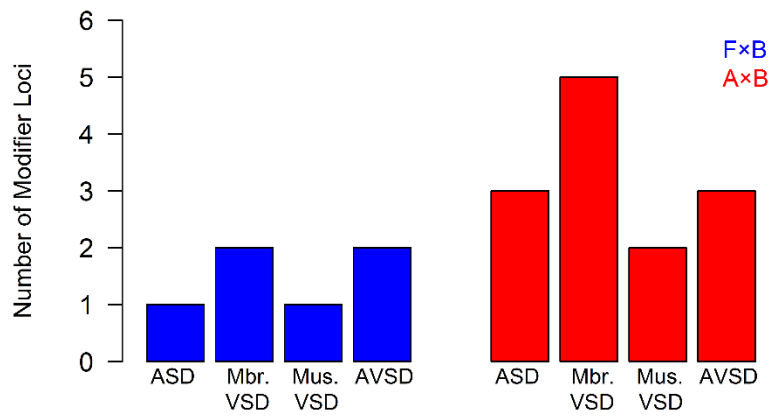
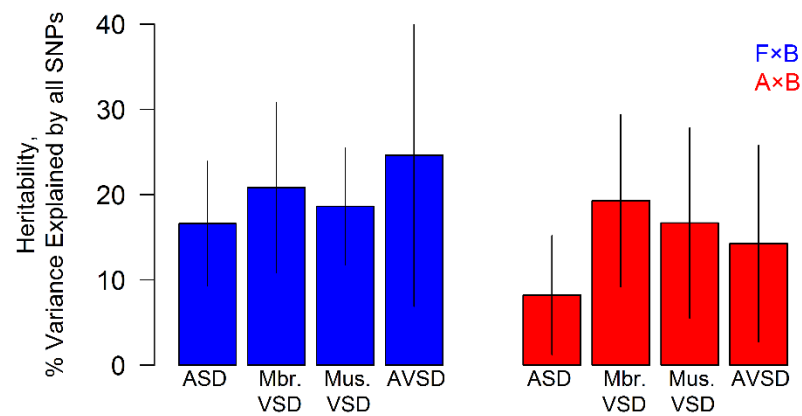


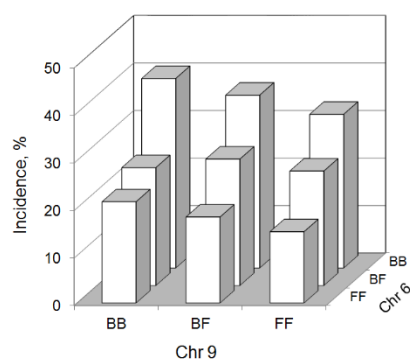
Supplementary Figure S1. Breeding scheme for inbred strain intercrosses. We produced F₁ hybrids by crossing wild-type FVB/N (F) or A/J (A) females to *Nkx2-5^{+/-}* C57BL/6N (B) males. We phenotyped newborn *Nkx2-5^{+/-}* F₂ pups from both A×B and F×B intercrosses and F₁₀ and F₁₄ pups from the F×B advanced intercross. The advanced intercross was produced by random mating of non-siblings and non-first cousins beginning in the F₃ and F₄ generations. The number of *Nkx2-5^{+/-}* pups phenotyped in each generation is shown.

a**b**

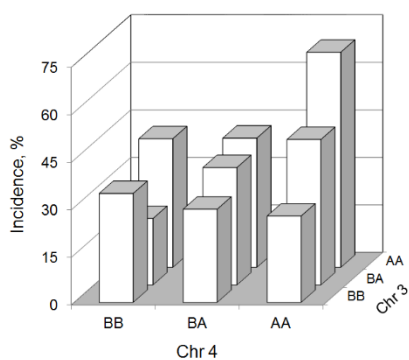
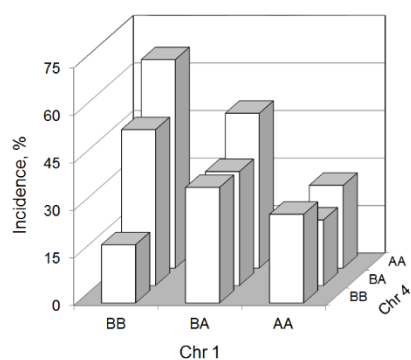
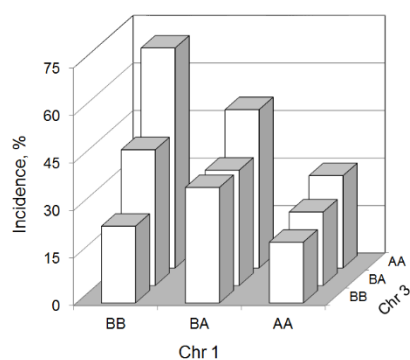
Supplementary Figure S2. Neither **a**, the number of significant and suggestive loci detected nor **b**, the heritability explained by all genotyped SNPs varies with the severity of a defect. Error bars are 95% C.I.

Supplementary Figure S3. The observed incidences at two-locus genotypes of ASD, membranous and muscular VSD, and AVSD are shown between every pair of suggestive or genome-wide significant modifier loci found in both crosses. In the two cases where there is only one suggestive locus, the locus is plotted against the next most significant locus in the cross.

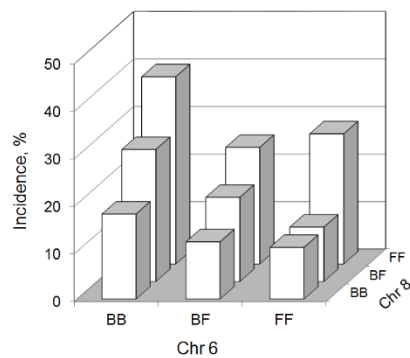
ASD: FxB



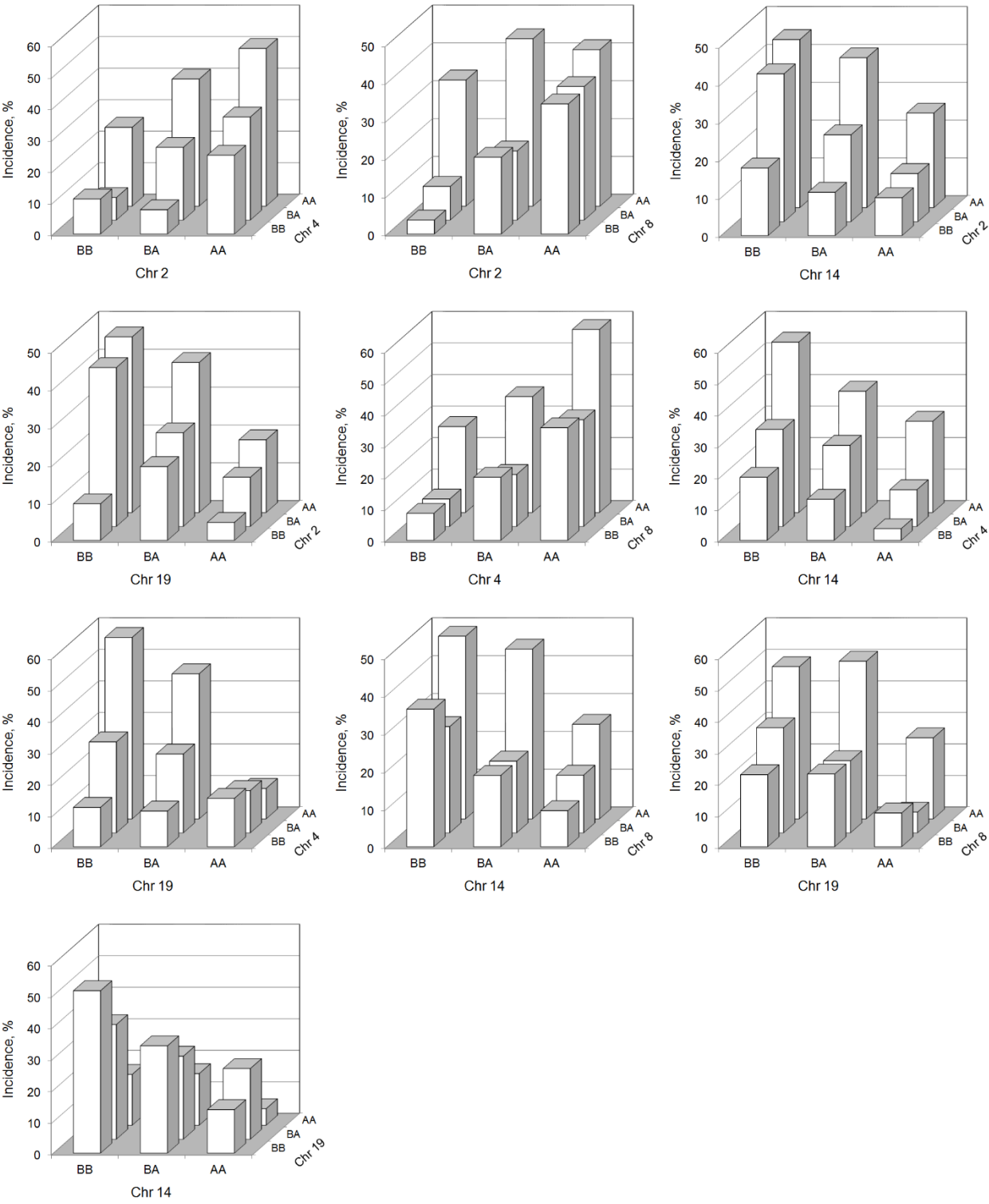
ASD: AxB



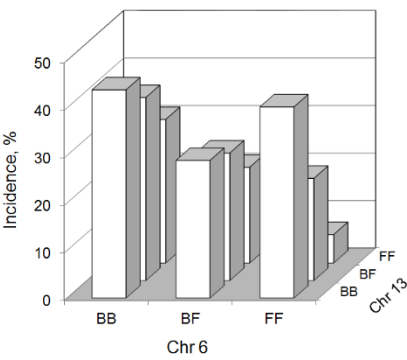
Membranous VSD: FxB



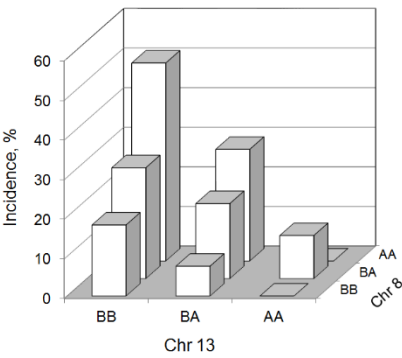
Membranous VSD: AxB



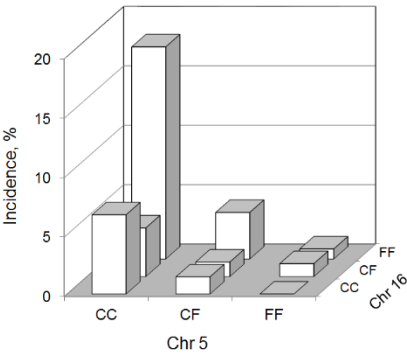
Muscular VSD: F×B



Muscular VSD: A×B



AVSD: FxB



AVSD: AxB

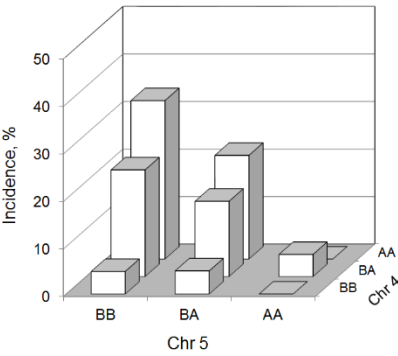
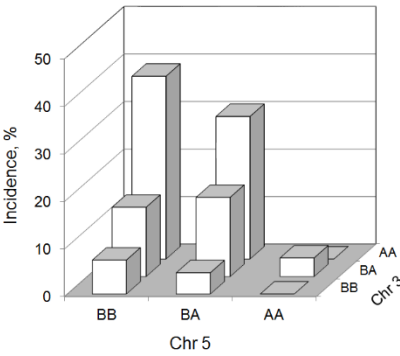
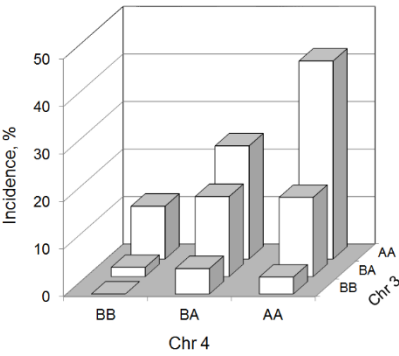


Table S1
SNPs in the A×B F2 intercross

| SNP, rsID | Chromosome | Centimorgans, Cox sex-averaged | Minor allele frequency |
|------------|------------|-----------------------------------|---------------------------|
| rs13475818 | 1 | 16.447 | 0.474 |
| rs3163007 | 1 | 32.307 | 0.465 |
| rs13475934 | 1 | 39.511 | 0.456 |
| rs3684360 | 1 | 54.7 | 0.473 |
| rs3701630 | 1 | 69.107 | 0.470 |
| rs6238909 | 1 | 84.931 | 0.469 |
| rs13476354 | 2 | 10.3282 | 0.475 |
| rs13459062 | 2 | 21.806 | 0.475 |
| rs3659784 | 2 | 62.098 | 0.490 |
| rs27349879 | 2 | 75.407 | 0.497 |
| rs3659658 | 2 | 89.467 | 0.484 |
| rs3676540 | 3 | 6.8289 | 0.467 |
| rs29807239 | 3 | 14.268 | 0.472 |
| rs3716258 | 3 | 24.097 | 0.473 |
| rs3706378 | 3 | 33.755 | 0.481 |
| rs13477291 | 3 | 43.5124 | 0.479 |
| rs31135898 | 3 | 53.0931 | 0.500 |
| rs30509660 | 3 | 63.036 | 0.495 |
| rs3685116 | 3 | 72.3035 | 0.483 |
| rs13477517 | 3 | 81.6622 | 0.490 |
| rs27682879 | 4 | 7.5557 | 0.485 |
| rs27807782 | 4 | 14 | 0.471 |
| rs3719378 | 4 | 45.706 | 0.485 |
| rs6195490 | 4 | 57.6654 | 0.491 |
| rs27610338 | 4 | 69.051 | 0.485 |
| rs13478067 | 4 | 86.167 | 0.482 |
| rs13478133 | 5 | 9.968 | 0.463 |
| rs13478182 | 5 | 18.159 | 0.467 |
| rs13478245 | 5 | 26.822 | 0.475 |
| rs3684754 | 5 | 36.0449 | 0.467 |
| rs13478337 | 5 | 41.8192 | 0.475 |
| rs3655541 | 5 | 51.434 | 0.488 |
| rs3715788 | 5 | 60.5724 | 0.497 |
| rs6237258 | 5 | 68.258 | 0.494 |
| rs13478585 | 5 | 85.2381 | 0.499 |
| rs6172481 | 6 | 1.806 | 0.495 |
| rs6271324 | 6 | 15.478 | 0.491 |
| rs13478830 | 6 | 32.556 | 0.487 |
| rs6292642 | 6 | 48.928 | 0.486 |
| rs6361894 | 6 | 63.435 | 0.481 |
| rs13479152 | 7 | 12.4855 | 0.499 |

| | | | |
|------------|----|---------|-------|
| rs32082888 | 7 | 25.4805 | 0.493 |
| rs3675728 | 7 | 39.8674 | 0.496 |
| rs4137968 | 7 | 54.459 | 0.499 |
| rs13479530 | 7 | 73.187 | 0.482 |
| rs3023176 | 8 | 7.587 | 0.464 |
| rs13479701 | 8 | 22.3824 | 0.456 |
| rs13479794 | 8 | 31.55 | 0.458 |
| rs13479955 | 8 | 50.074 | 0.475 |
| rs13479979 | 8 | 56.197 | 0.483 |
| rs13480121 | 9 | 16.3358 | 0.500 |
| rs30458137 | 9 | 32.7528 | 0.498 |
| rs33720457 | 9 | 40.876 | 0.485 |
| rs3710939 | 9 | 57.983 | 0.492 |
| rs13480488 | 10 | 3.006 | 0.472 |
| rs13459187 | 10 | 5.143 | 0.473 |
| rs29329268 | 10 | 5.8055 | 0.469 |
| rs13480521 | 10 | 7.8605 | 0.474 |
| rs13459119 | 10 | 9.754 | 0.479 |
| rs29325765 | 10 | 47.05 | 0.465 |
| rs13480773 | 10 | 62.2764 | 0.460 |
| rs26864121 | 11 | 13.3116 | 0.476 |
| rs13480991 | 11 | 25.492 | 0.484 |
| rs13481091 | 11 | 43.7211 | 0.483 |
| rs27059631 | 11 | 58.9 | 0.500 |
| rs3706128 | 11 | 70.2894 | 0.494 |
| rs13481256 | 11 | 82.957 | 0.489 |
| rs3678500 | 12 | 9.9405 | 0.471 |
| rs13481388 | 12 | 15.533 | 0.471 |
| rs13481459 | 12 | 22.8396 | 0.473 |
| rs6333493 | 12 | 28.726 | 0.476 |
| rs13481595 | 12 | 45.422 | 0.478 |
| rs3705279 | 13 | 7.2572 | 0.493 |
| rs13459140 | 13 | 17.8688 | 0.454 |
| rs13481783 | 13 | 21.21 | 0.493 |
| rs29237897 | 13 | 35.7893 | 0.486 |
| rs29229165 | 13 | 50.4979 | 0.494 |
| rs13482037 | 13 | 67.21 | 0.493 |
| rs30637674 | 14 | 7.08 | 0.485 |
| rs13482119 | 14 | 18.657 | 0.481 |
| rs3715961 | 14 | 23.9629 | 0.484 |
| rs3653455 | 14 | 34.614 | 0.482 |
| rs6306220 | 14 | 44.0387 | 0.470 |
| rs13482356 | 14 | 56.165 | 0.478 |
| rs32275246 | 15 | 8.538 | 0.483 |
| rs13482486 | 15 | 9.493 | 0.483 |
| rs13482587 | 15 | 21.146 | 0.486 |
| rs32164372 | 15 | 38.015 | 0.488 |

| | | | |
|------------|----|---------|-------|
| rs3695692 | 15 | 48.0369 | 0.500 |
| rs32677126 | 16 | 9.636 | 0.489 |
| rs4169065 | 16 | 21.7827 | 0.486 |
| rs4189683 | 16 | 34.357 | 0.496 |
| rs4210345 | 16 | 45.7803 | 0.492 |
| rs13459152 | 17 | 22.593 | 0.474 |
| rs13483049 | 17 | 29.7243 | 0.466 |
| rs33633158 | 17 | 45.4911 | 0.463 |
| rs6358426 | 18 | 10.1 | 0.486 |
| rs29976462 | 18 | 23.8762 | 0.488 |
| rs3656892 | 18 | 42.5727 | 0.488 |
| rs30997811 | 19 | 18.3527 | 0.472 |
| rs30415214 | 19 | 35.9722 | 0.463 |
| rs30931570 | 19 | 48.4583 | 0.469 |

Table S1
SNPs in the F×B F2 and advanced intercrosses

| SNP rsID | Chromosome | Centimorgans, Cox sex-averaged | Minor allele frequency |
|------------|------------|-----------------------------------|---------------------------|
| rs6269442 | 1 | 1.614 | 0.405 |
| rs13475701 | 1 | 1.744 | 0.405 |
| rs13475706 | 1 | 1.889 | 0.411 |
| rs3684358 | 1 | 2.06 | 0.412 |
| rs13475729 | 1 | 3.749 | 0.450 |
| rs3671256 | 1 | 5.009 | 0.431 |
| rs13475750 | 1 | 6.153 | 0.429 |
| rs6404446 | 1 | 6.442 | 0.430 |
| rs31949292 | 1 | 8.486 | 0.446 |
| rs6173215 | 1 | 8.692 | 0.443 |
| rs31917015 | 1 | 10.425 | 0.429 |
| rs6166266 | 1 | 10.731 | 0.417 |
| rs3677683 | 1 | 10.932 | 0.413 |
| rs6384194 | 1 | 11.319 | 0.408 |
| rs3695988 | 1 | 11.345 | 0.408 |
| rs4137502 | 1 | 11.461 | 0.410 |
| rs31837951 | 1 | 12.249 | 0.432 |
| rs3707642 | 1 | 12.426 | 0.436 |
| rs3681732 | 1 | 12.953 | 0.430 |
| rs3683997 | 1 | 14.842 | 0.414 |
| rs4222295 | 1 | 17.369 | 0.417 |
| rs13475823 | 1 | 18.581 | 0.426 |
| rs13475827 | 1 | 20.081 | 0.425 |
| rs13475834 | 1 | 20.661 | 0.428 |
| rs13475847 | 1 | 23.851 | 0.450 |
| rs13475851 | 1 | 25.709 | 0.449 |
| rs31383619 | 1 | 25.876 | 0.448 |
| rs3724092 | 1 | 25.91 | 0.448 |
| rs13475866 | 1 | 26.334 | 0.453 |
| rs6322485 | 1 | 32.063 | 0.467 |
| rs3163007 | 1 | 32.307 | 0.469 |
| rs6288543 | 1 | 34.187 | 0.479 |
| rs6312657 | 1 | 34.68 | 0.493 |
| rs13475931 | 1 | 39.196 | 0.490 |
| rs13475934 | 1 | 39.511 | 0.486 |
| rs13475936 | 1 | 39.78 | 0.482 |
| rs13475939 | 1 | 40.572 | 0.481 |
| rs13475946 | 1 | 41.565 | 0.482 |
| rs13475952 | 1 | 42.11 | 0.496 |
| rs3723062 | 1 | 43.848 | 0.415 |
| rs32600524 | 1 | 44.067 | 0.416 |
| rs6195073 | 1 | 44.7 | 0.459 |

| | | | |
|------------|---|---------|-------|
| rs31435980 | 1 | 44.9793 | 0.459 |
| rs13475980 | 1 | 46.189 | 0.458 |
| rs6268443 | 1 | 47.188 | 0.497 |
| rs3694065 | 1 | 48.814 | 0.496 |
| rs30596698 | 1 | 49.306 | 0.496 |
| rs31680156 | 1 | 49.601 | 0.494 |
| rs3685919 | 1 | 50.674 | 0.497 |
| rs13476061 | 1 | 50.919 | 0.490 |
| rs3674655 | 1 | 52.113 | 0.458 |
| rs3678634 | 1 | 52.718 | 0.461 |
| rs4137908 | 1 | 54.799 | 0.463 |
| rs13464873 | 1 | 55.969 | 0.478 |
| rs3699561 | 1 | 56.934 | 0.484 |
| rs3724826 | 1 | 57 | 0.484 |
| rs13476119 | 1 | 58.159 | 0.471 |
| rs8250053 | 1 | 58.391 | 0.471 |
| rs30968449 | 1 | 60.722 | 0.477 |
| rs13476141 | 1 | 61.841 | 0.482 |
| rs6382880 | 1 | 62.409 | 0.483 |
| rs13476152 | 1 | 62.56 | 0.483 |
| rs3672697 | 1 | 63.104 | 0.462 |
| rs30986578 | 1 | 63.3199 | 0.462 |
| rs6411476 | 1 | 63.404 | 0.462 |
| rs13476184 | 1 | 65.303 | 0.485 |
| rs31544365 | 1 | 67.667 | 0.485 |
| rs31299650 | 1 | 69.032 | 0.480 |
| rs13476229 | 1 | 76.767 | 0.437 |
| rs3707910 | 1 | 79.926 | 0.491 |
| rs3669108 | 1 | 81.044 | 0.485 |
| rs13476265 | 1 | 83.595 | 0.440 |
| rs13476273 | 1 | 84.91 | 0.429 |
| rs3667164 | 1 | 93.199 | 0.444 |
| rs13476300 | 1 | 96.082 | 0.380 |
| rs6180557 | 1 | 97.9052 | 0.405 |
| rs27096879 | 2 | 2.2384 | 0.499 |
| rs6213083 | 2 | 2.316 | 0.499 |
| rs4136817 | 2 | 2.515 | 0.477 |
| rs6359983 | 2 | 3.79 | 0.495 |
| rs6240512 | 2 | 8.426 | 0.491 |
| rs3674936 | 2 | 14.52 | 0.405 |
| rs13459062 | 2 | 21.806 | 0.402 |
| rs32868446 | 2 | 22.274 | 0.399 |
| rs13476442 | 2 | 22.742 | 0.408 |
| rs13476439 | 2 | 24.323 | 0.439 |
| rs13476454 | 2 | 24.77 | 0.462 |
| rs13476467 | 2 | 26.974 | 0.435 |
| rs13476472 | 2 | 27.478 | 0.418 |

| | | | |
|------------|---|--------|-------|
| rs6265423 | 2 | 27.693 | 0.418 |
| rs27901975 | 2 | 29.025 | 0.465 |
| rs3725341 | 2 | 29.897 | 0.425 |
| rs13476503 | 2 | 30.511 | 0.426 |
| rs27929044 | 2 | 30.694 | 0.426 |
| rs3718711 | 2 | 31.734 | 0.426 |
| rs3672719 | 2 | 33.018 | 0.455 |
| rs33395966 | 2 | 36.722 | 0.470 |
| rs6222797 | 2 | 38.403 | 0.467 |
| rs4136610 | 2 | 41.073 | 0.464 |
| rs3664661 | 2 | 42.714 | 0.470 |
| rs13476580 | 2 | 44.165 | 0.493 |
| rs3722345 | 2 | 48.304 | 0.491 |
| rs3667007 | 2 | 49.029 | 0.491 |
| rs8273639 | 2 | 49.444 | 0.496 |
| rs13476621 | 2 | 49.887 | 0.496 |
| rs6404809 | 2 | 50.023 | 0.496 |
| rs13476636 | 2 | 50.636 | 0.460 |
| rs13476639 | 2 | 51.239 | 0.466 |
| rs13476649 | 2 | 52.255 | 0.464 |
| rs6378047 | 2 | 53.194 | 0.498 |
| rs27359225 | 2 | 53.374 | 0.498 |
| rs13476666 | 2 | 53.746 | 0.498 |
| rs13476689 | 2 | 56.063 | 0.487 |
| rs13476691 | 2 | 56.306 | 0.485 |
| rs13476698 | 2 | 56.748 | 0.476 |
| rs33283452 | 2 | 56.948 | 0.476 |
| rs4138562 | 2 | 57.704 | 0.478 |
| rs3699172 | 2 | 58.312 | 0.479 |
| rs3149106 | 2 | 59.399 | 0.485 |
| rs8279354 | 2 | 59.823 | 0.487 |
| rs3658927 | 2 | 60.369 | 0.500 |
| rs6228179 | 2 | 60.677 | 0.483 |
| rs6401493 | 2 | 61.384 | 0.497 |
| rs13476762 | 2 | 62.081 | 0.457 |
| rs3661596 | 2 | 63.204 | 0.389 |
| rs3665528 | 2 | 63.278 | 0.389 |
| rs6363071 | 2 | 71.292 | 0.459 |
| rs6209325 | 2 | 73.369 | 0.468 |
| rs27349879 | 2 | 75.407 | 0.439 |
| rs13476860 | 2 | 77.376 | 0.408 |
| rs3695266 | 2 | 78.55 | 0.346 |
| rs13476874 | 2 | 80.116 | 0.321 |
| rs3664408 | 2 | 81.738 | 0.296 |
| rs13476889 | 2 | 85.007 | 0.325 |
| rs27311433 | 2 | 88.761 | 0.361 |
| rs3726974 | 2 | 89.685 | 0.375 |

| | | | |
|------------|---|----------|-------|
| rs13476928 | 2 | 97.782 | 0.450 |
| rs13476932 | 2 | 98.14 | 0.448 |
| rs3679483 | 2 | 102.647 | 0.403 |
| rs27681559 | 2 | 102.9288 | 0.406 |
| rs13476963 | 3 | 2.104 | 0.396 |
| rs13476969 | 3 | 2.406 | 0.393 |
| rs13476973 | 3 | 2.935 | 0.383 |
| rs6248752 | 3 | 2.967 | 0.383 |
| rs13476985 | 3 | 3.23 | 0.379 |
| rs3659988 | 3 | 4.094 | 0.402 |
| rs13476997 | 3 | 4.99 | 0.390 |
| rs6235984 | 3 | 7.393 | 0.435 |
| rs13477030 | 3 | 10.99 | 0.449 |
| rs3660588 | 3 | 13.426 | 0.462 |
| rs29807239 | 3 | 14.268 | 0.442 |
| rs13477043 | 3 | 15.29 | 0.418 |
| rs29919622 | 3 | 16.101 | 0.420 |
| rs4223883 | 3 | 16.434 | 0.420 |
| rs6246699 | 3 | 17.452 | 0.432 |
| rs6324747 | 3 | 19.211 | 0.480 |
| rs30263314 | 3 | 20.388 | 0.487 |
| rs13477097 | 3 | 21.275 | 0.487 |
| rs30057783 | 3 | 21.726 | 0.492 |
| rs4139913 | 3 | 21.749 | 0.491 |
| rs6241331 | 3 | 23.549 | 0.496 |
| rs4223969 | 3 | 26.26 | 0.497 |
| rs13477126 | 3 | 27.287 | 0.496 |
| rs13477138 | 3 | 29.092 | 0.448 |
| rs13477143 | 3 | 29.302 | 0.449 |
| rs13477154 | 3 | 30.058 | 0.450 |
| rs6212539 | 3 | 30.168 | 0.480 |
| rs31430997 | 3 | 30.245 | 0.481 |
| rs13477167 | 3 | 30.735 | 0.485 |
| rs6198234 | 3 | 32.419 | 0.433 |
| rs6264454 | 3 | 32.571 | 0.433 |
| rs13477201 | 3 | 33.735 | 0.427 |
| rs3706378 | 3 | 33.755 | 0.427 |
| rs13477210 | 3 | 34.419 | 0.415 |
| rs13477217 | 3 | 34.881 | 0.429 |
| rs13477224 | 3 | 35.847 | 0.444 |
| rs13477233 | 3 | 37.284 | 0.445 |
| rs13477251 | 3 | 38.955 | 0.424 |
| rs13477268 | 3 | 40.211 | 0.403 |
| rs3022964 | 3 | 42.089 | 0.416 |
| rs3726226 | 3 | 42.961 | 0.418 |
| rs4138887 | 3 | 45.048 | 0.449 |
| rs13477299 | 3 | 45.247 | 0.461 |

| | | | |
|------------|---|---------|-------|
| rs3701653 | 3 | 45.461 | 0.474 |
| rs29690864 | 3 | 47.761 | 0.465 |
| rs13477321 | 3 | 47.987 | 0.464 |
| rs3676545 | 3 | 48.528 | 0.455 |
| rs3698700 | 3 | 49.118 | 0.460 |
| rs13477357 | 3 | 50.381 | 0.450 |
| rs3708412 | 3 | 50.969 | 0.429 |
| rs30157172 | 3 | 52.425 | 0.431 |
| rs13477404 | 3 | 60.271 | 0.500 |
| rs13477421 | 3 | 62.12 | 0.485 |
| rs30509660 | 3 | 63.036 | 0.485 |
| rs3676039 | 3 | 63.124 | 0.485 |
| rs13477439 | 3 | 64.048 | 0.480 |
| rs3090379 | 3 | 66.233 | 0.488 |
| rs6290401 | 3 | 66.587 | 0.495 |
| rs3657112 | 3 | 72.448 | 0.423 |
| rs13477494 | 3 | 76.859 | 0.431 |
| rs13477506 | 3 | 79.346 | 0.392 |
| rs30801216 | 3 | 81.07 | 0.394 |
| rs13477517 | 3 | 81.6622 | 0.443 |
| rs30353245 | 3 | 82.066 | 0.477 |
| rs3660863 | 4 | 3.374 | 0.434 |
| rs6287606 | 4 | 7.098 | 0.435 |
| rs27682879 | 4 | 7.532 | 0.464 |
| rs27682826 | 4 | 7.534 | 0.464 |
| rs13477596 | 4 | 8.599 | 0.469 |
| rs13477602 | 4 | 9.709 | 0.478 |
| rs27748877 | 4 | 10.325 | 0.482 |
| rs13477617 | 4 | 11.276 | 0.490 |
| rs3701432 | 4 | 12.487 | 0.493 |
| rs27801920 | 4 | 13.275 | 0.475 |
| rs3663744 | 4 | 13.517 | 0.475 |
| rs27807782 | 4 | 14 | 0.447 |
| rs3674908 | 4 | 14.005 | 0.447 |
| rs13477643 | 4 | 17.003 | 0.458 |
| rs3698283 | 4 | 23.004 | 0.452 |
| rs27856136 | 4 | 24.49 | 0.457 |
| rs3677770 | 4 | 29.364 | 0.466 |
| rs3712541 | 4 | 32.814 | 0.461 |
| rs27935605 | 4 | 33.958 | 0.480 |
| rs6254381 | 4 | 34.002 | 0.481 |
| rs13477838 | 4 | 42.52 | 0.406 |
| rs13477866 | 4 | 45.65 | 0.428 |
| rs28076769 | 4 | 45.6667 | 0.428 |
| rs13477883 | 4 | 47.779 | 0.402 |
| rs6324470 | 4 | 49.475 | 0.422 |
| rs6226080 | 4 | 50.643 | 0.404 |

| | | | |
|-------------|---|---------|-------|
| rs3710617 | 4 | 51.378 | 0.429 |
| rs6381371 | 4 | 53.085 | 0.453 |
| rs3692563 | 4 | 54.658 | 0.495 |
| rs3675629 | 4 | 56.727 | 0.465 |
| rs6195490 | 4 | 57.6654 | 0.497 |
| rs13477959 | 4 | 57.707 | 0.498 |
| rs6355837 | 4 | 63.346 | 0.473 |
| rs32281313 | 4 | 66.216 | 0.477 |
| rs3663950 | 4 | 67.994 | 0.465 |
| rs13478002 | 4 | 68.924 | 0.461 |
| rs27610338 | 4 | 69.051 | 0.455 |
| rs4224864 | 4 | 70.21 | 0.409 |
| rs3719891 | 4 | 75.668 | 0.461 |
| rs3023025 | 4 | 77.015 | 0.471 |
| rs13478089 | 4 | 84.321 | 0.456 |
| rs13478067 | 4 | 85.611 | 0.470 |
| rs13478068 | 4 | 86.105 | 0.475 |
| rs6279100 | 4 | 88.605 | 0.452 |
| rs3664617 | 5 | 2.537 | 0.412 |
| rs6402980 | 5 | 2.883 | 0.397 |
| rs6223482 | 5 | 3.199 | 0.396 |
| rs3714258 | 5 | 3.933 | 0.393 |
| rs3687916 | 5 | 6.151 | 0.402 |
| rs13478139 | 5 | 10.162 | 0.475 |
| rs13478154 | 5 | 13.069 | 0.483 |
| rs13469943 | 5 | 16.96 | 0.425 |
| rs3700706 | 5 | 17.391 | 0.428 |
| rs13459085 | 5 | 17.941 | 0.405 |
| rs13478182 | 5 | 18.159 | 0.406 |
| rs6256504 | 5 | 21.165 | 0.414 |
| rs13478205 | 5 | 22.295 | 0.424 |
| rs6215373 | 5 | 24.09 | 0.426 |
| rs13478223 | 5 | 25.023 | 0.427 |
| rs3659933 | 5 | 25.74 | 0.427 |
| rs29521905 | 5 | 25.98 | 0.430 |
| rs3714001 | 5 | 26.89 | 0.445 |
| rs3664008 | 5 | 29.397 | 0.451 |
| rs259632697 | 5 | 30.567 | 0.448 |
| rs29584438 | 5 | 30.975 | 0.447 |
| rs3090667 | 5 | 31.824 | 0.442 |
| rs6187409 | 5 | 32.229 | 0.437 |
| rs33138184 | 5 | 32.845 | 0.448 |
| rs3707918 | 5 | 38.702 | 0.488 |
| rs3153758 | 5 | 40.4907 | 0.469 |
| rs29678187 | 5 | 40.926 | 0.464 |
| rs3721607 | 5 | 42.897 | 0.426 |
| rs29560457 | 5 | 44.025 | 0.440 |

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| rs13478384 | 5 | 44.297 | 0.438 |
| rs3673049 | 5 | 44.318 | 0.438 |
| rs13478388 | 5 | 44.712 | 0.438 |
| rs6232866 | 5 | 45.474 | 0.455 |
| rs13478402 | 5 | 47.492 | 0.454 |
| rs29502845 | 5 | 47.559 | 0.455 |
| rs3661241 | 5 | 47.74 | 0.478 |
| rs3705458 | 5 | 48.326 | 0.499 |
| rs13478416 | 5 | 48.461 | 0.499 |
| rs13478451 | 5 | 53.197 | 0.497 |
| rs13478463 | 5 | 54.517 | 0.498 |
| rs13478473 | 5 | 55.949 | 0.497 |
| rs6362200 | 5 | 55.994 | 0.495 |
| rs13478479 | 5 | 56.285 | 0.479 |
| rs6255362 | 5 | 60.0892 | 0.490 |
| rs32146173 | 5 | 60.445 | 0.487 |
| rs13478518 | 5 | 66.363 | 0.454 |
| rs13478540 | 5 | 74.362 | 0.470 |
| rs13478546 | 5 | 76.004 | 0.468 |
| rs4225536 | 5 | 77.062 | 0.473 |
| rs6298689 | 5 | 78.785 | 0.461 |
| rs3656197 | 5 | 80.281 | 0.468 |
| rs13478567 | 5 | 81.309 | 0.468 |
| rs13478573 | 5 | 82.5642 | 0.467 |
| rs13478583 | 5 | 85.1753 | 0.463 |
| rs3718776 | 5 | 89.193 | 0.452 |
| rs3661828 | 6 | 1.448 | 0.442 |
| rs13478602 | 6 | 1.65 | 0.442 |
| rs6172481 | 6 | 1.888 | 0.449 |
| rs3699833 | 6 | 2.513 | 0.445 |
| rs13478617 | 6 | 3.436 | 0.444 |
| rs13478631 | 6 | 4.899 | 0.440 |
| rs13478641 | 6 | 7.199 | 0.468 |
| rs3655269 | 6 | 8.073 | 0.431 |
| rs13478656 | 6 | 8.808 | 0.421 |
| rs3671709 | 6 | 11.736 | 0.411 |
| rs13478677 | 6 | 11.989 | 0.410 |
| rs13478684 | 6 | 12.318 | 0.402 |
| rs30945099 | 6 | 15.021 | 0.368 |
| rs13478705 | 6 | 15.022 | 0.368 |
| rs13478709 | 6 | 15.265 | 0.380 |
| rs3704635 | 6 | 15.43 | 0.388 |
| rs6330932 | 6 | 16.438 | 0.441 |
| rs13478719 | 6 | 17.777 | 0.476 |
| rs6238771 | 6 | 21.815 | 0.428 |
| rs13478732 | 6 | 21.865 | 0.428 |
| rs13478745 | 6 | 23.816 | 0.429 |

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| rs13478753 | 6 | 24.558 | 0.470 |
| rs30910255 | 6 | 27.764 | 0.448 |
| rs13478819 | 6 | 32.381 | 0.413 |
| rs3672029 | 6 | 32.53 | 0.413 |
| rs13478830 | 6 | 32.556 | 0.412 |
| rs3699367 | 6 | 33.047 | 0.411 |
| rs6377140 | 6 | 35.012 | 0.418 |
| rs6181382 | 6 | 35.526 | 0.411 |
| rs31002289 | 6 | 35.969 | 0.410 |
| rs13459097 | 6 | 36.95 | 0.325 |
| rs30605552 | 6 | 37.538 | 0.318 |
| rs13478882 | 6 | 39.97 | 0.350 |
| rs13478891 | 6 | 40.922 | 0.352 |
| rs13478893 | 6 | 41.108 | 0.355 |
| rs6239023 | 6 | 42.752 | 0.375 |
| rs6349084 | 6 | 44.804 | 0.389 |
| rs13478919 | 6 | 45.115 | 0.384 |
| rs4138572 | 6 | 45.6 | 0.383 |
| rs6292642 | 6 | 48.559 | 0.366 |
| rs6208251 | 6 | 48.778 | 0.364 |
| rs13478971 | 6 | 51.615 | 0.366 |
| rs13478977 | 6 | 52.302 | 0.335 |
| rs6393943 | 6 | 53.019 | 0.320 |
| rs6401637 | 6 | 53.749 | 0.315 |
| rs13478997 | 6 | 55.551 | 0.309 |
| rs13479014 | 6 | 59.24 | 0.389 |
| rs6389420 | 6 | 61.973 | 0.354 |
| rs3681620 | 6 | 62.834 | 0.382 |
| rs30316697 | 6 | 63.358 | 0.387 |
| rs3722480 | 6 | 63.612 | 0.388 |
| rs6339546 | 6 | 64.542 | 0.358 |
| rs13479053 | 6 | 64.794 | 0.376 |
| rs30015657 | 6 | 65.8784 | 0.391 |
| rs3023102 | 6 | 66.215 | 0.396 |
| rs13479071 | 6 | 68.53 | 0.403 |
| rs3672808 | 6 | 69.744 | 0.447 |
| rs6329892 | 6 | 74.038 | 0.470 |
| rs3658783 | 6 | 76.543 | 0.483 |
| rs30160101 | 6 | 77.5675 | 0.468 |
| rs30848564 | 6 | 77.701 | 0.461 |
| rs6265387 | 6 | 78.094 | 0.442 |
| rs30950360 | 6 | 78.865 | 0.452 |
| rs3700068 | 7 | 2.536 | 0.469 |
| rs3714915 | 7 | 2.617 | 0.469 |
| rs13479105 | 7 | 2.689 | 0.469 |
| rs6384973 | 7 | 3.058 | 0.468 |
| rs3658362 | 7 | 7.76 | 0.465 |

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|------------|---|---------|-------|
| rs3689218 | 7 | 9.441 | 0.491 |
| rs13479153 | 7 | 13.06 | 0.480 |
| rs31465998 | 7 | 15.8664 | 0.466 |
| rs32390275 | 7 | 16.524 | 0.462 |
| rs6239372 | 7 | 20.611 | 0.438 |
| rs32082888 | 7 | 25.4805 | 0.447 |
| rs13479208 | 7 | 27.892 | 0.444 |
| rs3719256 | 7 | 28.86 | 0.468 |
| rs31893514 | 7 | 31.277 | 0.472 |
| rs3699938 | 7 | 32.593 | 0.445 |
| rs13479243 | 7 | 32.8436 | 0.446 |
| rs13479251 | 7 | 32.929 | 0.446 |
| rs3663313 | 7 | 33.441 | 0.414 |
| rs31944466 | 7 | 33.556 | 0.417 |
| rs3714908 | 7 | 34.645 | 0.446 |
| rs13479319 | 7 | 38.358 | 0.463 |
| rs3676254 | 7 | 41.543 | 0.408 |
| rs13479339 | 7 | 43.462 | 0.442 |
| rs13479347 | 7 | 43.881 | 0.449 |
| rs13479355 | 7 | 44.319 | 0.449 |
| rs13479358 | 7 | 45.126 | 0.456 |
| rs13479363 | 7 | 45.693 | 0.469 |
| rs6213614 | 7 | 47.085 | 0.491 |
| rs13479385 | 7 | 48.729 | 0.475 |
| rs13479395 | 7 | 50.443 | 0.482 |
| rs32517623 | 7 | 50.648 | 0.481 |
| rs4226783 | 7 | 51.622 | 0.490 |
| rs13479414 | 7 | 52.15 | 0.467 |
| rs3707067 | 7 | 53.897 | 0.405 |
| rs13479427 | 7 | 54.309 | 0.421 |
| rs4137968 | 7 | 54.459 | 0.414 |
| rs3713052 | 7 | 54.621 | 0.406 |
| rs6357312 | 7 | 54.711 | 0.407 |
| rs13479461 | 7 | 58.644 | 0.437 |
| rs6275579 | 7 | 67.508 | 0.495 |
| rs13479506 | 7 | 68.039 | 0.492 |
| rs3682038 | 7 | 69.108 | 0.498 |
| rs3716088 | 7 | 76.319 | 0.484 |
| rs13479540 | 7 | 77.8094 | 0.456 |
| rs31680975 | 7 | 81.137 | 0.388 |
| rs3663988 | 7 | 84.321 | 0.314 |
| rs31198744 | 7 | 88.854 | 0.392 |
| rs6153168 | 8 | 3.092 | 0.456 |
| rs3023176 | 8 | 7.587 | 0.489 |
| rs13479619 | 8 | 7.914 | 0.485 |
| rs3657963 | 8 | 8.446 | 0.437 |
| rs13479625 | 8 | 9.266 | 0.423 |

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| rs33566717 | 8 | 10.583 | 0.438 |
| rs4140004 | 8 | 11.326 | 0.438 |
| rs3661760 | 8 | 11.48 | 0.438 |
| rs13479656 | 8 | 14.032 | 0.415 |
| rs13479673 | 8 | 16.533 | 0.414 |
| rs4227096 | 8 | 18.218 | 0.402 |
| rs3706948 | 8 | 18.826 | 0.402 |
| rs13479701 | 8 | 22.3824 | 0.418 |
| rs3665028 | 8 | 22.606 | 0.419 |
| rs3667738 | 8 | 23.504 | 0.406 |
| rs13479716 | 8 | 23.71 | 0.406 |
| rs3703811 | 8 | 23.87 | 0.406 |
| rs3666140 | 8 | 24.316 | 0.406 |
| rs6386110 | 8 | 24.757 | 0.439 |
| rs3719401 | 8 | 27.887 | 0.452 |
| rs13479755 | 8 | 28.863 | 0.455 |
| rs31276910 | 8 | 29.03 | 0.455 |
| rs13479768 | 8 | 29.246 | 0.455 |
| rs3707439 | 8 | 30.761 | 0.430 |
| rs3672639 | 8 | 30.936 | 0.441 |
| rs13479793 | 8 | 31.514 | 0.467 |
| rs13479794 | 8 | 31.55 | 0.467 |
| rs13479811 | 8 | 33.219 | 0.480 |
| rs3656875 | 8 | 33.567 | 0.492 |
| rs3699406 | 8 | 34.067 | 0.494 |
| rs3667475 | 8 | 34.488 | 0.479 |
| rs13479830 | 8 | 35.127 | 0.443 |
| rs36926924 | 8 | 37.45 | 0.429 |
| rs13479871 | 8 | 41.475 | 0.473 |
| rs6257357 | 8 | 41.611 | 0.473 |
| rs13479882 | 8 | 42.129 | 0.467 |
| rs13479884 | 8 | 42.33 | 0.469 |
| rs6391152 | 8 | 43.853 | 0.458 |
| rs13479922 | 8 | 44.877 | 0.454 |
| rs4137596 | 8 | 46.663 | 0.427 |
| rs6285803 | 8 | 48.12 | 0.436 |
| rs6287320 | 8 | 48.493 | 0.435 |
| rs13479947 | 8 | 49.503 | 0.443 |
| rs3706149 | 8 | 50.061 | 0.443 |
| rs13479955 | 8 | 50.074 | 0.443 |
| rs3669235 | 8 | 50.253 | 0.443 |
| rs13479956 | 8 | 50.34 | 0.443 |
| rs3662808 | 8 | 56.991 | 0.439 |
| rs6237645 | 8 | 57.389 | 0.444 |
| rs33401493 | 8 | 63.315 | 0.481 |
| rs3708073 | 8 | 70.716 | 0.444 |
| rs6310696 | 8 | 70.824 | 0.446 |

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| rs6377872 | 8 | 71 | 0.450 |
| rs3705725 | 8 | 72.309 | 0.458 |
| rs31833030 | 8 | 72.3393 | 0.458 |
| rs13480087 | 9 | 7.064 | 0.452 |
| rs13480092 | 9 | 7.305 | 0.452 |
| rs13480095 | 9 | 7.4084 | 0.456 |
| rs8270115 | 9 | 7.927 | 0.475 |
| rs13480103 | 9 | 9.511 | 0.473 |
| rs3088801 | 9 | 10.106 | 0.473 |
| rs6404775 | 9 | 14.314 | 0.499 |
| rs6385855 | 9 | 15.145 | 0.487 |
| rs3655898 | 9 | 18.165 | 0.418 |
| rs30437276 | 9 | 20.114 | 0.445 |
| rs6413270 | 9 | 20.806 | 0.426 |
| rs33646953 | 9 | 24.4263 | 0.443 |
| rs13462199 | 9 | 24.739 | 0.444 |
| rs13480173 | 9 | 25.485 | 0.451 |
| rs6395817 | 9 | 25.803 | 0.464 |
| rs13480179 | 9 | 26.352 | 0.464 |
| rs13480186 | 9 | 27.114 | 0.496 |
| rs3723670 | 9 | 28.839 | 0.496 |
| rs13480208 | 9 | 29.932 | 0.470 |
| rs13480217 | 9 | 31.394 | 0.496 |
| rs6224703 | 9 | 32.333 | 0.498 |
| rs30458137 | 9 | 32.7528 | 0.496 |
| rs3714012 | 9 | 33.18 | 0.493 |
| rs3655717 | 9 | 35.34 | 0.493 |
| rs6174757 | 9 | 36.954 | 0.492 |
| rs6355445 | 9 | 39.122 | 0.482 |
| rs3721056 | 9 | 39.7 | 0.488 |
| rs13480271 | 9 | 40.24 | 0.496 |
| rs33720457 | 9 | 40.876 | 0.489 |
| rs3724833 | 9 | 41.977 | 0.479 |
| rs13480285 | 9 | 42.583 | 0.483 |
| rs13480298 | 9 | 43.863 | 0.484 |
| rs3676124 | 9 | 45.286 | 0.485 |
| rs3695050 | 9 | 46.021 | 0.460 |
| rs3700596 | 9 | 46.512 | 0.494 |
| rs3669564 | 9 | 47.114 | 0.496 |
| rs13480340 | 9 | 47.798 | 0.470 |
| rs13480345 | 9 | 48.379 | 0.471 |
| rs13480351 | 9 | 48.893 | 0.461 |
| rs29789189 | 9 | 50.284 | 0.420 |
| rs3689336 | 9 | 50.613 | 0.423 |
| rs13480365 | 9 | 51.376 | 0.423 |
| rs3717654 | 9 | 54.162 | 0.413 |
| rs30343415 | 9 | 55.0782 | 0.431 |

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| rs13480399 | 9 | 57.487 | 0.475 |
| rs13480407 | 9 | 59.514 | 0.461 |
| rs13480428 | 9 | 63.934 | 0.449 |
| rs6320810 | 9 | 67.636 | 0.402 |
| rs3669563 | 9 | 69.841 | 0.447 |
| rs13459114 | 9 | 72.67 | 0.487 |
| rs6304156 | 9 | 73.664 | 0.484 |
| rs6185923 | 10 | 0.438 | 0.471 |
| rs29368538 | 10 | 1.298 | 0.464 |
| rs3721803 | 10 | 1.696 | 0.464 |
| rs13480488 | 10 | 3.006 | 0.442 |
| rs3664101 | 10 | 3.154 | 0.439 |
| rs4228112 | 10 | 4.417 | 0.446 |
| rs13459187 | 10 | 5.143 | 0.443 |
| rs29329268 | 10 | 5.8055 | 0.441 |
| rs3699409 | 10 | 5.979 | 0.440 |
| rs13480521 | 10 | 7.8605 | 0.466 |
| rs13459119 | 10 | 9.293 | 0.487 |
| rs13480534 | 10 | 9.7958 | 0.489 |
| rs3679120 | 10 | 10.4 | 0.494 |
| rs13480547 | 10 | 11.755 | 0.494 |
| rs13480554 | 10 | 12.941 | 0.498 |
| rs13480566 | 10 | 16.478 | 0.472 |
| rs13480578 | 10 | 18.922 | 0.465 |
| rs13480579 | 10 | 19.237 | 0.427 |
| rs13480601 | 10 | 23.19 | 0.463 |
| rs13480605 | 10 | 23.8239 | 0.470 |
| rs3696307 | 10 | 27.314 | 0.492 |
| rs13480621 | 10 | 30.574 | 0.460 |
| rs13480627 | 10 | 34.7364 | 0.408 |
| rs13480630 | 10 | 35.028 | 0.403 |
| rs29332616 | 10 | 37.031 | 0.446 |
| rs13480652 | 10 | 38.38 | 0.449 |
| rs13480657 | 10 | 38.917 | 0.473 |
| rs3717445 | 10 | 40.766 | 0.477 |
| rs13480678 | 10 | 41.5 | 0.478 |
| rs3679902 | 10 | 41.674 | 0.478 |
| rs3089366 | 10 | 45.073 | 0.481 |
| rs13480702 | 10 | 45.499 | 0.477 |
| rs29325765 | 10 | 47.05 | 0.464 |
| rs13480710 | 10 | 47.545 | 0.459 |
| rs13480712 | 10 | 48.536 | 0.459 |
| rs13480716 | 10 | 48.973 | 0.460 |
| rs13480722 | 10 | 50.35 | 0.476 |
| rs3710293 | 10 | 51.414 | 0.442 |
| rs3688351 | 10 | 54.723 | 0.431 |
| rs6290359 | 10 | 56.295 | 0.443 |

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|------------|----|---------|-------|
| rs6243755 | 10 | 56.692 | 0.443 |
| rs29353606 | 10 | 61.545 | 0.359 |
| rs3680872 | 10 | 61.556 | 0.359 |
| rs29360855 | 10 | 67.701 | 0.360 |
| rs3697243 | 10 | 73.832 | 0.376 |
| rs3676330 | 10 | 76.442 | 0.383 |
| rs13480836 | 11 | 2.495 | 0.424 |
| rs13480837 | 11 | 2.735 | 0.424 |
| rs13480863 | 11 | 5.918 | 0.424 |
| rs26925478 | 11 | 6.126 | 0.425 |
| rs3023249 | 11 | 6.662 | 0.424 |
| rs13480875 | 11 | 7.335 | 0.431 |
| rs29389113 | 11 | 10.513 | 0.470 |
| rs13480910 | 11 | 14.219 | 0.411 |
| rs3700830 | 11 | 17.794 | 0.450 |
| rs13459123 | 11 | 18.321 | 0.468 |
| rs26822994 | 11 | 18.8679 | 0.468 |
| rs3723833 | 11 | 19.079 | 0.467 |
| rs13480968 | 11 | 22.232 | 0.469 |
| rs6359329 | 11 | 23.638 | 0.491 |
| rs13480996 | 11 | 25.809 | 0.499 |
| rs3654344 | 11 | 25.922 | 0.500 |
| rs26898753 | 11 | 27.389 | 0.500 |
| rs13481009 | 11 | 27.986 | 0.500 |
| rs13481011 | 11 | 28.08 | 0.499 |
| rs13481033 | 11 | 32.472 | 0.452 |
| rs4228731 | 11 | 33.04 | 0.451 |
| rs3684076 | 11 | 33.7 | 0.468 |
| rs3697686 | 11 | 36.25 | 0.456 |
| rs3711357 | 11 | 37.947 | 0.475 |
| rs13481076 | 11 | 40.59 | 0.404 |
| rs6197743 | 11 | 42.96 | 0.413 |
| rs13481109 | 11 | 46.074 | 0.392 |
| rs13481119 | 11 | 46.826 | 0.365 |
| rs13481145 | 11 | 52.843 | 0.332 |
| rs3714299 | 11 | 58.424 | 0.443 |
| rs27059631 | 11 | 58.9 | 0.444 |
| rs3661058 | 11 | 62.745 | 0.440 |
| rs6393948 | 11 | 67.403 | 0.477 |
| rs3698446 | 11 | 68.645 | 0.477 |
| rs6386362 | 11 | 70.093 | 0.482 |
| rs6370458 | 11 | 71.91 | 0.497 |
| rs13481227 | 11 | 73.596 | 0.416 |
| rs3672597 | 11 | 75.82 | 0.391 |
| rs3699056 | 11 | 79.467 | 0.375 |
| rs13481256 | 11 | 82.957 | 0.443 |
| rs3712881 | 11 | 84.892 | 0.476 |

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|------------|----|---------|-------|
| rs13481303 | 12 | 5.626 | 0.436 |
| rs3706330 | 12 | 7.88 | 0.457 |
| rs13481321 | 12 | 7.923 | 0.458 |
| rs13481324 | 12 | 8.117 | 0.460 |
| rs3717860 | 12 | 8.495 | 0.456 |
| rs13481363 | 12 | 10.543 | 0.436 |
| rs3089800 | 12 | 11.63 | 0.425 |
| rs13481371 | 12 | 12.768 | 0.425 |
| rs6223000 | 12 | 14.927 | 0.433 |
| rs13481388 | 12 | 15.533 | 0.434 |
| rs6311081 | 12 | 16.814 | 0.435 |
| rs3658100 | 12 | 17.537 | 0.435 |
| rs13481406 | 12 | 18.11 | 0.451 |
| rs13481408 | 12 | 18.369 | 0.451 |
| rs29148707 | 12 | 20.993 | 0.485 |
| rs3670749 | 12 | 22.242 | 0.464 |
| rs13481459 | 12 | 22.8396 | 0.462 |
| rs3706319 | 12 | 25.397 | 0.452 |
| rs29158995 | 12 | 25.941 | 0.464 |
| rs13481496 | 12 | 26.705 | 0.479 |
| rs13481514 | 12 | 28.892 | 0.460 |
| rs13481527 | 12 | 30.34 | 0.472 |
| rs3655558 | 12 | 32.585 | 0.447 |
| rs13481541 | 12 | 33.626 | 0.455 |
| rs3662628 | 12 | 35.986 | 0.492 |
| rs29176418 | 12 | 36.457 | 0.495 |
| rs13481565 | 12 | 38.807 | 0.491 |
| rs29184538 | 12 | 43.833 | 0.437 |
| rs3670410 | 12 | 44.326 | 0.436 |
| rs13481588 | 12 | 45.007 | 0.435 |
| rs13481592 | 12 | 45.198 | 0.439 |
| rs6207869 | 12 | 45.478 | 0.444 |
| rs13481599 | 12 | 46.455 | 0.448 |
| rs13481604 | 12 | 49.82 | 0.483 |
| rs3716084 | 12 | 50.269 | 0.462 |
| rs13481614 | 12 | 51.183 | 0.486 |
| rs13481632 | 12 | 56.892 | 0.461 |
| rs6390948 | 12 | 59.558 | 0.469 |
| rs13481655 | 12 | 61.147 | 0.493 |
| rs3023711 | 12 | 62.619 | 0.480 |
| rs29249127 | 13 | 1.733 | 0.465 |
| rs6215262 | 13 | 2.1 | 0.464 |
| rs13481668 | 13 | 2.487 | 0.464 |
| rs13481673 | 13 | 2.837 | 0.442 |
| rs6348604 | 13 | 5.492 | 0.475 |
| rs3023379 | 13 | 6.3652 | 0.468 |
| rs13481715 | 13 | 6.898 | 0.464 |

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|------------|----|---------|-------|
| rs6314295 | 13 | 7.214 | 0.458 |
| rs3705279 | 13 | 7.2572 | 0.458 |
| rs3679784 | 13 | 7.543 | 0.460 |
| rs3663223 | 13 | 9.387 | 0.437 |
| rs13481767 | 13 | 16.31 | 0.485 |
| rs13481783 | 13 | 21.21 | 0.487 |
| rs3712907 | 13 | 21.327 | 0.498 |
| rs3688207 | 13 | 21.883 | 0.492 |
| rs6411274 | 13 | 24.301 | 0.493 |
| rs6244558 | 13 | 24.703 | 0.492 |
| rs3693942 | 13 | 29.453 | 0.490 |
| rs3690198 | 13 | 32.531 | 0.499 |
| rs4229817 | 13 | 34.532 | 0.474 |
| rs29730990 | 13 | 34.544 | 0.474 |
| rs13481871 | 13 | 37.601 | 0.460 |
| rs13481880 | 13 | 40.224 | 0.489 |
| rs13481883 | 13 | 40.871 | 0.488 |
| rs13481908 | 13 | 43.36 | 0.472 |
| rs29247893 | 13 | 43.678 | 0.472 |
| rs29565666 | 13 | 44.743 | 0.472 |
| rs29932904 | 13 | 45.235 | 0.471 |
| rs6288319 | 13 | 46.504 | 0.449 |
| rs6316213 | 13 | 47.483 | 0.431 |
| rs13481943 | 13 | 47.76 | 0.431 |
| rs29229165 | 13 | 50.4979 | 0.404 |
| rs13481961 | 13 | 50.925 | 0.399 |
| rs13481968 | 13 | 52.195 | 0.404 |
| rs13481983 | 13 | 55.812 | 0.425 |
| rs13459786 | 13 | 58.109 | 0.424 |
| rs13482005 | 13 | 59.736 | 0.403 |
| rs13482022 | 13 | 64.043 | 0.432 |
| rs6247696 | 13 | 64.656 | 0.433 |
| rs13482028 | 13 | 64.842 | 0.434 |
| rs13482035 | 13 | 66.772 | 0.433 |
| rs13482037 | 13 | 67.21 | 0.437 |
| rs4230144 | 14 | 4.71 | 0.477 |
| rs6322899 | 14 | 5.762 | 0.488 |
| rs6290836 | 14 | 6.421 | 0.480 |
| rs30637674 | 14 | 7.08 | 0.479 |
| rs3687889 | 14 | 11.062 | 0.481 |
| rs30721414 | 14 | 11.9357 | 0.459 |
| rs13482096 | 14 | 12.574 | 0.442 |
| rs3692121 | 14 | 14.111 | 0.447 |
| rs13482104 | 14 | 15.674 | 0.470 |
| rs6396829 | 14 | 16.608 | 0.466 |
| rs13482119 | 14 | 18.657 | 0.473 |
| rs13482143 | 14 | 22.258 | 0.475 |

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|------------|----|---------|-------|
| rs13482159 | 14 | 23.452 | 0.480 |
| rs3715961 | 14 | 23.9629 | 0.474 |
| rs13482170 | 14 | 25.173 | 0.458 |
| rs3666583 | 14 | 26.733 | 0.470 |
| rs13482191 | 14 | 27.71 | 0.470 |
| rs13482194 | 14 | 28.17 | 0.469 |
| rs13482216 | 14 | 33.165 | 0.495 |
| rs3672425 | 14 | 35.55 | 0.472 |
| rs13482247 | 14 | 37.396 | 0.445 |
| rs6284633 | 14 | 37.5422 | 0.445 |
| rs13459144 | 14 | 40.316 | 0.443 |
| rs13482265 | 14 | 42.277 | 0.424 |
| rs13482284 | 14 | 43.806 | 0.420 |
| rs3708535 | 14 | 44.007 | 0.421 |
| rs13482296 | 14 | 44.438 | 0.421 |
| rs6395984 | 14 | 45.189 | 0.410 |
| rs6291434 | 14 | 45.459 | 0.410 |
| rs13482311 | 14 | 45.801 | 0.422 |
| rs30835762 | 14 | 45.957 | 0.424 |
| rs13482327 | 14 | 47.839 | 0.442 |
| rs3692362 | 14 | 49.712 | 0.441 |
| rs30942806 | 14 | 52.61 | 0.441 |
| rs13482354 | 14 | 56.151 | 0.460 |
| rs3654132 | 14 | 56.158 | 0.460 |
| rs13482375 | 14 | 57.817 | 0.475 |
| rs6256423 | 14 | 58.78 | 0.429 |
| rs6169105 | 14 | 60.717 | 0.419 |
| rs3665550 | 14 | 62.625 | 0.417 |
| rs13482398 | 14 | 63.475 | 0.438 |
| rs13482407 | 14 | 65.852 | 0.418 |
| rs31594308 | 15 | 1.843 | 0.477 |
| rs13482418 | 15 | 1.849 | 0.477 |
| rs3665826 | 15 | 2.032 | 0.474 |
| rs31671106 | 15 | 3.823 | 0.500 |
| rs31927778 | 15 | 4.44 | 0.492 |
| rs13482431 | 15 | 5.575 | 0.446 |
| rs3711814 | 15 | 6.248 | 0.410 |
| rs31608298 | 15 | 7.706 | 0.424 |
| rs32187076 | 15 | 7.773 | 0.424 |
| rs13482455 | 15 | 7.869 | 0.424 |
| rs3715857 | 15 | 8.139 | 0.424 |
| rs13482477 | 15 | 8.543 | 0.424 |
| rs32275246 | 15 | 8.617 | 0.424 |
| rs13482497 | 15 | 11.032 | 0.414 |
| rs13482504 | 15 | 12.282 | 0.427 |
| rs32084485 | 15 | 12.5423 | 0.430 |
| rs6188239 | 15 | 14.103 | 0.444 |

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| rs13482529 | 15 | 15.274 | 0.438 |
| rs32312277 | 15 | 16.751 | 0.459 |
| rs13482543 | 15 | 16.809 | 0.459 |
| rs13482549 | 15 | 17.395 | 0.442 |
| rs3707900 | 15 | 19.919 | 0.436 |
| rs13482585 | 15 | 21.175 | 0.466 |
| rs13482595 | 15 | 25.03 | 0.460 |
| rs31824103 | 15 | 29.0311 | 0.398 |
| rs13482628 | 15 | 29.421 | 0.391 |
| rs13482637 | 15 | 32.182 | 0.393 |
| rs13482661 | 15 | 37.583 | 0.425 |
| rs3665030 | 15 | 37.745 | 0.427 |
| rs32164372 | 15 | 38.015 | 0.431 |
| rs6276391 | 15 | 38.245 | 0.434 |
| rs13482695 | 15 | 43.934 | 0.451 |
| rs13482704 | 15 | 45.108 | 0.461 |
| rs13482712 | 15 | 46.484 | 0.487 |
| rs6285067 | 15 | 49.907 | 0.443 |
| rs13482751 | 15 | 58.021 | 0.471 |
| rs4152638 | 16 | 2.426 | 0.386 |
| rs4152790 | 16 | 2.475 | 0.386 |
| rs4231060 | 16 | 2.889 | 0.390 |
| rs4157412 | 16 | 3.4148 | 0.389 |
| rs4158907 | 16 | 3.509 | 0.389 |
| rs32677126 | 16 | 9.636 | 0.414 |
| rs4165081 | 16 | 12.309 | 0.409 |
| rs4165279 | 16 | 12.645 | 0.407 |
| rs4167031 | 16 | 19.714 | 0.461 |
| rs4168640 | 16 | 21.374 | 0.481 |
| rs4170308 | 16 | 22.749 | 0.476 |
| rs4171440 | 16 | 24.104 | 0.489 |
| rs4177651 | 16 | 27.831 | 0.477 |
| rs4179075 | 16 | 28.385 | 0.474 |
| rs4182243 | 16 | 30.376 | 0.453 |
| rs4183448 | 16 | 30.604 | 0.453 |
| rs4185639 | 16 | 31.431 | 0.469 |
| rs4186744 | 16 | 32.099 | 0.468 |
| rs3696661 | 16 | 32.767 | 0.458 |
| rs6163640 | 16 | 32.971 | 0.453 |
| rs4189277 | 16 | 34.227 | 0.460 |
| rs4189683 | 16 | 34.357 | 0.456 |
| rs4191367 | 16 | 34.819 | 0.440 |
| rs4193069 | 16 | 36.067 | 0.427 |
| rs4194417 | 16 | 36.445 | 0.427 |
| rs4197416 | 16 | 37.958 | 0.417 |
| rs4197715 | 16 | 38.865 | 0.410 |
| rs4200124 | 16 | 40.292 | 0.418 |

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|------------|----|--------|-------|
| rs4201998 | 16 | 40.906 | 0.418 |
| rs6317052 | 16 | 45.623 | 0.373 |
| rs4211364 | 16 | 45.892 | 0.388 |
| rs4211664 | 16 | 46.759 | 0.417 |
| rs3680665 | 16 | 46.916 | 0.418 |
| rs4212102 | 16 | 47.413 | 0.413 |
| rs4213268 | 16 | 49.112 | 0.397 |
| rs4214396 | 16 | 49.568 | 0.397 |
| rs4217260 | 16 | 51.637 | 0.371 |
| rs4219905 | 16 | 54.059 | 0.387 |
| rs3712360 | 16 | 54.488 | 0.387 |
| rs3696981 | 16 | 57.427 | 0.397 |
| rs4136382 | 17 | 2.001 | 0.428 |
| rs13482845 | 17 | 2.515 | 0.465 |
| rs33373629 | 17 | 3.756 | 0.468 |
| rs3672987 | 17 | 17.806 | 0.386 |
| rs6390174 | 17 | 19.311 | 0.397 |
| rs3702604 | 17 | 19.559 | 0.388 |
| rs33178797 | 17 | 19.602 | 0.388 |
| rs6409750 | 17 | 22.923 | 0.449 |
| rs13483016 | 17 | 25.749 | 0.433 |
| rs6272475 | 17 | 27.907 | 0.433 |
| rs3714226 | 17 | 28.823 | 0.420 |
| rs3727008 | 17 | 38.866 | 0.483 |
| rs3675634 | 17 | 42.179 | 0.495 |
| rs3691628 | 17 | 44.65 | 0.459 |
| rs13483103 | 17 | 45.436 | 0.477 |
| rs13483117 | 17 | 49.683 | 0.490 |
| rs13483119 | 17 | 50.304 | 0.491 |
| rs13483131 | 17 | 51.965 | 0.491 |
| rs13483135 | 17 | 53.085 | 0.461 |
| rs13483144 | 17 | 56.362 | 0.478 |
| rs4231720 | 17 | 56.873 | 0.468 |
| rs33117354 | 17 | 59.733 | 0.460 |
| rs6288047 | 17 | 60.459 | 0.457 |
| rs6397044 | 17 | 60.64 | 0.446 |
| rs13483183 | 18 | 2.302 | 0.414 |
| rs29628302 | 18 | 3.578 | 0.406 |
| rs4231742 | 18 | 5.653 | 0.411 |
| rs13483212 | 18 | 6.068 | 0.406 |
| rs30271401 | 18 | 8.002 | 0.412 |
| rs6358426 | 18 | 10.034 | 0.442 |
| rs13483244 | 18 | 11.555 | 0.468 |
| rs4138020 | 18 | 11.996 | 0.446 |
| rs3722973 | 18 | 17.694 | 0.487 |
| rs3664831 | 18 | 19.514 | 0.497 |
| rs6220251 | 18 | 21.395 | 0.453 |

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|-------------|----|---------|-------|
| rs3676196 | 18 | 22.966 | 0.413 |
| rs4231834 | 18 | 23.625 | 0.458 |
| rs29976462 | 18 | 23.8762 | 0.451 |
| rs30176009 | 18 | 24.277 | 0.441 |
| rs13483364 | 18 | 28.334 | 0.379 |
| rs29626928 | 18 | 34.209 | 0.429 |
| rs8237402 | 18 | 35.096 | 0.428 |
| rs3688789 | 18 | 37.483 | 0.428 |
| rs3691542 | 18 | 39.503 | 0.475 |
| rs13483432 | 18 | 45.629 | 0.456 |
| rs13483436 | 18 | 48.825 | 0.434 |
| rs13459193 | 18 | 50.842 | 0.473 |
| rs13483446 | 18 | 51.811 | 0.476 |
| rs3720876 | 18 | 53.237 | 0.474 |
| rs13483466 | 18 | 55.727 | 0.440 |
| rs29667966 | 18 | 57.837 | 0.499 |
| rs13483482 | 18 | 58.209 | 0.495 |
| rs30456650 | 19 | 3.3776 | 0.487 |
| rs6236348 | 19 | 4.441 | 0.487 |
| rs30517739 | 19 | 7.103 | 0.466 |
| rs6316813 | 19 | 8.177 | 0.434 |
| rs30697936 | 19 | 8.771 | 0.490 |
| rs31280015 | 19 | 10.1503 | 0.483 |
| rs3686467 | 19 | 12.273 | 0.475 |
| rs30604569 | 19 | 13.2036 | 0.474 |
| rs13483556 | 19 | 13.705 | 0.474 |
| rs6309315 | 19 | 18.426 | 0.425 |
| rs6293693 | 19 | 20.923 | 0.394 |
| rs3090325 | 19 | 21.258 | 0.416 |
| rs30746021 | 19 | 21.7875 | 0.414 |
| rs13459194 | 19 | 26.625 | 0.384 |
| rs6237466 | 19 | 27.057 | 0.385 |
| rs30396271 | 19 | 29.792 | 0.397 |
| rs30364728 | 19 | 29.987 | 0.398 |
| rs30920120 | 19 | 32.228 | 0.395 |
| rs3655407 | 19 | 34.251 | 0.404 |
| rs30415214 | 19 | 35.9722 | 0.400 |
| rs3656289 | 19 | 36.17 | 0.399 |
| rs3687275 | 19 | 36.617 | 0.392 |
| rs13461374 | 19 | 36.6975 | 0.390 |
| rs13483643 | 19 | 38.427 | 0.356 |
| rs3023496 | 19 | 41.195 | 0.369 |
| rs6304326 | 19 | 47.937 | 0.456 |
| rs30931570 | 19 | 48.4583 | 0.453 |
| rs13483682 | 19 | 51.073 | 0.435 |
| rs249259485 | 19 | 56.384 | 0.454 |

Table S2. Modifier loci by cross and defect.

A×B, LOD. F×B, -log(p).

Bold, genome-wide significant. Non-bold, suggestive.

*, estimated marker. The closest SNP is indicated.

The locus interval is bounded by the 1 LOD or -log(p) drop from the peak SNP.

| Cross | Defect | Peak SNP | Locus interval | LOD or -log(p) | Risk Allele | Candidate genes |
|-------|---------|-----------------------------|--|----------------|-------------|--|
| A×B | ASD | rs6238909 | chr1:125665904-182054904 | 2.88 | B | <i>Csrp1, Lefty1, Lefty2, Pitx2, Vangl2</i> |
| A×B | ASD | rs31135898 | chr3:52939690-158052844 | 3.22 | A | <i>Bmpr1b, Notch2, Pifo, Pitx2</i> |
| A×B | ASD | rs13478067* | chr4:124165816-154991070 | 2.69 | A | |
| A×B | Mbr.VSD | rs3659784 | chr2:31172022-152809607 | 3.42 | A | <i>Actc1, Acvr1, Bbs5, Jag1, Lrp2, Mkks, Ttc21b, Zeb2</i> |
| A×B | Mbr.VSD | rs27610338 | chr4:100332046-154991070 | 5.60 | A | <i>Ptch2</i> |
| A×B | Mbr.VSD | rs13479701 | chr8:14759093-62208384 | 3.81 | A | <i>Hand2, Vegfc,</i> |
| A×B | Mbr.VSD | rs13482119 | chr14:17628076-67124319 | 2.92 | B | <i>Bmp4, Bmpr1a, Esco2, Gata4, Ift88, Myh6</i> |
| A×B | Mbr.VSD | rs30415214 | chr19:23376527-53761523 | 3.55 | B | <i>Acta2, Fgf8</i> |
| A×B | Mus.VSD | rs13479794 | chr8:14759093-108947107 | 3.77 | A | <i>Bbs2, Gdf1, Hand2, Nfatc3, Sall1, Vegfc</i> |
| A×B | Mus.VSD | rs13482037 | chr13:96099181-118789220 | 5.87 | B | <i>Fgf10, Isl1</i> |
| A×B | AVSD | rs13477291 | chr3:75914491-136196844 | 4.98 | A | <i>Notch2, Pifo, Pitx2</i> |
| A×B | AVSD | rs27610338* | chr4:100332046-154991070 | 3.40 | A | <i>Ptch2</i> |
| A×B | AVSD | rs13478337 | chr5:35506765-129965381 | 4.08 | B | <i>Cc2d2a, Evc, Evc2. Pkd2, Ptpn11, Med13l, Tbx3, Tbx5</i> |
| F×B | ASD | rs6304156 | chr9:121915911-123153990 | 3.02 | B | |
| F×B | Mbr.VSD | rs6292642 | chr6:94055997-111299794 | 6.12 | B | <i>Foxp1</i> |
| F×B | Mbr.VSD | rs3657963 | chr8:15279371-17579118 | 4.98 | F | <i>Csmd1</i> |
| F×B | Mus.VSD | rs6349084 | chr6:85961013-104553235 | 3.13 | B | <i>Prickle2, Foxp1</i> |
| F×B | AVSD | rs6255362 | chr5:116106456-134045067 | 4.74 | B | <i>Ptpn11, Med13l, Tbx3, Tbx5</i> |
| F×B | AVSD | rs4217260 | chr16:85097188-93538107 | 2.73 | F | |