Human Molecular Genetics, 2014, Vol. 23, No. 25 ***6944–6960***
doi:10.1093/hmg/ddu401
Advance Access published on August 5, 2014

Trans-ethnic meta-analysis of white blood cell phenotypes

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Received April 25, 2014; Revised and Accepted July 31, 2014

White blood cell (WBC) count is a common clinical measure used as a predictor of certain aspects of human health, including immunity and infection status. WBC count is also a complex trait that varies among individuals and ancestry groups. Differences in linkage disequilibrium structure and heterogeneity in allelic effects are expected to play a role in the associations observed between populations. Prior genome-wide association study (GWAS) meta-analyses have identified genomic loci associated with WBC and its subtypes, but much of the heritability of these phenotypes remains unexplained. Using GWAS summary statistics for over 50 000 individuals from three diverse populations (Japanese, African-American and European ancestry), a Bayesian model methodology was employed to account for heterogeneity between ancestry groups. This approach was used to perform a trans-ethnic meta-analysis of total WBC, neutrophil and monocyte counts. Ten previously known associations were replicated and six new loci were identified, including several regions harboring genes related to inflammation and immune cell function. Ninety-five percent credible interval regions were calculated to narrow the association signals and fine-map the putatively causal variants within loci. Finally, a conditional analysis was performed on the most significant SNPs identified by the trans-ethnic meta-analysis (MA), and nine secondary signals within loci previously associated with WBC or its subtypes were identified. This work illustrates the potential of trans-ethnic analysis and ascribes a critical role to multi-ethnic cohorts and consortia in exploring complex phenotypes with respect to variants that lie outside the European-biased GWAS pool.

INTRODUCTION

White blood cells (WBCs) are critically involved in the body's immune system, serving as a primary defense mechanism against foreign pathogens. WBC count is used as a clinical marker of inflammation status, and higher WBC count has been associated with a risk of cardiovascular disease, cancer mortality and all-cause mortality (1–3). Elevated WBC count is also associated with disease risk factors including increasing age, high blood pressure, cigarette smoking, adiposity and increasing plasma inflammatory markers (4).

WBCs are classified into five subtypes according to their morphology and functions, including neutrophils, basophils, eosinophils, lymphocytes and monocytes. Total WBC count is highly variable even among healthy individuals of the same population (5). WBC count is a moderately heritable phenotype, with h^2 estimates ranging from 0.14 to 0.40 across the WBC subtypes (6). Additionally, between 25 and 50% of individuals of African descent exhibit benign ethnic neutropenia, characterized by low neutrophil counts, due to a regulatory variant in the Duffy antigen receptor for chemokines (*DARC*) gene (5,7,8). Given the importance of WBC in both host defense and, potentially, pathologic inflammation, elucidation of additional genetic mechanisms responsible for regulating while blood cell count could have a substantial medical impact.

Admixture mapping and genome-wide association studies (GWAS) performed on cohorts of differing continental ancestry, including European, Japanese and African-American, have been successful in identifying multiple loci associated with WBC phenotypes (5,8–14). The joint effects of these loci generally explain only a small portion of the overall heritability of either total WBC or WBC subtypes. Some prior GWAS have not defined the subtypes of WBC that are driving their observed associations; however, neutrophils in particular are often implicated (9,11). Furthermore, the loci identified by GWAS generally encompass large genomic regions, often containing many genes and variants with comparable association signals. Thus, fine-mapping methods aimed at pinpointing association signals more precisely are needed (15).

Recently, the 1000 Genomes Project and phase three of the HapMap project released comprehensive reference panels for a number of ethnic groups, including African, Asian and additional European populations (16,17). Imputation using these higher density reference panels allows inference of genotypes not captured by genotyping arrays, markedly increasing the breadth of genetic variation that can be included in association tests. This has provided new opportunities both to detect novel loci and to refine the localization of association signals for a number of phenotypes, including WBC phenotypes.

Trans-ethnic meta-analysis (MA) potentially offers a more comprehensive view of the genetic variation that is associated with a trait, but traditional fixed-effects MA methods do not adequately address heterogeneity in allelic effects, allele frequencies or differences in linkage disequilibrium between ethnicities (18). For example, in a previous fixed-effects analysis of the cohorts included in the current study, only 152 of 161 single nucleotide polymorphisms (SNPs) that had been associated with WBC phenotypes in earlier analyses were replicated at a Bonferroni-corrected significance threshold of $P < 3.57\text{E}-3$, and no novel associations were observed (9). Whereas random-effects-based methods of MA do account for inter-study heterogeneity, they lose statistical power in the setting of high levels of heterogeneity that may result from experimental or statistical differences in study design (15,19).

These shortcomings have been addressed in the software package, MANTRA (Meta-Analysis of Trans-ethnic Association studies), which allows for heterogeneity between diverse ethnic groups and provides increased power and mapping resolution compared with random-effects-based methods (15). In the current study, we used MANTRA to combine summary results of ancestry-specific GWAS of WBC traits in three distinct populations. We identify novel loci associated with WBC count, assess heterogeneity in allelic effects between ancestry groups and improve fine-mapping resolution of some previously identified regions.

RESULTS

Descriptive statistics for each cohort are found in Table 1. In the trans-ethnic MANTRA analyses, we observed strong evidence of association, defined by a $\log_{10}$ Bayes factor (BF) of >6, at 10 previously identified loci and six novel loci, and detected nine secondary signals within 500 kb of a previously identified locus. The population-specific and trans-ethnic results for the established and novel loci associated with each WBC phenotype (total WBC, neutrophil and monocyte count) are summarized in Table 2. Cohort-level Manhattan plots are shown in Figure 1. Of the 15 previously identified variants (at 10 loci), six of the six monocyte associations, two of the four neutrophil associations and two of the five WBC count associations were initially identified in the original GWAS papers from which the data employed by this analysis are drawn.

Regions previously identified by single-ethnicity GWAS reappeared in the MANTRA trans-ethnic analyses, but in some instances, the index SNP from the original publication was not the most significant. These include rs4065321 and rs17609240 on 17q21.1 (WBC count and neutrophil count), rs2517524 on 6p21.33 (WBC count) and rs10956483 on 8q24.21 (monocyte count). Additionally, rs2814778, a marker identifying the Duffy null blood group antigen and located on the *DARC* gene of chromosome 1 at position (b37) 159 174 683, was available only in the COGENT data. This marker accounts for 20% of population variance in the WBC of African ancestry populations and is monomorphic in non-African populations.

Novel associations

In addition to replicating known variants, the trans-ethnic analysis identified six novel trait–locus associations (Table 2). For neutrophil counts, novel findings include rs6936204 in region 6p21.32, located nearest to *AK123889*. This region is very near known locus 6p21.33, which was previously associated with WBC and lymphocyte counts (9). These loci are near the *HLA* region; thus, it is possible that population stratification is driving this association (20). These variants are not in linkage disequilibrium (LD) with any of the known *HLA* markers, but as meiotic crossovers are known to cluster around *HLA*, it is possible that these variants are separated from this region by a recombination hotspot. Novel association for WBC count includes rs10932765 in region 2q35, located near *ARPC2*, which has previously been associated with monocyte count and inflammatory bowel disease (12,21). This region is notable because of its proximity to *IL8RA*, which encodes *CXCR1*. *CXCR1*, the receptor for the chemokine *IL-8*, is a mediator of inflammatory responses; interestingly, the Duffy antigen

Table 1. Descriptive statistics

Study Population ancestry	RIKEN Japanese	CHARGE European	COGENT African-American
Total WBC			
WBC count: mean (SD) in cells × 10^3/ml	6.20 (1.67), $n = 16\,843$	5.72 (1.24), $n = 19\,509$	5.94 (1.88), $n \sim 16\,388$
Neutrophils: mean (SD) in cells × 10^3/ml	3.80 (1.40), $n = 9802$	3.52 (1.06), $n = 16\,550$	3.57 (1.57), $n \sim 7391$
Monocytes: mean (SD) in cells × 10^3/ml	0.36 (0.22), $n = 9810$	0.43 (0.14), $n = 16\,550$	0.36 (0.17), $n \sim 7369$
Covariates			
Age in years: mean (SD)	63.5 (10.6)	63.8 (8.9)	50.9 (7.6)
BMI: mean (SD) kg/m^2	23.1 (3.6)	NA	NA
% Female	39.1	53.5	65.6
% Current smoker	52.6	17.6	NA
Sample size			
Total *N*	17 218	19 509	16 388

Counts are reported in thousands of cells per milliliter of blood (cells × 10^9/l).
SD, standard deviation; NA, not available.

Table 2. Loci defined in MANTRA analysis

Lead SNP	Chr	base pair (BP) (bd 37)	Effect	Other	MANTRA trans-ethnic meta-analysis				European ancestry GWAS meta-analysis						Japanese ancestry GWAS meta-analysis						African-American ancestry GWAS meta-analysis					
					$\log_{10}$ BF (bayes factor) assocation	PPA	Sample size	Gene(s)	EAF	Beta	SE	*P*-value	Sample size	R^{2a}	EAF	Beta	SE	*P*-value	Sample size	R^2	EAF	Beta	SE	*P*-value	Sample size	R^{2a}
WBC count—established loci																										
rs2518564*	1	159 062 436	A	G	34 1.59	1	51 768	DARC	0.293	0.007	0.003	2.81E−02	19 509	0.883	0.7159	0	0.003	0.9936	16 843	0.991	0.1725	0.1905	0.0048	1.39E−149	15 416	1
rs1371799	4	74 977 837	C	T	13.5	1	52 740	CXCL2	0.572	−0.012	0.003	2.14E−05	19 509	0.985	0.461	−0.012	0.003	3.63E−05	16 843	0.921	0.761	0.023	0.0041	5.21E−04	16 388	1
rs4895441	6	135 426 573	A	G	9.64	0.165	52 703	Intergenic	0.347	0.011	0.003	3.42E−04	19 509	1	0.628	0.018	0.003	8.99E−11	16 843	1	0.902	0.0002	0.0059	9.90E−01	16 351	1
rs445	7	92 408 370	C	T	16.8	1	52 740	CDK6	0.776	0.019	0.005	4.51E−04	19 509	1	0.685	0.019	0.003	8.99E−11	16 843	1	0.193	−0.0249	0.0049	9.90E−01	16 388	1
rs4794822	17	38 156 712	C	T	29.64	1	52 740	PSMD3	0.586	−0.028	0.003	3.23E−23	19 509	0.999	0.481	−0.019	0.003	2.90E−12	16 843	0.999	0.325	0.0128	0.0038	4.33E−02	16 388	0.918
WBC count—novel loci																										
rs10932765	2	219 099 484	C	T	6.95	0.025	52 740	ARPC2	0.503	0.011	0.003	3.36E−05	19 509	1	0.58	0.012	0.003	1.69E−05	16 843	0.986	0.877	0.0039	0.0056	7.26E−01	16 388	1
rs6734238	2	113 841 030	A	G	6.62	0.028	52 691	IL1F10	0.451	−0.009	0.003	1.46E−03	19 509	1	0.967	−0.018	0.008	2.49E−02	16 843	0.907	0.553	−0.0158	0.0035	5.92E−03	16 339	1
rs2853946	6	31 247 203	A	T	12.16	0.009	52 740	HLA-B	0.348	−0.017	0.003	1.28E−08	19 509	1	0.717	−0.013	0.003	8.19E−06	16 843	0.976	0.512	−0.0106	0.0035	7.65E−02	16 388	1
rs2163950	8	130 597 585	A	C	7.75	0.065	52 740	Intergenic	0.054	−0.017	0.006	5.91E−03	19 509	0.861	0.174	−0.021	0.004	5.36E−09	16 843	0.995	0.124	−0.0053	0.0058	6.44E−01	16 388	0.788
Monocyte count—established loci																										
rs1449263	2	182 319 301	C	T	19.24	1	33 729	ITGA4	0.541	−0.036	0.005	6.70E−14	16 550	0.942	0.626	−0.033	0.006	8.32E−08	9,810	0.994	0.58	0.0087	0.0031	4.68E−03	7369	0.965
rs12988934	2	182 323 665	C	T	7.75	0.022	26 360	ITGA4	0.789	−0.034	0.01	1.01E−03	16 550	0.511	0.732	−0.041	0.008	1.42E−07	9810	0.73	0.018	−0.0165	0.0854	8.47E−01	1803	0.418
rs9880192	3	128 297 569	C	G	8.3	1	33 745	C3orf27	0.441	−0.028	0.005	1.35E−08	16 550	0.867	0.091	−0.037	0.012	1.21E−03	9810	0.804	0.188	0.0037	0.0047	4.31E−01	7385	0.674
rs3095254	6	31 221 668	C	G	6.81	1	33 745	MHC	0.377	0.008	0.005	1.19E−01	16 550	0.976	0.461	0.035	0.006	8.27E−09	9810	0.896	0.562	0.0031	0.0031	3.31E−01	7385	0.935
rs1991866	8	130 624 105	C	G	15.3	1	33 598	Intergenic	0.451	−0.032	0.005	4.58E−11	16 550	0.96	0.598	−0.034	0.006	7.38E−08	9810	0.892	0.52	−0.0046	0.0031	1.32E−01	7238	1
rs10980800	9	113 915 905	C	T	11.63	1	33 692	Intergenic	0.769	0.044	0.006	1.10E−14	16 550	0.988	0.056	0.004	0.013	7.61E−01	9810	0.941	0.787	−0.0049	0.0037	1.85E−01	7332	1
Monocyte count—novel loci																										
rs2047076	5	76 058 509	C	T	6.03	1	33 729	Intergenic	0.714	0.005	0.006	3.80E−01	16 550	0.999	0.9998	2.678	0.474	1.64E−08	9,810	1	0.037	0.0023	0.0091	7.97E−01	7369	0.789
Neutrophil count—established loci																										
rs7667376	4	74 967 890	C	T	11.13	1	33 743	CXCL2	0.596	0.017	0.004	1.47E−04	16 550	0.972	0.542	0.017	0.005	5.96E−04	9802	1	0.221	−0.0428	0.008	8.50E−04	7391	1
rs445	7	92 408 370	C	T	10.52	1	33 744	CDK6	0.776	0.022	0.009	1.21E−02	16 550	1	0.685	0.024	0.005	8.96E−06	9802	1	0.203	−0.0479	0.0092	1.15E−03	7392	1
rs8078723	17	38 166 879	C	T	28.06	1	33 693	CSF3, MED24	0.626	0.043	0.004	2.84E−23	16 550	0.997	0.519	0.032	0.005	1.39E−10	9802	0.995	0.678	−0.0071	0.0073	6.19E−01	7341	1
rs4794822	17	38 156 712	C	T	28.92	1	33 753	PSMD3	0.586	−0.043	0.004	3.64E−23	16 550	0.999	0.481	−0.032	0.005	7.09E−11	9802	0.999	0.325	0.0048	0.0073	7.41E−01	7401	0.918
Neutrophil count—novel loci																										
rs6936204	6	32 217 092	C	T	6.45	0.048	33 706	AK123889	0.585	0.02	0.004	5.83E−06	16 550	0.991	0.912	0.032	0.009	3.97E−04	9802	0.983	0.279	0.01	0.0074	4.68E−01	7354	1

Strong evidence for association is defined as a BF of >6. Differences in effect alleles between cohorts were corrected before the MANTRA analysis.
PPA, posterior probability of association; SE, standard error; EAF, effect allele frequency.
[a]Consortia summary of imputation qualtiy score.
*Proxy for rs2814778.

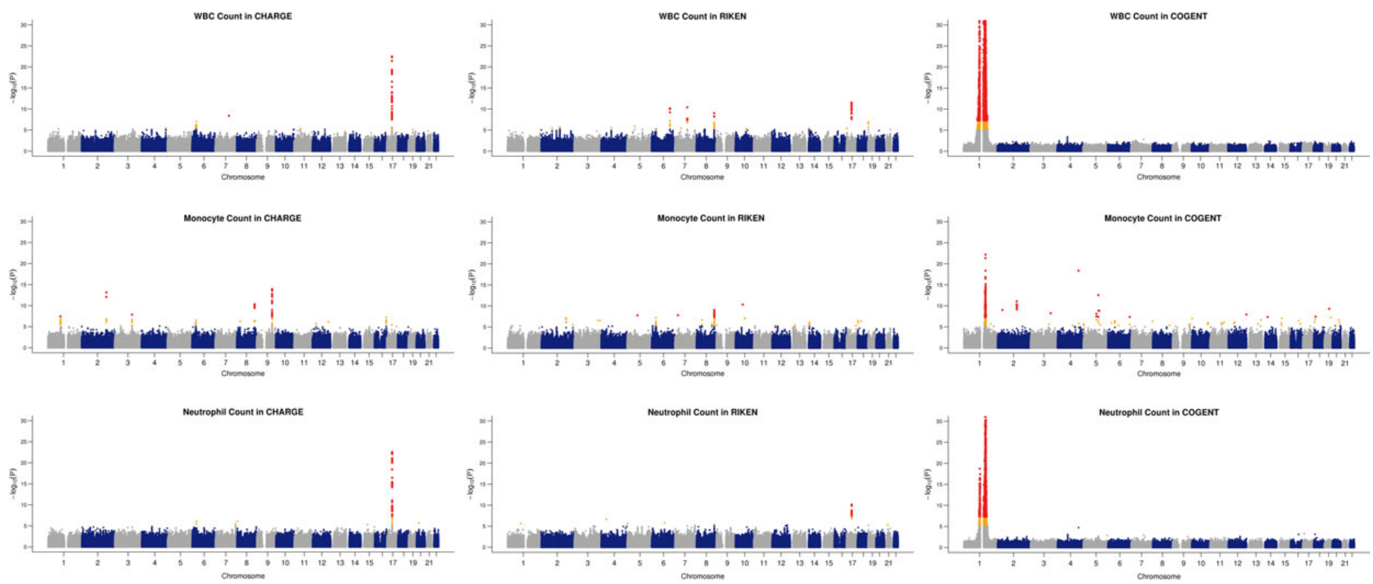

Figure 1. Manhattan plots subset by WBC subtype and cohort. Horizontal axis indicates the chromosomal position. Vertical axis for the blue Manhattan plots indicates $-\log_{10}$ *P*-values from fixed-effects meta-analysis, and vertical axis for the black Manhattan plots indicates BFs from trans-ethnic meta-analysis. Significance values are truncated at 30 on the *y*-axis for clarity and scaling of images. A 50 Mb region of apparent significance surrounds the centromere of chromosome 1 and suggests two distinct peaks; however, this results from the lack of genotyped or imputed SNPs in the region and is a spatial inflation of a truly causal variant in the nearby *DARC* gene [Nalls *et al*. (9) and Reiner *et al*. (12)].

is also a receptor for *IL-8*. Additional novel associations for WBC include rs2163950 at 8q24.21, located in an intergenic region, and rs6734238 in region 2q13, located near *IL1F10* and *IL1RN*. Top SNP rs6734238 tags the *IL-1* gene family locus near 2q13 and has also been associated with C-reactive protein levels in a European ancestry population (22). Notably, a large region of the implicated chromosome 6 associations for WBC, tagged by rs2853946, contains an apparently bimodal signal of association, between 310.00 and 313.00 Mb (Fig. 2). A single novel association for monocyte count was identified by rs2047076 in region 5q13.3, also within an intergenic region of the genome. This region falls between *F2R*, associated with platelet count (23), and *F2RL1* which encodes PAR-2, a monocyte receptor (24).

Variants showing strong evidence for association were examined for heterogeneity in their allelic effects across ancestries, indicated by a posterior probability of heterogeneity (PPH) of >0.5 (Table 3). For the novel monocyte-associated locus on chromosome 5, the RIKEN cohort has a large posterior mean allelic effect (PMAE), whereas the COGENT and CHARGE cohorts have PMAE that are much smaller. This suggests that the association may be specific to the Japanese population, or that the variant tagging this region, rs2047076, may not be a good proxy among European or African-American individuals because of differing LD structure between these populations. The associations reported on chromosome 4 for both WBC and neutrophils exhibit allelic effects in opposite directions between the ancestry groups, which could reflect multiple risk variants, or differing LD structure (1). The novel associations reported on chromosome 2 for WBC have a posterior probability of association (PPA) of $\sim$0.03, and the PMAE of these variants are similar across the three ancestries ($\sim$0.01). PPA is estimated from the weighted average of the alternative models and accounts for the differences in likelihood and statistical power between tests (25). Locus plots for novel associations are shown in Figures 2–7, and locus plots for known associations are shown in Supplementary Material, Figures S1–S11.

To determine how consistent the MANTRA results are across studies, a random-effects MA was also performed using METAL. The results are largely supportive of the known and novel loci reported here, with the exception of those variants with high levels of heterogeneity between populations, such as the novel variant associated with monocytes and located on chromosome 5, rs2047076. The results of this additional MA are found in Supplementary Material, Table S1.

Cohort-level data were imputed before the trans-ethnic analysis was performed. In instances where a novel variant was both imputed across multiple cohorts and exhibits low allele frequencies within those cohorts, additional replication is needed to validate the associations made here. In particular, these include rs2047076, associated with monocytes, and rs2163950, associated with WBC count (Table 2). Without replication, these novel results should be viewed cautiously. We are optimistic that in time, a similarly sized, ancestry-matched cohort will be available to replicate these analyses. In the meantime, we have provided genome-wide summary statistics for the primary MANTRA analyses of monocyte, neutrophil and WBC count traits in Supplementary Material, Table S2.

Fine mapping

Credible sets were defined to assess the extent to which the trans-ethnic analysis improved fine-mapping resolution of known associations. Credible region summary data for associated loci are presented in Supplementary Material, Table S3.

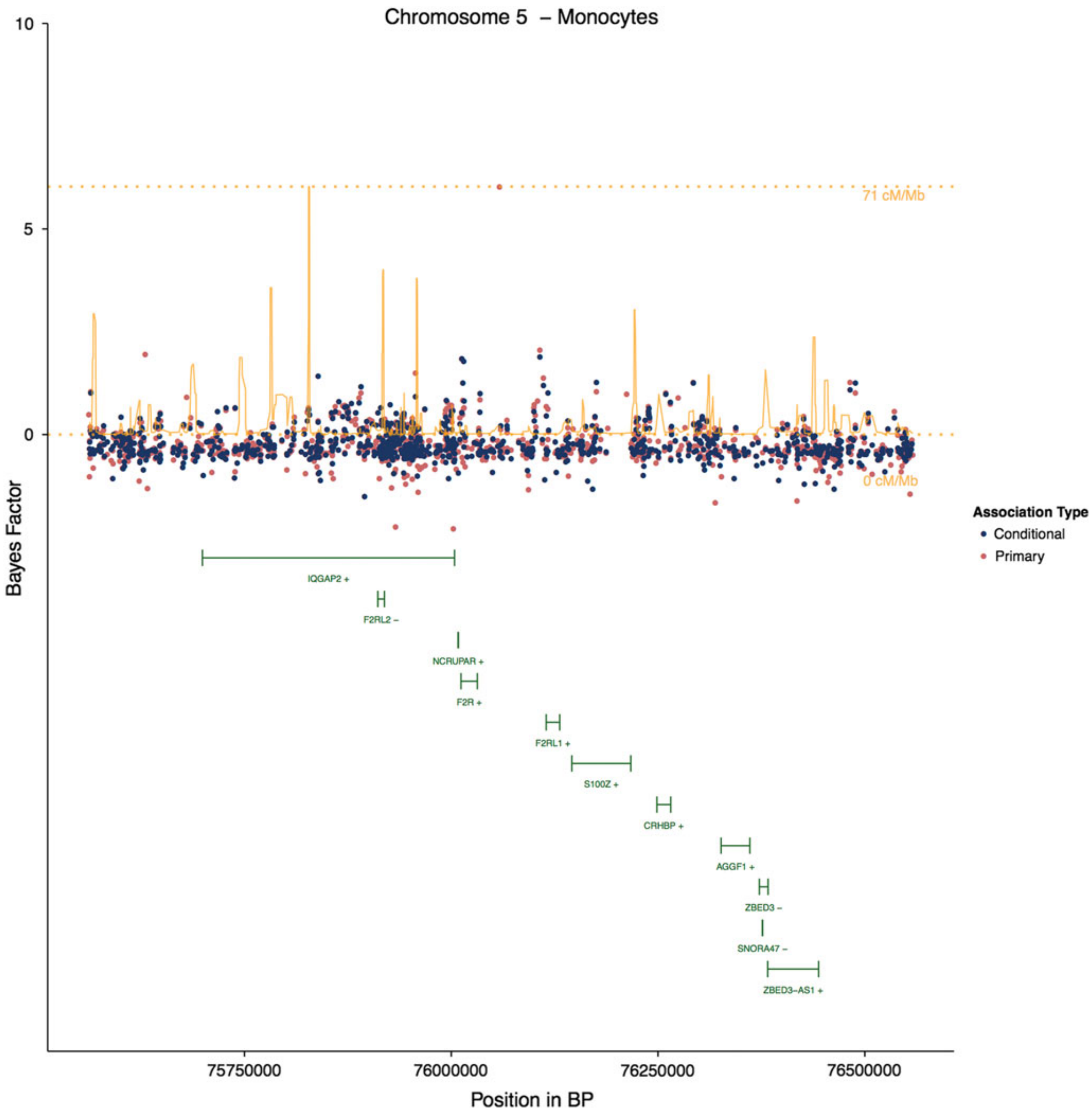

Figure 2. Locus plot for Monocyte association on chromosome 5. Vertical axis indicates BF, and horizontal axes indicate both chromosomal position and gene location.

The major locus affecting WBC levels in African-Americans is located in the *DARC* gene of chromosome 1, spanning 900 000 bp between 158 724 683 and 159 624 683 (3). The main variant associated with this signal is rs2814778, located at position (b37) 159 174 683. Our analyses replicated this finding, identifying a number of significant hits surrounding rs2814778 (chr1: 159 174 683). The surrounding variants are the product of a well-established selective sweep, and proximity to the Duffy null mutations predisposed them to association (26). While rs2814778 was not included in all three cohorts due to the removal of monomorphic SNPs during quality control, credible region analyses of this region identify a single nearby variant, rs2518564 (chr1: 159 062 436), as encompassing 99% of the signal. As the functional variant in the *DARC* locus is present exclusively in the African-American population consortium, we did not expect the this region to show meaningful fine mapping. The use of a proxy variant in high LD with the other two cohorts provides additional evidence of what is already known, this region is highly associated with WBC.

Other previously identified associations with WBC subtypes, however, were substantially narrowed. For example, the 7q21.2 region tagged soley by rs445 in both WBC and neutrophil counts was found to encompass 99% of the association signal for these traits. This variant is located within an intronic section of *CDK6*, a gene in the cyclin-dependent protein kinase family. At another previously identified locus for WBC and neutrophil count, located on chromosome 17, the association signal could be limited with 99% confidence to seven variants across a ~15 kb region associated with WBC count and two variants across a ~10 kb region associated with neutrophil count. The previously identified variant tagging this region, rs4794822, is within both of these SNP sets, but individually reaches only 72% confidence in WBC count and 88% confidence in neutrophil count.

Table 3. Heterogeneity of allelic effects

Subtype	Variant details SNP	Chr	Position (b37)	MANTRA MA $\log_{10}$ (BF)	PPH	CHARGE PMAE	PSD	RIKEN PMAE	PSD	COGENT PMAE	PSD
Novel											
WBC	rs10932765	2	219 099 484	6.95	0.025	0.01068	0.00182	0.01068	0.00182	0.01057	0.00205
WBC	rs6734238	2	113 841 030	6.62	0.028	−0.01193	0.00244	−0.01181	0.00213	−0.01195	0.00227
WBC	rs1371799	4	74 977 837	13.5	1	−0.01164	0.00207	−0.01163	0.00207	0.02273	0.00408
WBC	rs2853946	6	31 247 203	12.16	0.009	−0.01379	0.00179	−0.01379	0.00179	−0.01378	0.00181
WBC	rs2163950	8	130 597 585	7.75	0.065	−0.01688	0.00287	−0.01655	0.00304	−0.01614	0.00346
MONO	rs2047076	5	76 058 509	6.03	1	2.50643	0.47953	0.00458	0.00498	0.00457	0.00495
NEU	rs7667376	4	74 967 890	11.13	1	0.011	0.00199	0.01104	0.00199	−0.02275	0.00405
NEU	rs6936204	6	32 217 092	6.45	0.048	0.01028	0.00356	0.0096	0.00259	0.00681	0.00477
Known											
WBC	rs2518564*	1	159 062 436	341.59	1	0.00318	0.00241	0.00363	0.00258	0.19017	0.00469
WBC	rs4895441	6	135 426 573	9.64	0.165	0.01368	0.00248	0.01282	0.00239	0.01169	0.00446
WBC	rs445	7	92 408 370	16.8	1	0.01905	0.00254	0.01899	0.00297	−0.02476	0.00476
WBC	rs4794822	17	38 156 712	29.64	1	−0.02088	0.00309	−0.02491	0.00337	0.01249	0.00391
MONO	rs1449263	2	182 319 301	19.24	1	−0.03449	0.00399	−0.03484	0.00378	0.00857	0.00316
MONO	rs12988934	2	182 323 665	7.75	0.022	−0.03872	0.00621	−0.03853	0.00627	NA	NA
MONO	rs9880192	3	128 297 569	8.3	1	−0.03049	0.00687	−0.02917	0.0046	0.00315	0.00483
MONO	rs3095254	6	31 221 668	6.81	1	0.03449	0.00622	0.00473	0.00306	0.00439	0.00267
MONO	rs1991866	8	130 624 105	15.3	1	−0.0322	0.00418	−0.03217	0.00392	−0.00466	0.00316
MONO	rs10980800	9	113 915 905	11.63	1	0.0087	0.01581	0.043	0.00581	−0.00475	0.00379
NEU	rs445	7	92 408 370	10.52	1	0.01905	0.00254	0.01899	0.00297	−0.02476	0.00476
NEU	rs8078723	17	38 166 879	28.06	1	0.01851	0.00278	NA	NA	−0.01105	0.00378
NEU	rs4794822	17	38 156 712	28.92	1	−0.02088	0.00309	−0.02491	0.00337	0.01249	0.00391

Variants encompassing the 95% credible region of an associated region, as identified using the top hits from the MANTRA analysis, are presented for each subtype. Ancestry-specific posterior mean allelic effects (PMAE) are reported. PSD is the Bayesian equivalent of standard error and characterizes the variance of the effect. PMAE is the posterior mean allelic effect; when these values are similar between ancestry cohorts, it suggests that simiar variants are responsible for the effect. When values are in opposite directions, it suggests multiple risk variants, or differing LD structure.
PPH, a posterior probability of heterogeneity; PPA, posterior probability of association; the probability that an SNP is truly associated with a phenotype.
*Proxy for rs2814778.

Conditional analysis

Conditional analysis adjusting for the effect of the most significantly associated SNP at each locus was performed to assess the independence of possible novel variants and to detect the presence of any secondary association signals within known regions. Secondary signals were defined as additional associated variants within 500 kb of previously known loci. Of the primary (known and novel) loci, approximately half contained secondary signals; these include four signals associated with monocytes, three associated with neutrophils and six associated with WBC count. In some instances, the top signal identified by the secondary analysis was stronger than that observed in the primary analysis. This could occur, for example, when the allele frequencies of the initial, index SNP are similar across ancestries, but the conditional signal(s) more accurately tag a functional variant in the respective populations. In order to verify the authenticity of our conditional analysis results, we performed reverse conditioning on our secondary signals and found the signals reported here to remain significant, suggesting an independent effect on WBC subtypes. The top association signals from these conditional analyses are found in Table 4.

Expression quantitative trait loci analysis

All known, conditional and novel loci were assessed as potential expression quantitative trait loci (eQTLs) in leukocyte-derived tissues in order to identify any correlations between association signals and gene expression, as such correlations may account for functional relationships that are not captured by LD. Two known loci associated with monocyte count, and one novel locus newly associated with both WBC and neutrophil count, represented significant ($P < 5E-05$) eQTLs when assessing either the European ancestry sentinel SNPs or their proxies in the YRI (African) and ASN (Asian) populations (1). Three of the four index SNPs at these loci are located within chromosome 6p21.3; each has been associated with a different blood cell trait. The monocyte eQTLs on chromosome six are defined by the transcription factor gene *TCF19*; the neutrophil eQTLs relate primarily to the *HLA* transcripts, but depending on the tissue type are also associated with expression of *ATP6V1G2*, which encodes an enzyme involved in eukaryotic cell compartment acidification. The WBC count eQTLs also relate to various transcripts of this region. Additionally, a previously described locus associated with monocyte count on chromosome 2 is an eQTL for the *ITGA4* transcript at 2q31.3, which encodes the integrin alpha-4 subunit of the very late antigen-4 receptor on monocytes and other mononuclear cells (27,28). In instances where a proxy eQTL SNP has been used to represent a WBC or subtype-associated SNP, variants with greater concordance to the index SNP are viewed with more confidence than those with lower R^2 values. Only two eQTL SNPs were found to be concordant or in very high LD: rs3130320 ($R^2 = 1$) for neutrophils and rs6740847 ($R^2 = 0.983$) for monocytes. We have reported other SNPs as potential eQTLs if their R^2 value with the proxy eQTL SNP is >0.5; these SNPs are of course likely to be near the blood cell SNPs' physical location. All the proxy eQTL variants identified here are located in Supplementary Material, Table S4.

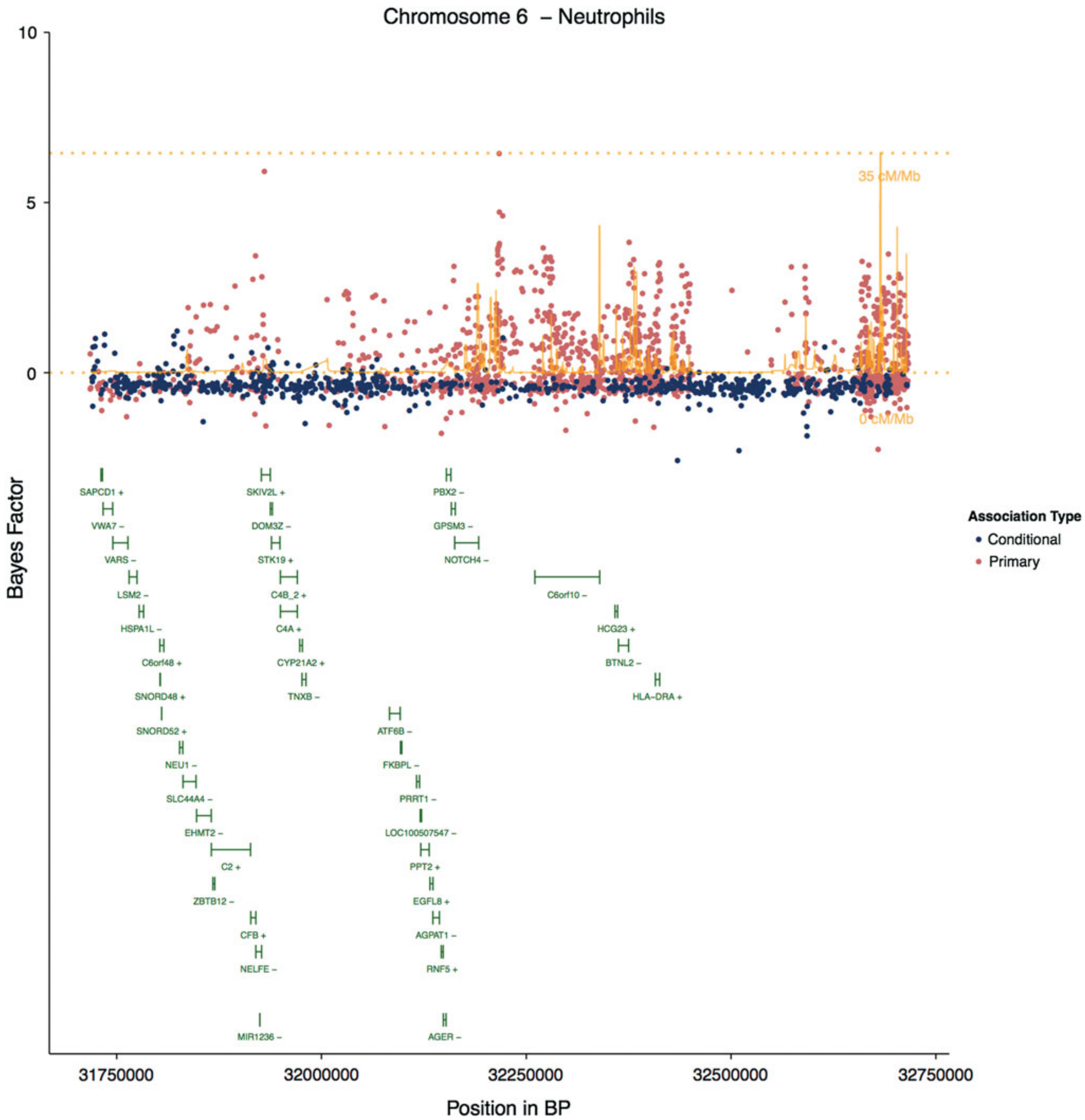

Figure 3. Locus plot for Neutrophil association on chromosome 6. Vertical axis indicates BF, and horizontal axes indicate both chromosomal position and gene location.

DISCUSSION

We applied trans-ethnic MA to summary data from Japanese, African-American and European-Americans populations and identified six new regions that contain biologically plausible genetic loci associated with WBC traits. Many of the novel and secondary association signals we observed involve genomic regions that contain several inflammatory and immune cell-related genes.

Particularly interesting, novel regions include the two loci on chromosome 2 associated with WBC count. The first, identified by rs6734238, falls within an inflammatory gene region of the interleukin-1 cytokine gene family (29). This region has been associated with several inflammation-related biomarkers, including C-reactive protein and fibrinogen. rs6734238 is located downstream of *IL1F10* and upstream of *IL1RN*. *IL1RN* encodes IL-1 receptor antagonist (IL-1RA), which regulates a variety of interleukin-1-related immune and inflammatory responses, including inhibition of interleukin 1, alpha (IL1A) and interleukin 1, beta (IL1B). *IL1F10* encodes IL-38, which regulates Th17 immune responses and stimulates IL-6 cytokine production from dendritic cells *in vitro* (30). The second chromosome 2 region, identified by rs10932765, is near *APRC2* and *CXCR1* (also known as *IL8RA*). *CXCR1* is of particular interest as this is a chemokine receptor involved in leukocyte chemotaxis and trafficking (31).

The novel chromosome 5q13 region associated with monocyte count lies within a family of protease-activated receptor genes, *F2RL2-F2RL1-F2R*. The *F2RL1* gene (protease-activated receptor-2 or PAR-2) has previously been related to some inflammatory and autoimmune diseases, and is a known receptor on monocytes (32). PAR-2 is a G protein-coupled receptor on monocyte/macrophages and other cell types that appear to have a direct role in the regulation of innate immune

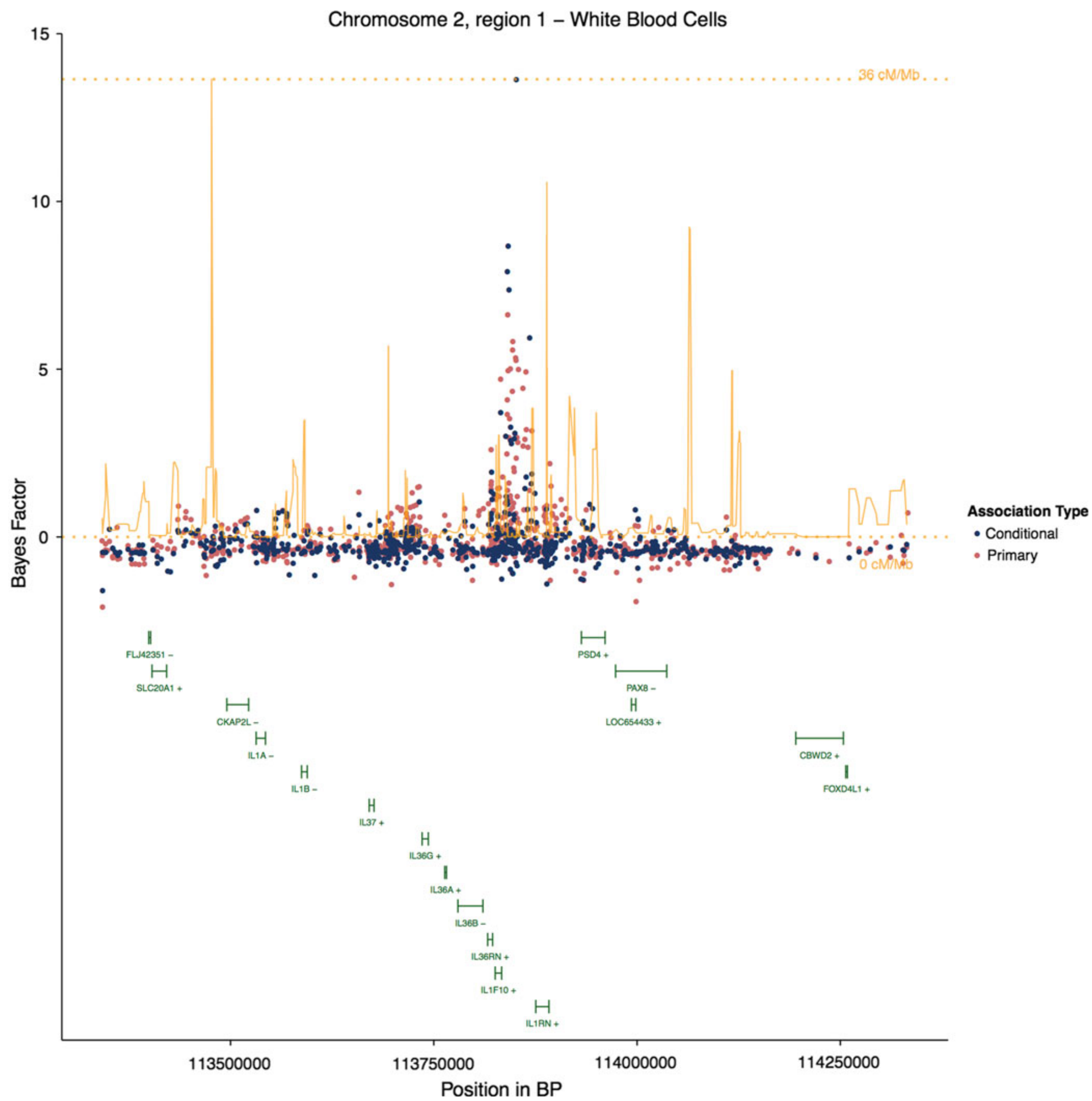

Figure 4. Locus plot for White Blood Cell count association on chromosome 2 (first region). Vertical axis indicates BF, and horizontal axes indicate both chromosomal position and gene location.

function. Specifically, PAR-2 can be activated by a number of endogenous inflammation-associated proteinases (e.g. mast cell tryptase, trypsin and neutrophil proteinase 3) or exogenous pathogen-derived proteinases (33). Notably, another member of the PAR gene family located on 5q13, *F2R*, encodes PAR-1, the platelet thrombin receptor. Common variants of *F2R* were recently associated with circulating platelet count in a European GWAS (23).

A single region of chromosome 6, associated with neutrophil and WBC count, is located near the *HBS1L* and *MYB* genes, which are known to be associated with fetal hemoglobin levels and monocyte counts. This locus has also been reported to be associated with red cell and platelet traits, but not previously with white cell traits. Although there is a single signal for neutrophils at this locus, the signal for WBC count appears bimodal. One of these two regions is captured by a single SNP with 99% confidence, while the second requires a regional span of nearly 1 Mb to reach the same level of confidence. This locus was also significant in our eQTL analysis across all ancestry types for both neutrophil and WBC count, in lymphoblastoid cell lines (LCLs) and whole blood.

The region of chromosome 8 newly associated with WBC count lies near a gene of unknown function, *GSDMC*, which encodes gasdermin C. Other genes belonging to the gasdermin family have been associated with immune-mediated phenotypes such as asthma and alopecia (34,35), suggesting a role for this gene family in inflammatory disorders (36).

A signal was observed on chromosome 16 for WBC count and neutrophils; however, the top associated variant is located within the intronic region of *HYDIN*, an mRNA transcript sequence involved in cilia motility. As previously reported, it is a likely homolog to the *DARC* region of chromosome 1 and represents a spurious signal (12).

The replicated region on chromosome 4, associated with both WBC and neutrophil counts, is located near a chemokine family

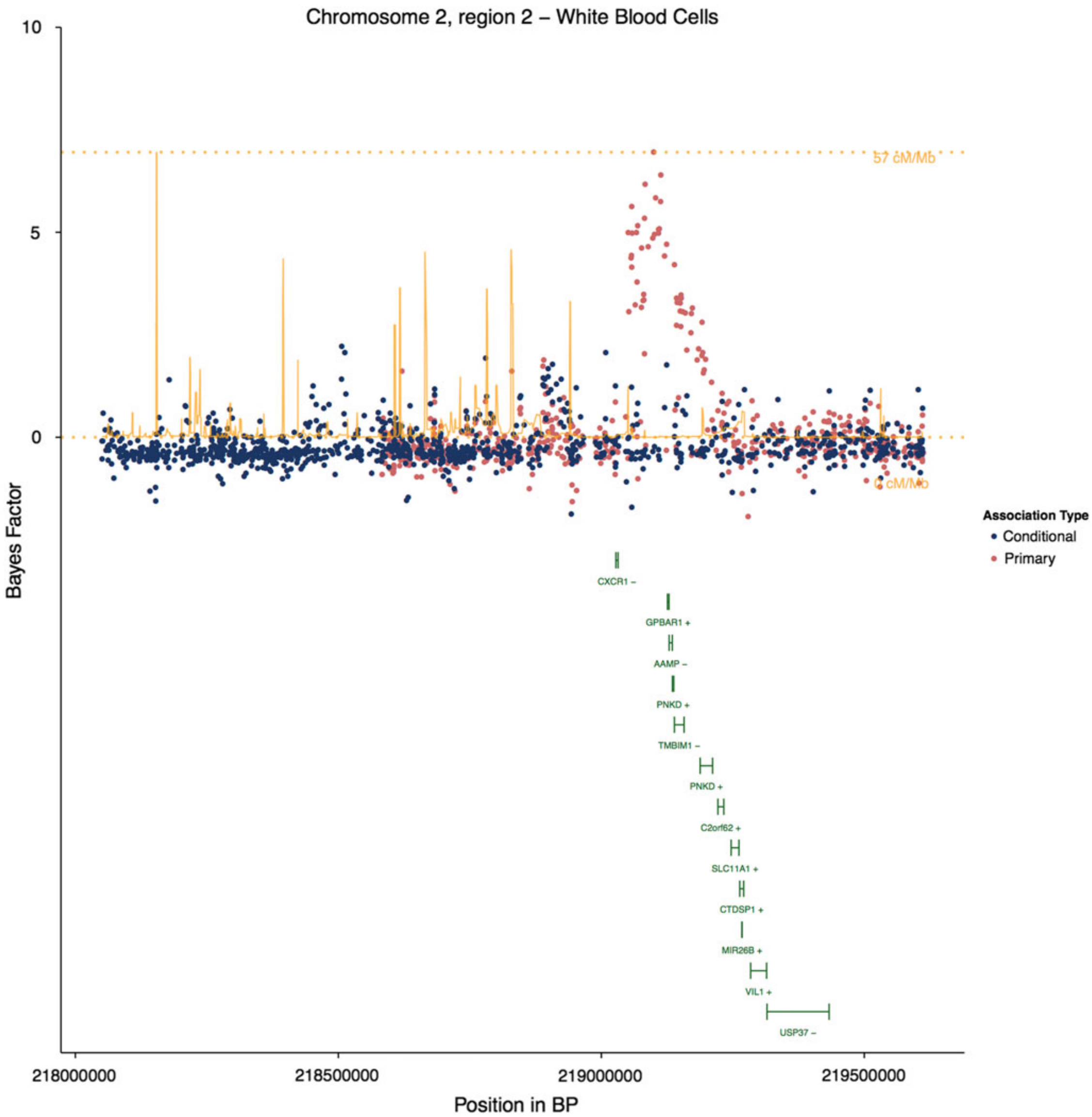

Figure 5. Locus plot for White Blood Cell count association on chromosome 2 (second region). Vertical axis indicates BF, and horizontal axes indicate both chromosomal position and gene location.

gene cluster, *CXCL5-CXCL3-CXCL2*. *CXCL2* interacts with another chemokine receptor, *CXCR2*, to control migration of leukocytes from the bone marrow (37). Taken together with the *DARC* locus, these findings extend the importance of common genetic variants of chemokine ligands and receptors in the regulation of WBC counts.

Using the proper reference panel is critical to the dependability and accuracy of this analysis. For this reason, ancestry-matched subsets of the 1000 Genomes were used as the reference panel from which LD was calculated, which are presumed to be drawn from the same general populations as those used here. However, the relatively small sample sizes available through 1000 Genomes increase the possibility of error in LD estimations (38). While the localization and resolution of functional variants may improve with the additional genomic variation measured in newer reference panels, we show that even without these newer panels, the associations identified using MANTRA provide plausible candidates for functionality.

In conclusion, trans-ethnic meta-analyses allow for an examination of disease traits within a large population of individuals and provide the opportunity to localize previously known regions and detect novel ones, while considering the heterogeneity of allelic effects that may exist between contentially distinct populations. Additionally, our results illustrate the utility of trans-ethnic fine mapping for narrowing regions of association. Well-established loci replicated in the present study show credible intervals that flank the known index variant. For example, the previously known monocyte associations on chromosomes 8 and 9, shown in Supplementary Material, Table S3, have 99% credible intervals of only a few thousand base-pairs, located in close proximity to the originally identified variants. Our analysis of the *DARC* region is complicated by the causal

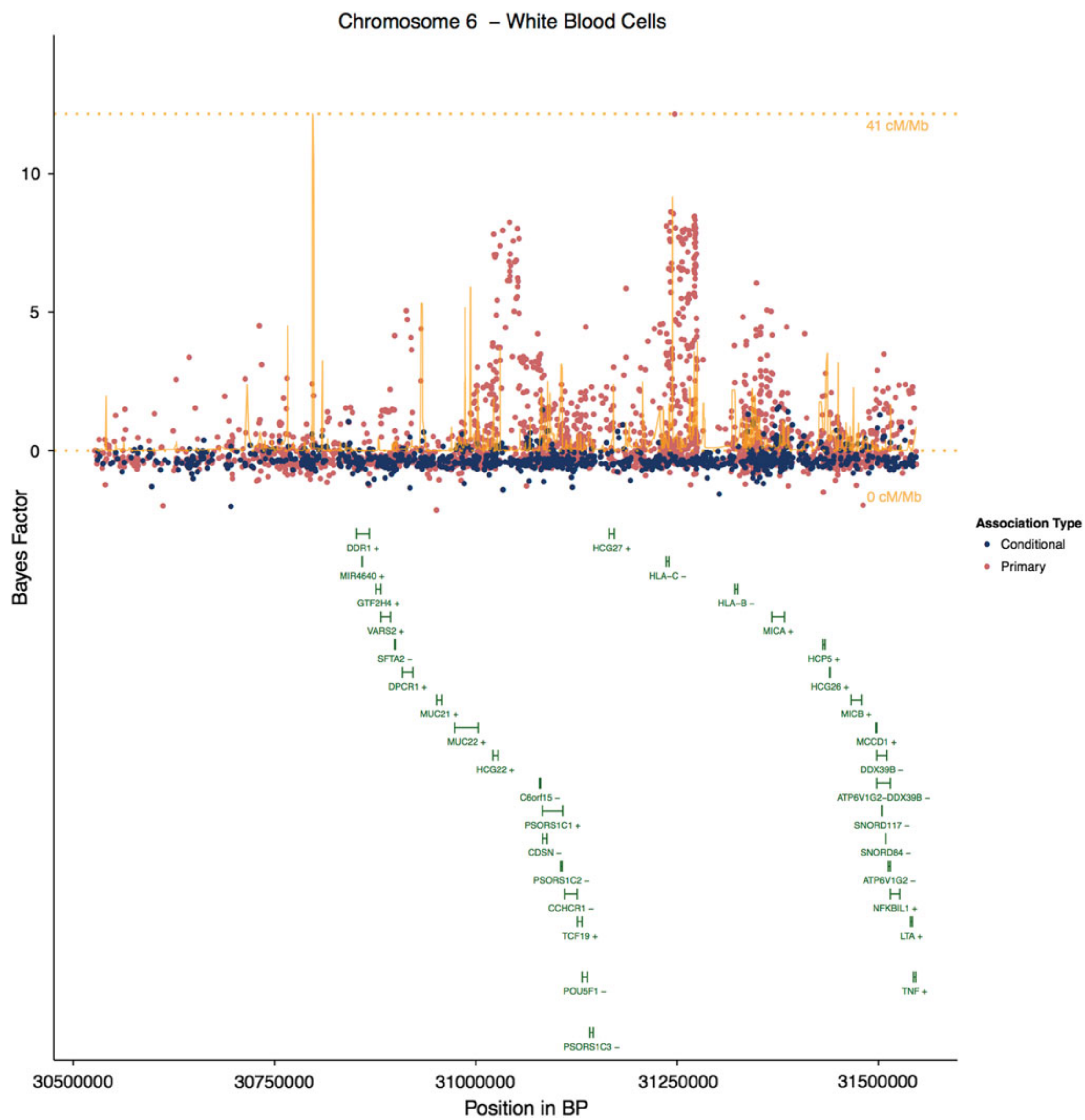

Figure 6. Locus plot for White Blood Cell count association on chromosome 6. Vertical axis indicates BF, and horizontal axes indicate both chromosomal position and gene location.

SNP being monomorphic in two of the three populations employed. When the credible interval analysis is applied to this region, the proxy variant (rs2518564) tagging the known functional variant (rs2814778) (5,8) is identified as accounting for the entire signal. However, prior association studies and evidence of biological function allow confident identification of rs2814778 as the functional variant. By calculating credible intervals across test statistics from analyses of combined ancestries, we were able to narrow expansive loci to smaller regions. Further work is necessary to identify what functional variants may lie within these regions.

The increasing availability of GWAS summary data for many phenotypic traits of interest, from many ethnically diverse populations, suggests that the trans-ethnic GWAS MA approach can yield additional association signals, thereby explaining some of the missing heritability and genetic architecture for other complex traits. In addition, this work is relevant for future targeted sequencing follow-up studies, as we have narrowed the scope of follow-up sequencing efforts for functional variants. By increasing the mapping resolution of the causal variants within these loci, we hope that these results guide next-generation targeted deep sequencing studies, which may disentangle the heterogeneity of effect across ethnicities (39). Future work will discern which functional variants are the same across ethnicities and which tag nearby regions, through LD, that harbor the true functional variant or variants.

MATERIALS AND METHODS

The trans-ethnic GWA strategy was applied to three consortia containing WBC phenotypes. These include a Japanese population represented by RIKEN (Rikagaku Kenkyusho, Institute of

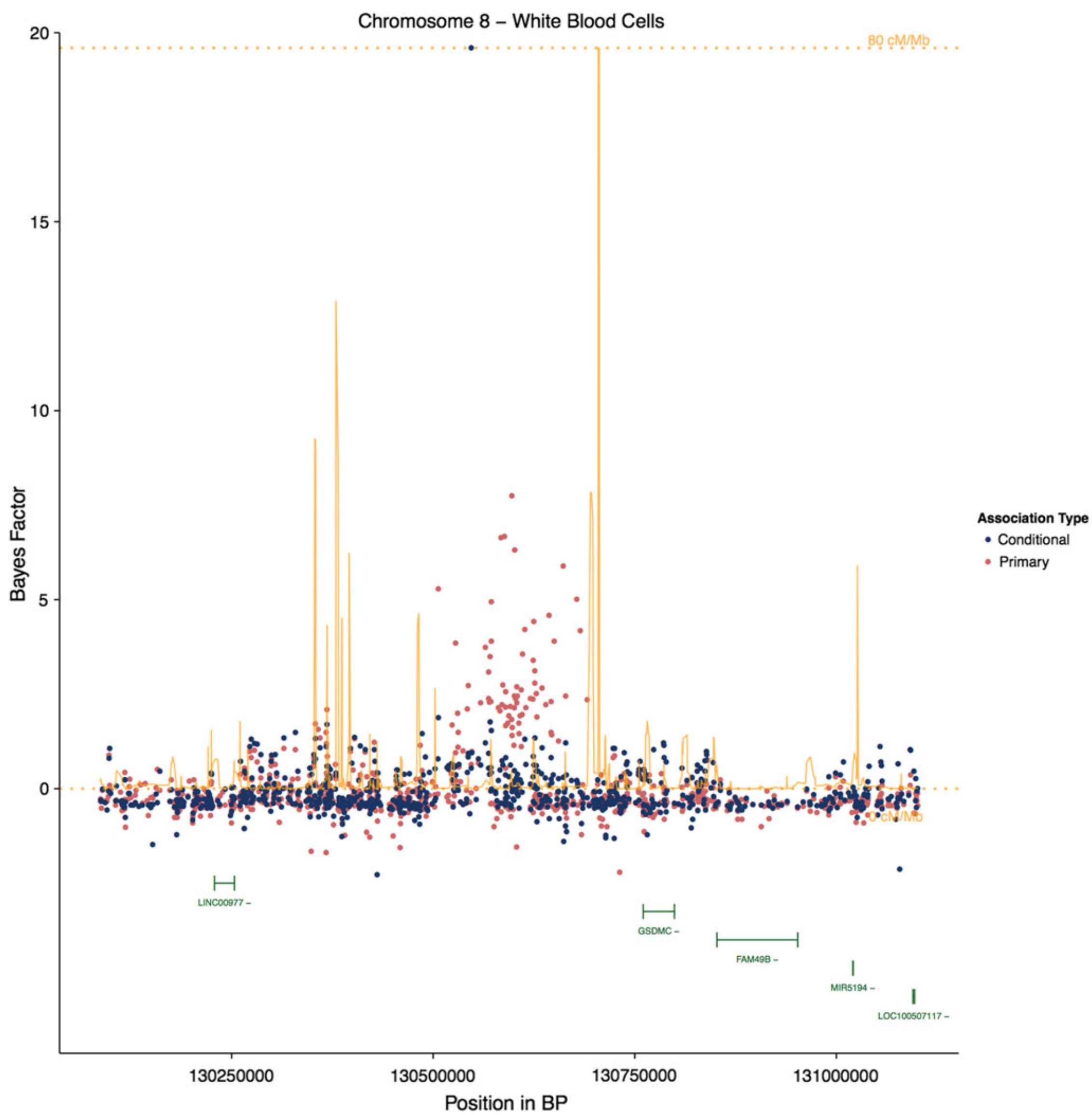

Figure 7. Locus plot for White Blood Cell count association on chromosome 8. Vertical axis indicates BF, and horizontal axes indicate both chromosomal position and gene location.

Physical and Chemical Research, Japan), a European ancestry population represented by the Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE) Consortium and an African-American population represented by the Continental Origins and Genetic Epidemiology Network (COGENT) Consortium (9,11,12). All three consortia contain measurements for total WBC count, neutrophil count and monocyte count, using the same scale of transformation and similar analytic paradigms. Clinical information of the subjects includes age, gender and smoking history, and was collected by self-report. Subject BMI was also collected as a measure. The laboratory data include total WBC count and subtypes, as determined using automated hematology cell counters according to the standardized protocol. The WBC phenotypes were natural log-transformed prior to analysis to provide a normal distribution. Samples >2 SD outside of the ethnicity specific mean for the given phenotype were excluded. This was done to ensure normality of the included samples, and to exclude any subclinical inflammation such as the common cold. If a sample was identified as an outlier for one or more subtype, it was excluded entirely from the study.

The RIKEN study comprises over 17 000 individuals from The BioBank Japan Project, which is made of up over 300 000 subjects (http://biobankjp.org) (11). Samples determined to be of non-Japanese origin by either self-report or by principal components analyses (PCAs) in GWAS were excluded from further analyses. For the GWAS, 592 232 SNPs were genotyped using Illumina HumanHap610-Quad Genotyping BeadChip. Subjects with call rates <0.98 were removed, as were SNPs with call rates <0.99. First- and second-degree relatives were excluded based on identity-by-descent analyses, as were SNPs with minor allele frequency (MAF) <0.01 or with Hardy–Weinberg equilibrium (HWE) P-values $<1.00\mathrm{E}-7$. After quality control, genotypes were imputed using MACH 1.0 in a two-step procedure,

Table 4. Loci identified by conditional analysis

Subtype	Primary top hits[a] SNP	Chr	Position	Secondary top hits SNP	Position	Effect allele	Other allele	N—studies	$\log_{10}$ BF	PPH	Sample size	Effect direction
MONO	rs1449263	2	182 319 301	rs711801	182 334 873	C	T	3	10.46982	0.579	33 711	++−
MONO	rs3095254	6	31 221 668	rs2517774	29 893 982	C	T	2	72.9753	1	26 360	?−−
MONO	rs2163952	8	130 610 389	rs1457475	134 988 329	A	G	3	6.48727	1	28 317	−−+
MONO	rs12350763	9	113 923 723	rs4401938	121 179 496	C	T	3	68.41786	0.99	33 729	+++
NEU	rs7667376	4	74 967 890	rs1440404	74 944 449	C	G	3	54.50984	1	33 713	++−
NEU	rs445	7	92 408 370	rs3731326	92 327 026	A	G	3	6.86032	1	33 753	+−−
NEU	rs4794822	17	38 156 712	rs4794321	46 028 844	C	T	3	7.89538	1	33 753	−−+
WBC	rs6734238	2	113 841 030	rs11899198	113 840 539	G	T	3	7.90504	1	52 694	−++
WBC	rs1371799	4	74 977 837	rs1440404	74 944 449	C	G	3	53.18811	1	52 697	+−−
WBC	rs9402686	6	135 427 817	rs1890428	140 253 023	C	T	2	22.53076	1	22 472	+?−
WBC	rs445	7	92 408 370	rs42626	89 961 237	C	T	3	11.88853	1	52 740	−++
WBC	rs2163950	8	130 597 585	rs10505542	130 547 253	C	T	3	19.59631	1	52 686	−−+
WBC	rs2241245	17	38 151 014	rs8070454	38 160 754	C	T	2	22.03367	1	33 231	+?−

Top hits from the GCTA conditional analyses are reported.
PPH, posterior probability of association; or, the probability that an SNP is truly associated with a phenotype. Effect direction order of studies: COGENT, CHARGE, RIKEN.
[a]Used as covariates in conditional analysis.

described in detail elsewhere (40,41). HapMap Phase II Japanese individuals from Tokyo (JPT) and Han Chinese individiuals from Beijing (CHB) individuals were adopted as references. SNPs with imputation qualities <0.30 were excluded prior to analyses, and genomic control was applied to the cohort-level data. All participants provided written informed consent as approved by the ethical committees of the Center for Genomic Medicine, RIKEN and the Institute of Medical Science, the University of Tokyo (11).

The CHARGE consortium dataset is comprised of over 19 000 individuals from seven discovery cohorts, including: the Rotterdam Study (RS), Framingham Heart Study (FHS), the NHLBI's Atherosclerosis Risk in Communities (ARIC) Study, the Age, Gene/Environment Susceptibility—Reykjavik Study (AGES), Health Aging and Body Composition study (HABC), the Baltimore Longitudinal Study of Aging (BLSA) and the Invecchaire in Chianti Study (inChianti) (9). Each of these studies, with the exception of the Framingham Heart Study, is comprised of unrelated individuals of confirmed European ancestry, based on PCAs. Prior to MA, SNPs with MAF <0.01, missingness >5% or HWE <1.00E−7 were excluded. Individuals with call rates <95% were also excluded. After quality control, genotypes were imputed using the CEU reference panel of the HapMap Phase II haplotype data. The CHARGE consortium is comprised of MA data resulting from the summary statistics of these individual studies. Prior to the meta- analyses, study results were adjusted for genomic inflation factors, and SNPs with imputation quality<0.30 were excluded. Meta-analyses were performed using a fixed-effects model in METAL (42).

The COGENT consortium is comprised of over 16 000 self-identified African-Americans from seven discovery cohorts, including: Atherosclerosis Risk in Communities (ARIC), Coronary Artery Risk Development in Young Adults (CARDIA), Johns Hopkins Genetic Study of Atherosclerosis Risk (GeneSTAR), HealthyAging in Neighborhoods of Diversity across the Life Span (HANDLS), Health, Aging, and Body Composition (Health ABC), Jackson Heart Study (JHS) and the Women's Health Initiative (WHI) (12). SNPs were excluded from cohort-level GWAS if MAF <1% or missingness>5%. Monomorphic SNPs and ambiguously mapped SNPs were also removed. Individual samples exhibiting gender mismatch or genotype missingness >10% were excluded. After quality control, genotypes were imputed with HapMap Phase II, using a 1 : 1 mixture of the CEU and YRI reference populations. Prior to MA, SNPs with imputation quality <0.30 were excluded. Study-specific GWA results were corrected for genomic inflation factors, and MA was performed using a fixed-effects model in METAL (42).

Statistical analysis

Summary statistics for the RIKEN GWAS and the CHARGE and COGENT meta-analyses were collected and stratified by ethnicity and WBC subtype availability. Data were input into the trans-ethnic MA software package, MANTRA (15), which makes use of a prior model of relatedness between studies corresponding to Fst, or mean effect allele frequency differences between populations. Relatedness is determined by differences in allele frequency between studies. MANTRA estimates the BF in favor of association for each SNP using a Markov chain Monte Carlo (MCMC) algorithm. Results are reported as $\log_{10}$ (BF), and associations of 6 or greater have the highest posterior odds of being truly present (43,44). Posterior probability of heterogeneity is also reported to examine levels of variation in allelic effects across the populations used in the analysis. Combining results across studies using a Bayesian approach is advantageous, as the evidence produced by this study is directly comparable to future studies performed in the same way. Simulations of distinct ancestry populations show that when MANTRA is compared with random-effects and fixed-effects meta-analyses, MANTRA shows increased performance and produces the highest-powered results in the detection of novel associations (15,22,45–47).

Since the initial imputation of the datasets used here, a number of more comprehensive reference panels have been released including the latest HapMap release and the samples available through the 1000 Genomes Project. As these reference panels contain more individuals and greater genome coverage, more genotypes are predicted with greater confidence than when using prior HapMap releases. Imputing raw data to the latest release of 1000 Genomes would be ideal; however, due to the data-sharing requirements of the cohorts included in this analysis, only summary statistics were available for these datasets. However, MANTRA is still expected to outperform a traditional MA in this case, as MANTRA accounts for heterogeneity while making no assumptions about differences or similarities in allelic effect.

To quantify uncertainty surrounding the top hits from the trans-ethnic MANTRA analysis, we calculated 95 and 99% credible regions (48). We estimated credible sets of SNPs by first defining a 1 Mb genomic region surrounding lead SNPs ($\pm$ 500 kb), then ranking the regional SNPs within this region according to their BF and then combining the cumulative posterior probabilities of these ranked SNPs until 95 and 99% confidence was reached.

In addition, the top hits from MANTRA were input into a conditional analysis in order to identify additional association signals at nearby susceptibility loci and to determine independence of these secondary signals from the index SNP association. As complex diseases are assumed to be influenced by two or more genes acting in concert, it is possible that prior GWAS aimed at identifying single loci have not detected secondary signals. Thus, when large sample sizes are available, conditional approaches can be useful in detecting secondary association signals with loci that initially appear to contribute a negligible risk to disease susceptibility. In addition, as evidence of association is predicated on a given conditioned SNP, it is possible that, in some instances, the secondary associations are stronger than what was observed in the primary single-ethnicity GWAS analysis. This is possible when the allele frequencies of a given SNP are similar across ancestries, as conditional hits may be closer to a functional variant than the original, single-population hit.

We used the software program Genome-wide Complex Trait Analysis (GCTA) v1.13 to perform conditional association analysis for each ancestry-specific set of summary results (49). As individual genotype data were unavailable, this was performed separately for each cohort using summary statistics and incorporating LD information from ancestry-matched reference samples containing individual-level genotype data. When original genotype data are not available, it is essential that the reference samples be from the same population as the original data, so that the LD structure estimated from the reference population is not biased. It is also critical that the reference sample is not affected by cryptic relatedness or population stratification. This is particularly relevant to admixed populations, such as COGENT, which is comprised of African-American individuals. In order to avoid confounding the genetic relationship matrix (GRM) produced by GCTA, eigenvectors are included in the model as covariates, to capture and account for any variance that is present due to population structure (49). In this analysis, we used ancestry-matched subsets from the 1000 Genomes Project to estimate LD structure within our samples (17). Using these samples as LD proxies, the GCTA association analyses were conditioned on the top hits from MANTRA, specific to each locus of interest. Independently associated SNPs were selected using a stepwise model selection procedure. Analyses were performed separately for each ancestry cohort. The results from each cohort were then meta-analyzed across ethnicities.

In addition to the trans-ethnic association analysis, a secondary analysis exploring eQTLs was performed using SNAP (50). SNAP is a web server that identifies and annotates nearby proxy SNPs in LD (according to HapMap) to those queried. Using ancestry-specific tissues, SNAP was identified alias SNPs for significant index SNPs, and proxy SNPs in high linkage disequilibrium ($R^2 > 0.5$). Sentinel, alias and proxy SNPs were queried within a collected database of expression SNP (eSNP) results, drawn from the following leukocyte-derived tissues: fresh lymphocytes (51), fresh leukocytes (52), leukocyte samples in individuals with celiac disease (53), whole blood samples (54–56), LCLs derived from asthmatic children (57,58), HapMap LCL from three populations (59), a separate study on HapMap CEU LCL (60) and additional LCL population samples [(61–63); Mangravite *et al.*, unpublished], CD19+ B cells (64), primary PHA (phytohaemagglutinin)-stimulated T cells (61), CD4+ T cells (65), peripheral blood monocytes (27,64,66), CD11+ dendritic cells before and after *Mycobacterium tuberculosis* infection (67) and micro-RNA QTLs queried for LCL (68). The collected eSNP results met criteria for statistical thresholds of association with gene transcript levels, as described in the original cited papers. In cases where an SNP was associated with a transcript, we further examined the strongest eSNP for the transcript within that dataset and the LD between the strongest eSNP and blood count-selected eSNPs. This was done to assess the concordance of the blood count and expression signals.

SUPPLEMENTARY MATERIAL

Supplementary Material is available at *HMG* online.

ACKNOWLEDGEMENTS

This study utilized the high-performance computational capabilities of the Biowulf Linux cluster at the National Institutes of Health, Bethesda, MD (http://biowulf.nih.gov).

Conflict of Interest statement. None declared.

FUNDING

Y.O. is supported by a grant from the Japan Society of the Promotion of Science (JSPS). The development of the software package MANTRA was supported by Wellcome Trust (grant nos WT098017, WT090532 and WT064890). S.K.G. was supported in part by P30HL101290. Funding for CHARGE was made possible by NIA/NIH contract AG000932-2 (2009) Characterization of Normal Genomic Variability. The Age, Gene/Environment Susceptibility Reykjavik Study is funded by NIH contract N01-AG-12100, the NIA Intramural Research Program, Hjartavernd (the Icelandic Heart Association) and the Althingi (the Icelandic Parliament). The Atherosclerosis Risk in the Communities Study is carried out as a collaborative study supported by National Heart, Lung, and Blood Institute contracts (HHSN268201100005C, HHSN268201100006C, HHSN2682 01100007C, HHSN268201100008C, HHSN268201100009C, HHSN268201100010C, HHSN268201100011C and HHSN268

201100012C), R01HL087641, R01HL59367 and R01HL086694; National Human Genome Research Institute contract (U01HG 004402) and National Institutes of Health contract (HHSN 268200625226C). The authors thank the staff and participants of the ARIC study for their important contributions. Infrastructure was partly supported by grant number UL1RR025005, a component of the National Institutes of Health and NIH Roadmap for Medical Research. The National Heart, Lung, and Blood Institute's Framingham Heart Study is a joint project of the National Institutes of Health and Boston University School of Medicine and was supported by the National Heart, Lung, and Blood Institute's Framingham Heart Study (contract No. N01-HC-25195) and its contract with Affymetrix for genotyping services (contract No. N02-HL-6-4278). Analyses reflect the efforts and resource development from the Framingham Heart Study investigators participating in the SNP Health Association Resource (SHARe) project. A portion of this research was conducted using the Linux Cluster for Genetic Analysis (LinGA-II) funded by the Robert Dawson Evans Endowment of the Department of Medicine at the Boston University School of Medicine and Boston Medical Center. The Health ABC Study was supported in part by the Intramural Research Program of the NIH, National Institute on Aging, NIA contracts N01AG62101, N01AG62103 and N01AG 62106. The GWAS was funded by NIA grant 1R01AG032098-01A1 to Wake Forest University Health Sciences and genotyping services were provided by the Center for Inherited Disease Research (CIDR). CIDR is fully funded through a federal contract from the National Institutes of Health to The Johns Hopkins University (contract number HHSN268200782096C). The InChianti Study was supported as a 'targeted project' (ICS 110.1RS97.71) by the Italian Ministry of Health, by the US National Institute on Aging (contracts N01-AG-916413, N01-AG-821336, 263 MD 9164 13 and 263 MD 821336) and in part by the Intramural Research Program, National Institute on Aging, National Institutes of Health, USA. The generation and management of GWAS genotype data for the Rotterdam Study is supported by the Netherlands Organization of Scientific Research NWO Investments (no. 175.010.2005.011, 911-03-012), the Research Institute for Diseases in the Elderly (014-93-015; RIDE2), EUROSPAN (European Special Populations Research Network; LSHG-CT-2006-01947), the Netherlands Organization for Scientific Research (Pionier, 047.016.009, 047.017. 043;050-060-810), Erasmus Medical Center and the Centre for Medical Systems Biology (CMSB I and II and Grand; National Genomics Initiative) of the Netherlands Genomics Initiative (NGI); The Rotterdam Study is further funded by Erasmus Medical Center and Erasmus University, Rotterdam, Netherlands Organization for the Health Research and Development (ZonMw), the Research Institute for Diseases in the Elderly (RIDE), the Ministry of Education, Culture and Science, the Ministry for Health, Welfare and Sports, the European Commission (DG XII) and the Municipality of Rotterdam. Funding for COGENT was obtained through the Broad Institute (N01-HC-65226) to create this genotype/phenotype database for wide dissemination to the biomedical research community. The Atherosclerosis Risk in Communities Study is carried out as a collaborative study supported by National Heart, Lung, and Blood Institute contracts (HHSN268201100005C, HHSN268 201100006C, HHSN268201100007C, HHSN268201100008C, HHSN268201100009C, HHSN268201100010C, HHSN26820 1100011C and HHSN268201100012C), R01HL087641, R01HL 59367 and R01HL086694; National Human Genome Research Institute (contract U01HG004402) and National Institutes of Health (contract HHSN268200625226C). The authors thank the staff and participants of the ARIC study for their important contributions. Infrastructure was partly supported by grant number UL1RR025005, a component of the National Institutes of Health and NIH Roadmap for Medical Research. ARIC is also supported by University of North Carolina at Chapel Hill (funded by N01-HC-55015), Baylor Medical College (N01-HC-55016), University of Mississippi Medical Center (N01-HC-55021), University of Minnesota (N01-HC-55019), Johns Hopkins University (N01-HC-55020), University of Texas Houston (N01-HC-55017) and University of North Carolina (N01-HC-55018). Coronary Artery Risk in Young Adults (CARDIA): University of Alabama at Birmingham (N01-HC-48047), University of Minnesota (N01-HC-48048), Northwestern University (N01-HC-48049), Kaiser Foundation Research Institute (N01-HC-48050), University of Alabama at Birmingham (N01-HC-95095), Tufts-New England Medical Center (N01-HC-45204), Wake Forest University (N01-HC-45205), Harbor-UCLA Research and Education Institute (N01-HC-05187), University of California, Irvine (N01-HC-45134 and N01-HC-95100). Jackson Heart Study (JHS): Jackson State University (N01-HC-95170), University of Mississippi (N01-HC-95171), Tougaloo College (N01-HC-95172). Healthy Aging in Neighborhoods of Diversity across the Life Span Study (HANDLS): This research was supported by the Intramural Research Program of the NIH, National Institute on Aging and the National Center on Minority Health and Health Disparities (intramural project # Z01-AG000513 and human subjects protocol # 2009-149). Health ABC: This research was supported by NIA contracts N01AG62101, N01AG62103 and N01AG62106. The GWAS was funded by NIA grant 1R01AG032098-01A1 to Wake Forest University Health Sciences and genotyping services were provided by the Center for Inherited Disease Research (CIDR). CIDR is fully funded through a federal contract from the National Institutes of Health to The Johns Hopkins University (contract number HHSN268200782096C). This research was supported in part by the Intramural Research Program of the NIH, National Institute on Aging. GeneSTAR Acknowledgement: This research was supported by the National Heart, Lung, and Blood Institute (NHLBI) through the PROGENI (U01 HL72518) and STAMPEED (R01 HL087698-01) consortia. Additional support was provided by grants from the NIH/National Institute of Nursing Research (R01 NR08153) and the NIH/National Center for Research Resources (M01-RR000052) to the Johns Hopkins General Clinical Research Center. WHI: The WHI program is funded by the National Heart, Lung, and Blood Institute, National Institutes of Health, US Department of Health and Human Services, through contracts N01WH22110, 24152, 32100-2, 32105-6, 32108-9, 32111-13, 32115, 32118-32119, 32122, 42107-26, 42129-32 and 44221. The Cardiovascular Health Study (CHS) is supported from contracts N01-HC-35129, N01-HC-45133, N01-HC-75150, N01-HC-85079 through N01-HC-85086, N01 HC-15103, N01 HC-55222 and U01 HL080295 from the National Heart, Lung, and Blood Institute, with additional contribution from the National Institute of Neurological Disorders and Stroke. Additional support for this work was provided by NIH R01 HL71862-06 and ARRA N000949304 (to A.P.R.). Some of the results of this paper were obtained by using the program package S.A.G.E., which is supported by a US Public Health Service Resource Grant (RR03655) from the National Center for Research Resources. The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript. Funding for RIKEN and the BioBank Japan Project was supported by Ministry of Education, Culture, Sports, Science and Technology, Japan. The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

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Supplemental Materials
Working Groups
CHARGE (Cohorts for Heart and Aging Research in Genome Epidemiology)
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CHARGE genotyping platforms by study:

- *AGES-Reykjavik Study* - Illumina 370CNV BeadChip array
- *ARIC* - Affymetrix Genome-Wide Human SNP Array 6.0 platform
- *RS* - Illumina 550K BeadChip array
- *FHS* - Affymetrix 500K array and an additional gene-focused 50K array
- *inChianti* - Illumina 550K BeadChip array
- *BLSA* - Infinium II HumanHap550 v. 1, Infinium II HumanHap550 v. 3, or a composite of Infinium HumanHap300 and Infinium II 240S

COGENT
Sampath Arepalli, Melissa A. Austin, Diane M. Becker, Angela Britton, Zhao Chen, David Couper, J. David Curb, Eric Dean, Charles B. Eaton, Michele K. Evans, Aaron R. Folsom, Myriam Fornage, Santhi K. Ganesh, Struan F. A. Grant, Tamara B. Harris, Dena Hernandez, Naoyuki Kamatini, Brendan J. Keating, Michiaki Kubo, Andrea LaCroix, Leslie A. Lange, Guillaume Lettre, Simin Liu, Yongmei Liu, Kurt Lohman, Rasika Mathias, Yan Meng, Emile R. Mohler III, Solomon Musani, Yusuke Nakamura, Michael A. Nalls, Christopher J. O'Donnell, Yukinori Okada, Cameron D. Palmer, George J. Papanicolaou, Kushang V. Patel, Alexander P. Reiner, Andrew B. Singleton, Beverly M. Snively, Atsushi Takahashi, Hua Tang, Herman A. Taylor Jr., Kent Taylor, Cynthia Thomson, James G. Wilson, Lisa R. Yanek, Lingyao Yang, Elad Ziv, Alan B. Zonderman

COGENT genotyping platforms by study:
ARIC - Affymetrix Genome-Wide Human SNP Array 6.0 platform
CARDIA - Affymetrix Genome-Wide Human SNP Array 6.0 platform
GeneSTAR - Illumina BeadChip array

HANDLS - Illumina BeadChip array
WHI - Affymetrix Affymetrix Genome-Wide Human SNP Array 6.0 platform
HealthABC - Illumina Human1M-Duo BeadChip platform

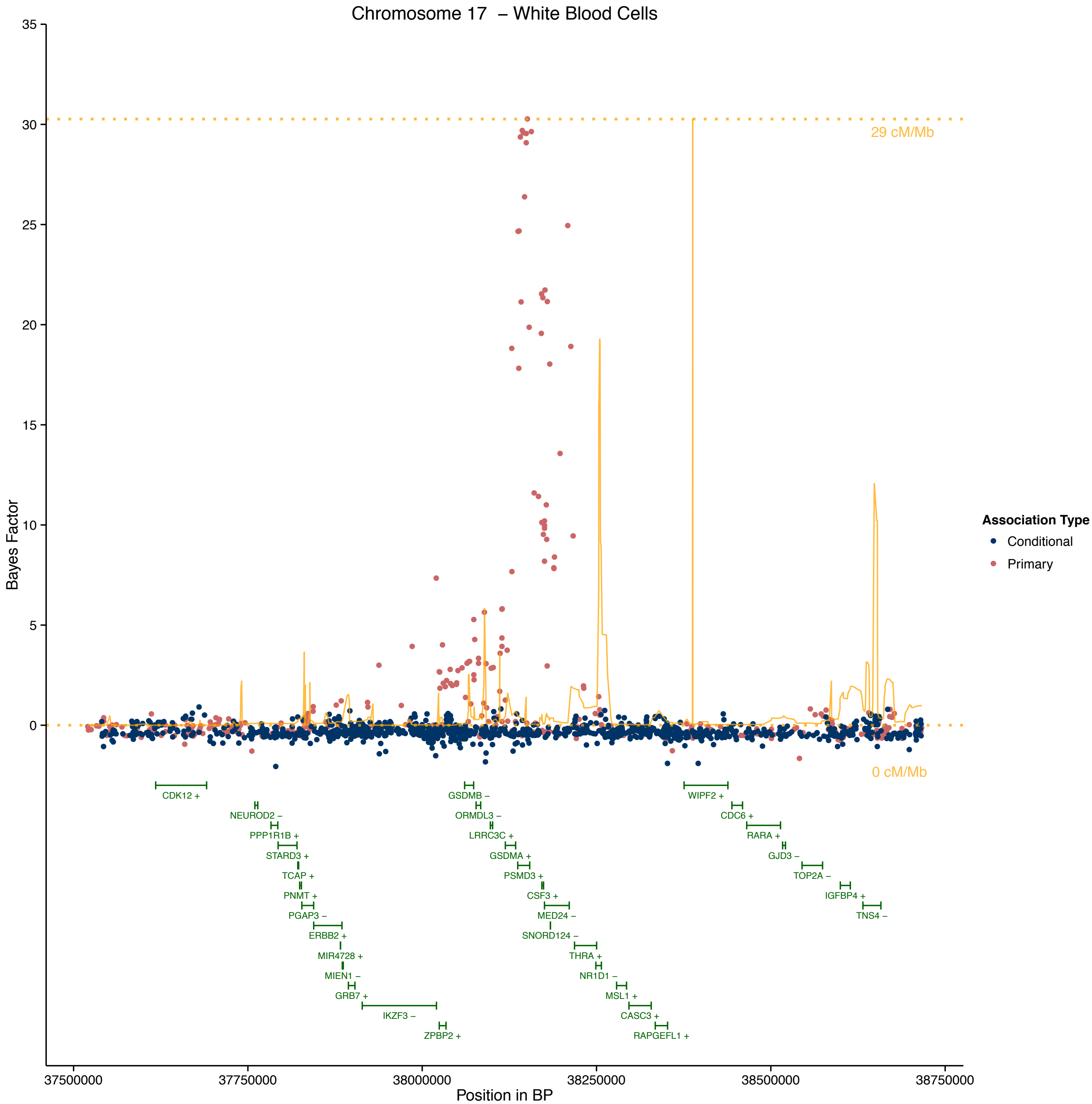
RIKEN
Koichiro Higasa, Tomomitsu Hirota, Naoya Hosono, Yoichiro Kamatani, Naoyuki Kamatani, Michiaki Kubo, Natsuhiko Kumasaka, Koichi Matsuda, Yusuke Nakamura, Hiroko Ohmiya, Yukinori Okada, Atsushi Takahashi, Mayumi Tamari, Toshiko Tanaka, Toshihiro Tanaka, Tatsuhiko Tsunoda, Yumi Yamaguchi-Kabata, Kazuhiko Yamamoto

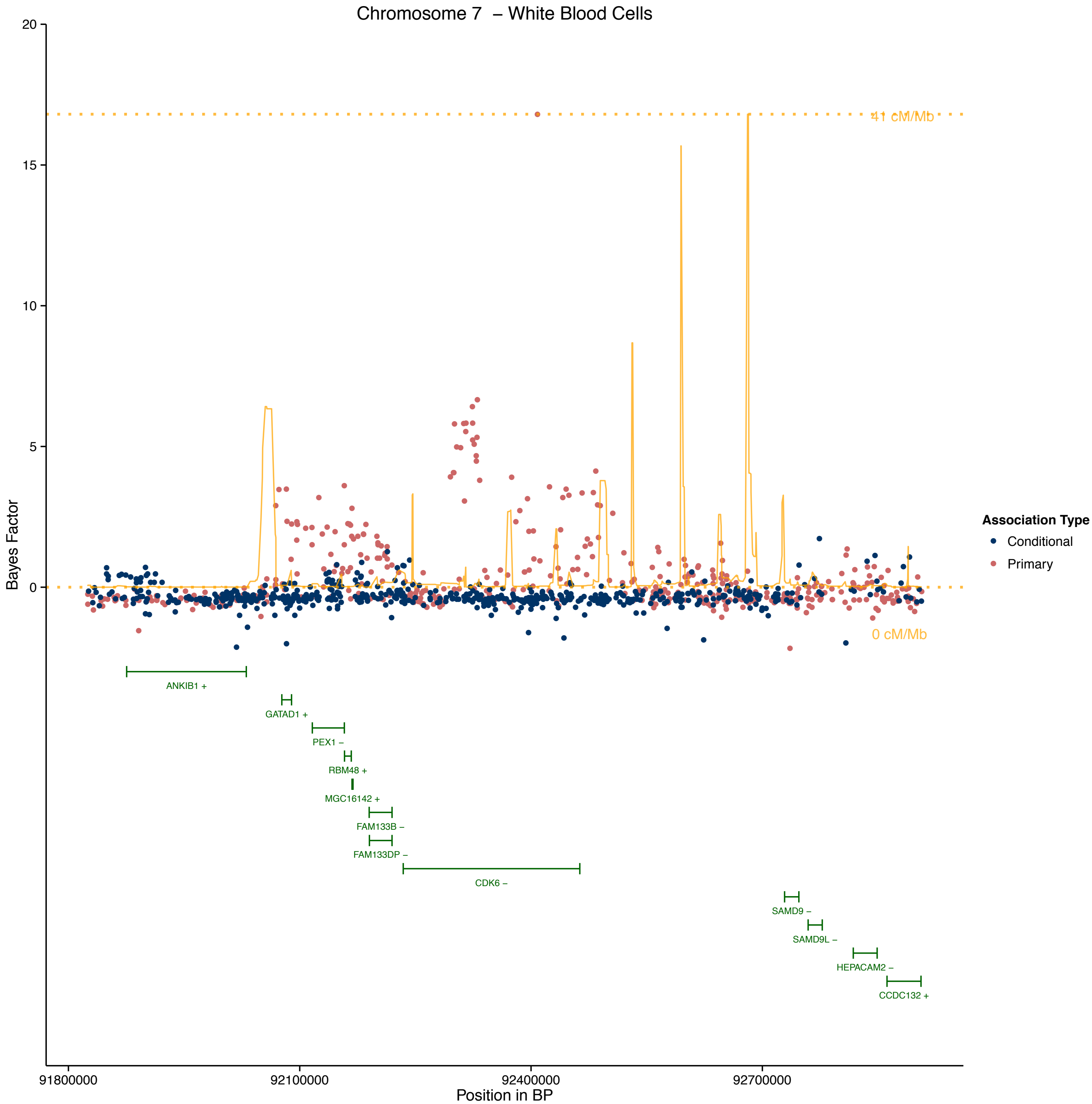
Supplemental eQTL analysis
We applied expression quantitative trait loci (eQTL) analysis to significant index SNPs using SNAP(18974171), and identified proxy SNPs in high linkage disequilibrium (r^2>0.8). Index and proxy SNPs were searched for within a collected database of expression SNP (eSNP) results including the following tissues: fresh lymphocytes (17873875), fresh leukocytes (19966804), leukocyte samples in individuals with Celiac disease (19128478), whole blood samples (18344981, 21829388, 22692066), lymphoblastoid cell lines (LCL) derived from asthmatic children (17873877, 23345460), HapMap LCL from 3 populations (17873874), a separate study on HapMap CEU LCL (18193047), additional LCL population samples (19644074, 22286170,22941192, Mangravite et al., unpublished), CD19+ B cells (22446964), primary PHA-stimulated T cells (19644074), CD4+ T cells (20833654), peripheral blood monocytes (19222302,20502693, 22446964), CD11+ dendritic cells before and after *Mycobacterium tuberculosis* infection (22233810), omental and subcutaneous adipose (18344981, 21602305, 22941192), stomach (21602305), endometrial carcinomas (21226949), ER+ and ER- breast cancer tumor cells (23374354), brain cortex (19222302, 19361613, 22685416), pre-frontal cortex (22031444, 20351726), frontal cortex (20485568), temporal cortex (20485568, 22685416), pons (20485568), cerebellum (20485568, 22685416), 3 additional large studies of brain regions including prefrontal cortex, visual cortex and cerebellum, respectively (Emilsson, *Cell* in press), liver (18462017, 21602305, 21637794), osteoblasts (19654370), lung (23209423), skin (21129726, 22941192) and primary fibroblasts (19644074). Micro-RNA QTLs were also queried for LCL (21691150), and gluteal and abdominal adipose (22102887). The cited original papers describe the criteria of association with gene transcript levels for eSNP results. The best eSNPs associated with a transcript were further examined using DIAGRAM, and LD between the DIAGRAM-selected eSNPs and the strongest associated eSNP was compared to determine the concordance of DIAGRAM and expression signals.

Supplemental Figure Legends
Figure S1 - 11. Locus plots for known hits. Vertical axis indicates Bayes Factor, and horizontal axes indicate both chromosomal position and gene location.

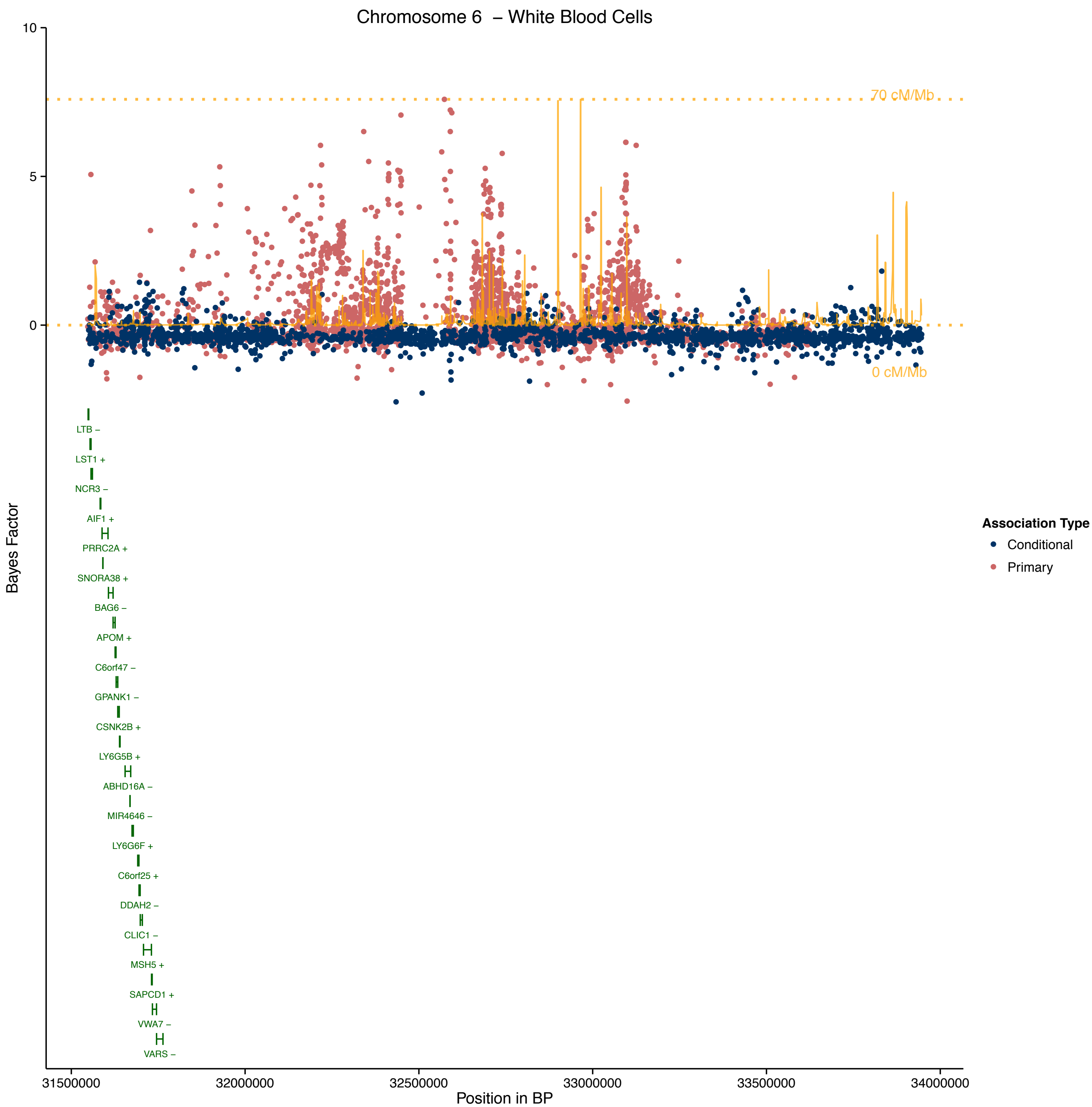
Supplemental Table Legends
Table S1. Random-effects meta-analysis of MANTRA identified loci.
Table S2.* Genome-wide summary statistics of the primary MANTRA analyses of Monocyte, Neutrophil, and White Blood Cell counts.
Table S3. Credible regions identified from MANTRA top hits are listed.
Table S4. Summarized eQTL analysis are reported.

*Located as a linked file through HMG's sharing site.

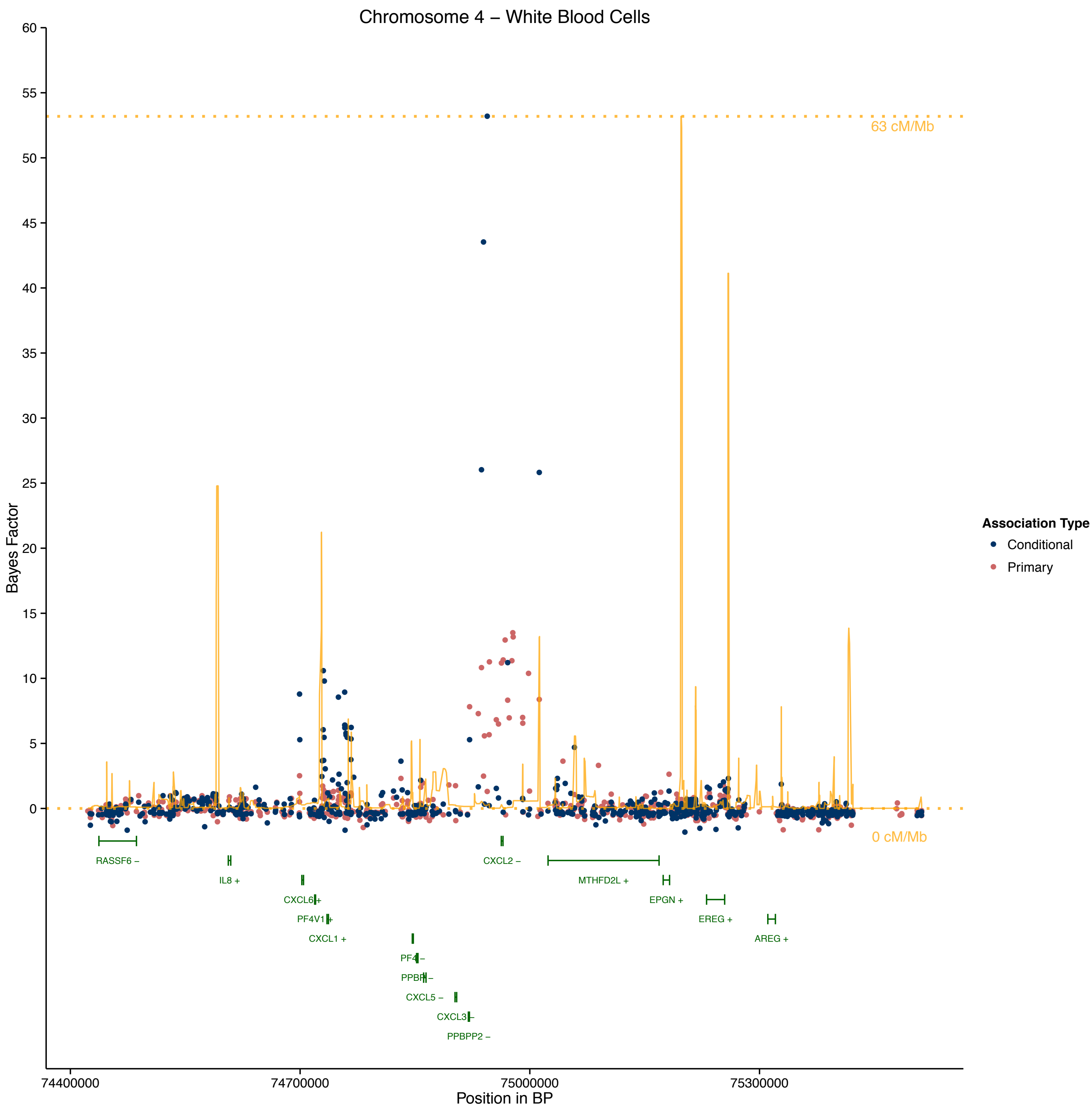

Chromosome 17 – White Blood Cells
Bayes Factor
Position in BP
29 cM/Mb
0 cM/Mb
Association Type
Conditional
Primary
CDK12 +
NEUROD2 –
PPP1R1B +
STARD3 +
TCAP +
PNMT +
PGAP3 –
ERBB2 +
MIR4728 +
MIEN1 –
GRB7 +
IKZF3 –
ZPBP2 +
GSDMB –
ORMDL3 –
LRRC3C +
GSDMA +
PSMD3 +
CSF3 +
MED24 –
SNORD124 –
THRA +
NR1D1 –
MSL1 +
CASC3 +
RAPGEFL1 +
WIPF2 +
CDC6 +
RARA +
GJD3 –
TOP2A –
IGFBP4 +
TNS4 –



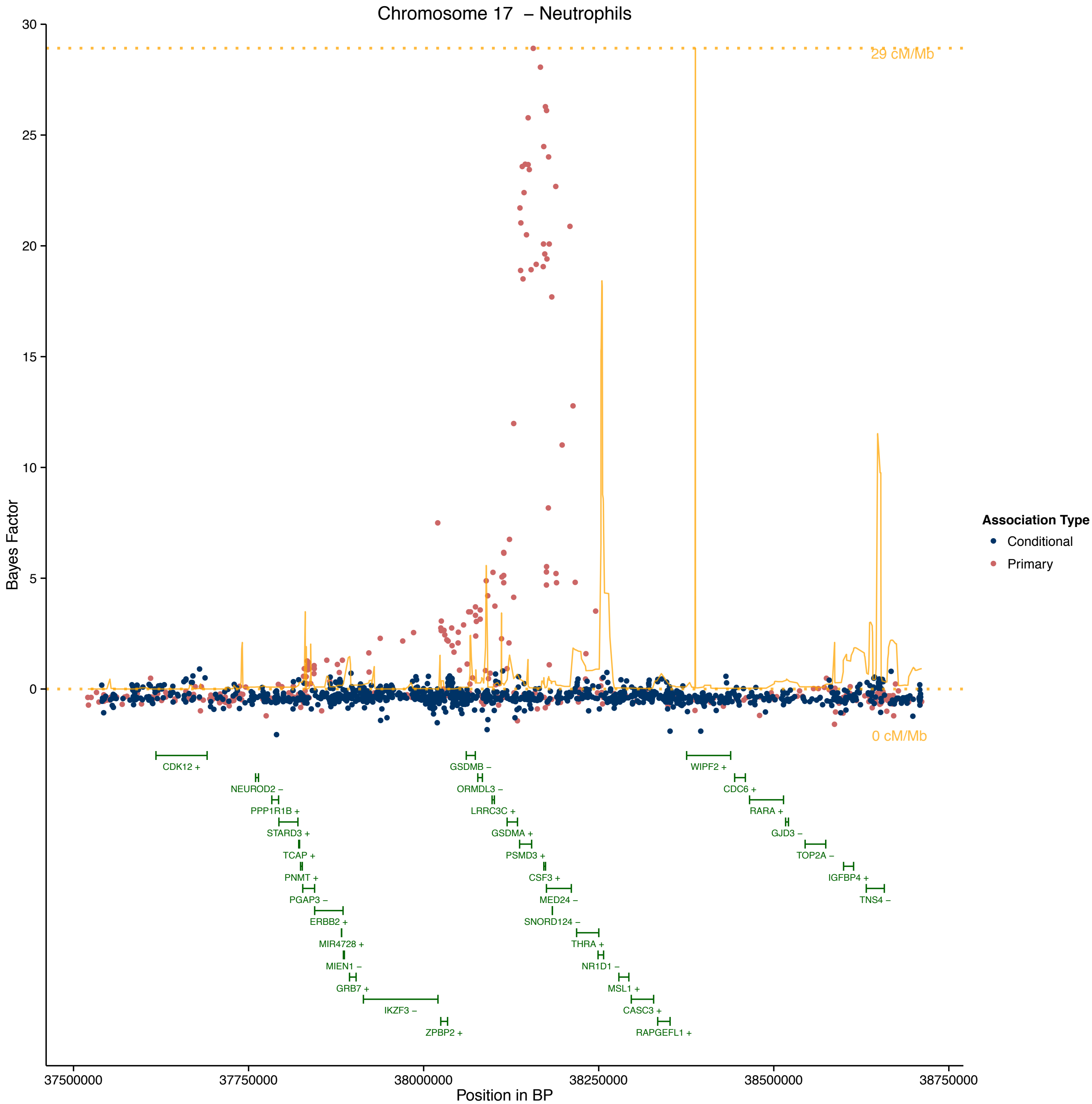
Chromosome 7 – White Blood Cells
Bayes Factor
20
15
10
5
0
41 cM/Mb
0 cM/Mb
Association Type
Conditional
Primary
ANKIB1 +
GATAD1 +
PEX1 –
RBM48 +
MGC16142 +
FAM133B –
FAM133DP –
CDK6 –
SAMD9 –
SAMD9L –
HEPACAM2 –
CCDC132 +
91800000
92100000
92400000
92700000
Position in BP

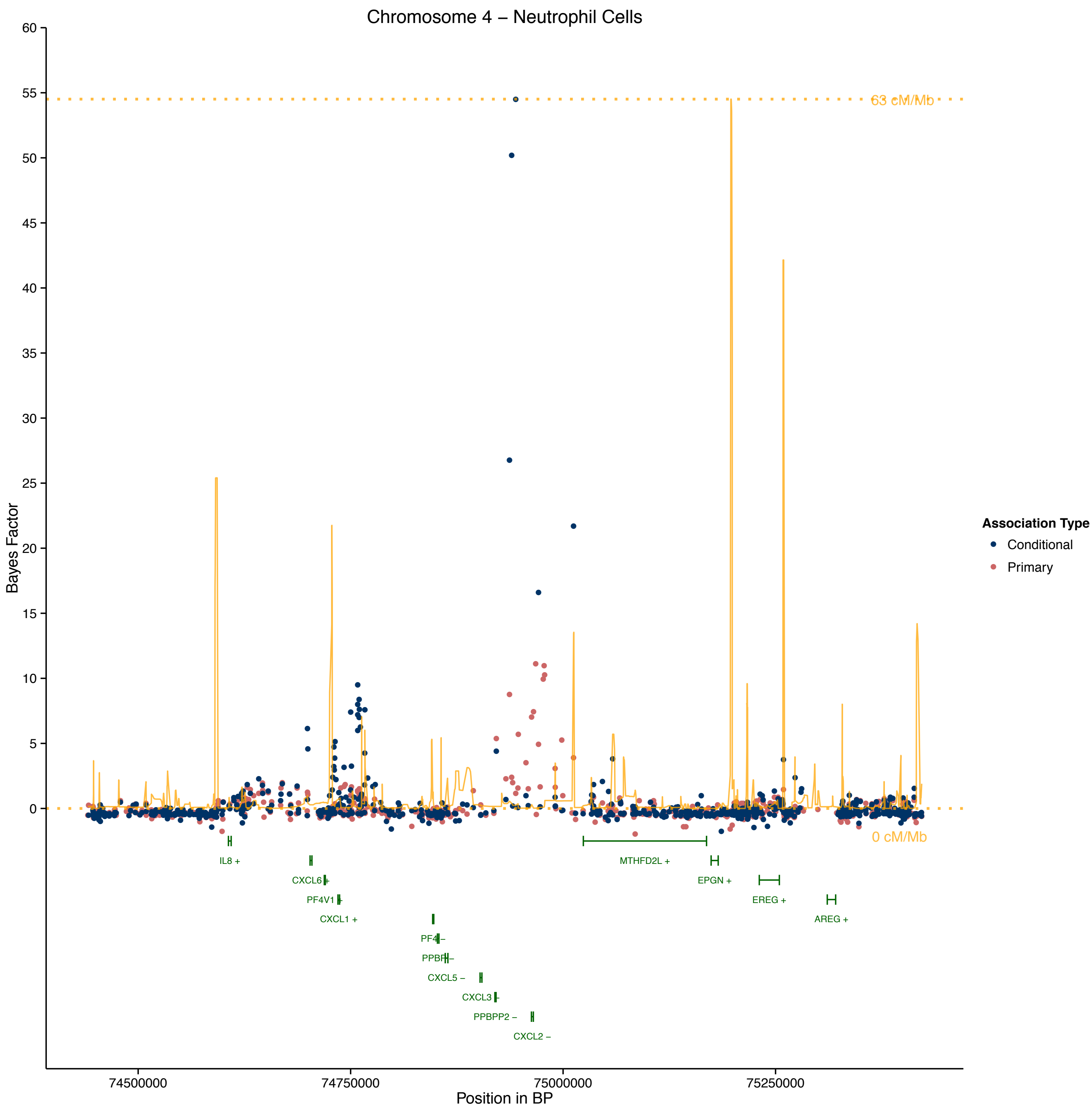


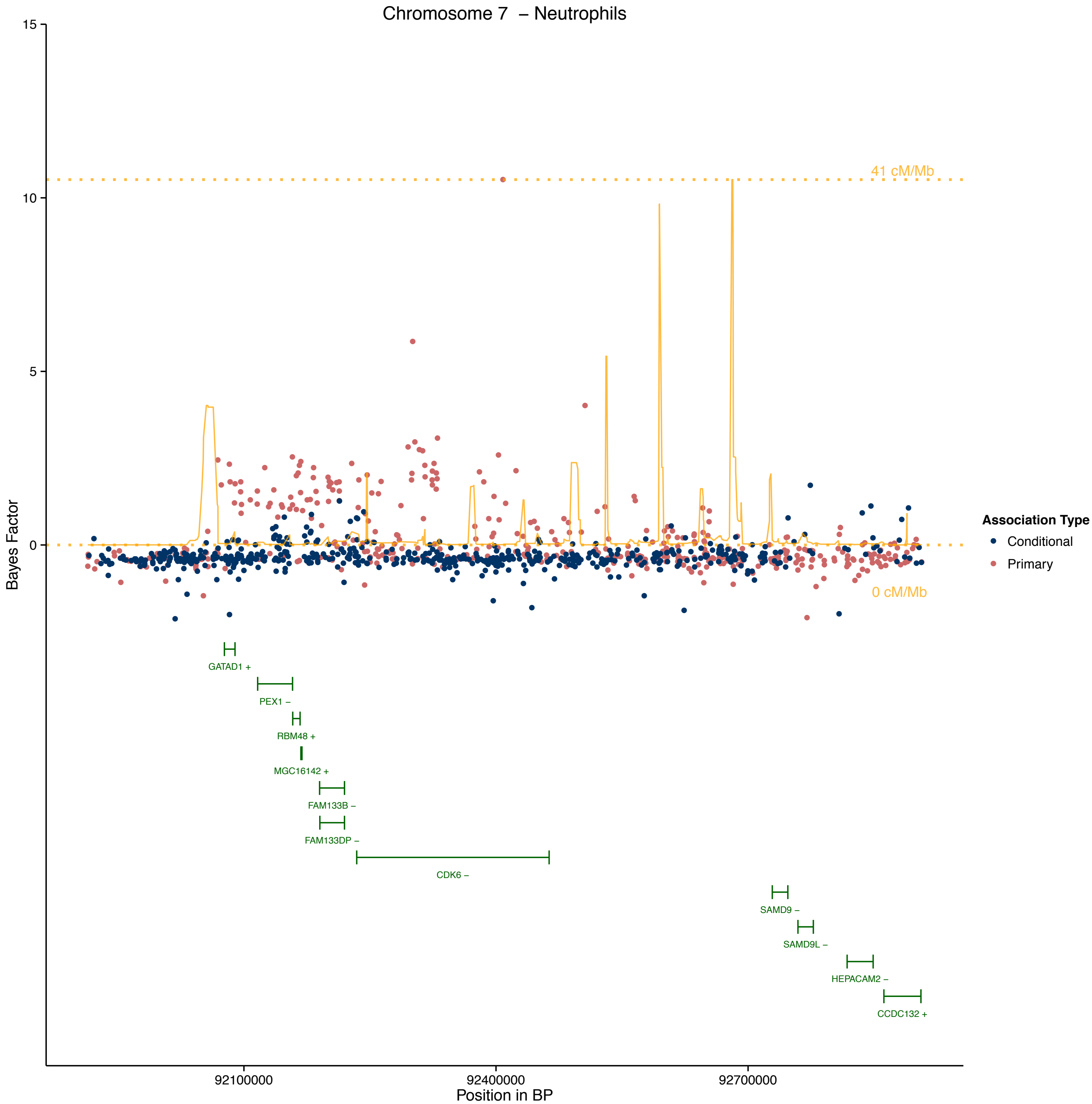
Chromosome 6 – White Blood Cells
Bayes Factor
10
5
0
70 cM/Mb
0 cM/Mb
LTB –
LST1 +
NCR3 –
AIF1 +
PRRC2A +
SNORA38 +
BAG6 –
APOM +
C6orf47 –
GPANK1 –
CSNK2B +
LY6G5B +
ABHD16A –
MIR4646 –
LY6G6F +
C6orf25 +
DDAH2 –
CLIC1 –
MSH5 +
SAPCD1 +
VWA7 –
VARS –
31500000
32000000
32500000
33000000
33500000
34000000
Position in BP
Association Type
Conditional
Primary



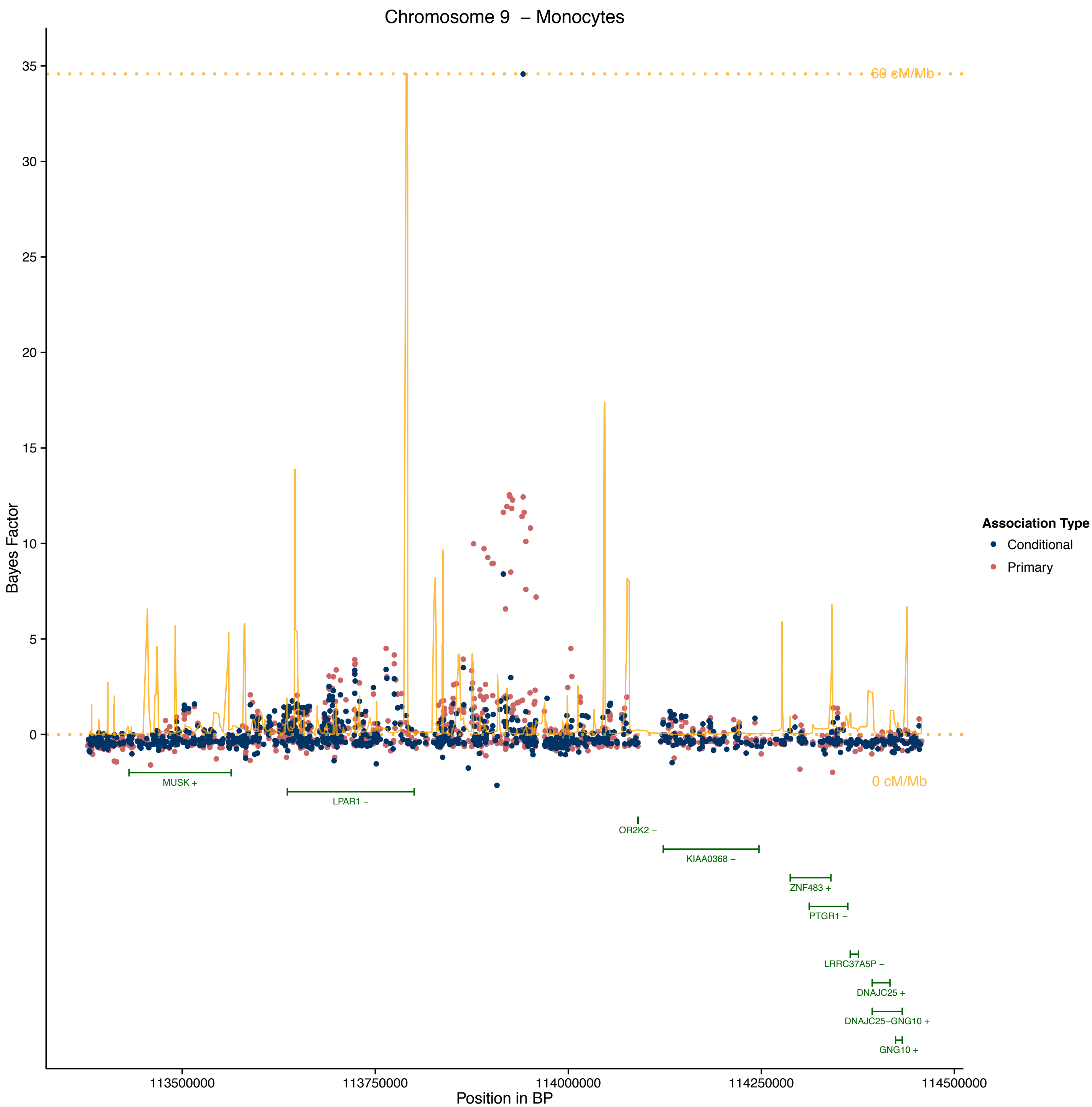
Chromosome 4 – White Blood Cells
Bayes Factor
60
55
50
45
40
35
30
25
20
15
10
5
0
63 cM/Mb
0 cM/Mb
RASSF6 –
IL8 +
CXCL6 +
PF4V1 +
CXCL1 +
PF4 –
PPBP –
CXCL5 –
CXCL3 –
PPBPP2 –
CXCL2 –
MTHFD2L +
EPGN +
EREG +
AREG +
74400000
74700000
75000000
75300000
Position in BP
Association Type
Conditional
Primary

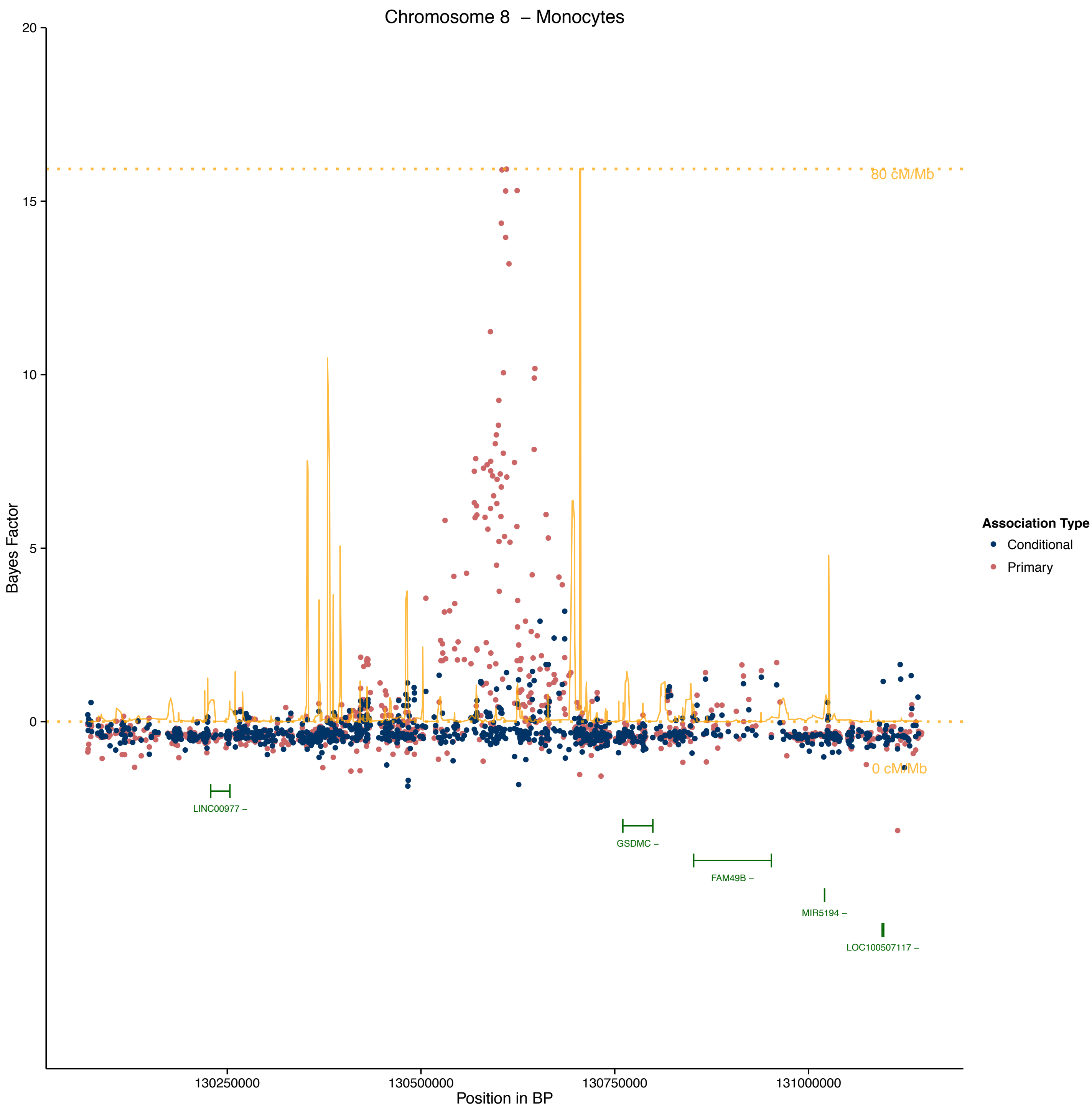

Chromosome 17 – Neutrophils
Bayes Factor
Position in BP
29 cM/Mb
0 cM/Mb
Association Type
Conditional
Primary
CDK12 +
NEUROD2 –
PPP1R1B +
STARD3 +
TCAP +
PNMT +
PGAP3 –
ERBB2 +
MIR4728 +
MIEN1 –
GRB7 +
IKZF3 –
ZPBP2 +
GSDMB –
ORMDL3 –
LRRC3C +
GSDMA +
PSMD3 +
CSF3 +
MED24 –
SNORD124 –
THRA +
NR1D1 –
MSL1 +
CASC3 +
RAPGEFL1 +
WIPF2 +
CDC6 +
RARA +
GJD3 –
TOP2A –
IGFBP4 +
TNS4 –


Chromosome 4 – Neutrophil Cells
Bayes Factor
60
55
50
45
40
35
30
25
20
15
10
5
0
63 cM/Mb
0 cM/Mb
IL8 +
CXCL6 +
PF4V1 +
CXCL1 +
PF4 –
PPBP –
CXCL5 –
CXCL3 –
PPBPP2 –
CXCL2 –
MTHFD2L +
EPGN +
EREG +
AREG +
74500000
74750000
75000000
75250000
Position in BP
Association Type
Conditional
Primary

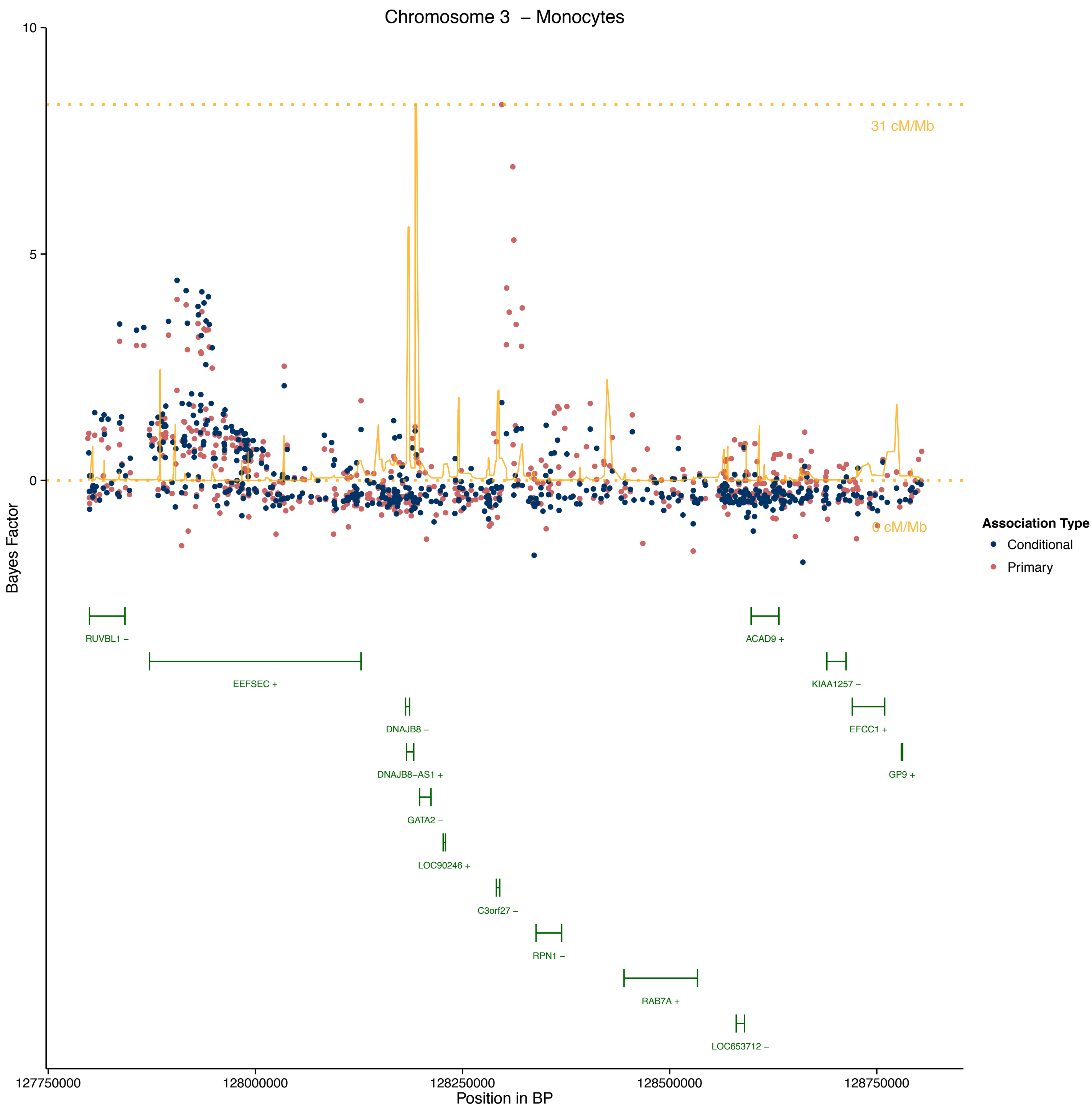


Chromosome 7 – Neutrophils
Bayes Factor
15
10
5
0
41 cM/Mb
0 cM/Mb
Association Type
Conditional
Primary
GATAD1 +
PEX1 –
RBM48 +
MGC16142 +
FAM133B –
FAM133DP –
CDK6 –
SAMD9 –
SAMD9L –
HEPACAM2 –
CCDC132 +
92100000
92400000
92700000
Position in BP

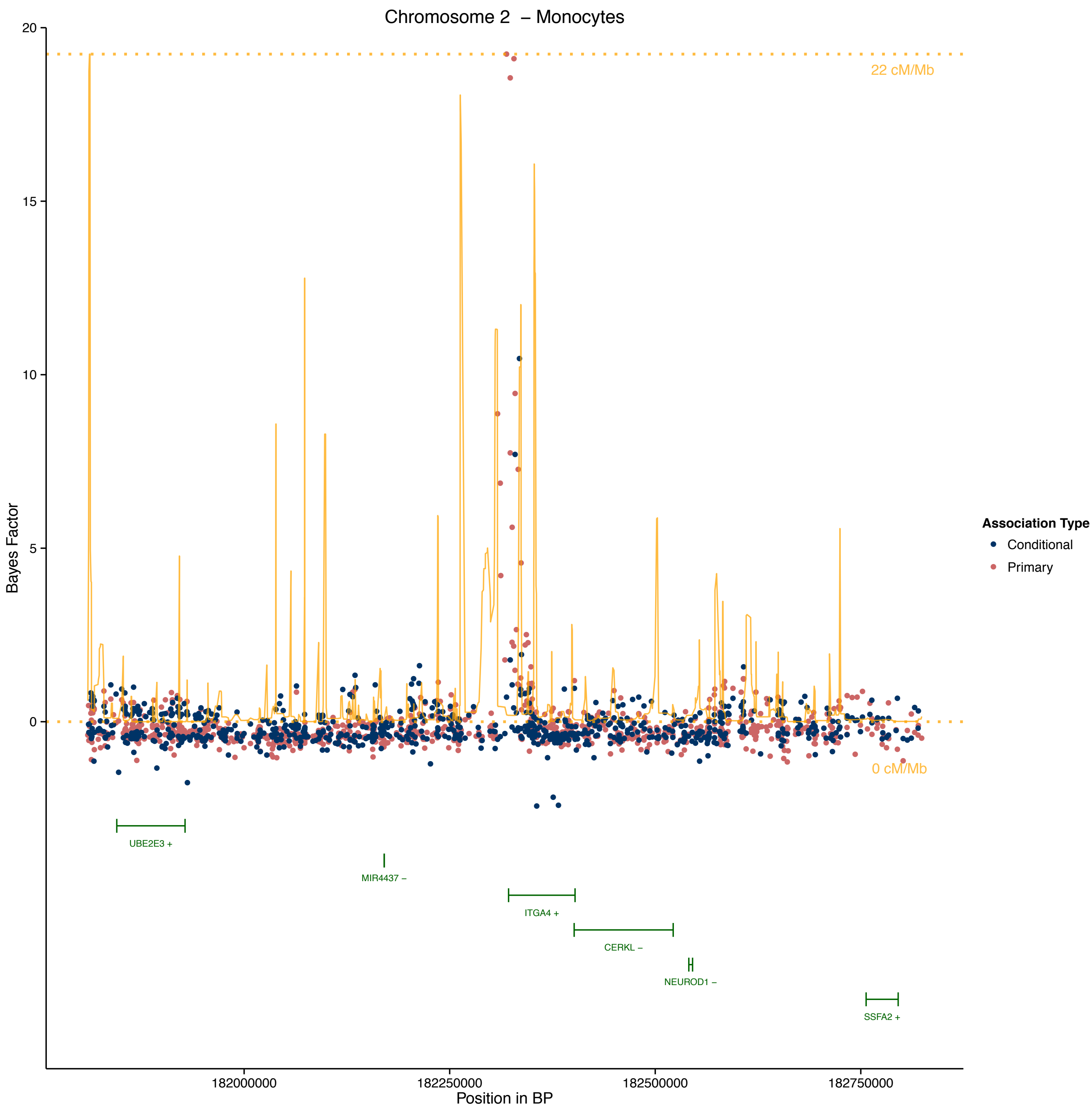

Chromosome 9 – Monocytes
Bayes Factor
35
30
25
20
15
10
5
0
60 cM/Mb
0 cM/Mb
MUSK +
LPAR1 –
OR2K2 –
KIAA0368 –
ZNF483 +
PTGR1 –
LRRC37A5P –
DNAJC25 +
DNAJC25−GNG10 +
GNG10 +
113500000
113750000
114000000
114250000
114500000
Position in BP
Association Type
Conditional
Primary



Chromosome 8 – Monocytes
Bayes Factor
Position in BP
80 cM/Mb
0 cM/Mb
LINC00977 –
GSDMC –
FAM49B –
MIR5194 –
LOC100507117 –
Association Type
Conditional
Primary



Chromosome 3 – Monocytes
10
5
0
31 cM/Mb
0 cM/Mb
Bayes Factor
Association Type
Conditional
Primary
RUVBL1 –
EEFSEC +
DNAJB8 –
DNAJB8–AS1 +
GATA2 –
LOC90246 +
C3orf27 –
RPN1 –
RAB7A +
LOC653712 –
ACAD9 +
KIAA1257 –
EFCC1 +
GP9 +
127750000
128000000
128250000
128500000
128750000
Position in BP



Chromosome 2 – Monocytes
20
15
10
5
0
Bayes Factor
22 cM/Mb
0 cM/Mb
UBE2E3 +
MIR4437 –
ITGA4 +
CERKL –
NEUROD1 –
SSFA2 +
182000000
182250000
182500000
182750000
Position in BP
Association Type
Conditional
Primary

Table S1. Random-effects meta-analysis of MANTRA identified loci.

Phenotype	SNP	Chr	Position	A1	A2	Summary Frequency	Effect	Standard Error	P-value	Direction	Heterogeneity P-value
Monocytes	rs10209150	2	182329619	a	g	0.8526	-0.0065	0.006	2.83E-01	?+-	1.71E-01
Monocytes	rs10930969	2	182327957	a	g	0.1562	-0.0126	0.0038	8.25E-04	--+	2.27E-02
Monocytes	rs13415157	2	182330844	a	c	0.9791	0.0111	0.0119	3.51E-01	??+	1.00E+00
Monocytes	rs1375493	2	182323766	a	g	0.5217	0.0192	0.0024	1.86E-15	+++	4.23E-06
Monocytes	rs1449260	2	182333447	a	g	0.3123	-0.0153	0.0026	4.01E-09	---	1.65E-02
Monocytes	***rs1449263***	***2***	***182319301***	***t***	***c***	***0.4227***	***0.0087***	***0.0024***	***3.09E-04***	***++-***	***1.28E-17***
Monocytes	rs155138	2	182319878	a	c	0.9485	0.0082	0.0071	2.45E-01	??+	1.00E+00
Monocytes	rs155141	2	182317202	a	t	0.1367	-0.0107	0.0034	1.68E-03	---	1.99E-02
Monocytes	rs155146	2	182332350	t	c	0.0589	-0.0086	0.0066	1.93E-01	?+-	2.77E-01
Monocytes	rs155147	2	182332146	a	g	0.0981	8.00E-04	0.0049	8.64E-01	?-+	2.26E-01
Monocytes	rs155148	2	182331265	a	g	0.7178	0.0144	0.0038	1.44E-04	+++	5.26E-02
Monocytes	rs155149	2	182329647	t	g	0.6017	-0.002	0.0028	4.70E-01	--+	3.25E-11
Monocytes	rs2124440	2	182328214	a	g	0.5145	0.0188	0.0024	2.37E-15	+++	6.86E-07
Monocytes	rs3731835	2	182321179	t	c	0.9794	0.0113	0.0118	3.38E-01	??+	1.00E+00
Monocytes	rs3770132	2	182332961	a	g	0.7067	0.0139	0.0052	8.13E-03	+++	1.53E-01
Monocytes	rs3770136	2	182329460	t	c	0.5251	-0.012	0.0042	4.08E-03	---	7.20E-02
Monocytes	rs3770137	2	182326136	c	g	0.719	0.0197	0.0038	1.77E-07	+++	9.79E-01
Monocytes	rs3770138	2	182325907	t	c	0.4876	-0.0129	0.0038	6.40E-04	--+	2.96E-02
Monocytes	rs10188326	2	182311519	t	g	0.9237	-0.0079	0.0057	1.69E-01	??-	1.00E+00
Monocytes	rs10930969	2	182327957	a	g	0.1562	-0.0126	0.0038	8.25E-04	--+	2.27E-02
Monocytes	***rs12988934***	***2***	***182323665***	***t***	***c***	***0.2469***	***0.0382***	***0.0063***	***1.32E-09***	***++?***	***5.90E-01***
Monocytes	rs13384671	2	182311594	a	g	0.6097	0.0123	0.0027	6.36E-06	+++	1.83E-05
Monocytes	rs1375493	2	182323766	a	g	0.5217	0.0192	0.0024	1.86E-15	+++	4.23E-06
Monocytes	rs1449263	2	182319301	t	c	0.4227	0.0087	0.0024	3.09E-04	++-	1.28E-17
Monocytes	rs155123	2	182312272	a	c	0.6856	0.0166	0.0036	3.61E-06	+?+	6.03E-03
Monocytes	rs155138	2	182319878	a	c	0.9485	0.0082	0.0071	2.45E-01	??+	1.00E+00
Monocytes	rs155141	2	182317202	a	t	0.1367	-0.0107	0.0034	1.68E-03	---	1.99E-02
Monocytes	rs2124440	2	182328214	a	g	0.5145	0.0188	0.0024	2.37E-15	+++	6.86E-07
Monocytes	rs3731835	2	182321179	t	c	0.9794	0.0113	0.0118	3.38E-01	??+	1.00E+00
Monocytes	rs3770137	2	182326136	c	g	0.719	0.0197	0.0038	1.77E-07	+++	9.79E-01
Monocytes	rs3770138	2	182325907	t	c	0.4876	-0.0129	0.0038	6.40E-04	--+	2.96E-02
Monocytes	rs2010527	3	128303083	c	g	0.5977	0.0103	0.0029	3.95E-04	+++	4.53E-04
Monocytes	rs2465354	3	128294897	t	c	0.6569	-0.003	0.0034	3.65E-01	+?-	5.07E-01
Monocytes	rs2712421	3	128287743	t	g	0.3218	0.0038	0.003	2.11E-01	++-	1.67E-04
Monocytes	rs2712423	3	128290938	t	g	0.6312	0.0079	0.003	9.02E-03	+++	2.72E-01
Monocytes	rs2713575	3	128294355	a	g	0.4891	-8.00E-04	0.0027	7.81E-01	-?-	7.33E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

Monocytes	rs2713589	3	128290208	t	c	0.5501	7.00E-04	0.0027	7.93E-01	-++	8.55E-01
Monocytes	rs2734046	3	128292213	a	g	0.1691	0.0016	0.0042	7.11E-01	-++	7.76E-01
Monocytes	rs6772849	3	128306418	t	c	0.3745	-0.0093	0.0026	3.86E-04	---	1.71E-04
Monocytes	rs6798431	3	128303373	t	c	0.5665	0.0102	0.0025	4.00E-05	+++	4.32E-05
Monocytes	rs7611156	3	128296868	t	c	0.7322	-0.0049	0.0039	2.12E-01	-+-	2.98E-01
Monocytes	***rs9880192***	***3***	***128297569***	***c***	***g***	***0.2892***	***-0.0134***	***0.0033***	***5.27E-05***	***--+***	***2.28E-06***
Monocytes	rs166175	5	76062954	a	g	0.671	0.0032	0.0034	0.3449	+++	0.7236
Monocytes	rs193943	5	76049832	t	c	0.4632	0.0017	0.0027	0.531	+-+	0.7421
Monocytes	***rs2047076***	***5***	***76058509***	***t***	***c***	***0.4863***	***-0.0046***	***0.005***	***0.3544***	***---***	***2.41E-07***
Monocytes	rs2054192	5	76048623	a	g	0.6932	3.00E-04	0.0038	0.9271	--+	0.1092
Monocytes	rs250718	5	76050452	c	g	0.6716	0.0033	0.0034	0.3259	++-	0.08492
Monocytes	rs250719	5	76050491	a	g	0.5465	0.0032	0.0025	0.197	+++	0.9672
Monocytes	rs250720	5	76051465	a	t	0.5113	0.0019	0.0025	0.4546	+++	0.9669
Monocytes	rs250723	5	76056054	t	c	0.6509	0.0031	0.003	0.2977	+-+	0.6892
Monocytes	rs250724	5	76061256	a	c	0.4776	-0.002	0.0025	0.4279	+--	0.8452
Monocytes	rs250726	5	76059981	a	g	0.3473	-0.0043	0.0028	0.1163	+--	0.5026
Monocytes	rs250727	5	76059301	t	c	0.4739	-4.00E-04	0.0024	0.8828	-+-	0.7668
Monocytes	rs250728	5	76059094	t	g	0.5791	-0.0023	0.003	0.4411	--+	0.544
Monocytes	rs250729	5	76059055	a	g	0.4825	-0.0013	0.0024	0.5883	---	0.9574
Monocytes	rs250759	5	76067728	a	g	0.422	-0.0035	0.0024	0.1447	+--	0.7495
Monocytes	rs250760	5	76067624	t	g	0.6115	-0.0025	0.0033	0.445	---	0.615
Monocytes	rs250761	5	76067376	t	c	0.5567	-0.0051	0.0026	0.05333	---	0.9884
Monocytes	rs515362	5	76061924	t	c	0.5102	9.00E-04	0.0024	0.6994	+-+	0.6515
Monocytes	rs6889169	5	76063338	t	g	0.9226	-0.0059	0.0059	0.3212	??-	1
Monocytes	rs1639114	6	31219224	a	c	0.0361	0.0066	0.0072	3.63E-01	?++	2.58E-01
Monocytes	rs1793891	6	31221698	t	c	0.8454	0.0062	0.0044	1.58E-01	-?+	6.40E-01
Monocytes	rs1986997	6	31228410	t	c	0.6391	-4.00E-04	0.0032	8.93E-01	+--	3.81E-06
Monocytes	rs2245822	6	31230800	a	g	0.1749	-0.0116	0.0035	8.18E-04	---	1.67E-01
Monocytes	rs2394950	6	31230701	a	g	0.0809	0.0035	0.005	4.81E-01	?+-	5.41E-02
Monocytes	rs2394951	6	31230759	a	g	0.1812	0.0099	0.0031	1.46E-03	+++	4.06E-03
Monocytes	rs2394952	6	31230882	a	g	0.6833	-0.0092	0.0031	3.56E-03	---	5.25E-03
Monocytes	rs2524117	6	31230869	t	c	0.3878	9.00E-04	0.0027	7.33E-01	-+-	1.93E-03
Monocytes	rs2524118	6	31230667	a	t	0.0849	0.0045	0.0054	4.09E-01	-?+	8.68E-01
Monocytes	rs2524121	6	31228972	a	g	0.11	0.0156	0.0038	3.49E-05	+++	7.74E-04
Monocytes	rs2844626	6	31229552	a	t	0.57	0.007	0.0025	5.26E-03	-++	6.72E-02
Monocytes	rs2844627	6	31229462	t	c	0.6571	-0.0035	0.0034	2.99E-01	--+	1.17E-03
Monocytes	rs2894189	6	31217815	a	c	0.4675	0.0066	0.0024	5.14E-03	+++	3.10E-02
Monocytes	rs2894196	6	31230111	a	t	0.0756	-0.0062	0.0053	2.44E-01	---	8.14E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

Monocytes	rs3095241	6	31215635	a	c	0.3707	0.008	0.0027	2.47E-03	+++	3.12E-02
Monocytes	***rs3095254***	***6***	***31221668***	***c***	***g***	***0.5019***	***0.0091***	***0.0024***	***1.89E-04***	***+++***	***2.42E-05***
Monocytes	rs3130408	6	31213791	a	g	0.7627	-0.0073	0.0043	9.33E-02	+--	2.62E-02
Monocytes	rs3130409	6	31213811	a	g	0.366	-0.0089	0.0028	1.66E-03	-?-	2.45E-03
Monocytes	rs3130433	6	31219638	a	g	0.1028	0.0075	0.0044	9.26E-02	-++	2.64E-02
Monocytes	rs3130441	6	31228565	a	g	0.1039	0.0156	0.0039	5.48E-05	+++	1.88E-04
Monocytes	rs3130444	6	31228634	t	c	0.2079	-0.0044	0.0041	2.85E-01	+?-	5.22E-02
Monocytes	rs3899471	6	31215037	t	c	0.2635	-0.001	0.0031	7.55E-01	--+	6.02E-01
Monocytes	rs4084090	6	31218835	a	g	0.7796	-0.0064	0.0043	1.34E-01	+--	4.12E-02
Monocytes	rs4084262	6	31218889	t	c	0.6501	-3.00E-04	0.0033	9.29E-01	?--	9.25E-01
Monocytes	rs4332019	6	31213413	t	g	0.2873	-0.0013	0.0031	6.62E-01	--+	5.58E-01
Monocytes	rs4416711	6	31221039	t	c	0.7447	0.003	0.0042	4.83E-01	-+-	9.50E-03
Monocytes	rs7747738	6	31230924	t	c	0.8998	-0.0026	0.0051	6.13E-01	??-	1.00E+00
Monocytes	rs9264180	6	31219902	a	c	0.5862	-0.0061	0.0026	2.08E-02	---	1.62E-01
Monocytes	rs9264374	6	31228666	t	c	0.2297	0.0026	0.0031	3.87E-01	?-+	5.22E-01
Monocytes	rs9264386	6	31229130	c	g	0.6804	-0.0104	0.003	6.01E-04	---	6.36E-03
Monocytes	rs9264391	6	31229203	a	g	0.0369	0.0116	0.0079	1.40E-01	-?+	6.14E-01
Monocytes	rs9264409	6	31229738	a	g	0.1741	0.0097	0.0031	2.13E-03	+++	9.08E-03
Monocytes	rs9264416	6	31230042	a	g	0.668	-0.01	0.0039	1.06E-02	-+-	1.53E-02
Monocytes	rs9368665	6	31229248	a	g	0.6998	0.0039	0.0052	4.45E-01	+++	7.44E-01
Monocytes	rs9368666	6	31229644	a	g	0.7238	0.0045	0.0052	3.87E-01	++-	6.19E-01
Monocytes	rs9468908	6	31216227	a	g	0.0685	-0.0049	0.0057	3.90E-01	?+-	8.11E-01
Monocytes	rs9501364	6	31217026	a	g	0.0872	0.0095	0.0046	3.80E-02	++-	1.08E-04
Monocytes	rs9501543	6	31216956	t	c	0.0474	-0.0057	0.0069	4.07E-01	+--	1.16E-02
Monocytes	rs9501548	6	31228552	a	g	0.0812	0.0041	0.0049	4.03E-01	?++	6.94E-02
Monocytes	rs10092988	8	130624661	a	g	0.3854	-0.0098	0.0028	4.81E-04	+--	2.02E-04
Monocytes	rs10100356	8	130626164	a	g	0.229	-0.0074	0.0031	1.52E-02	---	9.51E-01
Monocytes	rs10956485	8	130620585	t	c	0.3076	-0.0141	0.0029	1.07E-06	---	6.60E-06
Monocytes	rs12550563	8	130629300	a	g	0.2936	-0.0086	0.0027	1.57E-03	---	6.24E-03
Monocytes	rs12681229	8	130623784	t	c	0.2914	-0.0173	0.0036	1.87E-06	--+	4.65E-04
Monocytes	rs13253638	8	130623190	t	c	0.4147	-0.0221	0.0086	1.03E-02	?--	8.29E-01
Monocytes	rs13263823	8	130631510	a	c	0.4878	-0.004	0.0025	1.10E-01	--+	1.46E-02
Monocytes	rs13265608	8	130624121	t	c	0.0989	0.0181	0.0058	1.81E-03	-++	1.03E-01
Monocytes	rs1433585	8	130626097	a	g	0.1356	0.0135	0.0041	9.94E-04	++-	3.32E-03
Monocytes	rs1469737	8	130626936	a	g	0.0209	-0.0094	0.0138	4.96E-01	??-	1.00E+00
Monocytes	rs1583333	8	130614899	a	c	0.2211	0.0173	0.0037	2.66E-06	+++	1.89E-03
Monocytes	rs16893247	8	130625884	t	c	0.4523	0.0085	0.0042	4.28E-02	+-+	2.21E-02
Monocytes	rs16904126	8	130627979	a	g	0.606	-0.0131	0.0041	1.38E-03	--+	2.16E-03

Table S1. Random-effects meta-analysis of MANTRA identified loci.

Monocytes	rs16904127	8	130628606	a	g	0.264	-0.0079	0.0031	1.18E-02	---	7.43E-01
Monocytes	rs17180246	8	130623468	t	c	0.6634	0.0079	0.0052	1.28E-01	?++	1.28E-01
Monocytes	rs17180387	8	130624988	t	c	0.0729	-0.0063	0.0059	2.91E-01	?-+	4.77E-02
Monocytes	rs1982094	8	130624816	t	c	0.5272	-0.0173	0.0049	3.87E-04	--+	4.34E-04
Monocytes	***rs1991866***	***8***	***130624105***	***c***	***g***	***0.5138***	***-0.0156***	***0.0024***	***1.21E-10***	***---***	***1.41E-07***
Monocytes	rs7005206	8	130620813	a	g	0.1894	0.0073	0.0036	3.98E-02	-++	4.86E-01
Monocytes	rs7814618	8	130627555	t	c	0.5916	0.0066	0.0028	1.83E-02	+++	8.84E-03
Monocytes	rs7819128	8	130630157	t	c	0.3757	-0.0067	0.0028	1.52E-02	---	1.11E-02
Monocytes	rs7823123	8	130628808	t	c	0.0262	-0.0047	0.0117	6.88E-01	??-	1.00E+00
Monocytes	rs7825384	8	130626241	a	c	0.8726	-0.0053	0.0045	2.43E-01	??-	1.00E+00
Monocytes	rs7828331	8	130631930	a	g	0.425	0.0051	0.0027	5.61E-02	0	7.49E-03
Monocytes	rs7830620	8	130627508	a	c	0.7442	-0.0043	0.0035	2.23E-01	??-	1.00E+00
Monocytes	rs7834911	8	130628036	t	c	0.3566	-0.0078	0.0026	3.05E-03	---	3.55E-03
Monocytes	rs10116508	9	113913415	t	c	0.1843	0.0075	0.0057	1.91E-01	-?+	1.73E-01
Monocytes	rs10126017	9	113918933	a	g	0.4515	-6.00E-04	0.0026	8.22E-01	--+	5.87E-01
Monocytes	rs10217127	9	113919469	t	g	0.6003	-0.0061	0.003	4.03E-02	+-+	4.10E-03
Monocytes	rs10217157	9	113919523	t	c	0.4802	-0.0038	0.0026	1.49E-01	---	9.52E-01
Monocytes	rs10817156	9	113908195	c	g	0.4683	-0.0011	0.0024	6.44E-01	+-+	2.42E-01
Monocytes	rs10980798	9	113912649	t	c	0.1948	-0.0042	0.0031	1.86E-01	---	9.58E-01
Monocytes	***rs10980800***	***9***	***113915905***	***t***	***c***	***0.2554***	***-0.0093***	***0.003***	***2.23E-03***	***--+***	***7.40E-12***
Monocytes	rs10980802	9	113918856	a	g	0.7128	0.0122	0.0029	2.37E-05	++-	1.53E-06
Monocytes	rs10980805	9	113920552	a	c	0.4128	0.002	0.0026	4.35E-01	--+	2.56E-01
Monocytes	rs12342967	9	113924902	t	c	0.5967	-0.0119	0.0036	1.02E-03	---	2.83E-02
Monocytes	rs12345546	9	113919677	a	c	0.3243	5.00E-04	0.0028	8.43E-01	++-	6.14E-01
Monocytes	rs12346772	9	113920599	a	g	0.6638	-0.0226	0.0035	1.11E-10	---	8.14E-06
Monocytes	rs12350763	9	113923723	a	g	0.6447	-0.0166	0.0032	1.42E-07	---	5.54E-08
Monocytes	rs1330280	9	113908312	t	c	0.8854	0.0033	0.0076	6.64E-01	?++	3.70E-01
Monocytes	rs1360284	9	113921689	t	g	0.2286	-0.0028	0.0029	3.24E-01	---	9.06E-01
Monocytes	rs16915755	9	113916135	t	c	0.1795	-0.0031	0.004	4.42E-01	??-	1.00E+00
Monocytes	rs16915757	9	113918391	c	g	0.8825	0.0047	0.0049	3.41E-01	??+	1.00E+00
Monocytes	rs16915769	9	113923169	t	c	0.1178	-0.004	0.0048	4.09E-01	??-	1.00E+00
Monocytes	rs17811749	9	113916949	a	t	0.5784	0.0165	0.0047	4.76E-04	+++	2.81E-01
Monocytes	rs2418136	9	113919300	a	t	0.5811	0.0162	0.0047	5.66E-04	+++	2.83E-01
Monocytes	rs4541999	9	113907759	a	g	0.472	-0.0011	0.0024	6.55E-01	+-+	2.58E-01
Monocytes	rs6477805	9	113920108	a	g	0.3302	0.001	0.0028	7.22E-01	++-	7.57E-01
Monocytes	rs6477806	9	113920161	t	c	0.662	0.0023	0.0028	4.18E-01	+++	8.45E-01
Monocytes	rs7023923	9	113925534	t	c	0.5666	0.0082	0.0025	1.15E-03	++-	2.08E-08
Monocytes	rs7025176	9	113920511	t	c	0.0638	-0.0076	0.0067	2.53E-01	??-	1.00E+00

Table S1. Random-effects meta-analysis of MANTRA identified loci.

Monocytes	rs7034139	9	113924517	a	c	0.2196	0.0164	0.0032	1.99E-07	+++	3.94E-08
Monocytes	rs7849209	9	113915676	a	g	0.8211	0.0057	0.0042	1.78E-01	??+	1.00E+00
Monocytes	rs7867745	9	113908101	a	g	0.5084	0.0166	0.0054	1.96E-03	++-	5.55E-02
Monocytes	rs7870066	9	113911613	t	c	0.6929	0.0037	0.003	2.10E-01	+++	8.61E-01
Monocytes	rs9299192	9	113918647	a	t	0.3278	7.00E-04	0.0028	7.98E-01	++-	5.70E-01
Monocytes	rs1371798	4	74976781	t	c	0.4721	-0.0095	0.0031	2.14E-03	--+	2.78E-09
Neutrophils	rs1371799	4	74977837	t	c	0.4367	0.0088	0.0031	4.66E-03	++-	1.11E-10
Neutrophils	rs1837559	4	74959093	a	g	0.6052	-0.0159	0.0047	6.64E-04	-?-	3.55E-01
Neutrophils	rs1893319	4	74973129	t	c	0.5039	0.0152	0.0049	1.76E-03	+?-	5.59E-02
Neutrophils	rs3806792	4	74965274	t	c	0.4472	0.0068	0.0033	3.95E-02	++-	6.10E-08
Neutrophils	rs505197	4	74968560	t	c	0.9414	0.006	0.0189	7.53E-01	+?+	7.12E-01
Neutrophils	rs549280	4	74971196	a	g	0.5094	-0.0204	0.0042	9.52E-07	-?-	5.14E-01
Neutrophils	***rs7667376***	***4***	***74967890***	***t***	***c***	***0.4765***	***-0.0084***	***0.0031***	***6.04E-03***	***--+***	***1.02E-10***
Neutrophils	rs9131	4	74963049	t	c	0.4904	-0.006	0.0033	6.92E-02	--+	1.62E-08
Neutrophils	rs10263804	7	92416590	a	g	0.877	5.00E-04	0.0108	9.63E-01	??+	1.00E+00
Neutrophils	rs2282995	7	92411623	a	g	0.6026	-0.0129	0.0045	4.43E-03	---	8.34E-01
Neutrophils	rs3731303	7	92403859	t	c	0.3011	0.011	0.0045	1.52E-02	++-	2.75E-01
Neutrophils	rs3731304	7	92403660	a	c	0.0161	0.0541	0.0309	7.96E-02	??+	1.00E+00
Neutrophils	rs3802072	7	92403053	a	g	0.1835	0.0152	0.0041	1.87E-04	+++	7.54E-01
Neutrophils	rs3802073	7	92402480	t	c	0.3564	0.0052	0.0041	2.05E-01	++-	1.01E-02
Neutrophils	rs41461052	7	92407600	t	c	0.0564	0.0245	0.0158	1.21E-01	??+	1.00E+00
Neutrophils	***rs445***	***7***	***92408370***	***t***	***c***	***0.3892***	***-0.0093***	***0.0041***	***2.44E-02***	***--+***	***8.29E-11***
Neutrophils	rs8	7	92408329	t	c	0.3711	0.002	0.0061	7.44E-01	?+-	6.30E-01
Neutrophils	rs10223710	6	32218681	a	g	0.5313	-0.0066	0.0035	5.85E-02	---	4.40E-01
Neutrophils	rs10456405	6	32212867	t	g	0.1217	-0.0076	0.0062	2.19E-01	?--	9.32E-01
Neutrophils	rs12525893	6	32220577	t	c	0.3564	0.0017	0.0037	6.53E-01	++-	8.87E-02
Neutrophils	rs13194642	6	32211695	t	c	0.3186	0.0039	0.0045	3.89E-01	-++	3.39E-01
Neutrophils	rs1559876	6	32215769	c	g	0.3299	0.0062	0.0032	5.55E-02	++-	7.10E-02
Neutrophils	rs17576984	6	32212985	t	c	0.27	-0.0114	0.0046	1.28E-02	---	1.47E-01
Neutrophils	rs2395110	6	32215876	a	g	0.5005	-9.00E-04	0.0041	8.23E-01	+?-	1.83E-03
Neutrophils	rs2395111	6	32215964	t	c	0.4188	-0.0124	0.003	2.85E-05	---	4.57E-01
Neutrophils	rs2515892	6	32215252	t	g	0.5302	0.0127	0.0029	1.62E-05	+++	4.26E-01
Neutrophils	rs2894239	6	32215796	t	g	0.4538	-0.0129	0.0031	2.25E-05	---	5.34E-01
Neutrophils	rs2894240	6	32217846	a	g	0.4249	0.0063	0.003	3.17E-02	++-	4.23E-04
Neutrophils	rs3096700	6	32221782	a	c	0.3014	-0.0067	0.0046	1.52E-01	-?+	9.48E-03
Neutrophils	rs3115571	6	32220918	a	g	0.3473	-0.0121	0.0032	1.68E-04	--+	2.74E-03
Neutrophils	rs3115572	6	32220484	c	g	0.3515	-0.0125	0.0032	7.21E-05	--+	4.39E-03
Neutrophils	rs3115573	6	32218843	a	g	0.5346	-0.0039	0.0032	2.16E-01	--+	1.61E-03

Table S1. Random-effects meta-analysis of MANTRA identified loci.

Neutrophils	rs3115575	6	32216891	t	g	0.4655	-0.013	0.003	1.11E-05	---	4.64E-01
Neutrophils	rs3115576	6	32216850	a	t	0.426	0.0063	0.003	3.33E-02	++-	4.52E-04
Neutrophils	rs3130304	6	32207181	a	g	0.186	-0.0112	0.004	4.82E-03	---	7.30E-01
Neutrophils	rs3130309	6	32215472	a	g	0.3463	-0.0125	0.0032	8.62E-05	--+	3.82E-03
Neutrophils	rs3130310	6	32216911	c	g	0.524	-0.0063	0.003	3.26E-02	--+	5.28E-04
Neutrophils	rs3130311	6	32217367	a	g	0.5235	-0.0062	0.003	3.55E-02	--+	3.41E-04
Neutrophils	rs3130315	6	32220685	a	g	0.4244	0.0041	0.0032	2.00E-01	++-	1.97E-03
Neutrophils	rs3130316	6	32221228	t	c	0.4034	-0.0153	0.0032	1.90E-06	---	2.96E-01
Neutrophils	rs3130320	6	32223258	t	c	0.4139	-0.0154	0.0048	1.32E-03	-?-	3.51E-01
Neutrophils	rs371156	6	32209963	t	c	0.431	-0.0074	0.0032	2.08E-02	---	6.95E-01
Neutrophils	rs382259	6	32209027	t	c	0.438	-0.0082	0.0034	1.46E-02	---	6.08E-01
Neutrophils	rs405875	6	32215188	t	c	0.4207	-0.0125	0.003	2.36E-05	---	5.05E-01
Neutrophils	rs410283	6	32215198	t	g	0.5295	0.0126	0.003	1.90E-05	+++	4.50E-01
Neutrophils	rs411326	6	32211317	t	c	0.4329	-0.0044	0.0034	1.99E-01	-+-	1.67E-03
Neutrophils	rs412492	6	32213831	a	t	0.4785	-0.006	0.003	4.38E-02	--+	3.90E-04
Neutrophils	rs412657	6	32211085	t	g	0.4331	0.0058	0.0031	6.47E-02	++-	6.92E-01
Neutrophils	rs416352	6	32207393	t	g	0.4314	0.0017	0.0031	5.78E-01	+-+	4.15E-03
Neutrophils	rs419132	6	32210799	a	g	0.4703	-0.0025	0.0032	4.29E-01	--+	1.17E-01
Neutrophils	rs424232	6	32208324	t	c	0.3828	-7.00E-04	0.0033	8.43E-01	+-+	1.30E-01
Neutrophils	rs427037	6	32212264	a	g	0.5252	-0.0021	0.0033	5.22E-01	--+	3.73E-02
Neutrophils	rs440169	6	32213788	a	g	0.4294	0.0066	0.003	2.88E-02	++-	1.19E-04
Neutrophils	rs454748	6	32213210	a	g	0.5132	0.0074	0.003	1.33E-02	++-	1.44E-03
Neutrophils	rs454875	6	32213008	a	g	0.1384	0.0059	0.005	2.39E-01	++-	3.04E-01
Neutrophils	rs4959090	6	32219962	a	g	0.2316	0.0047	0.0037	1.98E-01	-++	3.58E-01
Neutrophils	rs507778	6	32209861	t	c	0.423	0.0012	0.0031	6.99E-01	+-+	3.38E-02
Neutrophils	rs563412	6	32215063	a	g	0.4711	0.006	0.0029	4.22E-02	++-	4.22E-04
Neutrophils	rs6457508	6	32216963	t	c	0.4857	0.0129	0.003	1.32E-05	+++	5.33E-01
Neutrophils	rs6457509	6	32217018	c	g	0.4247	0.0061	0.003	3.80E-02	++-	3.88E-04
Neutrophils	rs6457510	6	32217046	t	c	0.4854	0.0128	0.003	1.52E-05	+++	5.35E-01
Neutrophils	rs6457515	6	32223785	c	g	0.2382	-0.0095	0.0035	6.52E-03	--+	5.07E-03
Neutrophils	rs6457516	6	32223830	a	t	0.5404	0.0101	0.0035	3.93E-03	++-	1.28E-02
Neutrophils	rs6908927	6	32224489	a	g	0.2385	-0.01	0.0035	4.11E-03	--+	1.30E-02
Neutrophils	rs6914780	6	32216529	a	t	0.0756	0.0063	0.0068	3.52E-01	-++	9.14E-01
Neutrophils	rs6915612	6	32218625	a	g	0.0628	0.0116	0.0145	4.22E-01	??+	1.00E+00
Neutrophils	rs6916062	6	32219041	t	c	0.4791	0.0033	0.0086	7.01E-01	?+-	3.03E-01
Neutrophils	rs6921945	6	32220037	a	c	0.5291	-0.0062	0.0035	7.55E-02	---	5.29E-01
Neutrophils	***rs6936204***	***6***	***32217092***	***t***	***c***	***0.4321***	***-0.0196***	***0.0035***	***2.72E-08***	***---***	***1.85E-01***
Neutrophils	rs9267947	6	32211218	a	g	0.3727	0.0013	0.0032	6.78E-01	++-	2.08E-02

Table S1. Random-effects meta-analysis of MANTRA identified loci.

Neutrophils	rs9267948	6	32212233	a	g	0.6607	-0.0015	0.0034	6.61E-01	--+	2.82E-01
Neutrophils	rs9267954	6	32213052	a	t	0.826	-0.0059	0.0055	2.84E-01	-?-	7.49E-01
Neutrophils	rs9267955	6	32213150	a	g	0.0973	0.0033	0.012	7.84E-01	??+	1.00E+00
Neutrophils	rs9267956	6	32213638	a	g	0.6011	-0.0039	0.0035	2.61E-01	--+	9.66E-02
Neutrophils	rs9267958	6	32214616	a	c	0.5235	-0.0062	0.003	3.67E-02	--+	2.85E-04
Neutrophils	rs9267970	6	32217160	a	g	0.5211	-0.0059	0.003	4.45E-02	--+	3.12E-04
Neutrophils	rs9267971	6	32217185	t	c	0.4639	-0.013	0.003	1.13E-05	---	4.42E-01
Neutrophils	rs9267992	6	32220397	a	g	0.9256	-0.0033	0.0127	7.95E-01	??-	1.00E+00
Neutrophils	rs9268000	6	32223531	a	c	0.5759	-0.0073	0.0033	2.56E-02	--+	7.84E-02
Neutrophils	rs9296013	6	32216147	a	c	0.686	0.0098	0.0059	9.56E-02	+--	4.43E-03
Neutrophils	rs9296015	6	32218989	a	g	0.2758	0.0085	0.0036	1.97E-02	+++	2.37E-01
Neutrophils	rs9296016	6	32219010	a	t	0.2668	0.0063	0.0035	7.07E-02	+++	5.09E-01
Neutrophils	rs9357138	6	32219838	t	c	0.3014	0.0045	0.0046	3.29E-01	-++	3.08E-01
Neutrophils	***rs8078723***	***17***	***38166879***	***t***	***c***	***0.4046***	***-0.0307***	***3.00E-03***	***5.02E-24***	***--+***	***4.23E-08***
Neutrophils	***rs4794822***	***17***	***38156712***	***t***	***c***	***0.496***	***3.12E-02***	***3.00E-03***	***8.55E-25***	***++-***	***2.05E-07***
WBC count	rs16841659	1	159053650	c	g	0.9141	0.0122	0.004	2.33E-03	-?+	2.62E-07
WBC count	rs16841682	1	159064818	a	c	0.6964	0.0017	0.0029	5.61E-01	+-+	4.63E-01
WBC count	rs1894043	1	159069211	t	c	0.2701	0.0166	0.0022	6.13E-14	+-+	5.79E-166
WBC count	rs2078724	1	159072108	t	c	0.5111	0.0334	0.0032	2.84E-25	?-+	4.32E-18
WBC count	rs2518561	1	159055124	t	c	0.5007	0.0343	0.0031	1.37E-28	?-+	9.41E-18
WBC count	rs2518562	1	159055656	t	c	0.5229	-0.02	0.0022	2.42E-20	++-	1.45E-40
WBC count	***rs2518564***	***1***	***159062436***	***a***	***g***	***0.4639***	***0.0365***	***0.0021***	***6.92E-69***	***+++***	***6.98E-258***
WBC count	rs2518565	1	159070113	a	g	0.3318	-0.0236	0.0021	1.46E-29	+--	1.46E-58
WBC count	rs2814762	1	159068326	a	g	0.6498	0.053	0.0039	2.60E-42	?++	1.64E-04
WBC count	rs2814764	1	159064568	a	t	0.354	-0.0273	0.0021	2.12E-39	---	3.17E-79
WBC count	rs2852720	1	159060560	t	c	0.3129	0.038	0.0027	4.16E-45	+-+	2.71E-41
WBC count	rs2852721	1	159068064	t	c	0.6737	0.0472	0.0044	4.39E-27	--+	4.83E-08
WBC count	rs855866	1	159052720	a	g	0.3516	-0.0348	0.0021	6.43E-64	---	1.98E-203
WBC count	rs855867	1	159052847	a	g	0.4913	0.0276	0.0021	2.27E-39	+++	2.73E-83
WBC count	rs1371798	4	74976781	t	c	0.4882	-0.0058	0.0018	1.56E-03	--+	6.75E-11
WBC count	***rs1371799***	***4***	***74977837***	***t***	***c***	***0.4361***	***0.0052***	***0.0018***	***4.28E-03***	***++-***	***1.09E-12***
WBC count	rs1866755	4	74978340	t	c	0.4908	-0.0053	0.0018	3.59E-03	--+	2.30E-12
WBC count	rs1893319	4	74973129	t	c	0.4683	0.0111	0.0019	9.67E-09	+++	2.51E-01
WBC count	rs505197	4	74968560	t	c	0.9264	-0.0037	0.0143	7.94E-01	+?-	6.04E-01
WBC count	rs549280	4	74971196	a	g	0.4733	-0.011	0.0018	4.17E-10	---	7.41E-01
WBC count	rs551055	4	74981560	a	g	0.9486	-0.0086	0.014	5.39E-01	??-	1.00E+00
WBC count	rs7667376	4	74967890	t	c	0.4918	-0.005	0.0018	5.41E-03	--+	2.92E-12
WBC count	rs10484494	6	135430093	a	g	0.0945	-0.0127	0.0053	1.66E-02	?-+	1.18E-02

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs1074849	6	135423412	a	g	0.2266	0.0039	0.0022	7.07E-02	+++	4.29E-01
WBC count	rs11154792	6	135431640	t	c	0.5275	0.0131	0.0026	5.39E-07	+?-	5.35E-04
WBC count	rs11759553	6	135422296	a	t	0.5257	0.0108	0.0018	3.08E-09	++-	1.43E-04
WBC count	rs1411919	6	135432061	a	g	0.5694	-0.0047	0.0021	2.39E-02	---	6.19E-01
WBC count	rs2223385	6	135435171	a	g	0.2643	0.003	0.002	1.24E-01	+++	9.16E-01
WBC count	rs4895440	6	135426558	a	t	0.5299	0.0107	0.0018	4.87E-09	++-	5.78E-05
WBC count	***rs4895441***	***6***	***135426573***	***a***	***g***	***0.5376***	***0.0131***	***0.002***	***2.50E-11***	***+++***	***1.63E-02***
WBC count	rs6920211	6	135431318	t	c	0.4331	0.0126	0.0019	1.98E-11	+++	1.48E-02
WBC count	rs6930223	6	135424203	t	g	0.5024	-0.0095	0.0018	1.73E-07	---	6.28E-02
WBC count	rs7743042	6	135419834	a	g	0.3901	0.0058	0.0018	1.29E-03	++-	1.45E-01
WBC count	rs7743480	6	135420064	t	c	0.8608	-0.0032	0.0082	6.98E-01	??-	1.00E+00
WBC count	rs7766963	6	135432883	t	c	0.4892	0.0089	0.0018	1.05E-06	+++	6.60E-01
WBC count	rs7775698	6	135418635	t	c	0.4712	-0.0102	0.0025	3.81E-05	-?+	7.84E-04
WBC count	rs7776054	6	135418916	a	g	0.552	0.012	0.0019	2.99E-10	+++	8.84E-02
WBC count	rs9373124	6	135423209	t	c	0.4582	0.0113	0.0018	1.06E-09	++-	3.47E-04
WBC count	rs9376092	6	135427144	a	c	0.305	-0.0115	0.002	4.28E-09	--+	5.63E-04
WBC count	rs9389268	6	135419631	a	g	0.553	0.0115	0.0019	1.55E-09	+++	2.31E-02
WBC count	rs9389269	6	135427159	t	c	0.4243	0.013	0.002	5.11E-11	++-	5.78E-03
WBC count	rs9399137	6	135419018	t	c	0.4372	0.0116	0.002	8.29E-09	++-	4.87E-04
WBC count	rs9402684	6	135419305	t	c	0.4589	0.006	0.0018	8.67E-04	++-	2.26E-01
WBC count	rs9402686	6	135427817	a	g	0.3027	-0.0138	0.002	4.45E-12	---	8.24E-02
WBC count	rs9483787	6	135434609	a	c	0.1372	-0.0015	0.0051	7.71E-01	??-	1.00E+00
WBC count	rs9483788	6	135435501	t	c	0.4333	0.0128	0.0021	1.39E-09	+++	4.18E-01
WBC count	rs9494140	6	135430029	t	c	0.883	-7.00E-04	0.0057	9.02E-01	??-	1.00E+00
WBC count	rs9494141	6	135430299	t	c	0.2024	0.0061	0.0045	1.78E-01	??+	1.00E+00
WBC count	rs9494144	6	135432530	t	c	0.8832	-0.0013	0.0056	8.15E-01	??-	1.00E+00
WBC count	rs9494145	6	135432552	t	c	0.466	0.0124	0.0022	1.83E-08	+++	2.33E-01
WBC count	rs10263804	7	92416590	a	g	0.8781	-0.0138	0.0057	1.48E-02	??-	1.00E+00
WBC count	rs2282995	7	92411623	a	g	0.6411	-0.0064	0.0026	1.24E-02	--+	1.09E-01
WBC count	rs3731303	7	92403859	t	c	0.3141	0.0069	0.0026	7.41E-03	+++	1.55E-01
WBC count	rs3731304	7	92403660	a	c	0.0157	0.0409	0.0235	8.13E-02	??+	1.00E+00
WBC count	rs3802072	7	92403053	a	g	0.1923	0.0078	0.0023	6.82E-04	+++	2.15E-01
WBC count	rs3802073	7	92402480	t	c	0.3701	0.0023	0.0023	3.16E-01	++-	1.06E-03
WBC count	rs41461052	7	92407600	t	c	0.0578	0.0086	0.0082	2.96E-01	??+	1.00E+00
WBC count	***rs445***	***7***	***92408370***	***t***	***c***	***0.4013***	***-0.0098***	***0.0023***	***2.19E-05***	***--+***	***8.92E-14***
WBC count	rs8	7	92408329	t	c	0.4051	0.0028	0.0037	4.55E-01	?++	8.68E-01
WBC count	rs1006122	2	113785842	c	g	0.5553	-3.00E-04	0.0024	9.04E-01	+--	5.58E-01
WBC count	rs1013477	2	113777408	t	c	0.3527	-0.0016	0.0019	3.78E-01	-+-	7.87E-02

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs10165797	2	113828450	a	c	0.4294	-0.004	0.0018	2.39E-02	---	6.89E-01
WBC count	rs10169599	2	113838652	t	c	0.3387	0.002	0.002	3.38E-01	++-	1.27E-01
WBC count	rs10176274	2	113840575	c	g	0.5542	-0.0096	0.0021	7.81E-06	---	5.14E-01
WBC count	rs10179714	2	113805118	a	g	0.1941	-0.0061	0.0028	2.97E-02	-?+	9.58E-02
WBC count	rs10181720	2	113838608	a	g	0.4625	-0.0044	0.002	2.98E-02	---	7.17E-01
WBC count	rs10184259	2	113838628	t	c	0.5216	-0.0022	0.002	2.75E-01	--+	9.61E-02
WBC count	rs10184277	2	113823485	t	c	0.2994	-0.0076	0.0032	1.77E-02	-?+	1.38E-01
WBC count	rs10185781	2	113849150	a	c	0.2666	-0.0046	0.0022	3.25E-02	--+	1.56E-01
WBC count	rs10186133	2	113836944	t	g	0.3634	0.0037	0.0019	5.57E-02	++-	3.67E-02
WBC count	rs10188292	2	113840443	a	t	0.5807	-0.0091	0.0021	1.52E-05	---	1.83E-01
WBC count	rs10192014	2	113922412	a	g	0.3613	0.0015	0.0036	6.67E-01	+?+	6.96E-01
WBC count	rs10199363	2	113840791	a	g	0.9191	0.0144	0.005	3.73E-03	+?+	5.58E-01
WBC count	rs10205381	2	113753124	a	g	0.1217	5.00E-04	0.0056	9.28E-01	??+	1.00E+00
WBC count	rs10206428	2	113826475	a	g	0.3829	-0.0048	0.0018	7.06E-03	---	2.56E-01
WBC count	rs10207930	2	113860861	a	c	0.4591	0.0041	0.0018	2.72E-02	-++	6.02E-03
WBC count	rs10496447	2	113782059	a	g	0.5997	0.0019	0.003	5.31E-01	--+	3.98E-02
WBC count	rs10496448	2	113828690	c	g	0.197	-0.0083	0.0029	4.83E-03	-?-	6.23E-01
WBC count	rs10514809	2	113781077	t	c	0.022	-0.0031	0.0187	8.69E-01	??-	1.00E+00
WBC count	rs10864909	2	113750230	a	g	0.4359	0.0025	0.002	2.04E-01	-++	3.01E-01
WBC count	rs10864910	2	113935222	t	c	0.5149	0	0.0021	9.87E-01	-++	4.71E-01
WBC count	rs11123158	2	113811057	a	g	0.2844	-0.0062	0.0025	1.39E-02	-?-	3.25E-01
WBC count	rs11123159	2	113834030	t	c	0.451	0.0049	0.0024	3.56E-02	++-	6.21E-02
WBC count	rs11123161	2	113845578	t	c	0.37	-3.00E-04	0.0018	8.57E-01	-+-	4.59E-04
WBC count	rs11123162	2	113850114	a	g	0.4476	-0.0022	0.002	2.65E-01	+--	3.71E-02
WBC count	rs11123167	2	113906869	c	g	0.3792	0.0055	0.0021	7.77E-03	+++	6.62E-01
WBC count	rs1156701	2	113827845	a	g	0.09	0.0012	0.0031	6.94E-01	++-	1.58E-01
WBC count	rs11677140	2	113865808	a	c	0.5441	2.00E-04	0.0022	9.11E-01	-+-	3.03E-01
WBC count	rs11677407	2	113845029	t	c	0.3456	-0.0042	0.0022	5.36E-02	--+	8.75E-02
WBC count	rs11678375	2	113835691	t	c	0.5782	-0.0039	0.0019	4.44E-02	--+	3.72E-02
WBC count	rs11681884	2	113847628	t	c	0.3522	-0.0044	0.0021	4.18E-02	--+	1.50E-01
WBC count	rs11684289	2	113845038	t	g	0.4912	0.0036	0.0021	9.64E-02	++-	4.58E-02
WBC count	rs11684719	2	113842401	a	g	0.2257	-0.0089	0.0022	7.35E-05	---	7.36E-01
WBC count	rs11687782	2	113841782	a	t	0.464	0.0036	0.0019	5.40E-02	-++	6.19E-04
WBC count	rs11687786	2	113811731	t	g	0.6431	7.00E-04	0.0026	7.99E-01	-?+	1.57E-01
WBC count	rs11693683	2	113850653	a	t	0.3944	0.0046	0.0031	1.46E-01	+++	6.89E-02
WBC count	rs11883847	2	113792171	t	c	0.4891	0.0019	0.0037	6.01E-01	?-+	7.66E-03
WBC count	rs11885498	2	113900177	a	g	0.5914	-0.0056	0.0021	7.00E-03	---	8.64E-01
WBC count	rs11886754	2	113844342	c	g	0.5648	0.0056	0.0021	8.03E-03	+++	3.53E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs11891198	2	113844229	a	g	0.5745	0.0056	0.0022	1.04E-02	+++	3.58E-01
WBC count	rs11893386	2	113844310	t	c	0.4927	0.0041	0.0022	5.97E-02	++-	7.29E-02
WBC count	rs11896207	2	113850882	t	c	0.7353	-0.0111	0.0052	3.35E-02	?+-	4.49E-02
WBC count	rs11897481	2	113851439	t	c	0.3521	-0.0045	0.0021	3.79E-02	--+	1.63E-01
WBC count	rs11898158	2	113823572	a	g	0.5168	0.0098	0.0035	4.71E-03	?++	1.65E-01
WBC count	rs11898742	2	113845392	a	g	0.0721	0.002	0.0103	8.46E-01	??+	1.00E+00
WBC count	rs11899198	2	113840539	t	g	0.3744	-0.0022	0.0022	3.38E-01	--+	5.28E-04
WBC count	rs12328368	2	113847144	c	g	0.5653	-0.0109	0.0021	1.21E-07	---	2.28E-01
WBC count	rs12328766	2	113846738	a	g	0.5217	-0.0098	0.0021	3.43E-06	---	4.62E-01
WBC count	rs12329129	2	113847007	a	g	0.3445	0.0108	0.0021	2.00E-07	+++	2.27E-01
WBC count	rs12466799	2	113835999	t	c	0.566	-0.0025	0.0021	2.33E-01	--+	2.52E-01
WBC count	rs12469822	2	113830563	a	g	0.3218	0.0038	0.0019	4.90E-02	++-	5.14E-01
WBC count	rs12470990	2	113924738	t	c	0.5134	0.0026	0.0034	4.55E-01	+?+	7.17E-01
WBC count	rs12475161	2	113823626	t	c	0.4316	-0.0014	0.0018	4.44E-01	--+	1.01E-03
WBC count	rs12475781	2	113916912	t	g	0.3051	0.0042	0.002	3.57E-02	+++	4.29E-01
WBC count	rs12475887	2	113849986	a	c	0.4035	-2.00E-04	0.0024	9.50E-01	-++	1.23E-01
WBC count	rs12614131	2	113930867	t	c	0.3588	0.0018	0.0027	5.04E-01	++-	1.20E-01
WBC count	rs12711746	2	113752247	a	c	0.4277	0.0032	0.002	9.87E-02	-++	3.19E-01
WBC count	rs12711747	2	113785020	a	g	0.4022	2.00E-04	0.002	9.34E-01	-+-	2.82E-01
WBC count	rs12711749	2	113829709	a	g	0.4848	-0.0015	0.0018	4.12E-01	-+-	9.60E-02
WBC count	rs12711751	2	113837765	t	g	0.5337	-0.0023	0.002	2.59E-01	--+	2.61E-02
WBC count	rs12711752	2	113837840	t	c	0.562	-9.00E-04	0.002	6.36E-01	--+	5.91E-01
WBC count	rs12711762	2	113932800	t	c	0.3161	-3.00E-04	0.002	9.02E-01	--+	5.81E-01
WBC count	rs12711763	2	113932811	c	g	0.7857	-0.0045	0.0032	1.60E-01	-+-	7.50E-01
WBC count	rs12711765	2	113936036	a	g	0.5017	-0.0028	0.0039	4.74E-01	??-	1.00E+00
WBC count	rs128964	2	113887803	a	g	0.4888	0.0059	0.0026	2.27E-02	+++	6.79E-01
WBC count	rs13011842	2	113833570	t	c	0.3867	-0.0027	0.0026	2.87E-01	--+	5.64E-01
WBC count	rs13019891	2	113829869	t	g	0.4386	0.0038	0.002	6.20E-02	+++	9.47E-01
WBC count	rs13030546	2	113840014	a	g	0.5508	0.0031	0.0027	2.48E-01	-++	4.04E-01
WBC count	rs13033104	2	113756777	t	g	0.4674	0.0049	0.002	1.24E-02	++-	4.90E-01
WBC count	rs13382561	2	113863536	a	g	0.5636	-0.0104	0.0021	1.28E-06	---	1.52E-01
WBC count	rs13386602	2	113834820	a	c	0.5207	-0.006	0.0019	1.77E-03	---	5.82E-01
WBC count	rs13389431	2	113851830	a	g	0.0884	2.00E-04	0.0064	9.75E-01	??+	1.00E+00
WBC count	rs13398728	2	113842506	t	c	0.4349	-0.0052	0.0021	1.33E-02	--+	3.38E-04
WBC count	rs13404928	2	113866525	a	g	0.2362	-2.00E-04	0.0022	9.23E-01	--+	4.49E-01
WBC count	rs13406085	2	113861561	a	g	0.2624	-0.005	0.0022	2.05E-02	---	2.77E-01
WBC count	rs13407508	2	113794759	t	c	0.6701	8.00E-04	0.0024	7.38E-01	+?-	2.20E-02
WBC count	rs13409360	2	113838102	a	g	0.3925	0.0056	0.0021	7.74E-03	+++	7.97E-02

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs13409371	2	113838145	a	g	0.4052	0.0057	0.0021	6.81E-03	+++	1.20E-01
WBC count	rs13410552	2	113855406	c	g	0.5813	0.0043	0.0022	4.67E-02	++-	1.36E-01
WBC count	rs13410964	2	113843283	a	g	0.3262	0.0096	0.0021	5.35E-06	+++	2.22E-01
WBC count	rs13414333	2	113752731	a	g	0.9226	0.0044	0.0069	5.23E-01	??+	1.00E+00
WBC count	rs13419549	2	113933726	t	c	0.3229	-4.00E-04	0.0034	9.13E-01	+--	2.78E-01
WBC count	rs13424580	2	113852564	a	g	0.3039	0.0086	0.0022	9.81E-05	+++	1.13E-01
WBC count	rs1374280	2	113796666	t	c	0.4015	6.00E-04	0.0021	7.68E-01	-++	8.49E-01
WBC count	rs1374281	2	113898789	c	g	0.5901	-0.0051	0.0021	1.35E-02	---	8.37E-01
WBC count	rs1374284	2	113753583	t	c	0.5857	-9.00E-04	0.002	6.58E-01	+-+	8.74E-02
WBC count	rs1446509	2	113851159	a	t	0.5637	-0.0105	0.0021	5.29E-07	---	2.65E-01
WBC count	rs1446510	2	113851517	t	c	0.4689	0.0015	0.0022	4.83E-01	++-	6.01E-06
WBC count	rs1446511	2	113762543	t	c	0.4751	-6.00E-04	0.0026	8.05E-01	?+-	3.87E-01
WBC count	rs1446512	2	113762532	t	g	0.4751	-6.00E-04	0.0026	8.28E-01	?+-	3.78E-01
WBC count	rs1446514	2	113757973	t	g	0.2951	5.00E-04	0.0023	8.18E-01	?-+	3.78E-01
WBC count	rs1446515	2	113757654	a	t	0.4745	-0.002	0.0023	3.92E-01	?--	5.66E-01
WBC count	rs1446516	2	113750470	a	g	0.5939	-0.0025	0.0023	2.89E-01	+--	1.59E-01
WBC count	rs1446519	2	113822448	t	c	0.3881	-0.0053	0.0029	7.11E-02	-?+	2.03E-02
WBC count	rs1446521	2	113827396	a	g	0.4857	0.0022	0.0026	4.08E-01	+++	4.93E-01
WBC count	rs1446522	2	113827503	c	g	0.0934	7.00E-04	0.0031	8.14E-01	++-	1.26E-01
WBC count	rs1530549	2	113817455	t	c	0.3364	-0.0046	0.003	1.26E-01	---	5.52E-01
WBC count	rs1530550	2	113817513	a	t	0.5784	0.0046	0.0022	3.25E-02	-++	6.88E-02
WBC count	rs1530551	2	113817566	t	c	0.482	0.0018	0.0022	4.06E-01	+-+	2.46E-02
WBC count	rs1542176	2	113849837	t	c	0.3579	-0.0013	0.0019	4.90E-01	-+-	3.66E-03
WBC count	rs1562302	2	113810458	a	g	0.3777	0.0011	0.002	5.89E-01	+--	1.85E-01
WBC count	rs1562303	2	113782392	t	c	0.2935	0.0073	0.004	6.89E-02	??+	1.00E+00
WBC count	rs1562305	2	113751613	a	g	0.3701	0.0028	0.002	1.62E-01	++-	4.51E-01
WBC count	rs1562306	2	113751380	a	g	0.2937	0.002	0.0023	3.86E-01	-++	7.36E-01
WBC count	rs1596894	2	113754754	t	c	0.4851	6.00E-04	0.0025	7.96E-01	?+-	8.15E-01
WBC count	rs1630153	2	113869803	t	c	0.34	0.0032	0.0019	8.82E-02	-++	5.83E-03
WBC count	rs1665188	2	113852789	c	g	0.0769	-0.0143	0.0054	7.89E-03	-?-	4.03E-01
WBC count	rs1688072	2	113869347	a	g	0.4789	0.0059	0.0029	3.90E-02	+++	1.35E-01
WBC count	rs1688075	2	113858196	a	c	0.3855	-0.0016	0.0025	5.22E-01	-++	8.58E-02
WBC count	rs17042691	2	113745812	t	c	0.34	3.00E-04	0.0022	8.92E-01	-+-	4.36E-02
WBC count	rs17042709	2	113788100	a	g	0.2321	-0.0065	0.0027	1.63E-02	-?-	8.09E-01
WBC count	rs17042712	2	113788194	c	g	0.7978	0.001	0.0047	8.33E-01	?+-	5.56E-02
WBC count	rs17042750	2	113823151	t	g	0.0983	-0.0038	0.0037	3.01E-01	?+-	1.42E-03
WBC count	rs17042751	2	113823365	t	c	0.395	0.0019	0.0026	4.67E-01	++-	4.02E-01
WBC count	rs17042755	2	113824585	c	g	0.1835	0.0023	0.0026	3.78E-01	+++	4.61E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs17042786	2	113827859	t	c	0.4314	-0.007	0.0026	7.70E-03	-?-	3.96E-01
WBC count	rs17042795	2	113829840	a	g	0.6782	-0.016	0.0039	3.61E-05	?--	4.31E-01
WBC count	rs17042810	2	113838569	t	c	0.3626	-0.0026	0.0025	3.03E-01	--+	1.93E-04
WBC count	rs17042815	2	113839857	c	g	0.0865	0.0151	0.0052	3.47E-03	?++	4.88E-01
WBC count	rs17042819	2	113840039	a	g	0.7307	-0.0127	0.0051	1.26E-02	?--	6.53E-01
WBC count	rs17042827	2	113840657	a	g	0.9737	-0.0179	0.0116	1.24E-01	??-	1.00E+00
WBC count	rs17042828	2	113840934	t	c	0.087	0.0112	0.0051	2.76E-02	?-+	3.92E-02
WBC count	rs17042833	2	113842279	t	c	0.7301	-0.0093	0.0051	6.87E-02	?+-	6.32E-02
WBC count	rs17042838	2	113843337	a	g	0.1572	3.00E-04	0.0049	9.52E-01	??+	1.00E+00
WBC count	rs17042842	2	113843481	a	g	0.7399	-0.016	0.0049	1.21E-03	?--	4.29E-01
WBC count	rs17042853	2	113848200	a	t	0.2659	-0.0054	0.0021	1.14E-02	---	3.61E-01
WBC count	rs17042869	2	113849691	a	g	0.0419	0.0255	0.0093	5.90E-03	??+	1.00E+00
WBC count	rs17042888	2	113862173	a	g	0.1744	-0.0094	0.0024	8.74E-05	---	4.56E-01
WBC count	rs17042894	2	113864047	a	g	0.0704	0.0152	0.0054	4.62E-03	?++	5.09E-01
WBC count	rs17042905	2	113867956	t	c	0.36	-0.0027	0.0024	2.61E-01	--+	5.60E-05
WBC count	rs17042917	2	113870663	a	g	0.1702	-0.0096	0.0024	7.04E-05	---	2.02E-01
WBC count	rs17043030	2	113926885	t	c	0.709	-0.0028	0.0042	4.99E-01	?+-	1.26E-01
WBC count	rs17043031	2	113930864	a	g	0.8963	0.0043	0.0069	5.38E-01	+?+	6.99E-01
WBC count	rs17043037	2	113932352	t	g	0.0471	0.0162	0.0144	2.61E-01	??+	1.00E+00
WBC count	rs17043041	2	113933432	t	g	0.9406	-0.0044	0.0113	6.98E-01	??-	1.00E+00
WBC count	rs17043051	2	113933804	t	c	0.5665	-0.0015	0.0028	5.86E-01	-?+	3.67E-02
WBC count	rs17043057	2	113934413	t	c	0.9525	-0.0164	0.0142	2.48E-01	??-	1.00E+00
WBC count	rs17043069	2	113935807	t	g	0.8678	0.0042	0.0059	4.74E-01	??+	1.00E+00
WBC count	rs17207494	2	113864010	a	c	0.582	-0.0088	0.0022	6.34E-05	---	7.57E-02
WBC count	rs17486819	2	113871806	t	g	0.0808	-0.0027	0.004	4.90E-01	?+-	1.86E-03
WBC count	rs17624213	2	113933247	t	g	0.2778	-0.0027	0.0026	3.07E-01	---	9.52E-01
WBC count	rs17660913	2	113782329	a	g	0.559	7.00E-04	0.0028	8.09E-01	--+	2.30E-02
WBC count	rs17669228	2	113847712	t	c	0.3496	0.0059	0.003	4.71E-02	++-	4.05E-03
WBC count	rs1794066	2	113886350	a	g	0.4233	0.0042	0.0018	1.74E-02	-++	3.37E-02
WBC count	rs1794067	2	113886384	a	g	0.2199	-0.0037	0.0023	1.09E-01	0	5.57E-01
WBC count	rs1794068	2	113886503	a	g	0.2078	-0.0063	0.0026	1.48E-02	---	5.55E-01
WBC count	rs1800930	2	113820530	a	g	0.2762	-0.009	0.0025	2.68E-04	-?-	7.17E-01
WBC count	rs1867761	2	113922983	t	c	0.328	0.0038	0.0029	1.91E-01	+++	9.74E-01
WBC count	rs1867828	2	113768620	a	g	0.3852	0.0038	0.0019	4.60E-02	+++	7.01E-01
WBC count	rs1867829	2	113839151	a	g	0.46	0.0039	0.0021	6.36E-02	+-+	7.81E-02
WBC count	rs1867831	2	113773561	t	c	0.4248	1.00E-04	0.0025	9.80E-01	-++	3.97E-01
WBC count	rs1867834	2	113828099	t	c	0.4276	0.0039	0.0021	5.65E-02	+++	9.69E-01
WBC count	rs1900287	2	113797565	a	g	0.5339	1.00E-04	0.0025	9.62E-01	-+-	8.78E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs1992761	2	113810286	a	g	0.113	-0.0091	0.0035	9.09E-03	?--	3.68E-01
WBC count	rs2029582	2	113863771	t	c	0.6258	6.00E-04	0.0018	7.34E-01	+-+	6.56E-04
WBC count	rs2071459	2	113887483	t	c	0.567	7.00E-04	0.0021	7.23E-01	+-+	4.25E-01
WBC count	rs2100071	2	113825386	a	c	0.522	0	0.0025	9.96E-01	+--	8.73E-01
WBC count	rs2121326	2	113846975	c	g	0.1516	-0.0064	0.0028	2.14E-02	---	9.58E-02
WBC count	rs2121329	2	113852629	a	c	0.2608	-0.0045	0.0022	3.56E-02	--+	1.26E-01
WBC count	rs2197578	2	113790553	a	g	0.5528	-5.00E-04	0.0023	8.31E-01	-+-	7.85E-01
WBC count	rs2248588	2	113898710	t	c	0.7957	0.0019	0.0067	7.76E-01	??+	1.00E+00
WBC count	rs2248596	2	113898827	a	g	0.1956	8.00E-04	0.0047	8.66E-01	??+	1.00E+00
WBC count	rs2248600	2	113898879	a	g	0.8494	0.0012	0.0076	8.75E-01	??+	1.00E+00
WBC count	rs2248604	2	113898932	a	c	0.1594	-0.0013	0.0071	8.55E-01	??-	1.00E+00
WBC count	rs2305150	2	113789316	t	c	0.5366	0.0015	0.0018	4.01E-01	++-	2.62E-01
WBC count	rs2305152	2	113763463	a	c	0.5444	0.0047	0.0021	2.41E-02	++-	7.75E-01
WBC count	rs2472188	2	113820814	c	g	0.3273	-0.0056	0.0018	2.19E-03	---	1.48E-01
WBC count	rs2515401	2	113820476	t	c	0.4305	-0.0014	0.0018	4.32E-01	--+	2.15E-03
WBC count	rs2515402	2	113820580	a	c	0.6096	0.0054	0.0019	4.64E-03	+++	9.77E-02
WBC count	rs2515404	2	113821117	t	c	0.3949	-7.00E-04	0.0026	7.97E-01	+--	5.16E-01
WBC count	rs2515406	2	113822168	t	c	0.4163	6.00E-04	0.0027	8.22E-01	+--	2.56E-01
WBC count	rs2637988	2	113876779	a	g	0.3912	0.0019	0.0018	2.97E-01	-++	3.96E-01
WBC count	rs2853628	2	113880292	c	g	0.2497	-0.0031	0.0026	2.35E-01	?-+	3.50E-01
WBC count	rs2862772	2	113791482	c	g	0.5755	0.002	0.0018	2.55E-01	+-+	4.01E-01
WBC count	rs2862774	2	113797677	a	c	0.5307	0.003	0.0026	2.37E-01	-++	3.35E-02
WBC count	rs2862853	2	113826759	t	c	0.3596	-0.001	0.0024	6.82E-01	++-	3.48E-01
WBC count	rs2902452	2	113895516	a	c	0.3077	0.0047	0.0021	2.61E-02	+++	7.71E-01
WBC count	rs3087263	2	113885768	a	g	0.0757	-0.0021	0.005	6.73E-01	?--	3.24E-01
WBC count	rs3087266	2	113889100	t	c	0.5215	2.00E-04	0.002	9.11E-01	+-+	1.06E-01
WBC count	rs3087270	2	113893308	a	g	0.5737	0.0031	0.0021	1.34E-01	+++	8.43E-01
WBC count	rs3087271	2	113895200	a	c	0.5097	0.0022	0.0026	3.97E-01	-++	1.02E-01
WBC count	rs3099479	2	113898461	a	g	0.7958	0.0018	0.0067	7.88E-01	??+	1.00E+00
WBC count	rs315919	2	113876213	t	g	0.603	0.0017	0.0023	4.67E-01	+?+	8.51E-01
WBC count	rs315920	2	113873018	t	c	0.4157	-0.0019	0.0028	4.92E-01	---	8.39E-01
WBC count	rs315921	2	113872051	a	g	0.1649	-0.0028	0.0033	3.99E-01	---	9.12E-01
WBC count	rs315922	2	113862647	t	c	0.2908	-0.0012	0.0031	7.11E-01	--+	2.68E-02
WBC count	rs315925	2	113865367	t	c	0.5852	0.0028	0.0025	2.51E-01	+-+	7.56E-02
WBC count	rs315927	2	113866369	t	c	0.3416	0.0028	0.0018	1.30E-01	-++	9.84E-03
WBC count	rs315928	2	113868263	t	c	0.3954	8.00E-04	0.0029	7.77E-01	--+	3.64E-02
WBC count	rs315929	2	113869407	t	c	0.5832	0	0.0024	9.97E-01	+--	7.48E-02
WBC count	rs315931	2	113869843	a	c	0.3627	-0.0022	0.0019	2.27E-01	-+-	5.10E-03

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs315932	2	113869977	t	c	0.5742	0.0024	0.0025	3.46E-01	+-+	1.03E-01
WBC count	rs315935	2	113881365	a	g	0.8679	-0.0024	0.0055	6.60E-01	??-	1.00E+00
WBC count	rs315936	2	113880947	t	c	0.4368	-0.0033	0.0024	1.74E-01	--+	3.17E-01
WBC count	rs315937	2	113897154	c	g	0.7557	0.0027	0.0063	6.67E-01	??+	1.00E+00
WBC count	rs315938	2	113896045	a	t	0.8452	-0.0045	0.0049	3.62E-01	??-	1.00E+00
WBC count	rs315939	2	113895403	a	c	0.8433	1.00E-04	0.0074	9.89E-01	??+	1.00E+00
WBC count	rs315940	2	113895305	t	c	0.8476	-0.0043	0.0051	4.03E-01	??-	1.00E+00
WBC count	rs315941	2	113895235	a	g	0.8435	2.00E-04	0.0074	9.79E-01	??+	1.00E+00
WBC count	rs315942	2	113895145	t	g	0.5534	-0.003	0.002	1.36E-01	--+	4.59E-01
WBC count	rs315943	2	113894338	a	g	0.5797	-0.0063	0.0021	3.15E-03	---	4.61E-01
WBC count	rs315944	2	113894187	a	g	0.147	-0.0019	0.0078	8.08E-01	??-	1.00E+00
WBC count	rs315947	2	113893839	a	g	0.4581	-0.003	0.0018	1.02E-01	---	6.24E-01
WBC count	rs315948	2	113893256	t	c	0.4328	-0.0018	0.003	5.39E-01	+--	9.00E-01
WBC count	rs315949	2	113892774	a	g	0.3496	0.007	0.002	6.40E-04	+++	5.20E-01
WBC count	rs315951	2	113890586	c	g	0.399	0.0025	0.0018	1.62E-01	+++	6.82E-01
WBC count	rs315952	2	113890304	t	c	0.356	7.00E-04	0.0019	7.17E-01	-+-	1.98E-01
WBC count	rs315955	2	113889430	c	g	0.9107	-0.0127	0.0065	5.01E-02	??-	1.00E+00
WBC count	rs315957	2	113901313	t	c	0.7325	-0.0046	0.0027	8.96E-02	-?-	1.11E-01
WBC count	rs315958	2	113900851	t	g	0.5744	-0.0043	0.002	2.94E-02	---	2.56E-01
WBC count	rs3180235	2	113820672	a	g	0.3279	-0.0056	0.0018	2.39E-03	---	1.56E-01
WBC count	rs3180238	2	113820833	t	c	0.6116	0.0114	0.009	2.08E-01	+?+	8.05E-01
WBC count	rs3181052	2	113886049	a	g	0.4058	4.00E-04	0.0021	8.65E-01	+--	4.36E-01
WBC count	rs3181053	2	113886142	t	g	0.9512	0.0211	0.0085	1.35E-02	??+	1.00E+00
WBC count	rs3213448	2	113879297	a	g	0.4212	5.00E-04	0.0021	8.24E-01	+--	4.14E-01
WBC count	rs35029104	2	113772596	t	c	0.0688	0.0041	0.0075	5.85E-01	??+	1.00E+00
WBC count	rs3748914	2	113940681	t	c	0.4307	-9.00E-04	0.0018	6.13E-01	--+	5.49E-01
WBC count	rs3752739	2	113788590	c	g	0.7706	0.0061	0.003	4.31E-02	+?+	9.43E-01
WBC count	rs3762494	2	113937563	a	g	0.7537	-0.0071	0.0029	1.49E-02	-+-	3.81E-01
WBC count	rs377086	2	113878715	a	g	0.1228	0.0028	0.0055	6.13E-01	+?+	2.35E-01
WBC count	rs380092	2	113888900	a	t	0.3581	8.00E-04	0.0019	6.54E-01	-++	3.62E-01
WBC count	rs3811050	2	113830173	t	c	0.3958	8.00E-04	0.0021	6.92E-01	-++	2.76E-02
WBC count	rs3811053	2	113830926	t	c	0.523	0.0059	0.0021	5.62E-03	+++	4.59E-01
WBC count	rs3827763	2	113831289	a	g	0.4054	0.0016	0.0019	4.07E-01	+-+	2.40E-01
WBC count	rs396201	2	113891775	t	c	0.4582	0.0014	0.002	4.86E-01	++-	2.48E-01
WBC count	rs397211	2	113892141	t	c	0.4635	7.00E-04	0.0021	7.34E-01	++-	3.43E-01
WBC count	rs408392	2	113887458	t	g	0.3666	-0.0027	0.0025	2.86E-01	--+	7.57E-02
WBC count	rs41334144	2	113766332	t	c	0.8487	0.0079	0.0086	3.61E-01	??+	1.00E+00
WBC count	rs41411944	2	113922486	t	c	0.9068	-0.0034	0.0068	6.17E-01	??-	1.00E+00

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs4145013	2	113830688	a	g	0.5081	0.0053	0.0018	3.77E-03	+++	2.18E-01
WBC count	rs419598	2	113887207	t	c	0.3546	0.0016	0.0027	5.57E-01	++-	1.20E-01
WBC count	rs423904	2	113887262	t	c	0.3659	-0.0026	0.0025	3.06E-01	--+	8.43E-02
WBC count	rs4251955	2	113873871	a	g	0.0479	-0.0126	0.0086	1.45E-01	??-	1.00E+00
WBC count	rs4251961	2	113874467	t	c	0.4359	-0.0034	0.0022	1.12E-01	--+	2.03E-03
WBC count	rs4251967	2	113874968	c	g	0.0578	-0.0119	0.0052	2.29E-02	-?-	6.80E-01
WBC count	rs4251984	2	113877226	a	g	0.5098	0.0055	0.0026	3.49E-02	+++	8.68E-01
WBC count	rs4251985	2	113877413	t	g	0.3696	-0.0031	0.0027	2.50E-01	--+	1.09E-01
WBC count	rs4251995	2	113881050	t	g	0.9859	0.0149	0.0171	3.83E-01	??+	1.00E+00
WBC count	rs4252001	2	113883683	a	g	0.4541	0.0011	0.0021	6.12E-01	-++	3.99E-01
WBC count	rs4252012	2	113887349	a	c	0.046	0.0082	0.0089	3.54E-01	??+	1.00E+00
WBC count	rs4252019	2	113889119	t	c	0.5219	5.00E-04	0.002	8.23E-01	+-+	1.01E-01
WBC count	rs4252022	2	113890161	a	g	0.0562	-0.0055	0.0082	5.04E-01	??-	1.00E+00
WBC count	rs4252033	2	113891842	a	c	0.8539	-5.00E-04	0.0052	9.24E-01	??-	1.00E+00
WBC count	rs4252035	2	113892563	t	c	0.0319	0.0072	0.016	6.52E-01	??+	1.00E+00
WBC count	rs4252036	2	113892964	a	c	0.017	0.0202	0.0149	1.76E-01	??+	1.00E+00
WBC count	rs4252041	2	113890610	t	c	0.2199	0.0097	0.0075	1.98E-01	?+-	1.41E-01
WBC count	rs431726	2	113889006	t	g	0.3182	0.0031	0.0025	2.19E-01	++-	2.92E-01
WBC count	rs432014	2	113888579	t	c	0.3062	5.00E-04	0.0024	8.20E-01	++-	6.15E-03
WBC count	rs4368340	2	113845080	a	t	0.5289	-0.0032	0.0019	8.64E-02	+--	2.40E-03
WBC count	rs440286	2	113889469	a	c	0.2086	-0.0036	0.0027	1.80E-01	---	9.91E-01
WBC count	rs442710	2	113887399	a	g	0.2094	-0.0062	0.0026	1.82E-02	---	5.68E-01
WBC count	rs444413	2	113885826	a	g	0.2049	-0.0057	0.0026	2.79E-02	---	8.10E-01
WBC count	rs446433	2	113887273	a	g	0.2069	-0.0059	0.0026	2.26E-02	---	6.25E-01
WBC count	rs447713	2	113887672	a	g	0.5006	0.0057	0.0026	2.51E-02	+++	8.12E-01
WBC count	rs4496335	2	113844475	t	c	0.5066	0.0057	0.0022	8.85E-03	++-	1.16E-02
WBC count	rs451578	2	113888557	a	g	0.2049	-0.0064	0.0026	1.48E-02	---	4.27E-01
WBC count	rs452204	2	113889061	a	g	0.5077	-0.0045	0.0018	1.18E-02	+--	1.17E-01
WBC count	rs454078	2	113888793	a	t	0.4971	0.0058	0.0026	2.29E-02	+++	8.01E-01
WBC count	rs4848314	2	113839286	a	g	0.4534	0.0013	0.0024	6.05E-01	+--	5.80E-02
WBC count	rs4848316	2	113934451	t	c	0.4194	-7.00E-04	0.0018	6.81E-01	+-+	7.63E-01
WBC count	rs4849136	2	113748202	t	c	0.2951	8.00E-04	0.0023	7.24E-01	?-+	2.96E-01
WBC count	rs4849142	2	113779875	a	g	0.5068	0.001	0.0019	6.06E-01	+--	6.10E-02
WBC count	rs4849143	2	113787356	c	g	0.5146	0.0011	0.0025	6.78E-01	-+-	8.09E-01
WBC count	rs4849144	2	113800049	a	g	0.2431	-7.00E-04	0.0025	7.90E-01	+--	7.70E-01
WBC count	rs4849147	2	113829236	a	t	0.2511	-0.0022	0.0026	4.04E-01	---	4.14E-01
WBC count	rs4849148	2	113829522	t	c	0.3513	4.00E-04	0.0022	8.42E-01	-++	9.80E-02
WBC count	rs4849152	2	113848574	a	g	0.5245	0.0069	0.0019	2.38E-04	+++	3.20E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs4849153	2	113848654	t	c	0.5702	-4.00E-04	0.002	8.20E-01	+-+	2.45E-02
WBC count	rs4849159	2	113925061	t	c	0.309	7.00E-04	0.0022	7.34E-01	+--	2.63E-01
WBC count	rs4849160	2	113934085	a	g	0.261	-0.0013	0.0022	5.48E-01	---	8.02E-01
WBC count	rs4849163	2	113935028	t	c	0.3166	0.0017	0.0021	4.36E-01	+++	4.68E-01
WBC count	rs4849166	2	113939763	a	t	0.5418	0.0011	0.0018	5.29E-01	++-	7.19E-01
WBC count	rs4849167	2	113940839	c	g	0.5217	4.00E-04	0.0018	8.09E-01	++-	2.81E-01
WBC count	rs495282	2	113887294	c	g	0.2071	-0.0059	0.0026	2.27E-02	---	6.25E-01
WBC count	rs495410	2	113887338	a	c	0.9392	0.0099	0.0049	4.22E-02	+?+	6.81E-01
WBC count	rs579543	2	113889631	a	g	0.215	-0.0022	0.0027	4.05E-01	---	9.34E-01
WBC count	rs6542108	2	113755190	t	c	0.3654	4.00E-04	0.0021	8.50E-01	-+-	1.32E-01
WBC count	rs6542109	2	113756821	t	c	0.3766	0.001	0.002	6.26E-01	-+-	9.79E-02
WBC count	rs6542111	2	113822559	t	c	0.0406	0.0165	0.0082	4.51E-02	??+	1.00E+00
WBC count	rs6542113	2	113859276	a	g	0.0707	0.0155	0.0055	4.85E-03	?++	4.72E-01
WBC count	rs6542114	2	113862825	a	g	0.0595	-0.0109	0.0078	1.63E-01	??-	1.00E+00
WBC count	rs6542118	2	113912081	a	g	0.4871	-0.0037	0.002	6.10E-02	--+	1.84E-01
WBC count	rs6708535	2	113833839	t	c	0.1678	0.0046	0.0042	2.72E-01	?-+	1.55E-01
WBC count	rs6710007	2	113780930	a	g	0.505	9.00E-04	0.0019	6.31E-01	+--	5.94E-02
WBC count	rs6714534	2	113759330	t	c	0.3954	-0.0018	0.0023	4.32E-01	+-+	1.54E-01
WBC count	rs6721033	2	113908086	a	c	0.3987	0.0045	0.002	2.38E-02	+++	2.87E-01
WBC count	rs6722922	2	113841515	t	c	0.4936	0.0039	0.0022	6.88E-02	++-	4.71E-04
WBC count	rs6723495	2	113922579	t	c	0.7273	0.001	0.0043	8.23E-01	+?+	4.54E-01
WBC count	rs6724667	2	113789641	a	g	0.5307	-0.0011	0.0025	6.53E-01	-+-	4.42E-01
WBC count	rs6728590	2	113844600	a	g	0.5257	-0.0042	0.0018	2.19E-02	+--	7.79E-03
WBC count	rs6730516	2	113848961	t	c	0.4754	0.0071	0.0022	9.84E-04	++-	9.52E-03
WBC count	rs6731551	2	113844553	t	c	0.6277	0.0013	0.0019	4.90E-01	+-+	1.74E-04
WBC count	***rs6734238***	***2***	***113841030***	***a***	***g***	***0.5182***	***-0.0117***	***0.0021***	***2.37E-08***	***---***	***2.09E-01***
WBC count	rs6738239	2	113850792	a	c	0.3446	0.0106	0.0021	3.63E-07	+++	2.39E-01
WBC count	rs6738377	2	113850902	c	g	0.5289	-0.004	0.0018	2.98E-02	+--	1.21E-02
WBC count	rs6739883	2	113914312	a	g	0.1336	0.0022	0.0032	4.89E-01	++-	6.48E-01
WBC count	rs6741180	2	113844384	a	g	0.3445	0.0102	0.0021	8.42E-07	+++	2.48E-01
WBC count	rs6743171	2	113840058	c	g	0.3168	0.0079	0.0022	2.72E-04	+++	5.69E-02
WBC count	rs6743376	2	113832333	a	c	0.7371	0.0122	0.0026	1.75E-06	+?+	5.76E-01
WBC count	rs6744288	2	113783230	a	t	0.5023	4.00E-04	0.0018	8.11E-01	+--	4.79E-02
WBC count	rs6744874	2	113783909	a	t	0.1543	-0.0032	0.0037	3.89E-01	-?-	6.47E-01
WBC count	rs6746979	2	113854120	a	t	0.335	0.0106	0.0021	5.59E-07	+++	2.39E-01
WBC count	rs6750559	2	113841532	a	g	0.3589	0.0104	0.0021	9.57E-07	+++	3.94E-01
WBC count	rs6754298	2	113896213	a	t	0.3063	0.0047	0.0021	2.80E-02	+++	7.59E-01
WBC count	rs6754538	2	113777393	c	g	0.3001	0.0066	0.0039	9.15E-02	??+	1.00E+00

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs6755354	2	113826072	t	g	0.4443	0.002	0.0021	3.48E-01	+--	3.73E-01
WBC count	rs6756735	2	113806121	t	c	0.3324	-0.0082	0.0031	7.73E-03	-?-	3.66E-01
WBC count	rs6758965	2	113791193	t	c	0.638	3.00E-04	0.0024	9.02E-01	+?-	1.21E-02
WBC count	rs6759676	2	113836348	t	c	0.3562	0.0034	0.002	9.42E-02	++-	4.01E-02
WBC count	rs6760120	2	113932431	t	c	0.4236	-2.00E-04	0.0019	9.13E-01	--+	8.65E-01
WBC count	rs6761276	2	113832312	t	c	0.5895	-0.0027	0.002	1.74E-01	--+	2.56E-02
WBC count	rs724496	2	113922276	a	g	0.4256	2.00E-04	0.0027	9.28E-01	--+	5.29E-01
WBC count	rs7557928	2	113797968	t	g	0.445	5.00E-04	0.0023	8.44E-01	+-+	7.45E-01
WBC count	rs7558672	2	113825303	a	g	0.1901	-0.0085	0.0032	7.14E-03	-?-	4.79E-01
WBC count	rs7561080	2	113864920	a	g	0.6021	0.0054	0.0023	1.94E-02	+++	2.88E-01
WBC count	rs7569284	2	113803563	a	g	0.5537	0.0011	0.0023	6.47E-01	-++	8.43E-01
WBC count	rs7570267	2	113828578	a	g	0.627	0.0029	0.002	1.52E-01	-++	1.95E-01
WBC count	rs7571656	2	113758863	t	g	0.5891	-6.00E-04	0.002	7.40E-01	+-+	7.33E-02
WBC count	rs7573950	2	113859645	a	g	0.101	0.0234	0.009	8.96E-03	??+	1.00E+00
WBC count	rs7574159	2	113859761	a	g	0.3351	0.0101	0.0021	2.69E-06	+++	2.61E-01
WBC count	rs7574427	2	113860038	a	g	0.3084	0.0085	0.0022	1.22E-04	+++	1.31E-01
WBC count	rs7574787	2	113837416	t	g	0.624	0.009	0.0055	9.90E-02	-?+	3.14E-02
WBC count	rs7575934	2	113817334	t	c	0.4188	-0.0069	0.0027	1.21E-02	-?-	1.94E-01
WBC count	rs7583835	2	113754725	a	c	0.0463	-0.0078	0.0136	5.66E-01	??-	1.00E+00
WBC count	rs7584409	2	113742734	a	g	0.4811	-5.00E-04	0.0025	8.48E-01	?-+	8.32E-01
WBC count	rs7593760	2	113753731	a	g	0.9537	0.0077	0.0136	5.71E-01	??+	1.00E+00
WBC count	rs7595962	2	113934226	t	c	0.516	-9.00E-04	0.0021	6.56E-01	-+-	2.26E-01
WBC count	rs7599662	2	113825085	t	c	0.3882	-4.00E-04	0.0025	8.74E-01	-+-	9.44E-01
WBC count	rs7606584	2	113796484	t	c	0.186	-6.00E-04	0.007	9.32E-01	??-	1.00E+00
WBC count	rs768627	2	113821653	t	c	0.4295	-0.0014	0.0018	4.35E-01	--+	1.37E-03
WBC count	rs895495	2	113899758	a	g	0.464	-0.0038	0.002	6.06E-02	--+	2.16E-01
WBC count	rs895496	2	113899025	t	c	0.3891	0.0024	0.002	2.45E-01	++-	6.32E-02
WBC count	rs895497	2	113763575	a	g	0.2718	0.004	0.0026	1.23E-01	?++	8.67E-02
WBC count	rs9005	2	113891412	a	g	0.2583	-0.0033	0.002	9.80E-02	---	8.09E-01
WBC count	rs921065	2	113825966	t	c	0.4131	-3.00E-04	0.0018	8.47E-01	--+	1.02E-02
WBC count	rs928940	2	113877495	t	g	0.3068	2.00E-04	0.002	9.23E-01	-++	3.00E-01
WBC count	rs9308681	2	113781335	c	g	0.5484	6.00E-04	0.0024	8.13E-01	+--	6.80E-01
WBC count	rs9308682	2	113828425	a	g	0.3779	0.0027	0.0022	2.11E-01	+-+	1.86E-01
WBC count	rs931471	2	113912693	t	c	0.3665	0.0051	0.0021	1.40E-02	+++	3.25E-01
WBC count	rs957200	2	113821336	a	c	0.182	0.0022	0.0026	3.85E-01	+++	4.66E-01
WBC count	rs957201	2	113821200	t	c	0.4283	-0.0014	0.0018	4.51E-01	--+	1.20E-03
WBC count	rs9678578	2	113810947	a	t	0.5205	-2.00E-04	0.0025	9.27E-01	-0-	9.82E-01
WBC count	rs973635	2	113889134	a	g	0.4377	-0.0026	0.002	1.93E-01	+--	3.69E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs990524	2	113816481	t	c	0.363	2.00E-04	0.0025	9.41E-01	-0+	9.73E-01
WBC count	rs996879	2	113822241	a	g	0.2204	0.0031	0.0032	3.41E-01	+?+	2.44E-01
WBC count	rs9973741	2	113853381	a	g	0.7481	-0.0131	0.0034	1.45E-04	-?-	2.20E-01
WBC count	rs9973878	2	113752761	a	g	0.1357	0.0052	0.0052	3.22E-01	??+	1.00E+00
WBC count	rs10169718	2	219103580	a	g	0.5134	-0.0098	0.0018	7.67E-08	--+	7.59E-02
WBC count	rs10182823	2	219107367	a	g	0.8973	-4.00E-04	0.0083	9.62E-01	??-	1.00E+00
WBC count	rs1018288	2	219099260	c	g	0.7837	5.00E-04	0.0065	9.39E-01	??+	1.00E+00
WBC count	***rs10932765***	***2***	***219099484***	***t***	***c***	***0.4251***	***-0.0106***	***0.0019***	***9.42E-09***	***---***	***4.55E-01***
WBC count	rs11901011	2	219106136	a	g	0.0217	0.0149	0.0199	4.53E-01	??+	1.00E+00
WBC count	rs16858888	2	219090451	t	c	0.0885	-0.0128	0.0094	1.72E-01	??-	1.00E+00
WBC count	rs17572109	2	219093934	a	g	0.2382	-0.0068	0.0032	3.37E-02	?--	2.69E-01
WBC count	rs4674275	2	219097738	a	g	0.4084	-0.0087	0.0018	9.10E-07	--+	2.96E-02
WBC count	rs6436046	2	219098248	t	g	0.0184	-0.0236	0.0227	2.99E-01	??-	1.00E+00
WBC count	rs6436047	2	219108913	a	c	0.4046	-0.0091	0.0018	6.59E-07	--+	2.62E-02
WBC count	rs6436048	2	219109033	a	g	0.5661	0.0087	0.0018	8.77E-07	++-	3.15E-02
WBC count	rs6704974	2	219109391	a	g	0.1313	-0.0024	0.0076	7.53E-01	??-	1.00E+00
WBC count	rs6742439	2	219098672	a	g	0.2163	-5.00E-04	0.0065	9.39E-01	??-	1.00E+00
WBC count	rs6757318	2	219090422	a	g	0.784	8.00E-04	0.0065	9.02E-01	??+	1.00E+00
WBC count	rs7605980	2	219100869	c	g	0.5673	0.0087	0.0018	8.74E-07	++-	3.15E-02
WBC count	rs9288536	2	219089616	c	g	0.1232	-0.0011	0.0056	8.43E-01	??-	1.00E+00
WBC count	rs9288537	2	219096333	c	g	0.7003	-0.0024	0.004	5.50E-01	??-	1.00E+00
WBC count	rs9679606	2	219107700	a	g	0.6942	-0.0017	0.0059	7.72E-01	??-	1.00E+00
WBC count	rs9789363	2	219090365	t	c	0.6969	-0.0015	0.0039	7.01E-01	??-	1.00E+00
WBC count	rs10456057	6	31245534	a	g	0.4735	-0.0028	0.0031	3.66E-01	--+	5.71E-01
WBC count	rs12111032	6	31242191	a	g	0.4782	0.0054	0.0027	4.95E-02	?++	3.92E-01
WBC count	rs12191877	6	31252925	t	c	0.4245	0.0039	0.0031	2.07E-01	+++	5.68E-01
WBC count	rs12234123	6	31243604	a	g	0.2245	-0.0045	0.0028	1.10E-01	-++	2.07E-02
WBC count	rs12529015	6	31248262	a	g	0.1416	-0.0058	0.0031	6.47E-02	-++	7.21E-02
WBC count	rs13191343	6	31241109	t	c	0.3155	0.0054	0.0026	3.90E-02	+++	6.08E-01
WBC count	rs13200569	6	31243615	a	g	0.3146	-0.0033	0.0019	7.63E-02	-+-	2.09E-01
WBC count	rs13203895	6	31244082	t	c	0.4222	0.004	0.0031	1.94E-01	+++	9.02E-01
WBC count	rs13207315	6	31241127	t	c	0.4271	-0.0034	0.0026	1.97E-01	--+	3.25E-01
WBC count	rs13208617	6	31248819	t	c	0.4217	0.003	0.0031	3.26E-01	++-	6.05E-01
WBC count	rs16899147	6	31255201	a	g	0.6685	0.0027	0.0026	3.07E-01	+--	6.92E-02
WBC count	rs16899160	6	31256667	a	g	0.0655	-0.0125	0.0046	6.92E-03	?--	7.63E-01
WBC count	rs2040748	6	31243785	t	g	0.3754	0.0042	0.002	3.91E-02	++-	2.82E-04
WBC count	rs2074488	6	31240431	t	g	0.3562	-0.0055	0.0024	2.01E-02	--+	1.52E-02
WBC count	rs2074489	6	31240128	t	c	0.4071	-0.0023	0.0019	2.40E-01	-+-	2.03E-02

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs2074491	6	31239896	t	c	0.8493	0.003	0.0098	7.64E-01	+?+	9.12E-01
WBC count	rs2249741	6	31240712	a	c	0.3549	-0.0105	0.0041	1.08E-02	??-	1.00E+00
WBC count	rs2249742	6	31240721	t	c	0.5109	0.0051	0.0017	3.17E-03	++-	2.37E-08
WBC count	rs2394963	6	31251462	t	c	0.4608	-0.0018	0.0018	3.31E-01	-+-	4.27E-02
WBC count	rs2395471	6	31240692	a	g	0.4747	0.0033	0.0017	4.92E-02	-++	8.88E-02
WBC count	rs2524042	6	31257160	c	g	0.5922	-0.012	0.0024	4.98E-07	---	4.31E-01
WBC count	rs2524043	6	31257012	a	g	0.5902	-0.0175	0.0028	8.24E-10	---	1.51E-01
WBC count	rs2524044	6	31256753	t	g	0.4573	-0.0083	0.0024	4.50E-04	--+	6.39E-03
WBC count	rs2524047	6	31256591	a	g	0.5906	-0.0174	0.0028	8.57E-10	---	1.47E-01
WBC count	rs2524048	6	31256561	t	c	0.3832	-0.0154	0.0028	5.89E-08	--+	2.40E-03
WBC count	rs2524049	6	31255953	c	g	0.5814	-0.0137	0.0025	2.18E-08	---	3.20E-01
WBC count	rs2524050	6	31255541	t	c	0.4065	-0.0132	0.003	8.99E-06	--+	6.70E-03
WBC count	rs2524051	6	31255500	a	g	0.5907	-0.0175	0.0028	8.41E-10	---	1.47E-01
WBC count	rs2524052	6	31253996	a	g	0.3813	-0.0055	0.0019	4.33E-03	+--	7.24E-03
WBC count	rs2524053	6	31252469	t	g	0.4984	-0.0025	0.0019	2.02E-01	+-+	3.34E-04
WBC count	rs2524054	6	31252396	a	c	0.2011	-0.0077	0.0022	4.03E-04	+--	5.57E-05
WBC count	rs2524055	6	31252237	a	c	0.5899	-0.0172	0.0029	1.70E-09	---	9.47E-02
WBC count	rs2524057	6	31251895	a	g	0.5922	-0.012	0.0024	5.58E-07	---	4.33E-01
WBC count	rs2524059	6	31250823	c	g	0.2066	-0.0024	0.0028	3.99E-01	+?-	7.55E-02
WBC count	rs2524063	6	31248155	a	g	0.1072	0.0173	0.0028	4.05E-10	+++	2.11E-01
WBC count	rs2524067	6	31245821	a	g	0.4562	0.0121	0.0031	7.70E-05	?++	6.02E-01
WBC count	rs2524068	6	31245061	t	g	0.3804	0.0083	0.0026	1.38E-03	0	1.41E-02
WBC count	rs2524069	6	31244789	a	t	0.4054	0.0135	0.0033	3.59E-05	?++	8.67E-01
WBC count	rs2524070	6	31244520	a	g	0.1551	0.0101	0.0024	3.69E-05	++-	8.59E-03
WBC count	rs2524074	6	31244021	a	g	0.5899	0.0088	0.0021	2.82E-05	-++	2.32E-03
WBC count	rs2524077	6	31243603	t	c	0.3468	0.0133	0.0028	1.42E-06	++-	6.74E-05
WBC count	rs2524078	6	31242649	a	g	0.45	0.0112	0.003	2.20E-04	?++	9.03E-01
WBC count	rs2524079	6	31242174	a	g	0.4084	0.0121	0.0019	1.97E-10	+++	2.92E-01
WBC count	rs2524082	6	31241761	a	t	0.4934	0.0074	0.0017	1.63E-05	+++	1.24E-01
WBC count	rs2524083	6	31241737	t	c	0.3452	0.0133	0.0028	2.66E-06	++-	6.70E-05
WBC count	rs2524084	6	31241639	a	g	0.478	0.0107	0.0018	2.53E-09	+++	3.43E-01
WBC count	rs2524094	6	31240041	t	c	0.5217	0.0033	0.0019	7.91E-02	-++	1.63E-02
WBC count	rs2844599	6	31256005	c	g	0.102	0.017	0.0028	1.85E-09	+++	8.32E-02
WBC count	rs2844600	6	31253771	t	g	0.3158	0.015	0.0028	1.21E-07	++-	1.15E-03
WBC count	rs2844603	6	31250854	a	g	0.2085	-0.0026	0.0028	3.51E-01	+?-	6.60E-02
WBC count	rs2844605	6	31248591	a	c	0.4656	-0.0083	0.0017	1.13E-06	---	1.80E-01
WBC count	rs2844611	6	31243979	a	t	0.5905	0.0088	0.0021	3.07E-05	-++	2.08E-03
WBC count	rs2844612	6	31243971	a	g	0.2291	-0.0086	0.0021	4.46E-05	+--	2.29E-03

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs2844613	6	31243846	t	g	0.4509	-0.0067	0.0031	2.92E-02	?-+	2.01E-03
WBC count	rs2844615	6	31242959	t	c	0.3368	0.0135	0.0028	8.59E-07	++-	1.76E-04
WBC count	rs2844618	6	31242439	t	c	0.3377	0.0137	0.0028	6.38E-07	++-	2.22E-04
WBC count	rs2844619	6	31242223	c	g	0.31	-0.0097	0.002	1.89E-06	+--	1.55E-04
WBC count	rs2844621	6	31241537	t	c	0.4445	-0.0051	0.002	9.73E-03	--+	1.95E-02
WBC count	rs2844622	6	31240060	a	g	0.2562	-0.0071	0.0021	5.14E-04	+--	3.43E-03
WBC count	rs28481932	6	31242900	a	g	0.625	7.00E-04	0.0023	7.53E-01	+?-	9.09E-03
WBC count	rs2853929	6	31255434	t	c	0.3101	0.0155	0.0029	5.99E-08	++-	2.39E-03
WBC count	rs2853930	6	31255424	a	c	0.6214	-0.0153	0.003	2.35E-07	---	2.23E-01
WBC count	rs2853933	6	31254088	t	c	0.4906	-0.0012	0.0021	5.74E-01	+-+	2.94E-03
WBC count	rs2853934	6	31253928	a	t	0.5945	-0.0173	0.0028	8.77E-10	---	1.46E-01
WBC count	rs2853935	6	31253878	t	c	0.576	-0.0059	0.0027	2.95E-02	-?-	5.02E-01
WBC count	rs2853937	6	31252569	t	c	0.3787	-0.0156	0.0028	3.36E-08	--+	4.92E-03
WBC count	rs2853939	6	31250642	t	c	0.4989	-0.003	0.0019	1.22E-01	+-+	1.16E-03
WBC count	rs2853943	6	31247871	t	c	0.4963	0.0021	0.0024	3.84E-01	-?+	1.49E-01
WBC count	***rs2853946***	***6***	***31247203***	***a***	***t***	***0.5198***	***-0.0139***	***0.0018***	***2.67E-14***	***---***	***4.37E-01***
WBC count	rs2853948	6	31245573	c	g	0.1071	0.0176	0.0027	1.66E-10	+++	3.29E-01
WBC count	rs3130693	6	31242859	t	c	0.5511	-0.0021	0.0026	4.30E-01	-?-	8.13E-01
WBC count	rs3130696	6	31243884	a	g	0.2691	-0.0074	0.002	1.85E-04	---	6.18E-01
WBC count	rs3132485	6	31243389	a	c	0.4261	-9.00E-04	0.0017	5.94E-01	-0-	6.06E-01
WBC count	rs3132486	6	31243170	a	g	0.5518	-0.003	0.0018	9.26E-02	-+-	1.16E-01
WBC count	rs3132488	6	31242695	t	g	0.6175	-0.004	0.0033	2.27E-01	-?-	7.01E-01
WBC count	rs3132489	6	31242674	t	c	0.5637	-5.00E-04	0.0019	7.90E-01	-++	3.97E-01
WBC count	rs3132490	6	31242560	a	g	0.6104	0.0037	0.0025	1.37E-01	-++	2.37E-02
WBC count	rs3132491	6	31242272	t	c	0.4201	0.0048	0.0025	5.85E-02	-++	3.05E-02
WBC count	rs3134745	6	31242762	t	c	0.4455	0.0088	0.0033	8.54E-03	+?-	2.61E-03
WBC count	rs3873374	6	31251311	t	c	0.4898	0.0045	0.0022	4.30E-02	+?+	3.28E-01
WBC count	rs3873375	6	31251360	t	c	0.4643	-0.0019	0.0018	2.85E-01	-+-	1.04E-01
WBC count	rs3930575	6	31244654	a	g	0.1303	-0.0047	0.0026	7.03E-02	+--	4.57E-02
WBC count	rs3931670	6	31243767	c	g	0.2886	0.0061	0.0019	1.69E-03	+++	6.06E-01
WBC count	rs4361609	6	31240635	c	g	0.1906	0.0044	0.0022	4.89E-02	-++	9.48E-05
WBC count	rs4386816	6	31247135	t	c	0.4409	-0.0042	0.0024	7.41E-02	--+	2.68E-05
WBC count	rs4628144	6	31257104	t	c	0.4329	0.0017	0.0018	3.27E-01	+-+	8.48E-02
WBC count	rs5009853	6	31240636	t	c	0.2671	-0.0031	0.0048	5.22E-01	-+-	8.67E-01
WBC count	rs5010528	6	31241032	a	g	0.5863	-0.0113	0.0028	6.92E-05	---	7.80E-01
WBC count	rs6457358	6	31239999	a	t	0.5449	0.0081	0.0039	3.82E-02	+++	8.45E-01
WBC count	rs6457372	6	31247121	a	g	0.4975	-0.0044	0.0017	1.11E-02	---	9.63E-01
WBC count	rs6906846	6	31245736	a	g	0.3114	0.0022	0.0018	2.30E-01	+-+	4.04E-02

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs6913377	6	31243495	a	g	0.0711	-7.00E-04	0.0045	8.78E-01	?-+	7.11E-01
WBC count	rs6919409	6	31244532	a	g	0.0677	-0.0109	0.0045	1.61E-02	?--	9.82E-01
WBC count	rs6919908	6	31244960	t	c	0.4206	0.0033	0.0024	1.75E-01	+?-	3.06E-02
WBC count	rs6923313	6	31241370	t	c	0.5801	-0.0067	0.0024	5.60E-03	-?-	6.36E-01
WBC count	rs7381988	6	31246703	a	g	0.5936	0.0044	0.0025	7.92E-02	-++	9.90E-03
WBC count	rs7382297	6	31247067	t	g	0.3092	-0.001	0.0027	7.19E-01	+-+	1.23E-01
WBC count	rs7382307	6	31247149	a	g	0.1298	-0.0043	0.0026	9.09E-02	+--	4.59E-02
WBC count	rs7754443	6	31254263	a	g	0.4021	0.0018	0.0018	3.22E-01	-++	7.98E-02
WBC count	rs7755686	6	31247796	c	g	0.114	-1.00E-04	0.0036	9.86E-01	--+	3.68E-01
WBC count	rs7759127	6	31240988	t	g	0.4004	-0.011	0.0029	1.37E-04	--+	5.01E-04
WBC count	rs7767581	6	31239855	c	g	0.248	-0.0074	0.0021	3.73E-04	+--	1.98E-04
WBC count	rs7773175	6	31240959	c	g	0.585	-0.0119	0.002	1.96E-09	---	1.75E-01
WBC count	rs9264602	6	31237405	t	c	0.5731	-0.0066	0.003	2.90E-02	-?-	6.07E-01
WBC count	rs9264603	6	31237437	t	c	0.4216	0.0051	0.0028	7.38E-02	+?+	5.29E-01
WBC count	rs9264604	6	31237449	t	c	0.4344	0.0049	0.003	1.06E-01	+?+	6.36E-01
WBC count	rs9264606	6	31237592	a	c	0.2397	-0.0075	0.0021	3.40E-04	+--	1.51E-04
WBC count	rs9264608	6	31237660	a	g	0.2553	-0.0082	0.0021	6.72E-05	+--	7.19E-04
WBC count	rs9264636	6	31238297	t	c	0.4458	0.0046	0.002	2.48E-02	-+-	1.50E-06
WBC count	rs9264647	6	31238613	a	g	0.2419	-0.0082	0.0021	8.33E-05	+--	2.05E-04
WBC count	rs9264664	6	31239227	t	c	0.4264	0.0045	0.0021	3.54E-02	-+-	5.31E-07
WBC count	rs9264672	6	31239766	t	c	0.3186	0.0143	0.0028	3.45E-07	++-	3.74E-04
WBC count	rs9264679	6	31240663	a	t	0.5891	0.0044	0.0026	8.65E-02	-++	3.80E-02
WBC count	rs9264681	6	31240871	c	g	0.305	0.0025	0.0019	1.83E-01	-+-	1.36E-01
WBC count	rs9264731	6	31244068	a	g	0.5917	0.0046	0.0026	7.19E-02	-++	4.50E-02
WBC count	rs9264733	6	31244214	c	g	0.2797	0.0083	0.0025	7.66E-04	+?+	5.97E-01
WBC count	rs9264742	6	31244616	t	c	0.4047	-0.0087	0.0037	2.06E-02	?-+	3.16E-02
WBC count	rs9264745	6	31245478	a	g	0.6158	0.0037	0.0024	1.24E-01	-++	2.92E-02
WBC count	rs9264759	6	31248678	t	c	0.4067	-0.0029	0.002	1.51E-01	+--	5.88E-02
WBC count	rs9348860	6	31252667	t	c	0.4748	0.0041	0.0026	1.21E-01	+-+	4.08E-02
WBC count	rs9348861	6	31252722	a	g	0.6626	0.0044	0.0026	9.17E-02	+-+	4.41E-02
WBC count	rs9348862	6	31252747	t	c	0.0626	-0.0045	0.0048	3.43E-01	?--	6.17E-01
WBC count	rs9366776	6	31256630	a	g	0.1425	-0.0031	0.0026	2.27E-01	-+-	1.12E-02
WBC count	rs9368669	6	31248493	t	c	0.6627	0.0059	0.0032	6.68E-02	+--	6.82E-02
WBC count	rs9368670	6	31252882	t	c	0.3253	-0.0037	0.0026	1.53E-01	-++	3.38E-02
WBC count	rs9368671	6	31254704	t	c	0.3252	-0.0038	0.0026	1.46E-01	-++	3.49E-02
WBC count	rs9380232	6	31242741	t	c	0.0403	-0.0026	0.0055	6.36E-01	?-+	1.80E-01
WBC count	rs9380234	6	31248568	a	g	0.1492	-0.0062	0.0032	5.61E-02	-+-	6.14E-02
WBC count	rs9380236	6	31254664	a	g	0.6842	0.0031	0.0028	2.66E-01	+--	1.45E-02

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs9391714	6	31245080	a	g	0.1481	-0.0059	0.0032	6.68E-02	-+-	6.70E-02
WBC count	rs9394049	6	31244028	a	c	0.0937	0.0019	0.0038	6.25E-01	?++	7.73E-01
WBC count	rs9461680	6	31243347	t	c	0.4008	-0.0035	0.002	8.64E-02	--+	6.93E-02
WBC count	rs9461681	6	31251040	a	g	0.4077	0.0015	0.0017	3.99E-01	-++	1.66E-01
WBC count	rs9461684	6	31253444	t	c	0.4404	0.001	0.003	7.44E-01	++-	2.24E-05
WBC count	rs9468915	6	31250801	a	c	0.5258	-0.006	0.0019	1.85E-03	---	9.64E-02
WBC count	rs9468919	6	31253866	a	g	0.1486	0.013	0.0031	3.20E-05	-++	5.96E-01
WBC count	rs9468920	6	31254936	a	g	0.4072	0.0017	0.0018	3.36E-01	-++	3.89E-02
WBC count	rs9468922	6	31255286	a	g	0.4359	-4.00E-04	0.0017	8.32E-01	-++	4.53E-01
WBC count	rs10094039	8	130589676	a	g	0.4504	0.0056	0.0017	1.31E-03	++-	7.97E-03
WBC count	rs10103048	8	130602281	a	c	0.4571	0.008	0.0023	4.30E-04	+?+	1.65E-02
WBC count	rs10107630	8	130603635	t	c	0.4953	-0.006	0.0017	5.04E-04	--+	2.30E-02
WBC count	rs10458304	8	130596459	t	c	0.3851	-4.00E-04	0.0043	9.32E-01	-?+	7.73E-01
WBC count	rs10956484	8	130588520	a	g	0.1551	-0.0179	0.0032	2.44E-08	-?-	2.49E-02
WBC count	rs11785889	8	130603247	t	c	0.4256	0.0073	0.0021	3.92E-04	++-	1.79E-02
WBC count	rs11995855	8	130601919	t	c	0.971	0.0093	0.0199	6.40E-01	??+	1.00E+00
WBC count	rs13277237	8	130604563	a	g	0.497	-0.0063	0.0017	2.47E-04	---	3.54E-02
WBC count	rs1368700	8	130600091	a	g	0.3388	0.0043	0.0018	1.80E-02	++-	1.84E-03
WBC count	rs1433577	8	130595881	a	g	0.3429	0.0064	0.0019	5.67E-04	0	1.85E-02
WBC count	rs1433578	8	130601089	t	c	0.5297	0.0148	0.0028	9.77E-08	++-	3.50E-03
WBC count	rs1433580	8	130603707	t	c	0.4096	-0.0067	0.0018	2.33E-04	---	3.49E-02
WBC count	rs16904119	8	130593742	t	g	0.3902	-0.0061	0.0019	1.24E-03	---	1.19E-02
WBC count	rs16904121	8	130600781	t	c	0.4246	0.0068	0.002	9.39E-04	++-	4.76E-02
WBC count	rs17265074	8	130603007	t	g	0.0811	-6.00E-04	0.004	8.88E-01	?+-	1.72E-01
WBC count	rs1821340	8	130605291	c	g	0.1665	0.0049	0.0041	2.34E-01	-?+	4.21E-01
WBC count	rs1865223	8	130606476	t	g	0.5206	-0.0044	0.0018	1.44E-02	--+	1.01E-03
WBC count	rs2043405	8	130596548	a	g	0.1455	0.0031	0.0043	4.70E-01	+?+	9.75E-01
WBC count	***rs2163950***	***8***	***130597585***	***a***	***c***	***0.1404***	***-0.0167***	***0.0028***	***1.90E-09***	***---***	***8.93E-02***
WBC count	rs2163951	8	130603357	t	c	0.5054	-0.0034	0.0031	2.81E-01	---	8.37E-01
WBC count	rs6470743	8	130606310	a	g	0.327	0.0057	0.0019	2.61E-03	++-	2.09E-02
WBC count	rs6982402	8	130589924	t	c	0.6347	-0.001	0.0042	8.11E-01	+?-	7.68E-01
WBC count	rs6982553	8	130589974	a	t	0.3543	0.0047	0.0018	9.56E-03	++-	9.89E-04
WBC count	rs6986451	8	130589711	a	g	0.1445	0.0037	0.0042	3.77E-01	+?+	7.47E-01
WBC count	rs7000289	8	130597230	a	g	0.5107	-0.0054	0.0018	2.90E-03	--+	4.87E-03
WBC count	rs7000320	8	130589906	t	c	0.4408	0.0067	0.0018	2.68E-04	+++	2.64E-02
WBC count	rs7000372	8	130590017	a	g	0.5079	-0.0053	0.0019	4.35E-03	--+	2.45E-03
WBC count	rs7000917	8	130590087	a	g	0.9601	0.0015	0.006	7.99E-01	-?+	6.35E-01
WBC count	rs7004211	8	130594056	t	c	0.631	-7.00E-04	0.0043	8.72E-01	+?-	7.37E-01

Table S1. Random-effects meta-analysis of MANTRA identified loci.

WBC count	rs7005227	8	130597858	a	c	0.3249	0.0055	0.0019	3.76E-03	++-	1.50E-02
WBC count	rs7008811	8	130600611	t	g	0.4125	-0.0064	0.0018	4.31E-04	---	3.31E-02
WBC count	rs7011870	8	130592498	a	g	0.4961	-0.0049	0.0018	8.06E-03	--+	1.31E-03
WBC count	rs7840212	8	130599247	t	c	0.4977	-1.00E-04	0.0018	9.45E-01	--+	2.67E-01
WBC count	rs892353	8	130601285	a	g	0.0793	-0.002	0.0042	6.30E-01	?+-	2.55E-01
WBC count	rs996313	8	130598217	a	g	0.3249	0.0057	0.0019	2.37E-03	++-	2.59E-02
WBC count	***rs4794822***	***17***	***38156712***	***t***	***c***	***0.5098***	***0.0158***	***1.80E-03***	***2.75E-19***	***++-***	***2.49E-16***

Random-effects meta-analysis performed using METAL. MANTRA identified variants are in bold italics.

Table S3. Credible Interval Statistics

Trait	SNP	Chr	Position (b37)	Effect Allele	Other Allele	Study Number	log10(BF)	PPH	Sample Size	Effect Direction	Genes	set95*
Neutrophils	rs7667376	4	74967890	C	T	3	11.12528	1	33743	-++	NA	0.52118827
Neutrophils	rs1371798	4	74976781	C	T	3	9.94375	1	33753	-++	NA	0.997634695
Neutrophils	rs1371799	4	74977837	C	T	3	10.9749	1	33753	+--	NA	0.889838606
Neutrophils	rs1866755	4	74978340	C	T	3	10.27447	1	33705	-++	NA	0.963321226
Neutrophils	rs2072633	6	31919578	A	G	3	3.44008	0.509	33698	---	Several, HLA	0.977220747
Neutrophils	rs592229	6	31930441	G	T	3	5.91581	1	33737	++-	Several, HLA	0.941088647
Neutrophils	rs204989	6	32161852	A	G	3	3.12774	0.041	33716	---	Several, HLA	0.986900655
Neutrophils	rs405875	6	32215188	C	T	3	3.44774	0.026	33743	+++	Several, HLA	0.976511099
Neutrophils	rs410283	6	32215198	G	T	3	3.65833	0.019	33753	---	Several, HLA	0.974006156
Neutrophils	rs2515892	6	32215252	G	T	3	3.58835	0.025	33753	---	Several, HLA	0.975004576
Neutrophils	rs3130309	6	32215472	A	G	3	3.22801	0.529	33753	+--	Several, HLA	0.984631838
Neutrophils	rs2395111	6	32215964	C	T	3	3.26049	0.02	32931	+++	Several, HLA	0.983314935
Neutrophils	rs3115575	6	32216891	G	T	3	3.73571	0.025	33753	+++	Several, HLA	0.971611839
Neutrophils	rs6457508	6	32216963	C	T	3	3.76889	0.013	33753	---	Several, HLA	0.970210081
Neutrophils	rs6457510	6	32217046	C	T	3	3.22972	0.024	33753	---	Several, HLA	0.984196353
Neutrophils	rs6936204	6	32217092	C	T	3	6.45169	0.048	33706	+++	Several, HLA	0.728875097
Neutrophils	rs9267971	6	32217185	C	T	3	3.79636	0.022	33597	+++	Several, HLA	0.968697032
Neutrophils	rs9267972	6	32217232	A	G	2	4.72678	0.016	26352	?--	Several, HLA	0.954820942
Neutrophils	rs3115572	6	32220484	C	G	3	3.32271	0.487	33680	+--	Several, HLA	0.981399393
Neutrophils	rs3115571	6	32220918	A	G	3	3.08206	0.616	33753	+--	Several, HLA	0.988222552
Neutrophils	rs3130316	6	32221228	C	T	3	4.61145	0.027	33737	+++	Several, HLA	0.965350572
Neutrophils	rs3132931	6	32235895	G	T	3	2.97088	0.019	33744	---	Several, HLA	0.98932872
Neutrophils	rs3096673	6	32238013	C	T	3	3.02775	0.021	33744	---	Several, HLA	0.989087816
Neutrophils	rs1559873	6	32243129	C	T	3	2.96203	0.019	33717	---	Several, HLA	0.989564764
Neutrophils	rs9268142	6	32256418	C	T	3	3.1193	0.02	33753	---	Several, HLA	0.987582941
Neutrophils	rs3749966	6	32261507	C	T	3	2.94944	0.023	33744	---	Several, HLA	0.989794063
Neutrophils	rs9268163	6	32270875	C	T	3	3.67587	0.02	33753	+++	Several, HLA	0.972833169
Neutrophils	rs3864301	6	32271955	C	T	3	3.26717	0.014	33753	+++	Several, HLA	0.982845633
Neutrophils	rs9268176	6	32274079	C	T	3	3.39956	0.023	33753	+++	Several, HLA	0.978515431
Neutrophils	rs7341300	6	32275027	C	T	3	3.37453	0.013	33753	+++	Several, HLA	0.979747993
Neutrophils	rs9268181	6	32276009	C	T	3	3.38306	0.013	33697	---	Several, HLA	0.979137764
Neutrophils	rs9268182	6	32276027	G	T	3	3.0606	0.022	33753	---	Several, HLA	0.988518737
Neutrophils	rs9268204	6	32279500	C	T	3	3.33732	0.018	33753	+++	Several, HLA	0.980308116
Neutrophils	rs6934429	6	32279622	G	T	3	3.40078	0.017	33743	+++	Several, HLA	0.977868998
Neutrophils	rs9268207	6	32280462	C	T	3	3.05808	0.02	33702	+++	Several, HLA	0.988813208
Neutrophils	rs1018434	6	32281360	C	T	3	3.26851	0.025	33738	---	Several, HLA	0.982369056
Neutrophils	rs3129959	6	32375796	A	T	2	3.82824	0.017	26352	?++	Several, HLA	0.967085187
Neutrophils	rs9268503	6	32377061	C	T	2	3.17613	0.025	26352	?--	Several, HLA	0.985430664
Neutrophils	rs6932810	6	32380190	A	G	2	2.94422	0.029	26352	?++	Several, HLA	0.990020623
Neutrophils	rs6918317	6	32381210	C	T	2	3.32915	0.016	26352	?++	Several, HLA	0.9808578
Neutrophils	rs2239806	6	32411307	C	T	3	3.1711	0.055	33744	-++	Several, HLA	0.985812664
Neutrophils	rs1051336	6	32412592	A	G	3	3.20433	0.036	33713	---	Several, HLA	0.985044214
Neutrophils	rs1041885	6	32412809	A	T	3	3.23663	0.034	33744	+--	Several, HLA	0.98375915

Table S3. Credible Interval Statistics

Neutrophils	rs9286790	6	32439828	A	G		3	3.15656	0.027	33753	+++	Several, HLA	0.986554952
Neutrophils	rs602875	6	32573629	A	G		2	3.10547	1	26352	?-+	Several, HLA	0.987911363
Neutrophils	rs2395225	6	32590624	C	T		2	3.12463	0.018	26352	?--	Several, HLA	0.987243891
Neutrophils	rs4713581	6	32660023	C	T		2	3.28066	0.059	26352	?++	Several, HLA	0.981891006
Neutrophils	rs2858310	6	32668323	A	G		3	3.16059	0.02	33753	+++	Several, HLA	0.98618553
Neutrophils	rs9469246	6	32692227	G	T		3	3.48349	0.109	33701	-++	Several, HLA	0.975788823
Neutrophils	rs445	7	92408370	C	T		3	10.52497	1	33744	-++	CDK6	0.999977503
Neutrophils	rs4794822	17	38156712	C	T		3	28.91982	1	33753	+--	NA	0.874563179
Neutrophils	rs8078723	17	38166879	C	T		3	28.06213	1	33693	-++	NA	0.995930339

Table S3. Credible Interval Statistics

Trait	SNP	Chr	Position (b37)	Effect Allele	Other Allele	Study Number	log10 (BF)	PPH	Sample Size	Effect Direction	Genes	set95*
Monocytes	rs1449263	2	182319301	C	T	3	19.23857	1	33729	+--	ITGA4	0.513404537
Monocytes	rs2124440	2	182328214	A	G	3	19.1084	1	33681	+++	ITGA4	0.893847628
Monocytes	rs1375493	2	182323766	A	G	3	18.55404	1	33745	+++	ITGA4	1
Monocytes	rs9880192	3	128297569	C	G	3	8.30125	1	33745	+--	NA	0.958237747
Monocytes	rs9839508	3	128310794	A	T	3	6.92642	1	33704	-++	NA	0.998662118
Monocytes	rs9849126	3	128312069	C	T	3	5.30501	0.982	33708	+++	NA	0.999628688
Monocytes	rs2047076	5	76058509	C	T	3	6.03105	1	33729	+++	NA	0.998865282
Monocytes	rs1264376	6	30765579	A	C	3	3.99291	1	28260	+--	Several, HLA	0.987763272
Monocytes	rs1264344	6	30800577	C	T	3	4.0451	1	33693	-+-	Several, HLA	0.985309756
Monocytes	rs2535326	6	30832063	C	T	3	4.12249	1	33728	-+-	Several, HLA	0.983486311
Monocytes	rs2844654	6	30838688	G	T	3	4.02148	1	33729	+-+	Several, HLA	0.986991592
Monocytes	rs1264333	6	30844314	C	T	3	4.08467	1	33729	+-+	Several, HLA	0.98443954
Monocytes	rs2240804	6	30920890	A	G	3	4.46125	1	33729	--+	Several, HLA	0.97929274
Monocytes	rs3131012	6	31115441	C	T	3	5.00397	1	33729	+--	Several, HLA	0.945313282
Monocytes	rs2073717	6	31122126	C	G	3	4.65235	0.288	33671	---	Several, HLA	0.973796085
Monocytes	rs3130456	6	31126252	A	C	3	4.29037	0.405	33729	---	Several, HLA	0.982446349
Monocytes	rs3095239	6	31126790	A	G	3	4.74009	0.475	33621	+++	Several, HLA	0.966295715
Monocytes	rs1419880	6	31135197	C	T	3	6.51791	1	33745	+--	Several, HLA	0.767942886
Monocytes	rs6904669	6	31192796	A	G	3	3.87778	1	33728	++-	Several, HLA	0.9896044
Monocytes	rs3130712	6	31209510	C	T	3	3.90702	1	33674	-++	Several, HLA	0.988396482
Monocytes	rs28570051	6	31210601	C	T	2	4.7051	1	15304	-+?	Several, HLA	0.970273372
Monocytes	rs3095254	6	31221668	C	G	3	6.81258	1	33745	+++	Several, HLA	0.509456724
Monocytes	rs3130441	6	31228565	A	G	3	4.31576	0.889	33745	+++	Several, HLA	0.980915624
Monocytes	rs2844623	6	31232543	C	T	3	6.21948	1	33720	+--	Several, HLA	0.897962028
Monocytes	rs1049281	6	31236567	C	T	2	4.6144	1	26360	?-+	Several, HLA	0.977024039
Monocytes	rs9264636	6	31238297	C	T	3	5.11292	1	33745	-+-	Several, HLA	0.928636566
Monocytes	rs9264664	6	31239227	C	T	3	5.04802	1	33745	-+-	Several, HLA	0.937397437
Monocytes	rs2524084	6	31241639	A	G	3	3.84627	0.969	33729	+++	Several, HLA	0.990154951
Monocytes	rs9264699	6	31241933	A	C	2	3.89501	0.106	26360	?--	Several, HLA	0.98901242
Monocytes	rs6919908	6	31244960	C	T	2	4.82581	1	16373	+-?	Several, HLA	0.961984325
Monocytes	rs2524064	6	31247817	A	G	2	4.88433	0.269	26360	?-+	Several, HLA	0.951323045
Monocytes	rs2524053	6	31252469	G	T	3	4.0388	1	33745	--+	Several, HLA	0.98616744
Monocytes	rs2853928	6	31257511	A	C	3	4.8386	1	33745	++-	Several, HLA	0.956732173
Monocytes	rs6457374	6	31272261	C	T	3	5.41726	1	33727	-+-	Several, HLA	0.918463607
Monocytes	rs10107630	8	130603635	C	T	3	14.3687	1	33745	-++	CCDC26	0.994867393
Monocytes	rs13277237	8	130604563	A	G	3	15.9041	1	33728	---	CCDC26	0.793234363
Monocytes	rs4480083	8	130609320	C	T	3	13.95825	1	33745	-++	CCDC26	0.999230753
Monocytes	rs4407843	8	130609368	A	C	2	15.28985	0.012	26360	?++	CCDC26	0.983640202
Monocytes	rs2163952	8	130610389	C	T	3	15.92914	1	33697	-++	CCDC26	0.40804784
Monocytes	rs1991866	8	130624105	C	G	3	15.30419	1	33598	---	CCDC26	0.890008896

Table S3. Credible Interval Statistics

Monocytes	rs10980800	9	113915905	C	T	3	11.63069	1	33692	-++	RP11-202G18.1	0.943693203
Monocytes	rs12346772	9	113920599	A	G	3	11.92453	0.999	33745	---	RP11-202G18.1	0.862140888
Monocytes	rs12350763	9	113923723	A	G	3	12.55646	1	33745	---	RP11-202G18.1	0.262246809
Monocytes	rs7034139	9	113924517	A	C	3	12.44428	1	33745	+++	RP11-202G18.1	0.46479586
Monocytes	rs1330279	9	113926908	A	G	3	11.84052	1	33745	+++	RP11-202G18.1	0.912580323
Monocytes	rs12337595	9	113927801	A	G	3	12.27785	1	33745	---	RP11-202G18.1	0.800936831
Monocytes	rs10124626	9	113940107	A	C	3	11.40469	1	33745	---	RP11-202G18.1	0.992935828
Monocytes	rs10123393	9	113941670	C	T	3	12.43457	1	33745	-++	RP11-202G18.1	0.662866549
Monocytes	rs17812386	9	113942888	A	G	3	11.62563	1	33745	+++	RP11-202G18.1	0.974445688

Table S3. Credible Interval Statistics

Trait	SNP	Chr	Position (b37)	Effect Allele	Other Allele	Study Number	log10 (BF)	PPH	Sample Size	Effect Direction	Genes	set95*	
WBC	rs2518564	1	159062436	A	G	3	341.58519	1	51768	+++	DARC	Inf	
WBC	rs6734238	2	113841030	A	G	3	6.61886	0.028	52691	---	IL1RN	0.680435948	A
WBC	rs12328368	2	113847144	C	G	3	5.82474	0.021	52702	---	IL1RN	0.789747799	A
WBC	rs12329129	2	113847007	A	G	3	5.56842	0.037	52740	+++	IL1RN	0.850330308	A
WBC	rs6738239	2	113850792	A	C	3	5.34698	0.022	52700	+++	IL1RN	0.88671404	A
WBC	rs1446509	2	113851159	A	T	3	5.26256	0.028	52740	---	IL1RN	0.916670276	A
WBC	rs6741180	2	113844384	A	G	3	5.02042	0.035	52740	+++	IL1RN	0.933823559	A
WBC	rs6746979	2	113854120	A	T	3	4.99966	0.026	52740	+++	IL1RN	0.950176176	A
WBC	rs6750559	2	113841532	A	G	3	4.95959	0.025	52693	+++	IL1RN	0.965087536	A
WBC	rs13382561	2	113863536	A	G	3	4.91913	0.037	52740	---	IL1RN	0.978672461	A
WBC	rs6743376	2	113832333	A	C	2	4.70749	0.014	33230	++?	IL1RN	0.987017286	A
WBC	rs7574159	2	113859761	A	G	3	4.43428	0.025	52740	+++	IL1RN	0.991465721	A
WBC	rs10171839	2	219051314	A	G	3	4.99431	0.71	52685	-++	ARPC2,TRNA	0.9604962	B
WBC	rs13026485	2	219057984	C	T	3	5.63031	0.011	52698	+++	ARPC2,TRNA	0.910468592	B
WBC	rs6752254	2	219058743	C	T	3	4.9914	0.026	52740	---	ARPC2,TRNA	0.966542104	B
WBC	rs10206984	2	219066980	C	T	3	4.99748	0.039	52740	+--	ARPC2,TRNA	0.954409649	B
WBC	rs13384682	2	219069137	A	G	3	5.16233	0.056	52740	-++	ARPC2,TRNA	0.933189765	B
WBC	rs13393821	2	219076742	C	G	3	4.61738	0.155	52740	+--	ARPC2,TRNA	0.990878058	B
WBC	rs12694432	2	219082330	A	G	3	5.34854	0.049	52740	+--	ARPC2,TRNA	0.924228048	B
WBC	rs7578940	2	219083318	G	T	3	6.17796	0.026	52737	+++	ARPC2,TRNA	0.805936872	B
WBC	rs4674274	2	219089131	A	T	3	4.64791	0.167	52740	-++	ARPC2,TRNA	0.988322762	B
WBC	rs4674275	2	219097738	A	G	3	4.86409	0.093	52740	+--	ARPC2,TRNA	0.982434553	B
WBC	rs10932765	2	219099484	C	T	3	6.95452	0.025	52740	+++	ARPC2,TRNA	0.55536852	B
WBC	rs7605980	2	219100869	C	G	3	4.95231	0.099	52683	-++	ARPC2,TRNA	0.977924816	B
WBC	rs10169718	2	219103580	A	G	3	5.84272	0.048	52701	+--	ARPC2,TRNA	0.848868885	B
WBC	rs6436047	2	219108913	A	C	3	5.07854	0.146	52701	+--	ARPC2,TRNA	0.948278508	B
WBC	rs6436048	2	219109033	A	G	3	4.97763	0.097	52701	-++	ARPC2,TRNA	0.97239932	B
WBC	rs6738394	2	219110625	A	G	3	5.0964	0.097	52740	+--	ARPC2,TRNA	0.940889243	B
WBC	rs13392177	2	219112956	C	T	3	5.7574	0.029	52665	+++	ARPC2,TRNA	0.884143417	B
WBC	rs13430006	2	219113089	G	T	3	6.40768	0.016	52668	---	ARPC2,TRNA	0.713035686	B
WBC	rs3731859	2	219124222	A	G	3	4.70781	0.024	52740	+++	ARPC2,TRNA	0.985581369	B
WBC	rs3806792	4	74965274	C	T	3	11.40926	1	52739	+--	NA	0.988197424	
WBC	rs7667376	4	74967890	C	T	3	12.95485	1	52740	-++	NA	0.983622655	
WBC	rs1371798	4	74976781	C	T	3	11.35837	1	52740	-++	NA	0.992266343	
WBC	rs1371799	4	74977837	C	T	3	13.49611	1	52740	+--	NA	0.558752008	
WBC	rs1866755	4	74978340	C	T	3	13.17081	1	52690	-++	NA	0.822943664	
WBC	rs2853946	6	31247203	A	T	3	12.15511	0.009	52740	---	HLA-B	0.996632812	A
WBC	rs45855	6	32189481	A	T	3	4.70607	0.009	51806	+++	Several, HLA	0.990319437	B
WBC	rs9267972	6	32217232	A	G	2	6.0505	0.012	36352	?--	Several, HLA	0.93845529	B
WBC	rs3115572	6	32220484	C	G	3	5.38859	0.037	52673	---	Several, HLA	0.971244947	B
WBC	rs9268402	6	32341353	A	G	3	6.51568	0.006	52702	+++	Several, HLA	0.866294331	B
WBC	rs9268473	6	32355683	A	G	3	5.5005	0.01	52739	---	Several, HLA	0.965853416	B

Table S3. Credible Interval Statistics

WBC	rs7194	6	32412480	A	G	3	5.45412	0.017	41911	+++	Several, HLA	0.968752176	B
WBC	rs1051336	6	32412592	A	G	3	4.95743	0.014	52692	---	Several, HLA	0.982602579	B
WBC	rs1041885	6	32412809	A	T	3	4.85516	0.011	51806	---	Several, HLA	0.986669768	B
WBC	rs2227139	6	32413459	A	G	3	4.94958	0.024	52740	+++	Several, HLA	0.983509715	B
WBC	rs3763327	6	32413830	C	G	3	5.09542	0.017	52740	+++	Several, HLA	0.98051656	B
WBC	rs9286790	6	32439828	A	G	3	5.20455	0.015	52740	+++	Several, HLA	0.974799402	B
WBC	rs12194148	6	32444198	G	T	3	5.13929	0.854	52740	+--	Several, HLA	0.979247412	B
WBC	rs9378212	6	32445691	C	T	3	5.17552	0.762	52740	+--	Several, HLA	0.976325605	B
WBC	rs9378213	6	32448398	G	T	3	4.93964	0.781	52740	-++	Several, HLA	0.984396325	B
WBC	rs9391786	6	32448561	A	G	3	7.05769	0.026	52740	---	Several, HLA	0.832892343	B
WBC	rs5020946	6	32450089	G	T	3	4.85706	0.733	52710	+--	Several, HLA	0.985939886	B
WBC	rs9270657	6	32566021	G	T	3	5.8223	0.995	52740	+--	Several, HLA	0.95652103	B
WBC	rs602875	6	32573629	A	G	2	7.59229	1	36352	?-+	Several, HLA	0.398457786	B
WBC	rs615672	6	32574171	C	G	3	4.90065	0.014	52614	---	Several, HLA	0.985206805	B
WBC	rs9271562	6	32590411	A	G	2	6.50348	0.01	36352	?--	Several, HLA	0.898771063	B
WBC	rs2395225	6	32590624	C	T	2	7.23567	0.011	36352	?--	Several, HLA	0.573749876	B
WBC	rs9271586	6	32590899	G	T	2	5.17311	0.169	36352	?--	Several, HLA	0.977843363	B
WBC	rs9271850	6	32595060	A	G	2	7.1466	0.011	36352	?++	Several, HLA	0.716538075	B
WBC	rs2395237	6	32690945	A	C	3	5.27583	0.012	51716	---	Several, HLA	0.973167695	B
WBC	rs9469246	6	32692227	G	T	3	4.84978	0.797	52673	-++	Several, HLA	0.987390663	B
WBC	rs1383264	6	32739967	A	T	3	5.77773	0.008	52640	---	Several, HLA	0.962627951	B
WBC	rs3117016	6	33095516	A	G	3	6.14184	0.035	52701	+++	Several, HLA	0.912894237	B
WBC	rs3117014	6	33095615	C	T	3	5.05724	0.214	52740	-++	Several, HLA	0.981678898	B
WBC	rs3117013	6	33095636	A	G	3	6.14164	0.018	52740	---	Several, HLA	0.927010909	B
WBC	rs3130234	6	33096009	A	C	3	4.77032	0.022	52740	---	Several, HLA	0.989258646	B
WBC	rs3117008	6	33096274	A	G	3	4.7826	0.029	52740	+++	Several, HLA	0.988658285	B
WBC	rs3117007	6	33096514	C	G	3	4.7267	0.014	52740	+++	Several, HLA	0.989801637	B
WBC	rs3117005	6	33096755	A	G	3	4.80485	0.023	52740	---	Several, HLA	0.988040706	B
WBC	rs3129207	6	33125312	C	G	3	6.04494	0.011	52699	+++	Several, HLA	0.94975409	B
WBC	rs9376090	6	135411228	C	T	3	8.98253	0.022	43711	---	HBS1L	0.95209774	C
WBC	rs7776054	6	135418916	A	G	3	8.47363	0.054	52740	+++	HBS1L	0.988485197	C
WBC	rs11759553	6	135422296	A	T	3	8.6132	0.895	52740	-++	HBS1L	0.981048367	C
WBC	rs9373124	6	135423209	C	T	3	8.38179	0.767	52740	+--	HBS1L	0.994504523	C
WBC	rs4895440	6	135426558	A	T	3	8.87397	0.969	52740	-++	HBS1L	0.970792843	C
WBC	rs4895441	6	135426573	A	G	3	9.63521	0.165	52703	+++	HBS1L	0.86513885	C
WBC	rs9389269	6	135427159	C	T	3	9.40127	0.276	52740	+--	HBS1L	0.928093506	C
WBC	rs9402686	6	135427817	A	G	3	10.38729	0.055	52740	---	HBS1L	0.609604066	C
WBC	rs6920211	6	135431318	C	T	3	9.77147	0.167	52732	---	HBS1L	0.757252163	C
WBC	rs445	7	92408370	C	T	3	16.80458	1	52740	-++	CDK6	1	
WBC	rs2894479	8	130584161	A	C	2	6.64341	0.116	33223	--?	CCDC26	0.950697794	
WBC	rs10956484	8	130588520	A	G	2	6.66953	0.15	32297	--?	CCDC26	0.886495614	
WBC	rs2163950	8	130597585	A	C	3	7.74878	0.065	52740	---	CCDC26	0.818313608	
WBC	rs1433578	8	130601089	C	T	3	6.31136	0.593	52740	+--	CCDC26	0.980585995	
WBC	rs13263733	8	130661418	A	G	2	5.90041	0.026	36352	?--	CCDC26	0.992188447	

Table S3. Credible Interval Statistics

WBC	rs2241245	17	38151014	C	T	3	30.26561	1	52740	-++	PSMD3	0.47512314	
WBC	rs4065321	17	38143548	C	T	3	29.70093	1	52740	-++	PSMD3	0.604580332	
WBC	rs4794822	17	38156712	C	T	3	29.64331	1	52740	+--	PSMD3	0.71795243	
WBC	rs9915252	17	38145088	C	G	3	29.58448	0.029	52740	+++	PSMD3	0.816961774	
WBC	rs8073254	17	38149350	C	G	3	29.55371	0.034	52740	+++	PSMD3	0.909198989	
WBC	rs2305482	17	38140927	A	C	3	29.36374	0.018	52701	+++	PSMD3	0.968756451	
WBC	rs11658328	17	38149236	C	T	3	29.08263	1	52740	+--	PSMD3	0.999932867	

Variants encompassing the 95% credible region of an associated region, as identified using the top hits from the MANTRA analysis, are presented for each subtype. PPA = posterior probability of association; the probability that a SNP is truly associated with a phenotype. *set95 = 95% credible set.

Table S4. Summarized eQTL Results

Blood Cell GWAS SNP	Position (b37)	Blood Cell Trait	Relation To Esnp	R^2	eQTL SNP	chr	pos(hg18)	Tissue	eQTL p-value	Transcript	Best eSNP For Transcript	Best eSNP p-value	R^2 (CEU) to Blood Cell GWAS SNP*
rs2853946	31247203	WBC	C_SentinelSNP	1	rs2853946	6	31355182	LCL (MuTHER)	7.53E-05	BAT1	rs206017	2.06E-06	>500kb
rs2853946	31247203	WBC	Proxy:ASN,Rel22	0.645	rs3094691	6	31382672	LCL (MuTHER)	1.09E-06	MICB	rs2844498	4.06E-12	0.34
rs2853946	31247203	WBC	Proxy:YRI,Rel22	0.554	rs3130521	6	31304355	LCL (MuTHER)	2.28E-09	TCF19	rs887464	1.20E-14	0.333
rs6936204	32217092	Neutrophil	C_SentinelSNP	1	rs6936204	6	32325070	Whole Blood**	0.00E+00	HLA-DRB5	rs9270986	0.00E+00	0.278
rs6936204	32217092	Neutrophil	Proxy:YRI,Rel22	0.848	rs1559873	6	32351107	Whole Blood**	0.00E+00	HLA-DRB5	rs9270986	0.00E+00	0.057
rs6936204	32217092	Neutrophil	Proxy:ASN,Rel22	0.653	rs9268557	6	32497283	Whole Blood**	0.00E+00	HLA-DRB5	rs9270986	0.00E+00	0.256
rs6936204	32217092	Neutrophil	C_SentinelSNP	1	rs6936204	6	32325070	LCL (MuTHER)	1.06E-05	ATP6V1G2	rs3132454	4.90E-14	>500kb
rs6936204	32217092	Neutrophil	Proxy:ASN,Rel22	1	rs3130320	6	32331236	LCL (MuTHER)	3.01E-06	ATP6V1G2	rs3132454	4.90E-14	>500kb
rs6936204	32217092	Neutrophil	Proxy:YRI,H3	0.781	rs3096674	6	32346197	LCL (MuTHER)	1.13E-06	HLA-DPB1	rs7772134	0.00E+00	>500kb
rs3095254	31221668	Monocyte	Proxy:ASN,Rel22	0.565	rs879882	6	31247431	LCL (MuTHER)	2.25E-10	TCF19	rs887464	1.20E-14	0.198
rs3095254	31221668	Monocyte	Proxy:YRI,Rel22	0.737	rs3130409	6	31321790	LCL (MuTHER)	2.00E-06	TCF19	rs887464	1.20E-14	0.301
rs3095254	31221668	Monocyte	C_SentinelSNP	1	rs3095254	6	31329647	LCL (MuTHER)	1.54E-12	TCF19	rs887464	1.20E-14	0.371
rs1449263	182319301	Monocyte	Proxy:YRI,Rel22	0.539	rs1449260	2	182041692	Monocytes	4.16E-13	ITGA4	rs2124440	0.00E+00	0.329
rs1449263	182319301	Monocyte	Proxy:ASN,H3	0.983	rs6740847	2	182016597	Monocytes (CD14+)	0.00E+00	ITGA4	rs1449263	0.00E+00	0.967
rs1449263	182319301	Monocyte	C_SentinelSNP	1	rs1449263	2	182027546	Monocytes (CD14+)	0.00E+00	ITGA4	rs1449263	0.00E+00	1-sameSNP

Table 6. Summarized results of the eQTL analysis are reported (all cis). *Not in HapMap build, ** Pax Gene Whole Blood (Mehta). The final R^2 column includes only European ancestry tissue types.