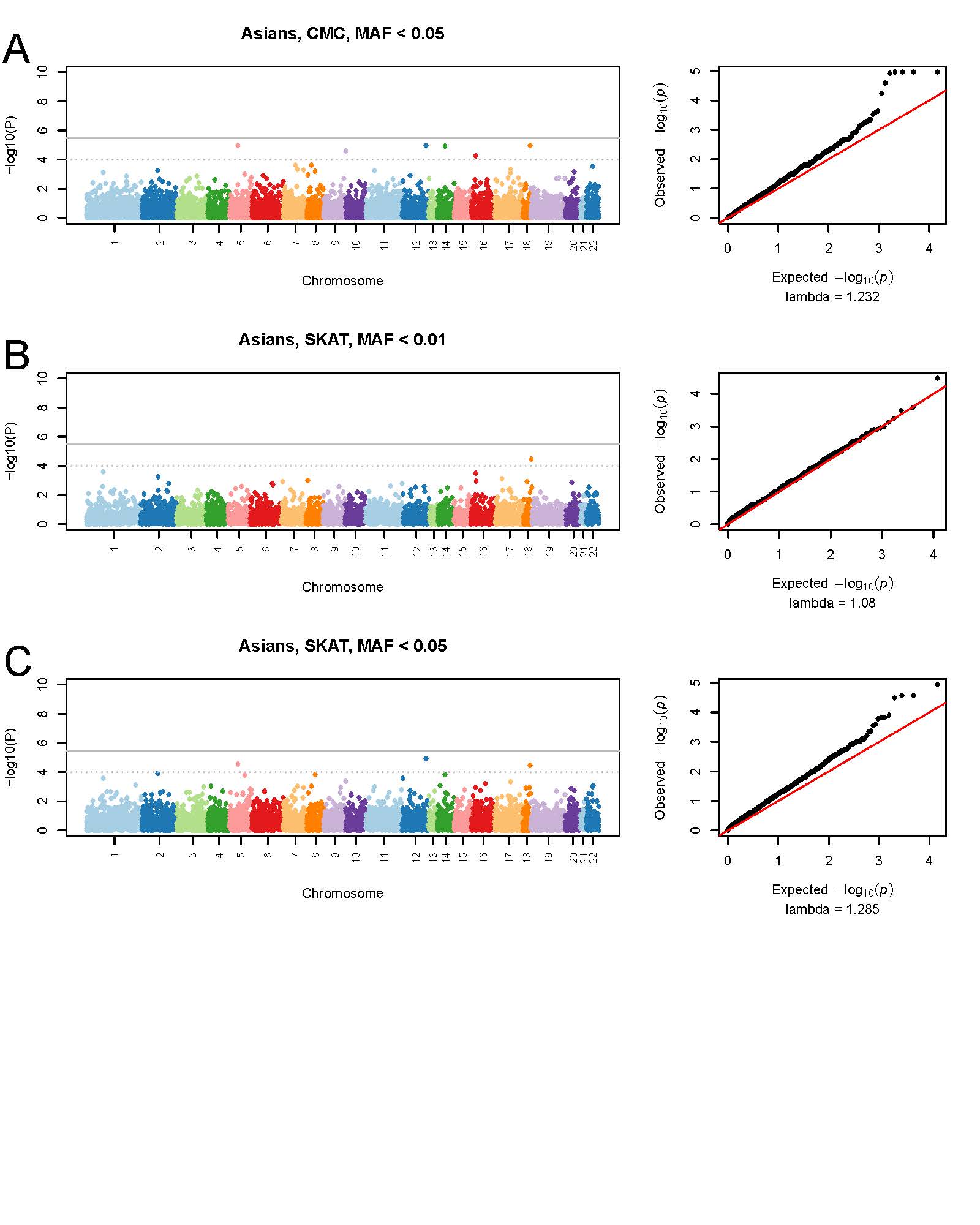


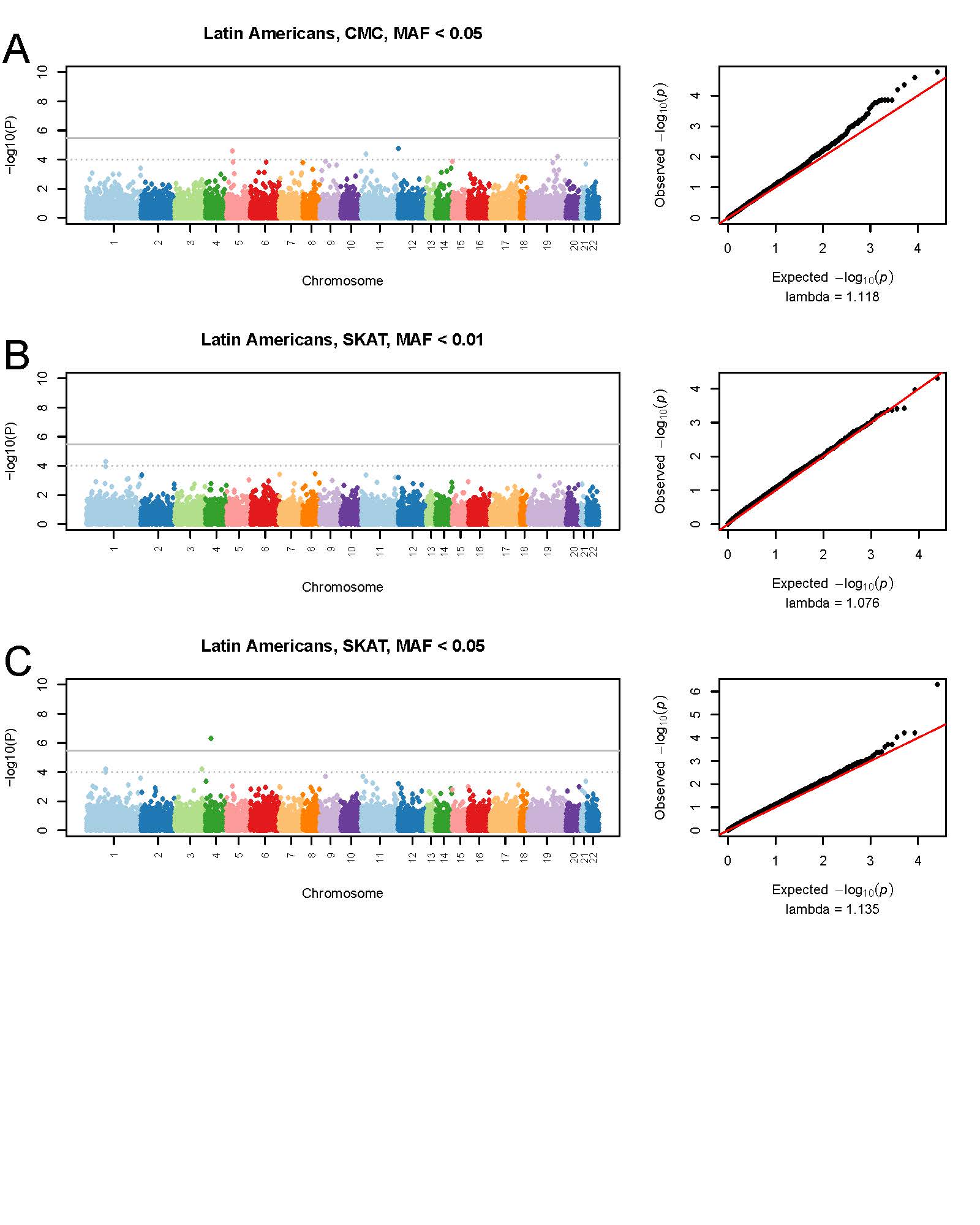
**Supplementary Figure 1. Association results for gene-based tests of low-frequency coding variants in all populations.** Manhattan plots and QQ plots are shown for the CMC test (A) and SKAT (B,C). The grey line shows Bonferroni-corrected genome-wide significance (i.e. p<3.4 x 10-6) and the dotted grey line shows the threshold for suggestive association (p<1.0 x 10-4).

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**Supplementary Figure 2. Association results for gene-based tests of low-frequency coding variants in Europeans.** Manhattan plots and QQ plots are shown for the CMC test (A) and SKAT (B,C). The grey line shows Bonferroni-corrected genome-wide significance (i.e. p<3.4 x 10-6) and the dotted grey line shows the threshold for suggestive association (p<1.0 x 10-4).



**Supplementary Figure 3. Association results for gene-based tests of low-frequency coding variants in Asians.** Manhattan plots and QQ plots are shown for the CMC test (A) and SKAT (B,C). The grey line shows Bonferroni-corrected genome-wide significance (i.e. p<3.4 x 10-6) and the dotted grey line shows the threshold for suggestive association (p<1.0 x 10-4).



**Supplementary Figure 4. Association results for gene-based tests of low-frequency coding variants in Latin Americans.** Manhattan plots and QQ plots are shown for the CMC test (A) and SKAT (B,C). The grey line shows Bonferroni-corrected genome-wide significance (i.e. p<3.4 x 10-6) and the dotted grey line shows the threshold for suggestive association (p<1.0 x 10-4).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Supplementary Table 1. Low Frequency Variants in Associated Genes** | | | | | |  |  |  |  |  |
| **GENE** | **CHR** | **BP** | **SNP** | **A1** | **A2** | **Cases** | | **Controls** | | **Population** |
| **MAF** | **N (Chrom.)** | **MAF** | **N (Chrom.)** |
| AHRR | 5 | 306807 | rs111451538 | A | G | 0 | 1152 | 0.001796 | 1670 | Europeans |
| AHRR | 5 | 432995 | rs200229746 | A | G | 0.000868 | 1152 | 0 | 1670 | Europeans |
| AHRR | 5 | 434146 | rs111768223 | T | C | 0.01302 | 1152 | 0.00479 | 1670 | Europeans |
| AHRR | 5 | 434219 | rs35756515 | T | C | 0.000868 | 1152 | 0 | 1670 | Europeans |
| AHRR | 5 | 434546 | rs61757546 | T | C | 0.009549 | 1152 | 0.001198 | 1670 | Europeans |
| AHRR | 5 | 434581 | rs200762873 | G | C | 0.003472 | 1152 | 0.000599 | 1670 | Europeans |
| ALDH5A1 | 6 | 24495234 | rs200793796 | G | T | 0.002757 | 3990 | 0.00369 | 3252 | All Populations |
| ALDH5A1 | 6 | 24505099 | rs118203982 | A | G | 0 | 3990 | 0.000308 | 3252 | All Populations |
| ALDH5A1 | 6 | 24505165 | rs113591366 | C | G | 0.002506 | 3990 | 0.00246 | 3252 | All Populations |
| ALDH5A1 | 6 | 24505196 | rs62621664 | T | G | 0.01228 | 3990 | 0.01384 | 3252 | All Populations |
| ALDH5A1 | 6 | 24515432 | rs145087265 | G | A | 0.000501 | 3990 | 0 | 3252 | All Populations |
| ALDH5A1 | 6 | 24515462 | rs201146454 | C | A | 0.000251 | 3990 | 0.000308 | 3252 | All Populations |
| ALDH5A1 | 6 | 24520644 | rs149482918 | A | G | 0.01203 | 3990 | 0.00492 | 3252 | All Populations |
| ALDH5A1 | 6 | 24520719 | rs115784602 | A | G | 0.002005 | 3990 | 0.005228 | 3252 | All Populations |
| ALDH5A1 | 6 | 24528249 | rs147358733 | A | G | 0 | 3990 | 0.001538 | 3252 | All Populations |
| ALDH5A1 | 6 | 24528262 | rs139719918 | G | C | 0.000251 | 3990 | 0.000308 | 3252 | All Populations |
| ALDH5A1 | 6 | 24528331 | rs149793005 | G | A | 0.000501 | 3990 | 0 | 3252 | All Populations |
| ALDH5A1 | 6 | 24532351 | rs144177566 | A | G | 0.000251 | 3990 | 0 | 3252 | All Populations |
| ALDH5A1 | 6 | 24533753 | rs142482046 | C | A | 0.000251 | 3990 | 0.000923 | 3252 | All Populations |
| ALDH5A1 | 6 | 24533806 | rs151294087 | A | G | 0.000251 | 3990 | 0.000308 | 3252 | All Populations |
| ALDH5A1 | 6 | 24534412 | rs140376278 | T | C | 0.000251 | 3990 | 0.000308 | 3252 | All Populations |
| ALDH5A1 | 6 | 24534705 | rs11558625 | A | G | 0.01278 | 3990 | 0.00615 | 3252 | All Populations |
| ALDH5A1 | 6 | 24534724 | rs115442722 | T | C | 0.007268 | 3990 | 0.008918 | 3252 | All Populations |
| ALDH5A1 | 6 | 24534754 | rs9461036 | T | G | 0.001754 | 3990 | 0.002153 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535161 | kgp26342350 | T | C | 0 | 3990 | 0.000308 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535226 | rs9467217 | G | A | 0.001754 | 3990 | 0.002153 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535234 | rs114422378 | T | C | 0.01053 | 3990 | 0.02306 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535235 | rs143074829 | A | G | 0 | 3990 | 0.000615 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535295 | rs138759652 | T | C | 0.000752 | 3990 | 0.000615 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535332 | rs116311769 | A | C | 0.002256 | 3990 | 0.001538 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535347 | rs73386199 | G | A | 0.005013 | 3990 | 0.003383 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535413 | rs75854500 | A | G | 0.001253 | 3990 | 0.00123 | 3252 | All Populations |
| ALDH5A1 | 6 | 24535502 | rs142687378 | T | G | 0.000251 | 3990 | 0 | 3252 | All Populations |
| ALDH5A1 | 6 | 24536159 | rs150916849 | C | T | 0.005514 | 3990 | 0.003383 | 3252 | All Populations |
| ALDH5A1 | 6 | 24536925 | rs114960321 | T | C | 0.006516 | 3990 | 0.004305 | 3252 | All Populations |
| SMIM21 | 18 | 73139434 | rs142533881 | A | G | 0.001362 | 734 | 0.02795 | 322 | Asians |
| SMIM21 | 18 | 73139497 | rs146783544 | G | C | 0 | 734 | 0.003106 | 322 | Asians |
| CCDC62 | 12 | 123286287 | rs75175797 | A | G | 0 | 734 | 0.003106 | 322 | Asians |
| CCDC62 | 12 | 123297902 | rs55716280 | T | C | 0.001362 | 734 | 0.03106 | 322 | Asians |
| CCDC77 | 12 | 520944 | rs117439611 | A | G | 0.000476 | 2100 | 0.004792 | 1252 | Latin Americans |
| CCDC77 | 12 | 521010 | rs141242862 | A | G | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| CCDC77 | 12 | 527682 | rs138940892 | G | A | 0.000476 | 2100 | 0 | 1252 | Latin Americans |
| CCDC77 | 12 | 527732 | rs112747420 | G | C | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| CCDC77 | 12 | 542393 | rs150836970 | T | A | 0.000476 | 2100 | 0.005591 | 1252 | Latin Americans |
| CCDC77 | 12 | 542402 | rs76228130 | C | G | 0.001905 | 2100 | 0.007987 | 1252 | Latin Americans |
| CCDC77 | 12 | 549792 | rs143445221 | A | G | 0.000952 | 2100 | 0.000799 | 1252 | Latin Americans |
| CCDC77 | 12 | 549793 | rs150919241 | G | A | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| CCDC77 | 12 | 549903 | rs114037221 | G | T | 0.001429 | 2100 | 0.007987 | 1252 | Latin Americans |
| CCDC77 | 12 | 550074 | rs149364540 | A | G | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| CDSN | 6 | 31084090 | rs150846158 | T | G | 0.006076 | 1152 | 0 | 1670 | Europeans |
| CDSN | 6 | 31084244 | rs193021253 | T | C | 0.001736 | 1152 | 0 | 1670 | Europeans |
| CDSN | 6 | 31084936 | rs144038841 | C | G | 0.000868 | 1152 | 0 | 1670 | Europeans |
| CDSN | 6 | 31085136 | rs75843924 | T | C | 0.000868 | 1152 | 0 | 1670 | Europeans |
| CDSN | 6 | 31085286 | rs144847588 | T | C | 0.001736 | 1152 | 0 | 1670 | Europeans |
| DOPEY1 | 6 | 83831730 | rs76960445 | T | C | 0.000476 | 2100 | 0.004792 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83835312 | rs144970641 | A | T | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83838684 | rs61543280 | T | A | 0.000952 | 2100 | 0.003195 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83838852 | rs147987838 | A | G | 0.002381 | 2100 | 0.002396 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83841928 | rs148719618 | T | G | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83847326 | rs41271565 | G | C | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83847590 | rs147812480 | C | T | 0 | 2100 | 0.000799 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83847699 | rs149855399 | G | C | 0 | 2100 | 0.001597 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83848215 | rs139555117 | C | T | 0 | 2100 | 0.000799 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83848222 | rs150951069 | A | G | 0 | 2100 | 0.001597 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83848454 | rs140671585 | G | A | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| DOPEY1 | 6 | 83851743 | rs115360882 | G | A | 0.002857 | 2100 | 0.009585 | 1252 | Latin Americans |
| DSC1 | 18 | 28711594 | rs146414667 | A | G | 0 | 3990 | 0.000308 | 3252 | All Populations |
| DSC1 | 18 | 28712532 | rs60591390 | A | G | 0.001253 | 3990 | 0.001538 | 3252 | All Populations |
| DSC1 | 18 | 28712551 | rs147041330 | G | C | 0.000752 | 3990 | 0.000615 | 3252 | All Populations |
| DSC1 | 18 | 28713955 | rs116112762 | C | T | 0.000251 | 3990 | 0 | 3252 | All Populations |
| DSC1 | 18 | 28713994 | rs28620831 | G | A | 0.02782 | 3990 | 0.04028 | 3252 | All Populations |
| DSC1 | 18 | 28714687 | rs200047736 | C | G | 0.000251 | 3990 | 0 | 3252 | All Populations |
| DSC1 | 18 | 28719812 | rs115338830 | G | T | 0.000251 | 3990 | 0.000308 | 3252 | All Populations |
| DSC1 | 18 | 28720032 | rs144984328 | A | G | 0.000251 | 3990 | 0.000308 | 3252 | All Populations |
| DSC1 | 18 | 28734765 | rs115175435 | G | A | 0.001253 | 3990 | 0.001845 | 3252 | All Populations |
| DSC1 | 18 | 28737407 | rs35338395 | A | G | 0.02732 | 3990 | 0.04766 | 3252 | All Populations |
| EHMT1 | 9 | 140638534 | rs11137198 | A | G | 0.001362 | 734 | 0.003106 | 322 | Asians |
| EHMT1 | 9 | 140648742 | rs45450992 | T | C | 0.004087 | 734 | 0.01863 | 322 | Asians |
| FLYWCH1 | 16 | 2988194 | rs199847169 | A | G | 0 | 734 | 0.009317 | 322 | Asians |
| FLYWCH1 | 16 | 2990062 | rs200567618 | T | A | 0 | 734 | 0.01242 | 322 | Asians |
| GTPBP3 | 19 | 17449524 | rs141865220 | T | C | 0 | 1152 | 0.000599 | 1670 | Europeans |
| GTPBP3 | 19 | 17451883 | rs138116759 | T | G | 0 | 1152 | 0.000599 | 1670 | Europeans |
| GTPBP3 | 19 | 17451962 | rs144775733 | T | C | 0 | 1152 | 0.000599 | 1670 | Europeans |
| GTPBP3 | 19 | 17451981 | rs3745193 | A | G | 0.05469 | 1152 | 0.02575 | 1670 | Europeans |
| HEATR8 | 1 | 55118790 | rs150191046 | G | C | 0.001429 | 2100 | 0.001597 | 1252 | Latin Americans |
| HEATR8 | 1 | 55119467 | rs12094920 | A | G | 0.001905 | 2100 | 0.01358 | 1252 | Latin Americans |
| HEATR8 | 1 | 55119546 | rs1655518 | A | G | 0.01762 | 2100 | 0.02077 | 1252 | Latin Americans |
| HEATR8 | 1 | 55119654 | rs12074499 | T | C | 0.004286 | 2100 | 0.01677 | 1252 | Latin Americans |
| HEATR8 | 1 | 55119702 | rs189525766 | C | T | 0.003333 | 2100 | 0.002396 | 1252 | Latin Americans |
| HEATR8 | 1 | 55134536 | rs74071881 | T | G | 0 | 2100 | 0.000799 | 1252 | Latin Americans |
| HEATR8 | 1 | 55134585 | rs2304314 | G | A | 0.02857 | 2100 | 0.02556 | 1252 | Latin Americans |
| HEATR8 | 1 | 55136188 | rs139403235 | T | C | 0.001429 | 2100 | 0.000799 | 1252 | Latin Americans |
| HEATR8 | 1 | 55139413 | rs200552161 | T | C | 0 | 2100 | 0.002396 | 1252 | Latin Americans |
| HEATR8 | 1 | 55139471 | rs138838053 | T | C | 0 | 2100 | 0.003195 | 1252 | Latin Americans |
| HEATR8 | 1 | 55144466 | rs75269200 | G | A | 0.006667 | 2100 | 0.02077 | 1252 | Latin Americans |
| HEATR8 | 1 | 55144525 | rs186975837 | A | G | 0.000952 | 2100 | 0.000799 | 1252 | Latin Americans |
| HEATR8 | 1 | 55145619 | rs148550771 | A | G | 0.000476 | 2100 | 0 | 1252 | Latin Americans |
| HEATR8 | 1 | 55151961 | rs201626732 | A | G | 0.000476 | 2100 | 0 | 1252 | Latin Americans |
| HEATR8 | 1 | 55151994 | rs201167904 | C | T | 0.000952 | 2100 | 0 | 1252 | Latin Americans |
| HEATR8 | 1 | 55166015 | rs139827199 | T | C | 0.000476 | 2100 | 0 | 1252 | Latin Americans |
| HEATR8 | 1 | 55166016 | rs145665162 | A | G | 0.001429 | 2100 | 0.000799 | 1252 | Latin Americans |
| HEATR8 | 1 | 55166079 | rs201020637 | C | T | 0.003333 | 2100 | 0.002396 | 1252 | Latin Americans |
| HEATR8 | 1 | 55167782 | rs181655955 | T | C | 0.001429 | 2100 | 0 | 1252 | Latin Americans |
| HEATR8 | 1 | 55168298 | rs3765018 | A | G | 0.0119 | 2100 | 0.008786 | 1252 | Latin Americans |
| HEATR8 | 1 | 55168357 | rs201261795 | T | C | 0.000952 | 2100 | 0.001597 | 1252 | Latin Americans |
| HEATR8 | 1 | 55168366 | rs201876492 | A | G | 0.000476 | 2100 | 0 | 1252 | Latin Americans |
| HEATR8 | 1 | 55172129 | rs11807983 | A | G | 0.008095 | 2100 | 0.007188 | 1252 | Latin Americans |
| HEATR8 | 1 | 55172201 | rs200035527 | G | A | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| HEATR8 | 1 | 55174748 | rs145464693 | A | T | 0.001905 | 2100 | 0.000799 | 1252 | Latin Americans |
| HEATR8 | 1 | 55175664 | rs149350120 | G | A | 0.002381 | 2100 | 0.00639 | 1252 | Latin Americans |
| HEATR8 | 1 | 55175775 | rs187438824 | C | G | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| HEATR8 | 1 | 55175807 | rs201511804 | T | C | 0.000952 | 2100 | 0 | 1252 | Latin Americans |
| KIAA0586 | 14 | 58896083 | rs147119902 | A | T | 0.009537 | 734 | 0.04348 | 322 | Asians |
| KIAA0586 | 14 | 58909435 | rs61735931 | C | T | 0.001362 | 734 | 0.003106 | 322 | Asians |
| KIAA0586 | 14 | 58920178 | rs147844088 | A | G | 0.001362 | 734 | 0.003106 | 322 | Asians |
| KIAA0586 | 14 | 58941425 | rs139493302 | T | C | 0.008174 | 734 | 0.03727 | 322 | Asians |
| KIAA0586 | 14 | 58949390 | rs77860620 | A | G | 0.002725 | 734 | 0.003106 | 322 | Asians |
| KIAA0586 | 14 | 58953746 | rs1617510 | C | G | 0 | 734 | 0.003106 | 322 | Asians |
| KIAA0586 | 14 | 58953863 | rs140565291 | C | A | 0 | 734 | 0.01242 | 322 | Asians |
| KIAA0586 | 14 | 58955530 | rs190271845 | C | T | 0.00545 | 734 | 0.003106 | 322 | Asians |
| KIAA0586 | 14 | 59014522 | rs140026883 | A | G | 0 | 734 | 0.003106 | 322 | Asians |
| N4BP2 | 4 | 40103817 | rs61748746 | A | G | 0.04524 | 2100 | 0.01518 | 1252 | Latin Americans |
| N4BP2 | 4 | 40104051 | rs10014170 | G | A | 0.0119 | 2100 | 0.01358 | 1252 | Latin Americans |
| N4BP2 | 4 | 40104294 | rs76438214 | C | G | 0.001905 | 2100 | 0.001597 | 1252 | Latin Americans |
| N4BP2 | 4 | 40104739 | rs62621880 | A | C | 0.000952 | 2100 | 0.001597 | 1252 | Latin Americans |
| N4BP2 | 4 | 40119617 | rs140402064 | T | C | 0.002381 | 2100 | 0.000799 | 1252 | Latin Americans |
| N4BP2 | 4 | 40121635 | rs142968103 | T | A | 0.02714 | 2100 | 0.04393 | 1252 | Latin Americans |
| N4BP2 | 4 | 40122313 | rs61748748 | T | A | 0.01429 | 2100 | 0.01518 | 1252 | Latin Americans |
| N4BP2 | 4 | 40122377 | rs78767806 | A | G | 0.00619 | 2100 | 0.01438 | 1252 | Latin Americans |
| N4BP2 | 4 | 40122453 | rs78417585 | T | C | 0.00381 | 2100 | 0.009585 | 1252 | Latin Americans |
| N4BP2 | 4 | 40122511 | rs150758210 | C | A | 0.004286 | 2100 | 0.000799 | 1252 | Latin Americans |
| N4BP2 | 4 | 40122771 | rs146409608 | C | T | 0.002381 | 2100 | 0 | 1252 | Latin Americans |
| N4BP2 | 4 | 40123399 | rs80192073 | T | G | 0.001429 | 2100 | 0.00639 | 1252 | Latin Americans |
| N4BP2 | 4 | 40123790 | rs61748749 | G | T | 0.04524 | 2100 | 0.01518 | 1252 | Latin Americans |
| N4BP2 | 4 | 40146415 | rs139228666 | G | C | 0.001905 | 2100 | 0.000799 | 1252 | Latin Americans |
| NLN | 5 | 65054587 | rs34339013 | A | G | 0.008095 | 2100 | 0.01278 | 1252 | Latin Americans |
| NLN | 5 | 65073287 | rs199806654 | T | G | 0 | 2100 | 0.000799 | 1252 | Latin Americans |
| NLN | 5 | 65081722 | rs151303282 | A | G | 0.000476 | 2100 | 0.003994 | 1252 | Latin Americans |
| NLN | 5 | 65084101 | rs6863012 | G | A | 0.02333 | 2100 | 0.03435 | 1252 | Latin Americans |
| NLN | 5 | 65118738 | rs6860508 | T | C | 0.03238 | 2100 | 0.05671 | 1252 | Latin Americans |
| OR2T6 | 1 | 248550916 | rs60632569 | A | G | 0.000952 | 2100 | 0.00639 | 1252 | Latin Americans |
| OR2T6 | 1 | 248550977 | rs114783918 | T | G | 0.001905 | 2100 | 0.005591 | 1252 | Latin Americans |
| OR2T6 | 1 | 248551009 | rs41308164 | A | G | 0.002857 | 2100 | 0.009585 | 1252 | Latin Americans |
| OR2T6 | 1 | 248551174 | rs61736246 | A | G | 0.000952 | 2100 | 0.00639 | 1252 | Latin Americans |
| OR2T6 | 1 | 248551195 | rs116441189 | A | G | 0.001905 | 2100 | 0.000799 | 1252 | Latin Americans |
| OR2T6 | 1 | 248551324 | rs140972140 | T | C | 0.000952 | 2100 | 0.004792 | 1252 | Latin Americans |
| OR2T6 | 1 | 248551346 | rs149801091 | T | C | 0.001429 | 2100 | 0.000799 | 1252 | Latin Americans |
| OR2T6 | 1 | 248551598 | rs61736247 | T | C | 0.000952 | 2100 | 0.002396 | 1252 | Latin Americans |
| OR2T6 | 1 | 248551727 | rs56967655 | A | T | 0.000952 | 2100 | 0.00639 | 1252 | Latin Americans |
| OR52E4 | 11 | 5905557 | rs140748846 | A | C | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| OR52E4 | 11 | 5905639 | rs150480805 | G | T | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| OR52E4 | 11 | 5905669 | rs16914094 | G | T | 0.001429 | 2100 | 0.009585 | 1252 | Latin Americans |
| OR52E4 | 11 | 5906117 | rs61876191 | G | A | 0 | 2100 | 0.002396 | 1252 | Latin Americans |
| OR52E4 | 11 | 5906193 | rs137865578 | A | G | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| POLD1 | 19 | 50902164 | rs3218773 | A | G | 0.008095 | 2100 | 0.01278 | 1252 | Latin Americans |
| POLD1 | 19 | 50902188 | rs150066950 | T | A | 0.000952 | 2100 | 0.001597 | 1252 | Latin Americans |
| POLD1 | 19 | 50902196 | rs3218772 | T | C | 0.002857 | 2100 | 0.003195 | 1252 | Latin Americans |
| POLD1 | 19 | 50902633 | rs147911699 | T | G | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| POLD1 | 19 | 50905151 | rs137953986 | A | G | 0 | 2100 | 0.001597 | 1252 | Latin Americans |
| POLD1 | 19 | 50905173 | rs41563714 | T | C | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| POLD1 | 19 | 50905310 | rs1726803 | A | G | 0.01095 | 2100 | 0.01518 | 1252 | Latin Americans |
| POLD1 | 19 | 50905725 | rs76131127 | T | C | 0.000952 | 2100 | 0.002396 | 1252 | Latin Americans |
| POLD1 | 19 | 50905730 | rs8105725 | G | A | 0.000476 | 2100 | 0.001597 | 1252 | Latin Americans |
| POLD1 | 19 | 50905877 | rs113282414 | T | G | 0.002857 | 2100 | 0.005591 | 1252 | Latin Americans |
| POLD1 | 19 | 50905911 | rs199545019 | A | G | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| POLD1 | 19 | 50912126 | rs1726790 | A | G | 0.01238 | 2100 | 0.01837 | 1252 | Latin Americans |
| POLD1 | 19 | 50916772 | rs1274607 | C | T | 0.03238 | 2100 | 0.05431 | 1252 | Latin Americans |
| POLD1 | 19 | 50918229 | rs3218775 | A | G | 0.01 | 2100 | 0.01278 | 1252 | Latin Americans |
| PRTG | 15 | 55912325 | rs184951996 | C | T | 0 | 3990 | 0.000308 | 3252 | All Populations |
| PRTG | 15 | 55912380 | rs202082038 | C | G | 0.001003 | 3990 | 0 | 3252 | All Populations |
| PRTG | 15 | 55912391 | rs79244725 | A | G | 0.000501 | 3990 | 0.000615 | 3252 | All Populations |
| PRTG | 15 | 55916656 | rs141129581 | A | G | 0.000752 | 3990 | 0.000615 | 3252 | All Populations |
| PRTG | 15 | 55916703 | rs148011047 | G | T | 0.002256 | 3990 | 0.000615 | 3252 | All Populations |
| PRTG | 15 | 55921043 | rs77440317 | T | C | 0.001504 | 3990 | 0.001538 | 3252 | All Populations |
| PRTG | 15 | 55921152 | exm2223537 | C | T | 0 | 3990 | 0.000308 | 3252 | All Populations |
| PRTG | 15 | 55929515 | rs10518816 | G | C | 0.007268 | 3990 | 0.00492 | 3252 | All Populations |
| PRTG | 15 | 55931949 | rs200168393 | G | A | 0.000251 | 3990 | 0.000308 | 3252 | All Populations |
| PRTG | 15 | 55933382 | rs140497034 | A | C | 0.005764 | 3990 | 0.00246 | 3252 | All Populations |
| PRTG | 15 | 55964644 | rs199658038 | C | T | 0.000501 | 3990 | 0 | 3252 | All Populations |
| PRTG | 15 | 55964778 | rs149494002 | G | C | 0.005514 | 3990 | 0.004305 | 3252 | All Populations |
| PRTG | 15 | 55965738 | rs200069819 | A | C | 0.001253 | 3990 | 0.000615 | 3252 | All Populations |
| PRTG | 15 | 55972815 | rs201799023 | C | T | 0.000251 | 3990 | 0 | 3252 | All Populations |
| PRTG | 15 | 55976015 | rs151321413 | C | T | 0.001504 | 3990 | 0.000308 | 3252 | All Populations |
| PRTG | 15 | 55976057 | rs116205356 | C | T | 0.001754 | 3990 | 0.000615 | 3252 | All Populations |
| PRTG | 15 | 56032665 | rs185716584 | G | C | 0.005263 | 3990 | 0.00369 | 3252 | All Populations |
| PRTG | 15 | 56032840 | rs190129010 | C | T | 0.000752 | 3990 | 0 | 3252 | All Populations |
| RAD23A | 19 | 13059006 | rs73505386 | C | G | 0 | 2100 | 0.002396 | 1252 | Latin Americans |
| RAD23A | 19 | 13059148 | rs148187629 | A | C | 0.000476 | 2100 | 0 | 1252 | Latin Americans |
| RAD23A | 19 | 13059563 | rs4987203 | A | G | 0.001905 | 2100 | 0.007987 | 1252 | Latin Americans |
| RAD23A | 19 | 13059626 | rs4987202 | T | C | 0.001429 | 2100 | 0.007188 | 1252 | Latin Americans |
| RNU5D | 5 | 80628399 | rs144410754 | C | T | 0 | 734 | 0.003106 | 322 | Asians |
| RNU5D | 5 | 80641789 | rs34607174 | T | C | 0.001362 | 734 | 0.006211 | 322 | Asians |
| THOC6 | 16 | 3076274 | rs116125644 | A | G | 0 | 734 | 0.009317 | 322 | Asians |
| THOC6 | 16 | 3077030 | rs116675970 | C | A | 0 | 734 | 0.006211 | 322 | Asians |
| THOC6 | 16 | 3077388 | rs149696424 | T | C | 0 | 734 | 0.006211 | 322 | Asians |
| YEATS2 | 3 | 183432967 | rs138709666 | A | G | 0.01286 | 2100 | 0.01198 | 1252 | Latin Americans |
| YEATS2 | 3 | 183442219 | rs16858033 | G | A | 0.03286 | 2100 | 0.05351 | 1252 | Latin Americans |
| YEATS2 | 3 | 183442258 | rs200719432 | T | C | 0.000952 | 2100 | 0 | 1252 | Latin Americans |
| YEATS2 | 3 | 183469912 | rs142872171 | T | C | 0 | 2100 | 0.001597 | 1252 | Latin Americans |
| YEATS2 | 3 | 183474410 | rs199904072 | G | T | 0.000476 | 2100 | 0.000799 | 1252 | Latin Americans |
| YEATS2 | 3 | 183474412 | rs35139586 | G | A | 0.000476 | 2100 | 0.002396 | 1252 | Latin Americans |
| YEATS2 | 3 | 183476697 | rs151134207 | G | A | 0.001429 | 2100 | 0.000799 | 1252 | Latin Americans |
| YEATS2 | 3 | 183476698 | rs34759333 | A | C | 0.00619 | 2100 | 0.001597 | 1252 | Latin Americans |
| YEATS2 | 3 | 183490222 | rs116616592 | T | G | 0.001429 | 2100 | 0.001597 | 1252 | Latin Americans |
| YEATS2 | 3 | 183491429 | rs201274382 | G | A | 0.000952 | 2100 | 0 | 1252 | Latin Americans |
| YEATS2 | 3 | 183508590 | rs79808533 | G | A | 0.01905 | 2100 | 0.03994 | 1252 | Latin Americans |
| YEATS2 | 3 | 183508669 | rs188928313 | A | G | 0.000952 | 2100 | 0 | 1252 | Latin Americans |
| YEATS2 | 3 | 183508714 | rs74496163 | A | G | 0.01524 | 2100 | 0.03754 | 1252 | Latin Americans |
| YEATS2 | 3 | 183516747 | rs201941589 | T | C | 0.003333 | 2100 | 0.008786 | 1252 | Latin Americans |
| YEATS2 | 3 | 183524803 | rs190474641 | A | G | 0.001429 | 2100 | 0.000799 | 1252 | Latin Americans |

|  |
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| **Supplemental Table 2. Control input genes for functional annotation enrichment analysis** |
| *ARHGAP29* |
| *BCOR* |
| *BMP4* |
| *CDH1* |
| *CHD7* |
| *CHRNG* |
| *COL2A1* |
| *COL8A1* |
| *CRISPLD2* |
| *DHODH* |
| *EPHA3* |
| *FGFR1* |
| *FGFR2* |
| *FLNA* |
| *FOXE1* |
| *GLI2* |
| *GLI3* |
| *GRHL3* |
| *IRF6* |
| *KDM6A* |
| *MAFB* |
| *MID1* |
| *MSX1* |
| *MTHFR* |
| *MYC* |
| *NIPBL* |
| *NOG* |
| *NTN1* |
| *OFD1* |
| *PAX7* |
| *PHF8* |
| *PTCH1* |
| *PVRL1* |
| *RIPK4* |
| *SATB2* |
| *SHH* |
| *SIX3* |
| *SOX9* |
| *SPRY2* |
| *TBX1* |
| *TBX22* |
| *TCOF1* |
| *TFAP2A* |
| *TGFA* |
| *TGFBR1* |
| *TGIF* |
| *TP63* |
| *TPM1* |
| *TWIST1* |
| *VAX1* |
| *WNT3* |