

CTNNA3 and SEMA3D: Promising loci for asthma exacerbation identified through multiple genome-wide association studies

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Background: Asthma exacerbations are a major cause of morbidity and medical cost.

Objective: The objective of this study was to identify genetic predictors of exacerbations in asthmatic subjects.

Methods: We performed a genome-wide association study meta-analysis of acute asthma exacerbation in 2 pediatric clinical trials: the Childhood Asthma Management Program

(n = 581) and the Childhood Asthma Research and Education (n = 205) network. Acute asthma exacerbations were defined as treatment with a 5-day course of oral steroids. We obtained a replication cohort from Biobank of Vanderbilt University Medical Center (BioVU; n = 786), the Vanderbilt University electronic medical record-linked DNA biobank. We used CD4⁺ lymphocyte genome-wide mRNA expression profiling to identify associations of top single nucleotide polymorphisms with mRNA abundance of nearby genes.

Results: A locus in catenin (cadherin-associated protein), alpha 3 (*CTNNA3*), reached genome-wide significance (rs7915695, $P = 2.19 \times 10^{-8}$; mean exacerbations, 6.05 for minor alleles vs 3.71 for homozygous major alleles). Among the 4 top single nucleotide polymorphisms replicated in BioVU, rs993312 in Sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3D (*SEMA3D*) was significant ($P = .0083$) and displayed stronger association among African Americans ($P = .0004$ in BioVU [mean exacerbations, 3.91 vs 1.53]; $P = .0089$ in the Childhood Asthma Management Program [mean exacerbations, 6.0 vs 3.25]). *CTNNA3* variants did not replicate in BioVU. A regulatory variant in the *CTNNA3* locus was associated with *CTNNA3* mRNA expression in CD4⁺ cells from asthmatic patients ($P = .00079$). *CTNNA3* appears to be active in the immune response, and *SEMA3D* has a plausible role in airway remodeling. We also provide a replication of a previous association of purinergic receptor P2X, ligand-gated ion channel, 7 (*P2RX7*), with asthma exacerbation.

Conclusions: We identified 2 loci associated with exacerbations through a genome-wide association study. *CTNNA3* met genome-wide significance thresholds, and *SEMA3D* replicated in a clinical biobank database. (J Allergy Clin Immunol 2015;■■■:■■■-■■■.)

Key words: Asthma, exacerbation, genome-wide association study, expression quantitative trait locus, CTNNA3, SEMA3D, biobank, childhood asthma

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Although many asthmatic patients maintain control of asthma symptoms, acute asthma exacerbations remain a dangerous and costly consequence of asthma. In 2008, asthma exacerbations resulted in 10.5 million school days lost and 14.2 million work days lost¹; in 2007, asthma exacerbations resulted in 3445 deaths, 1.75 million emergency department visits, and 456,000 hospitalizations.¹ The cost of these events is estimated at \$50 billion in direct medical costs and another \$6 billion in loss of productivity annually.² The investigation of asthma

Abbreviations used

ABRIDGE: Asthma BioRepository for Integrative Genomic Exploration
 ASM: Airway smooth muscle
 BioVU: Biobank of Vanderbilt University Medical Center
 CAMP: Childhood Asthma Management Program
 CARE: Childhood Asthma Research and Education
 CDNM: Channing Division of Network Medicine
 CEBP: CCAAT/enhancer-binding protein
 CLIC: Characterizing the Response to a Leukotriene Receptor Antagonist and an Inhaled Corticosteroid
 CTNNA3: Catenin (cadherin-associated protein), alpha 3
 eQTL: Expression quantitative trait locus
 GWAS: Genome-wide association study
 ICS: Inhaled corticosteroid
 LD: Linkage disequilibrium
 MARS: Montelukast or Azithromycin for Reduction of Inhaled Corticosteroids in Childhood Asthma Study
 PACT: Pediatric Asthma Controller Trial
 P2RX7: Purinergic receptor P2X, ligand-gated ion channel, 7
 SEMA3D: Sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3D
 SNP: Single nucleotide polymorphism
 TTN: Titin

exacerbation has the possibility to improve care and curtail an important public health burden.

An asthma exacerbation has been defined as “worsening of asthma requiring the use of systemic corticosteroids ... to prevent a serious outcome.”³ Exacerbations have been associated with several clinical and demographic factors, including respiratory tract infection,^{4,5} race,⁶ sex,⁷ treatment noncompliance,⁸ and smoke⁹ and air pollution¹⁰ exposures. A host of genetic variants have also been linked to asthma exacerbation rates (reviewed by Greenberg¹¹) and also broader genomic features, including gene methylation,¹² peripheral blood gene expression,¹³ and gene exposure interactions.¹⁴ These studies have demonstrated the importance of genomic factors in influencing asthma exacerbation rates.

Previous genetic studies of asthma exacerbation include successful candidate gene investigations¹⁵⁻¹⁸ and genome-wide association studies (GWASs) that (1) investigated variant-vitamin D interactions,¹⁴ (2) resulted in no genome-wide significant results,¹⁹ or (3) identified a predictive model without identifying GWAS loci.²⁰ Our objective was to conduct a GWAS of asthma exacerbations in a pediatric cohort to identify additional genetic loci associated with increased or reduced exacerbation. We analyzed GWAS data from 2 clinical trials of patients with childhood asthma, the Childhood Asthma Management Program (CAMP)²¹ and Childhood Asthma Research and Education (CARE)²² network trials, in which measures of systemic oral steroid use were available and performed replication in the electronic medical record-linked Biobank of Vanderbilt University Medical Center (BioVU).²³ The combination of these trials provided an opportunity to identify genetic variants that might be associated with asthma exacerbation in children and uncover additional biology related to acute asthma episodes while providing a replication in a more diverse outpatient sample.

METHODS

CAMP

We performed a GWAS in the CAMP cohort.²¹ CAMP enrolled 1041 children aged 5 to 12 years with mild-to-moderate persistent asthma over a 23-month period and followed them for an additional 4 years. Recruitment criteria and study characteristics have been described previously.^{21,24} CAMP participants were randomized into 3 treatment arms: budesonide, nedocromil, or placebo. After the CAMP trial design, acute asthma exacerbation was treated with a prednisone dose of 2 mg/kg per day (maximum, 60 mg) as a single morning dose for 2 days, followed by 1 mg/kg per day (maximum, 30 mg) as a single morning dose for 2 days, with additional treatment extension up to the supervising physician's discretion based on clinical response.²¹ We considered the total number of these exacerbations (“bursts”) over the length of the CAMP trial (4 years) to be our primary outcome.

CARE

The CARE Network²² clinical trials enrolled children between the ages of 1 and 18 years at the time of study participation who had a confirmed diagnosis of asthma or wheezing illness. To match the phenotype and clinical characteristics of CAMP, we studied the 205 participants from 3 CARE Network trials: the Pediatric Asthma Controller Trial (PACT, *n* = 130),²⁵ the Characterizing the Response to a Leukotriene Receptor Antagonist and an Inhaled Corticosteroid (CLIC) trial (*n* = 53),²⁶ and Montelukast or Azithromycin for Reduction of Inhaled Corticosteroids in Childhood Asthma Study (MARS, *n* = 22).²⁷ These subjects were aged 5 years or more at enrollment, had a diagnosis of asthma, and had detailed exacerbation data (supplemental prednisone courses prescribed) over the length of those studies (PACT, 48 weeks; CLIC trial, 16 weeks; and MARS, 6-26 weeks). The total number of exacerbations was used as the primary outcome.

Vanderbilt BioVU

BioVU²³ accrues DNA samples during routine clinical care from Vanderbilt patients who have not opted out of participation using blood that would have otherwise been discarded for clinical testing. Biological samples from BioVU are linked by using research unique identifiers to the Synthetic Derivative, a deidentified version of Vanderbilt's electronic medical record.

We identified patients with a diagnosis of asthma who were prescribed inhaled corticosteroids (ICSs) with an electronic algorithm developed and validated based on physician chart review of 50 randomly selected cases. We selected subjects aged 4 to 35 years who had 2 or more encounters with a diagnosis of asthma on 2 different days. We included subjects who had a prescription for an ICS. The algorithm excludes patients with confounding diseases, such as cystic fibrosis, chronic obstructive pulmonary disease, pulmonary hypertension, pulmonary embolism, lung cancer, immunodeficiency, bronchiectasis, congestive heart failure, and other diseases. The algorithm identified asthma-related hospitalizations and emergency department visits. The positive predictive value of the algorithms was shown to be greater than 92%. The algorithm is available at <http://PheKB.org>.

From the BioVU population, we identified a cohort of 786 asthmatic subjects. We defined exacerbation as an asthma-related hospitalization or emergency department visit for which there was an injected or oral steroid prescribed, occurring in 191 of the 786 patients. We counted the number of exacerbations occurring in a 4-year window, a time period chosen to match the duration of observation in CAMP. This was used as our primary outcome for the BioVU cohort (see Fig E1 in this article's Online Repository at www.jacionline.org).

GWASs

We used CAMP subjects passing genotype quality controls with self-designated European ancestry (*n* = 581). Genome-wide genotyping was previously performed at the Channing Division of Network Medicine (CDNM) by using Illumina HumanHap 610 BeadChips (Illumina, San Diego, Calif), which were then imputed by using MaCH²⁸ with reference to the 1000 Genomes Pilot data to obtain high-confidence imputations on more than

6.5 million single nucleotide polymorphisms (SNPs). We removed any SNPs that had an r^2 MaCH imputation quality score of less than 0.5, as well as any SNPs with a minor allele frequency of less than 0.05. We used imputed SNP data and estimated minor alleles for each SNP (a continuous measure between 0 and 2) to use the most informative SNP calculation from the imputation. We performed a GWAS for association with the number of bursts using a linear regression model with additive effects for each SNP using PLINK v1.07,²⁹ adjusting for age and sex as covariates. Similar results were obtained with MaCH r^2 values of less than 0.3.

To verify that the top hits from the GWAS were not artifacts of a nonnormally distributed phenotype, we performed permutation testing with the top GWAS SNPs ($P < 10^{-5}$). This is a nonparametric method for adjusting for a nonnormal phenotype distribution; we chose this method over other methods, such as Poisson regression (unsuitable because phenotype distribution does not have variance = mean) and log transformation of the phenotype (performs poorly, except under particular conditions).³⁰ Permutation testing was done with PLINK using 100 million permutations to estimate the null distribution for each of the top SNPs.

The top CAMP GWAS SNPs were tested for association in the CARE Network by using a linear regression test for association with the number of steroid bursts. We obtained CARE Network data on genome-wide SNP measurements from the Asthma BioRepository for Integrative Genomic Exploration (ABRIDGE).³¹ Genotyping was previously performed through the SNP Health Association Resource Asthma Resource Project by Affymetrix (Santa Clara, Calif), according to the manufacturer's protocol, by using the Affymetrix Genome-Wide Human SNP Array 6.0. These genotype data are archived on the database of Genotypes and Phenotypes (www.ncbi.nlm.nih.gov/gap) for all CARE Network participants. Imputation was previously performed at CDNM as before (by using MaCH, 6.5 million SNPs imputed to 1000 Genomes Project data). Significance P values obtained from the CAMP permutation testing and the CARE Network replication were combined by using the Liptak-Stouffer method.

Four top loci were identified for replication in BioVU and assayed at single SNPs by using TaqMan (Applied Biosystems, Foster City, Calif). To consider as similar a phenotype as possible to our CAMP burst phenotype, we counted the number of exacerbations in a 4-year period, choosing a 4-year period that maximized exacerbations for each patient. These SNPs were then tested for linear association with the number of exacerbations, with adjustment for race, sex, and smoking status.

Expression analysis

We used all available CD4⁺ lymphocyte cells with genome-wide mRNA expression profiling from ABRIDGE to check our top SNPs for potential functional effects on gene expression. The ABRIDGE project contains a wide variety of blood and cell lines from various extant asthma trials, which includes CD4⁺ lymphocytes from the CARE and Genomic Research on Asthma in the African Diaspora³² cohorts of ABRIDGE. These were previously processed on Illumina Human HT-12 v4 arrays, according to the manufacturer's protocol (Illumina, San Diego, Calif). This array assays for 47,036 different gene RNA products. These data were processed through quality control metrics at the CDNM for data missingness rates, arrays that failed across subjects, and gene probes that displayed either outlying expression levels or limited changes in expression. This resulted in 154 samples from the CARE Network and 195 samples from Genomic Research on Asthma in the African Diaspora passing quality control metrics that were available for analysis. Each SNP within 400 kbp of rs7915695 was tested for association with catenin (cadherin-associated protein), alpha 3 (*CTNNA3*) mRNA expression in the 349 CD4⁺ lymphocytes. Expression P values were computed by using regression and including the top 10 principal components of expression to account for stratification and batch effects. Bronchoalveolar cells from ABRIDGE ($n = 43$) were used in case-control expression analysis.

RNA sequencing analysis

We tested for differential expression of the Sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3D (*SEMA3D*) gene

TABLE I. Cohort characteristics

	CAMP	CARE network	BioVU
No.	581	205	786
Race, no. white (%) [*]	581 (100)	205 (100)	447 (56.7) [†]
Age (y), mean $\pm$ SD [*]	8.87 $\pm$ 2.14	10.59 $\pm$ 3.03	22.34 $\pm$ 10.76
Sex, no. male (%) [*]	347 (59.72)	127 (61.95)	256 (32.57)
Height (cm), mean $\pm$ SD [*]	133.17 $\pm$ 13.86	143.09 $\pm$ 17.37	156.71 $\pm$ 21.07
BMI (kg/m ²), mean $\pm$ SD [*]	17.91 $\pm$ 3.15	19.99 $\pm$ 4.87	26.97 $\pm$ 9.68
Asthma onset (age [y]), mean $\pm$ SD [*]	3.12 $\pm$ 2.46	3.93 $\pm$ 3.26	17.04 $\pm$ 10.29
Smoking, no. of smokers (%) [*]	12 (2.36)	0 (0.00)	197 (25.06)
ICS, no. of ICS (%) [*]	172 (29.60)	198 (96.59)	766 (97.46)
Bursts (count), mean $\pm$ SD [*]	4.12 $\pm$ 4.84	0.60 $\pm$ 1.17	0.93 $\pm$ 3.47

BMI, Body mass index.

^{*}All variables are significantly different by using 1-sided ANOVA ($P < .001$).

[†]Racial ancestry makeup in BioVU also contains 27% African Americans ($n = 212$) and 16% other/unknown ($n = 127$).

in asthma airway smooth muscle (ASM) cells by using the RNA sequencing data set GSE58434, which is available from the Gene Expression Omnibus Web site (<http://www.ncbi.nlm.nih.gov/geo/>). For that study, primary ASM cells were isolated from white donors, 5 with fatal asthma and 10 age- and sex-matched control subjects with no chronic illness. ASM cell cultivation was described previously.³³ Total RNA was extracted, sequenced, and analyzed, as described previously.³⁴ Briefly, TopHat-2.0.9 was used to align reads to the hg19 genome build, Cufflinks (v2.1.1) was used to quantify hg19 transcripts based on reads that mapped to the provided hg19 reference file, and differential expression of genes was obtained with Cuffdiff (v2.1.1) while applying bias correction for all samples.

RESULTS

Baseline characteristics for our 3 cohorts (CAMP, CARE, and BioVU) are shown in Table I. CAMP and CARE are similar in many regards, whereas subjects in BioVU are significantly older, have a higher body mass index, are more likely to be current smokers, are less likely to be of European ancestry, and are less likely to be male. Subjects in CAMP required more oral steroid bursts on average (4.12 ± 4.84) compared with subjects in the CARE Network (0.60 ± 1.17) and BioVU (0.93 ± 3.47 , $P < .001$).

GWAS results on 581 CAMP subjects as are shown in Fig E2 in this article's Online Repository at www.jacionline.org. The genomic inflation factor of the total P value distribution of the GWAS was 1.0048 (see Fig E3 in this article's Online Repository at www.jacionline.org), indicating minimal stratification and the general suitability of the null hypothesis of no association for most assayed SNPs. Label-shuffling permutation tests (see Fig E4 in this article's Online Repository at www.jacionline.org) on SNPs with raw P values of less than 10^{-5} showed little variation in P values for the indicated SNPs in the genes *CTNNA3*, *SEMA3D*, titin (*TTN*), and purinergic receptor P2X, ligand-gated ion channel, 7 (*P2RX7*), providing further evidence that the original (linear regression) GWAS was a suitable test of the association of SNPs with exacerbation phenotype, despite the phenotype having a nonnormal distribution. No SNPs reached the statistical threshold for genome-wide significance in the permuted CAMP GWAS ($P < 5 \times 10^{-8}$).

For these top SNPs, we combined analysis with a GWAS of the CARE cohort ($n = 205$). Fig 1 shows the combined (Liptak)

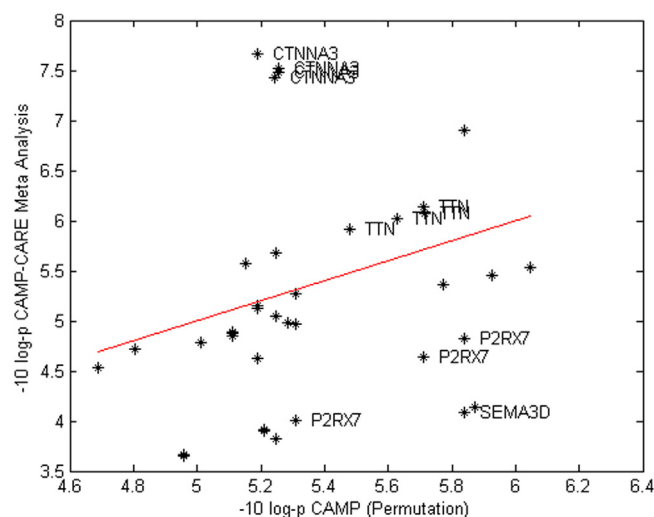


FIG 1. CAMP permutation versus joint CAMP–CARE Network *P* values from meta-analysis for the top GWAS SNPs. Stars indicate SNPs and are annotated with gene symbols in cases in which the SNP is within a gene. The diagonal line indicates $x = y$; SNPs that did not change *P* values from CAMP permutation testing to CAMP–CARE Network meta-analysis are close to this line.

CAMP–CARE Network *P* values for the top SNPs versus the original CAMP permutation *P* values. This indicates that the strong signals in *CTNNA3* and *TTN* were confirmed, whereas *SEMA3D* and *P2RX7* were not significant in the CARE Network. Table II shows the observed *P* values (in CAMP and the CARE Network) for the top genic SNPs (a full list of top SNPs appears in Table E1 in this article's Online Repository at www.jacionline.org). Considering the meta-analyses of these SNPs, the locus in *CTNNA3* meets the genome-wide threshold for statistical significance ($P < 5 \times 10^{-8}$), with SNPs rs7915695, rs7923078, rs7923279, and rs6480203 all reaching genome-wide significance. CAMP subjects with 1 or more C alleles for rs7915695 experienced more exacerbations (mean, 6.05) than subjects homozygous for the reference T allele (mean, 3.71; see Fig E5 in this article's Online Repository at www.jacionline.org).

To test the generalizability of these variants to predict asthma exacerbations in the general population, we studied 786 asthmatic samples from BioVU.²³ The top SNPs in *TTN* represented 2 distinct linkage disequilibrium (LD) blocks, whereas the SNPs in *CTNNA3* and *SEMA3D* each represented only 1 such block; accordingly, 4 representative SNPs were chosen for genotyping in BioVU (Table III). The *SEMA3D* SNP rs993312 was significantly associated after Bonferroni correction for 4 independent tests by using covariates for race, sex, and smoking status. In a stratified analysis rs993312 was not significant in subjects of European ancestry in BioVU ($P = .51$), although it was more significant in African Americans ($n = 212$; $P = .0004$; mean exacerbations, 3.91 vs 1.53 for 2 or more A alleles; see Fig E1). We then surveyed 96 African Americans from the CAMP cohort not included in the original GWAS analysis and found an association of rs993312 with exacerbation ($P = .0089$; mean exacerbations, 6.0 vs 3.25; see Fig E5). The SNPs tested in *TTN* and *CTNNA3* did not replicate in BioVU.

The *CTNNA3* SNP rs7915695 is an intronic SNP within the *CTNNA3* gene. It is in strong LD ($r^2 = 0.97$), with a predicted regulatory variant, rs10997296, that is annotated as a

strong enhancer (HaploReg v2)³⁴ in human mammary epithelial cells. rs10997296 is further in a DNase I hypersensitivity site in a large variety of epithelial and endothelial cells, including small airway epithelial cells.³⁴ This implies that rs10997296 might have a role in regulating expression of *CTNNA3* in a cell type of relevance to asthma exacerbation. The risk allele of rs10997296 was associated with lower *CTNNA3* expression in a sample of CD4⁺ lymphocyte cells drawn from 349 asthmatic patients in the ABRIDGE cohort ($P = 7.9 \times 10^{-4}$, Fig 2 and see Fig E6 in this article's Online Repository at www.jacionline.org). We have included a list of top expression quantitative trait locus (eQTL) SNPs for *CTNNA3* in Table E2 in this article's Online Repository at www.jacionline.org, which might be of interest to future investigators of this locus. This association was also significant in a smaller sample of 111 CD4⁺ lymphocytes from nonasthmatic control subjects in ABRIDGE ($P = .0012$).

Although we have analyzed these variants for association with an asthma severity phenotype of exacerbation, for comparison, we also checked the top 2 associations in *SEMA3D* and *CTNNA3* for association with asthma affection status. Additionally, the rs993312 risk allele A in *SEMA3D* was also associated with asthma occurrence in a large asthma meta-analysis ($P = .047$, GABRIEL).³⁵ The *CTNNA3* risk allele C for rs7915695 showed suggestive evidence in the same ($P = .14$, GABRIEL).³⁵ Compared with our own results, the same alleles increase both occurrence of asthma and occurrence of asthma exacerbations. We further checked *SEMA3D* gene products for expression differences in asthmatic versus control samples from ABRIDGE, finding a significant effect in bronchoalveolar lavage samples ($P = .0295$, $n = 43$, regression test, see Fig E7 in this article's Online Repository at www.jacionline.org), in which *SEMA3D* expression was somewhat increased in cases relative to control subjects. In a small sample of human ASM cells ($n = 15$), *SEMA3D* expression was found to differ significantly between asthma cases and age/sex-matched control subjects ($q = 0.011$, transcriptome-wide adjusted value, Cuffdiff v2.1.1), with greater expression in asthmatic samples. *CTNNA3* was not expressed in ASM cells nor was it significantly differentially expressed in bronchoalveolar samples.

DISCUSSION

We found evidence for 2 loci of association with asthma exacerbation: one in *CTNNA3* reached genome-wide significance thresholds in the meta-analysis of 2 pediatric cohorts, and the other in *SEMA3D* replicated in an adult, diverse, real-life population, particularly in African Americans.

SEMA3D has been previously implicated in both schizophrenia³⁶ and anomalous pulmonary venous connections.³⁷ The *SEMA3D* SNP rs993312 is intronic to the *SEMA3D* gene and in strong LD ($r^2 = 0.99$) with a regulatory intronic SNP, rs55834466. The ENCODE project identifies rs55834466 as a strong enhancer in epidermal keratinocytes and human mammary epithelial cells (HaploReg v2³⁴). In addition to brain and nervous tissue, *SEMA3D* is relatively overexpressed in the lung in comparison with other tissue types (Illumina Human BodyMap 2.0³⁸).

SEMA3D is a member of the semaphorin class 3 signaling molecules, of which SEMA3A and SEMA3E are secreted transmembrane proteins involved in immune response and the recruitment of CD4⁺ and CD8⁺ T cells.³⁹ SEMA3A and SEMA3E

TABLE II. Results of top SNPs after meta-analysis in the CAMP and CARE Network cohorts

Chromosome	SNP	Effect allele	MAF (HapMap CEU)	Gene	SNP role	CAMP <i>P</i> value: Permutation	CARE network <i>P</i> value	Effect directions	Combined <i>P</i> value
10	rs7915695	C	9.3%	<i>CTNNA3</i>	Intronic	6.45×10^{-6}	2.14×10^{-5}	+/+	$2.19 \times 10^{-8*}$
10	rs7923078	C	11.5%	<i>CTNNA3</i>	Intronic	5.54×10^{-6}	6.52×10^{-5}	+/+	$3.02 \times 10^{-8*}$
10	rs7923279	T	11.7%	<i>CTNNA3</i>	Intronic	5.54×10^{-6}	8.09×10^{-5}	+/+	$3.34 \times 10^{-8*}$
10	rs6480203	C	11%	<i>CTNNA3</i>	Intronic	5.71×10^{-6}	9.88×10^{-5}	+/+	$3.79 \times 10^{-8*}$
10	rs10997296	A	8.3%	<i>CTNNA3</i>	Intronic	6.09×10^{-5}	6.34×10^{-5}	+/+	4.9×10^{-7}
2	rs1484118	A	7.6%	<i>TTN</i>	Intronic	1.95×10^{-6}	.08122	+/+	7.24×10^{-7}
2	rs11893580	G	8.2%	<i>TTN</i>	Intronic	2.36×10^{-6}	.09024	+/+	9.60×10^{-7}
2	rs746578	A	7.5%	<i>TTN</i>	Coding	1.93×10^{-6}	.09668	-/-	8.41×10^{-7}
2	rs4894042	G	8.3%	<i>TTN</i>	Intronic	3.32×10^{-6}	.08119	+/+	1.22×10^{-6}
12	rs7978398	T	NA†	<i>P2RX7</i>	Intronic	1.45×10^{-6}	.2357	+/-	1.51×10^{-5}
12	rs11065464	A	19.5%	<i>P2RX7</i>	Intronic	1.95×10^{-6}	.2032	-/+	2.28×10^{-5}
12	rs7958311	A	20%	<i>P2RX7</i>	Coding	4.89×10^{-6}	0.08952	-/+	9.85×10^{-5}
7	rs993312	A	27%	<i>SEMA3D</i>	Intronic	1.45×10^{-6}	.9734	+/-	8.23×10^{-5}

*Indicates SNPs meeting significance thresholds for genome-wide significance ($P < 5 \times 10^{-8}$). The combined *P* value was computed by using the Liptak-Stouffer method. Effect directions refer to the sign of CAMP β values (before the slash) and CARE Network β values (trailing the slash), which are interpreted as the direction of exacerbations for each additional copy of the effect allele (ie, + indicates each additional copy of the allele resulted in an increase of exacerbations). The effect allele shown is the minor allele and was used for meta-analysis.

†This SNP is unavailable in the HapMap CEU population.

TABLE III. SNP replication results in BioVU

Gene	Chromosome	SNP	Position	Allele	<i>P</i> value
<i>TTN</i>	2	rs13390491	179582327	T	.7638
<i>TTN</i>	2	rs4894044	179632133	A	.1982
<i>SEMA3D</i>	7	rs993312	84747844	A	.00825*
<i>CTNNA3</i>	10	rs7915695	68444734	C	.8236

SNPs were assayed in BioVU by using TaqMan (Applied Biosystems). These represent 4 distinct loci in different LD blocks.

*rs993312 was significant after multiple testing correction for 4 tests.

are adjacent to *SEMA3D* on chromosome 7. *SEMA3D* is a signaling protein responsible for endothelial cell migration⁴⁰ and has been shown to be essential for healthy angiogenesis during development.⁴¹ Angiogenesis is also a feature of airway remodeling,⁴² the process of tissue changes in the airways that occurs in some asthmatic patients and leads to worsening asthma symptoms and development of chronic airway obstruction.⁴³ Because *SEMA3D* is known to direct angiogenesis in development and can repress angiogenesis in cancer,⁴⁴ it is possible that *SEMA3D* plays a role in airway remodeling. In fact, there are 3 plausible mechanisms of *SEMA3D*'s involvement in airway remodeling and thus asthma exacerbation⁴³: (1) it directs angiogenesis; (2) it directs airway epithelium migration, resulting in a reduction of epithelial cells; and (3) possibly, like other semaphorins, it has effects on immune cell recruitment during the inflammatory response, which leads to remodeling. Examination of *SEMA3D* expression in ABRIDGE samples did not reveal a significant eQTL in LD with rs993312.

Although the *CTNNA3* SNP did not replicate in BioVU, the associations were very strong in both the CAMP and CARE Network cohorts, and both effects were in the same direction, with the minor allele decreasing the probability of asthma exacerbation. This is similar to our previous work, in which strong associations in pediatric asthma were not replicated in adult cohorts.⁴⁵ We verified that rs10997296, which was in strong LD with the top *CTNNA3* GWAS hit rs7915695, was associated with *CTNNA3* expression in CD4⁺ lymphocytes, immune cells that represent an important cell type in asthma exacerbation.

CTNNA3 has previously been associated with diisocyanide toluene-induced asthma in at least 2 separate cohorts, one Korean⁴⁶ and one of European ancestry.⁴⁷ An SNP in the promoter region of *CTNNA3* was also associated with response to asthma treatment (glucocorticoid therapy) in a population of patients with childhood asthma.⁴⁸ The rs7915695 variant is itself a strong enhancer (HaploReg v2)³⁴ and has been observed to bind the transcription factor CEBP- β (*CEBPB*), a member of the CCAAT/enhancer-binding protein (CEBP) family of transcription factors that help regulate a wide variety of processes, including inflammatory response.⁴⁹ Two of these factors, *CEBPB* and *CEBPD*, have been shown to be induced by glucocorticoids in lung epithelium⁵⁰ and skeletal muscle cells.⁵¹ Additionally, *CEBPB* transcription has been shown to be induced by *IL1*, *IL6*, and LPS.⁴⁹ *CEBPB*'s broad influence on inflammatory processes and genes and the known binding of *CEBPB* with *CTNNA3* provide evidence for *CTNNA3*'s likely role in the immune response. Additionally, the *CTNNA3* protein has been shown to play a role in muscle cell coherence, which might also provide insight into its possible action on asthma exacerbation.⁵²

Although not carried forward for replication in BioVU, the *P2RX7* gene has recently been associated with asthma exacerbation.¹⁶ A coding SNP in *P2RX7* was suggestively significant in the CAMP cohort ($P < 5 \times 10^{-6}$) after permutation, and this CAMP result can thus be seen as a replication of the earlier finding that *P2RX7* is associated with asthma exacerbation. We also checked our top hits for correspondence with a previous GWAS and did not find any overlap with results reported by Anderson et al.¹⁹ A recent GWAS of early-childhood asthma and wheeze identified *CDHR3* as a risk gene⁵³; the top SNP identified in that study was rs6967330, which was not significant in CAMP ($P = .9$). Of approximately 270 SNPs tested in *CDHR3* in CAMP, rs28605757 was the most significant ($P = .0026$); however, this was not significant after a multiple-testing correction for 270 tested SNPs in this gene.

Although asthma exacerbation rates are dependent on the medication prescribed for asthma maintenance and ICSs can be particularly efficacious in avoiding exacerbations,²⁴ these were not included in the CAMP analysis. Our results are presented

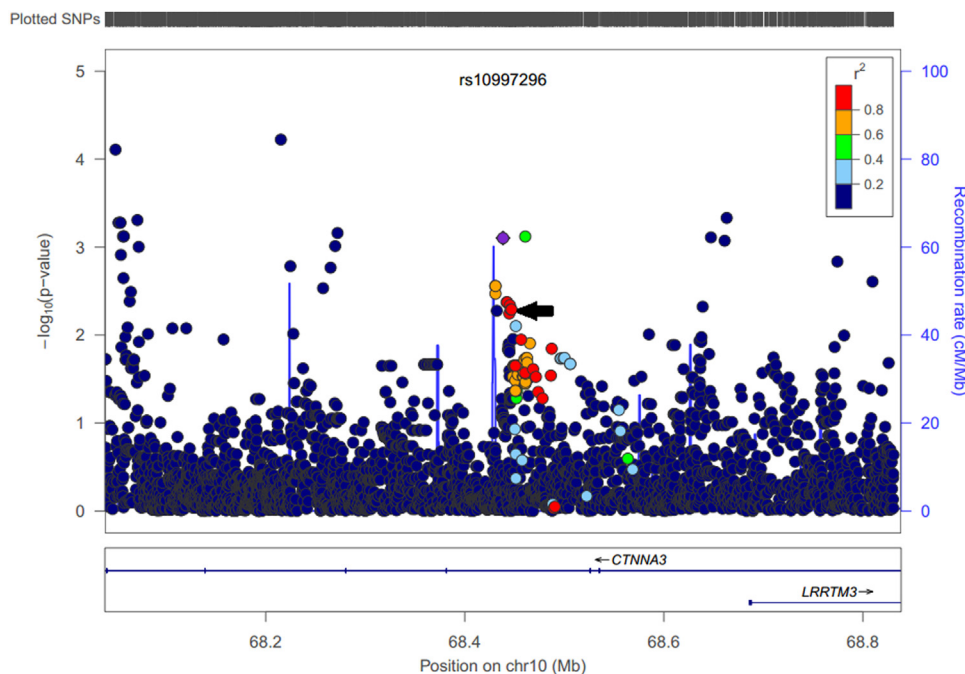


FIG 2. *CTNNA3* eQTL plot for rs10997296. The suspected regulatory SNP rs10997269 is labeled and highlighted with a purple diamond. rs7915695 is indicated with a black arrow. Other SNPs are colored with their LD to rs10997269 (r^2), indicating a locus of SNPs nearby that might have action on *CTNNA3* expression. The illustration was generated with LocusZoom.

without regard to ICS regimen, but rerunning the main CAMP GWAS with the presence or absence of ICSs as a covariate did not appreciably alter the results or P values obtained; similarly, no interaction was detected with ICSs and either rs993312 or rs7915695 ($P = .4$ and $P = .7$, respectively). Furthermore, stratified analysis in CAMP showed both rs993312 and rs7915695 have consistent directions of effect and effect sizes. In the non-ICS arm of CAMP, each minor allele A of the *SEMA3D* SNP rs993312 increased the number of exacerbations by 1.75 (95% CI, 0.94-2.55; $n = 343$; $P = 2.73 \times 10^{-5}$), and in the ICS arm effects were similar (1.2; 95% CI, 0.19-2.21; $n = 238$; $P = .021$). Similarly, the *CTNNA3* SNP rs7915695 has consistent strength of effect in both the placebo (1.81; 95% CI, 0.68-2.95; $P = .0019$) and ICS arms (2.25; 95% CI, 0.74-3.76; $P = .0038$). In the CARE Network and BioVU the majority of participants were receiving ICS therapy (Table I). That *CTNNA3* and *SEMA3* appear to influence exacerbation regardless of ICS therapy implies that their effect is not pharmacogenetic, although it is interesting that *CTNNA3* has previously been associated with ICS response.

Although both rs993312 and rs7915695 were found to be associated with asthma exacerbation, there was some evidence of an effect on asthma status in the GABRIEL asthma meta-analysis. Both SNPs show stronger association with asthma exacerbation than with asthma affection status: *SEMA3D* showed expression was associated with case-control status in both a small bronchoalveolar lavage sample and an ASM sample, and rs7915695 was identified as a regulator of *CTNNA3* expression in both CD4⁺ lymphocytes from asthmatic patients in ABRIDGE and in case-control analysis. Thus *SEMA3D* might influence exacerbations by being an asthma susceptibility gene, whereas *CTNNA3* could have a different mechanism of effect. Further

work will be needed to identify precise biological mechanisms that lead to poorly controlled asthma rather than merely to persistent asthma.

Failure to replicate *CTNNA3* might be due to some differences between the CAMP and CARE Network studies and the BioVU cohort. CAMP and the CARE Network were clinical trials with detailed phenotyping and close attention from care providers, whereas BioVU, a real-life population, provides snapshots of a patient's interactions with the hospital and emergency department. Additionally, CAMP and the CARE Network are pediatric cohorts, whereas BioVU contained a higher proportion of adults, and the exacerbation rates have been shown to be different in these groups.⁷ Examining a rarely occurring phenotype like exacerbation leads to small sample sizes, and this might also have contributed to difficulty in replicating the *CTNNA3* locus. However, as more asthma cohorts are genotyped and collected, it would be important to perform additional GWASs of asthma exacerbation with larger sample sizes. As always, there is a tension between the quality of the phenotyping and the feasible size of the study, and our results here highlight the strengths of both approaches. We have provided complete lists of our top SNPs from the CAMP permutation association tests and from the *CTNNA3* expression association investigation to aide future researchers that can reconsider these phenotypes with larger populations (see Tables E1 and E3).

Our study has presented 2 promising loci that have several possible biochemical mechanisms for action in asthma exacerbation to augment their statistical associations in multiple cohorts. One of our variants replicated from childhood clinical trials of European ancestry to an adult biobank cohort of mixed races; this *SEMA3D* variant was associated in African Americans and further replicated in a sample of pediatric African Americans.

This analysis demonstrates the utility of using disparate populations for identifying genetic associations. We also leverage public ABRIDGE expression data to identify DNase I sensitivity SNPs in high LD with our top associations and demonstrate that this in turn is associated with expression of *CTNNA3*. Additionally, we have demonstrated the use of a simple label-shuffling permutation-testing scheme for assessing genetic associations with nonnormally distributed phenotypes. That *SEMA3D* seems to affect airway epithelium and *CTNNA3* plays a role in adhesion of smooth muscle cells reinforce our results and the role of these cells in asthma pathogenesis and exacerbation.

In conclusion, we identified 2 regulatory SNPs within *CTNNA3* and *SEMA3D* that are associated with asthma exacerbations. *SEMA3D* has strong evidence of a role in airway remodeling, and *CTNNA3* is believed to play a role in immune response; both are important processes in the causes and frequency of asthma exacerbation.

We thank all CAMP subjects for their ongoing participation in this study. We acknowledge the CAMP investigators and research team, who were supported by the National Heart, Lung and Blood Institute, for collection of CAMP Genetic Ancillary Study data. All work on data collected from the CAMP Genetic Ancillary Study was conducted at the CDNM of the Brigham and Women's Hospital under appropriate CAMP policies and human subject protections.

Key messages

- An eQTL in *CTNNA3* is identified that is genome-wide significant for association with asthma exacerbation in children.
- Genetic variants in *SEMA3D* are associated with asthma exacerbation and replicated in an adult biobank population.

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CTNNA3 and SEMA3D: promising loci for asthma exacerbation identified through multiple GWAS.

Supplementary Material

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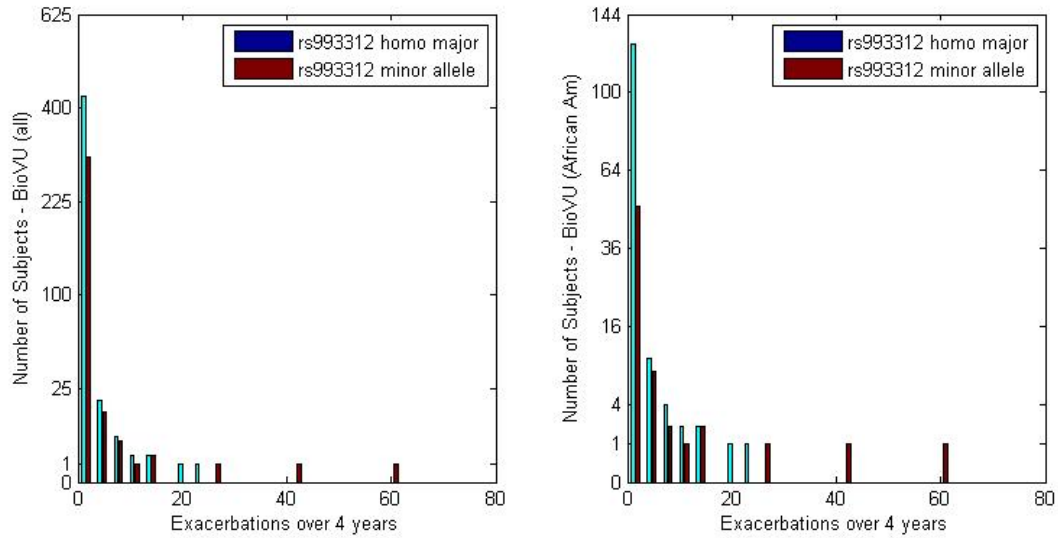
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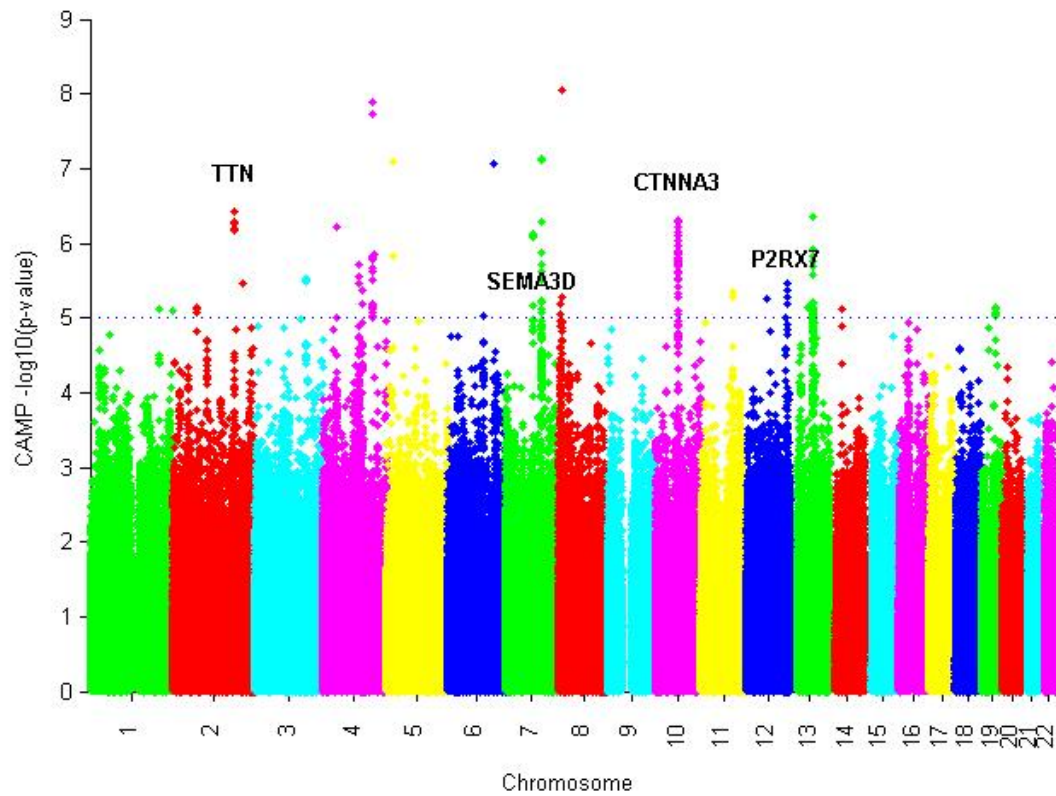
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Supplemental Figure E1. Frequency of Total Exacerbations in BioVU



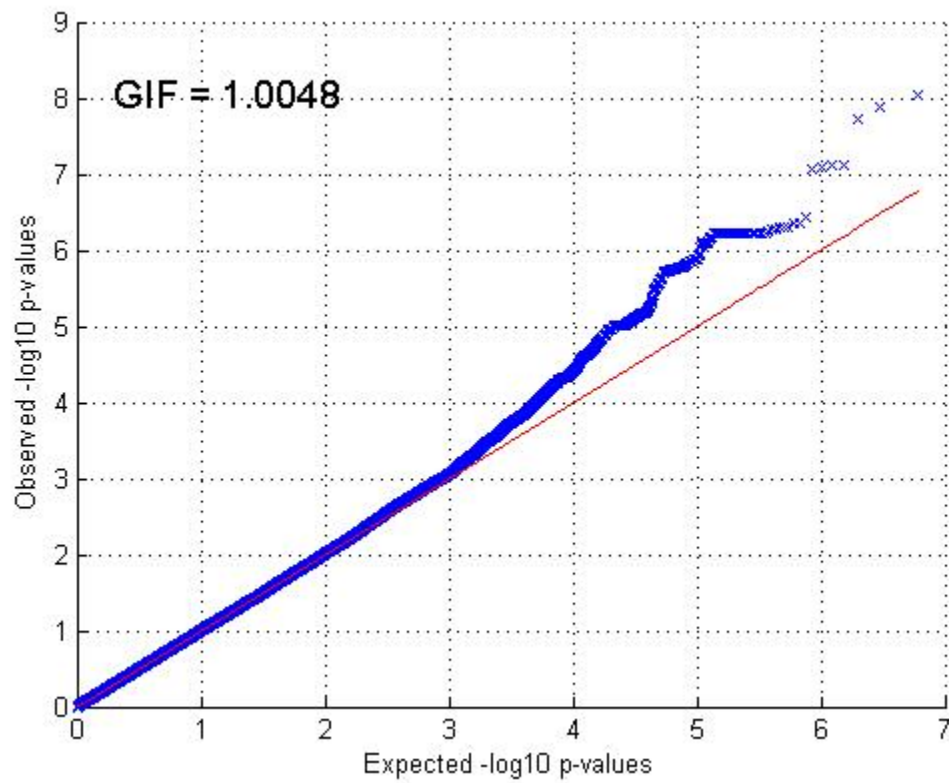
Supplemental Figure E1. Histogram of oral or injected steroid bursts (exacerbations) for a 4-year period for subjects in BioVU (n = 786). Exacerbations are shown on a square-root scale to highlight the tail of the distribution. Left Panel: All BioVU subjects stratified by rs993312 genotype (*SEMA3D* locus, $p = 0.00825$). Right Panel: The subset of BioVU subjects of African American ancestry (n = 212) stratified by rs993312 genotype (*SEMA3D* locus, $p = 0.0004$).

Supplemental Figure E2. CAMP GWAS of Exacerbations.



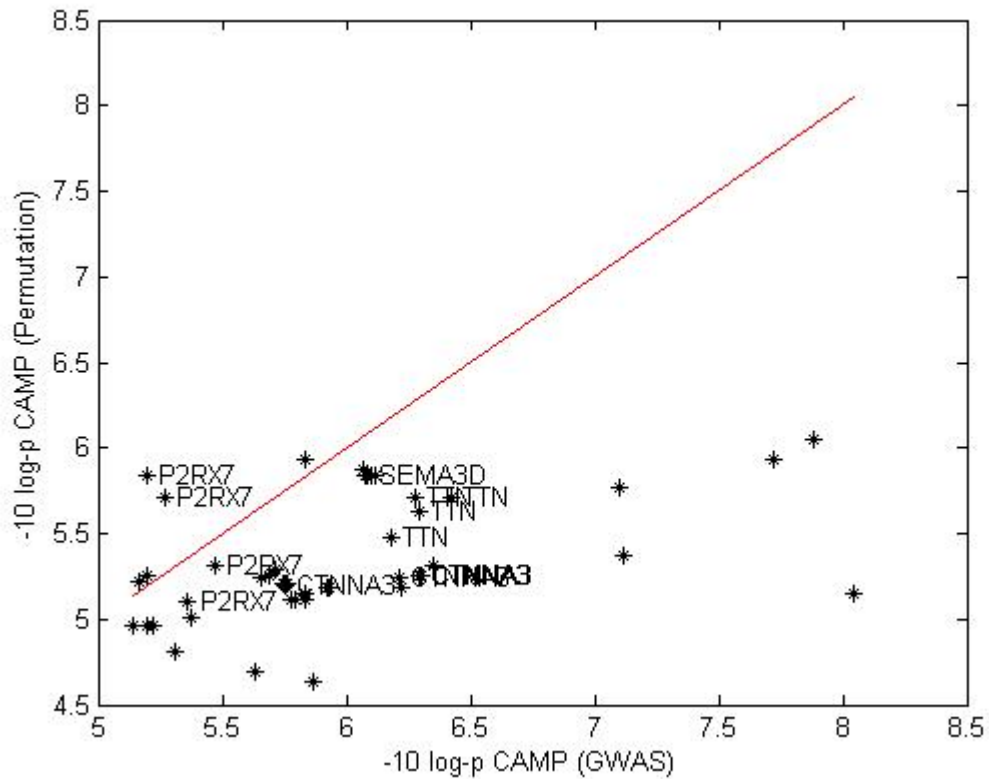
Supplemental Figure E2. Manhattan plot of CAMP GWAS. Linear regression associations of each SNP are shown as colored dots with color indicating chromosomes. The y-axis is the negative log10 p-value of association with total number of exacerbations throughout the 4 years of the main CAMP trial. The dotted line indicates the cut-off used for follow-up in permutation testing. Top genic loci are labeled with the gene name.

Supplemental Figure E3



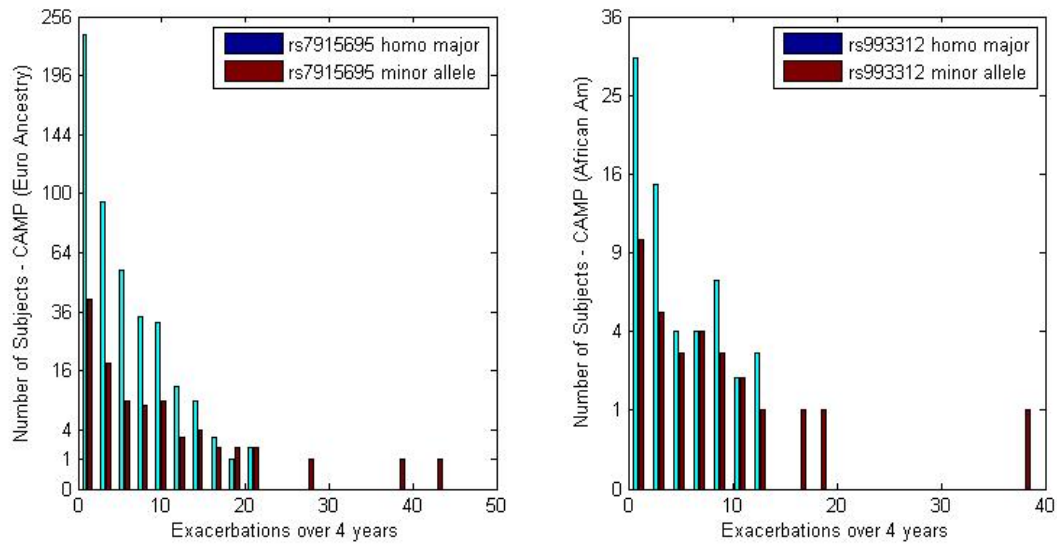
Supplemental Figure E3. Quartile-Quartile plot of CAMP GWAS. Genomic Inflation Factor (GIF) = 1.0048, indicating little to no stratification.

Supplemental Figure E4.



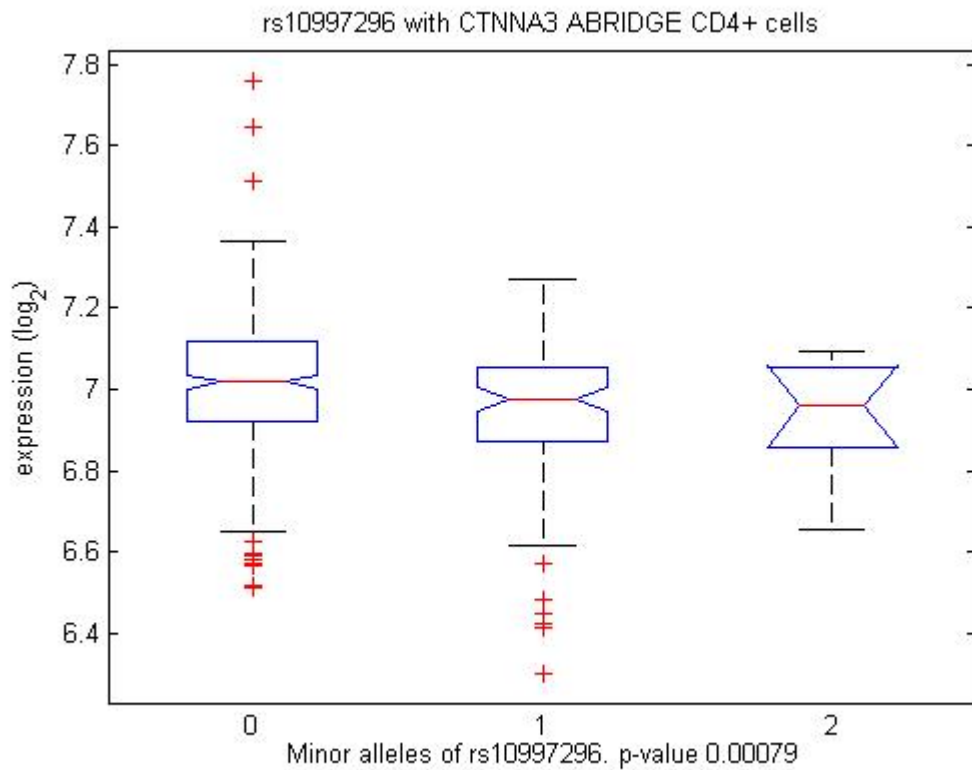
Supplemental Figure E4. CAMP p-values vs. CAMP permutation p-values, shown on a log10 scale, for the top 50 GWAS SNPs. This Figure shows the original linear regression p-values in CAMP on the x-axis and the empirical p-values from simulation on the y-axis; stars indicate SNPs and are annotated with gene symbols in cases where the SNP is within a gene. This shows the signals from *CTNNA3* decreased slightly in permutation, and the signal from *SEMA3D* decreased slightly less, while the signal in *P2RX7* increased slightly. Intra-genic outliers (right side) decreased considerably.

Supplemental Figure E5. Frequency of Total Prednisone Bursts in CAMP



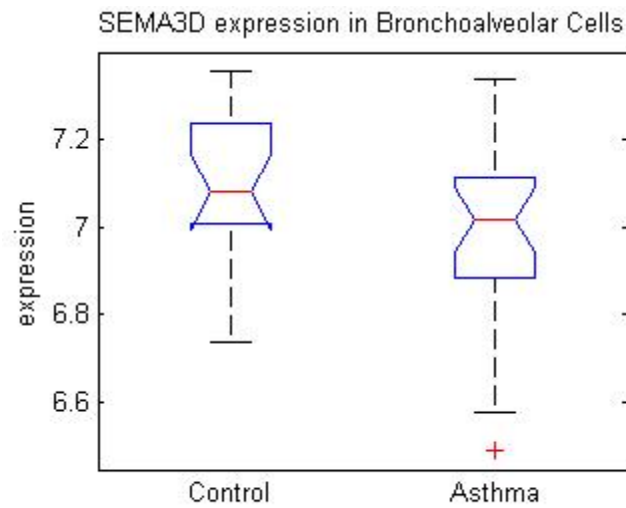
Supplemental Figure E5. Histogram of prednisone bursts (exacerbations) in CAMP. Exacerbations are plotted on a square-root scale to highlight the tail of the distribution. Left Panel: CAMP subjects of European ancestry (n = 581) stratified by rs7915695 genotype (*CTNNA3* locus, $p = 6.45 \times 10^{-6}$). Right Panel: CAMP subjects of African American ancestry (n = 96) stratified by rs993312 genotype (*SEMA3D* locus, $p = 0.0089$).

Supplemental Figure E6.



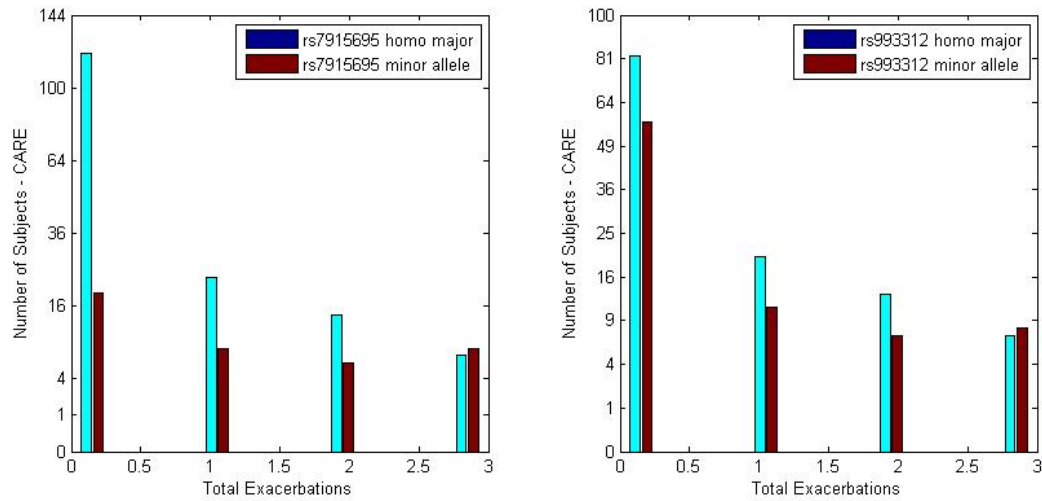
Supplemental Figure E6. Differential expression of *CTNNA3* by rs10997296 genotype. The SNP rs10997296 shows statistically significant changes in expression of *CTNNA3* in CD4+ lymphocytes in the ABRIDGE populations, after adjustment for the top 10 principal components of gene-expression.

Supplemental Figure E7.



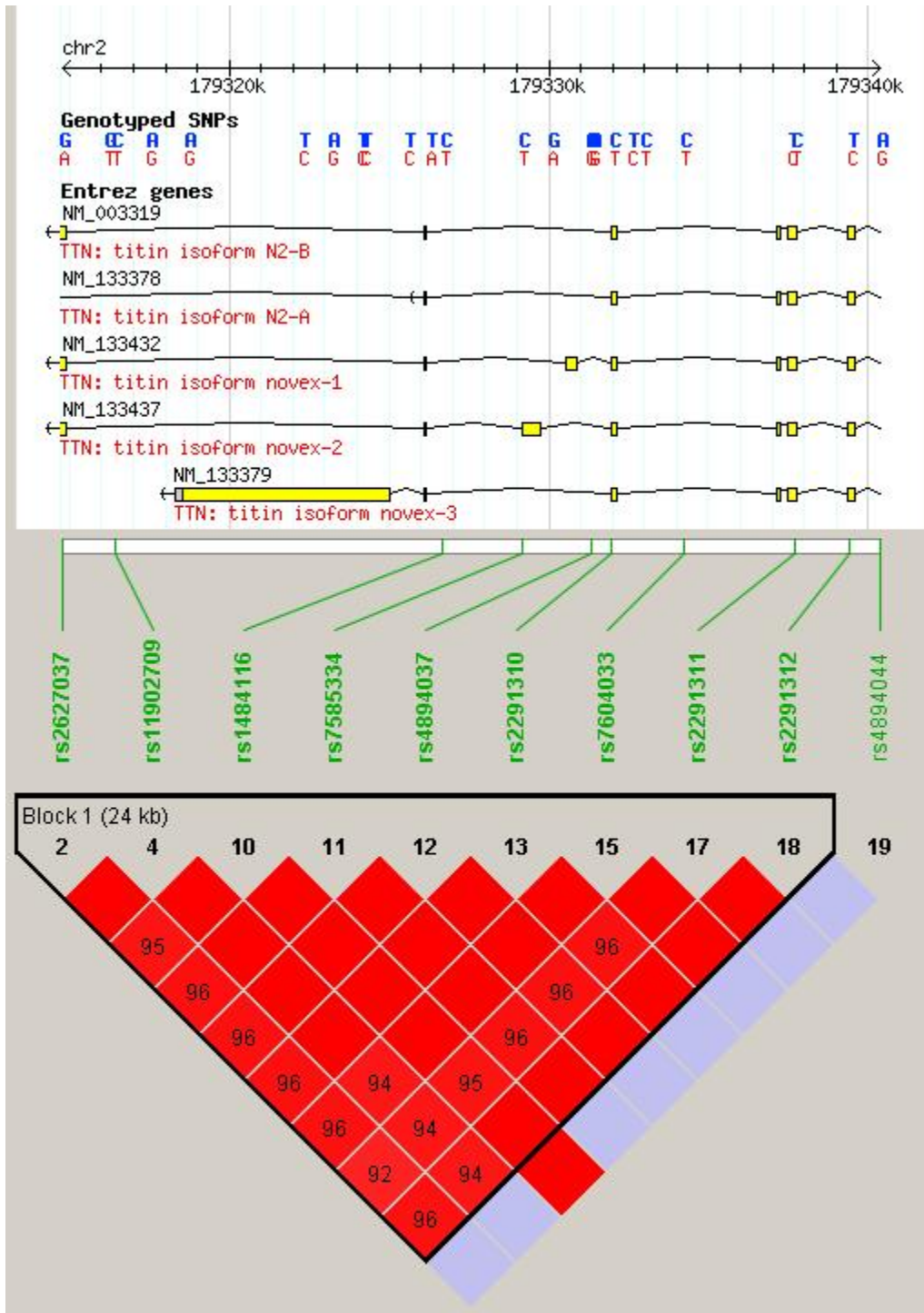
Supplemental Figure E7. Differential expression of SEMA3D in a sample of 43 bronchoalveolar cells from ABRIDGE. Samples from asthmatics had significantly less expression than controls ($p = 0.0295$).

Supplemental Figure E8.



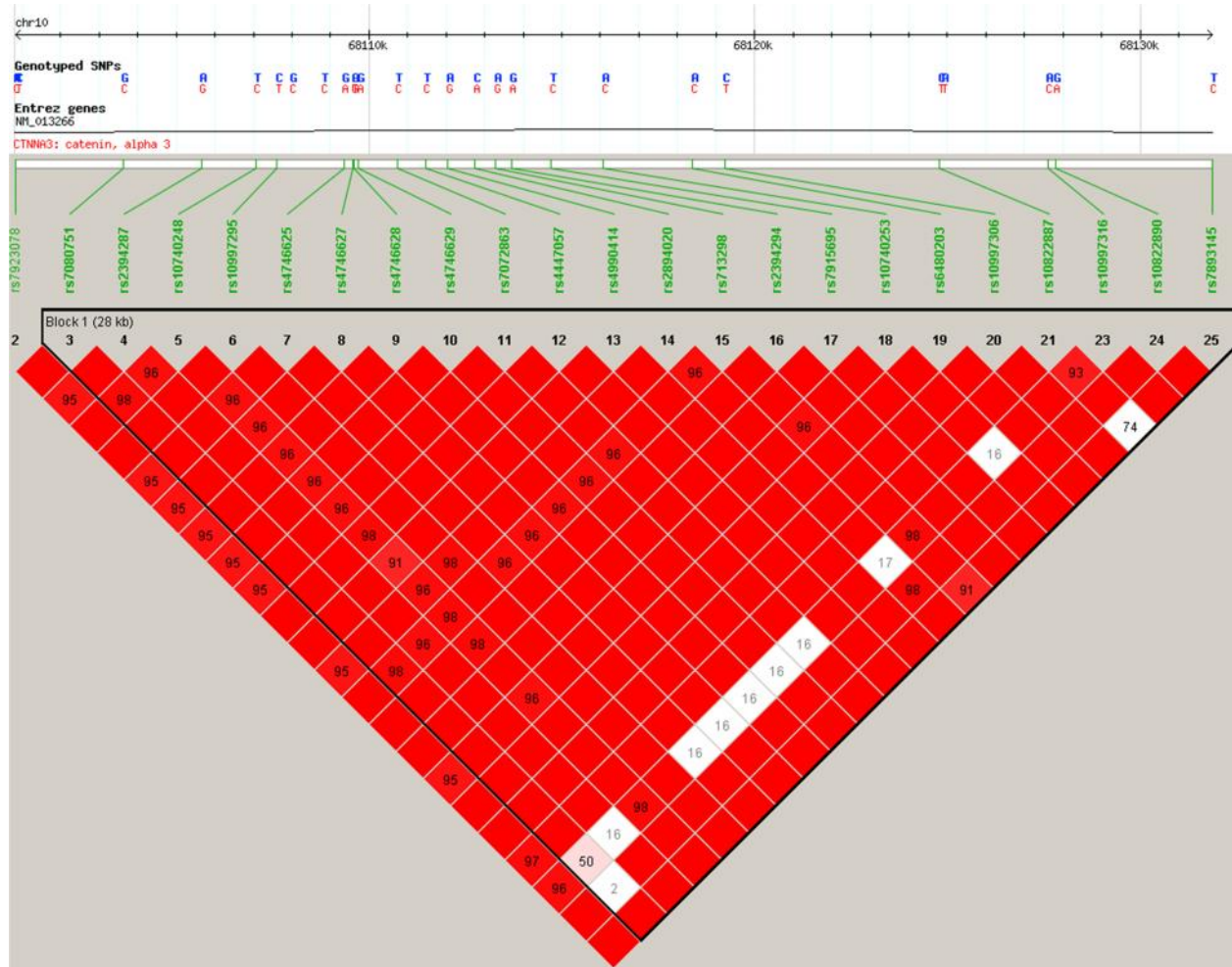
Supplemental Figure E8. Histogram of prednisone bursts (exacerbations) in CARE. Exacerbations are plotted on a square-root scale to highlight the tail of the distribution. Left Panel: CARE subjects stratified by rs7915695 genotype (*CTNNA3* locus, $p = 2.14 \times 10^{-5}$). Right Panel: CARE subjects stratified by rs993312 genotype (*SEMA3D* locus, $p = 0.79$).

Supplemental Figure E9.



Supplemental Figure E9. Chromosome 2 haplotype block spanning TTN gene. This shows linkage disequilibrium (D') between SNPs rs746578 and rs4894044. Blocks were defined using HaploView v4.2. For reasons of computational efficiency, only some tag SNPs in this range were taken forward for additional permutation testing in CAMP (see Supplemental Table S1).

Supplemental Figure E10.



Supplemental Figure E10. Chromosome 10 haplotype block spanning CTNNA3. This shows linkage disequilibrium (D') between SNPs rs7923279 and rs10997319. Blocks were defined using HaploView v4.2. For reasons of computational efficiency, only some tag SNPs in this range were taken forward for additional permutation testing in CAMP (see Supplemental Table S1).

Supplemental Table E1.

SNP	CHR	position	Allele	CAMP p	CAMP-Perm1	N.Perm1	CAMP-Perm2	N.Perm2	CARE p	Effect Dir	Meta P	Gene?	Role
rs12746416	1	207,118,289	a	7.71E-06	2.97E-04	91000	NA	NA	0.356	++	3.87E-04	ARHGAP2 5	
chr1:245911024	1	245,911,024	a	7.98E-06	1.70E-04	158682	NA	NA	NA	+?	1.70E-04		
chr2:68907258	2	68,907,258	t	7.56E-06	7.57E-05	356643	NA	NA	0.1912	+-	5.15E-04		
chr2:68911643	2	68,911,643	c	8.42E-06	7.57E-05	356643	NA	NA	0.2078	-+	4.80E-04		
chr2:68911942	2	68,911,942	t	8.41E-06	7.57E-05	356643	NA	NA	0.2094	+-	4.77E-04		
rs61732604	2	68,918,058	t	7.53E-06	4.37E-05	618000	NA	NA	NA	-?	4.37E-05	TTN	coding
rs56068004	2	68,920,596	a	7.29E-06	4.37E-05	618000	NA	NA	NA	-?	4.37E-05		
chr2:68921427	2	68,921,427	a	7.66E-06	4.37E-05	618000	NA	NA	0.2566	-+	2.49E-04		
rs746578	2	179,313,425	t	5.25E-07	2.00E-06	1000000	1.93E-06	9831000	0.09668	++	8.42E-07		
rs11893580	2	179,317,490	a	5.11E-07	3.00E-06	1000000	2.36E-06	8051940	0.09024	--	9.60E-07		
rs1484118	2	179,328,203	a	3.78E-07	3.00E-06	1000000	1.95E-06	9751000	0.08122	++	7.23E-07	TTN	intronic
rs4894042	2	179,336,607	a	6.55E-07	4.00E-06	1000000	3.32E-06	5715279	0.08119	--	1.22E-06	TTN	intronic
rs7559166	2	179,336,614	t	6.55E-07	4.00E-06	1000000	NA	NA	0.103	--	1.81E-06	TTN	intronic
rs12693167	2	179,336,762	a	5.50E-07	4.00E-06	1000000	NA	NA	0.08273	++	1.49E-06	TTN	intronic
rs4894044	2	179,340,378	a	6.58E-07	4.00E-06	1000000	NA	NA	0.08321	++	1.50E-06	TTN	intronic
rs3771013	2	206,328,277	c	3.41E-06	1.90E-05	1000000	NA	NA	0.0924	+-	2.87E-04	NRP2	intronic
rs2202287	3	148,628,699	t	3.23E-06	3.20E-05	843000	NA	NA	0.2191	+-	2.23E-04	COL25A1	intronic
chr3:148636289	3	148,636,289	t	2.95E-06	3.20E-05	843000	NA	NA	0.05687	+-	5.91E-04		
rs12634916	3	148,642,861	a	2.96E-06	2.50E-05	1000000	NA	NA	0.2183	+-	1.81E-04		
chr3:148648058	3	148,648,058	a	3.16E-06	2.50E-05	1000000	NA	NA	0.219	+-	1.81E-04		
rs10935669	3	148,648,919	t	2.97E-06	2.50E-05	1000000	NA	NA	0.2182	-+	1.82E-04		
chr4:42406057	4	42,406,057	a	5.96E-07	7.00E-06	1000000	6.48E-06	2932177	0.4509	+-	2.34E-05	COL25A1	intronic
rs1025148	4	110,132,390	a	1.91E-06	3.25E-05	831000	NA	NA	0.8239	--	2.29E-05		
chr4:110135750	4	110,135,750	a	3.48E-06	2.20E-05	1000000	NA	NA	NA	+?	2.20E-05		
rs9999788	4	110,141,021	t	2.82E-06	2.20E-05	1000000	NA	NA	0.3683	--	3.68E-05		
rs1948250	4	118,770,576	t	4.20E-06	3.00E-06	1000000	9.77E-06	1945188	0.3568	--	1.67E-05		
rs1948251	4	118,770,592	t	6.61E-06	1.90E-05	1000000	NA	NA	0.4822	--	4.82E-05	COL25A1	intronic
rs2635301	4	118,772,189	a	6.61E-06	1.90E-05	1000000	NA	NA	0.4565	--	4.41E-05		
rs2635207	4	118,773,707	t	6.61E-06	1.90E-05	1000000	NA	NA	0.4554	--	4.39E-05		
rs2635303	4	118,774,250	t	6.61E-06	1.90E-05	1000000	NA	NA	0.4556	++	4.40E-05		
rs2247756	4	118,775,754	a	6.61E-06	1.90E-05	1000000	NA	NA	0.494	--	5.02E-05		
rs2200828	4	118,778,590	t	6.61E-06	1.90E-05	1000000	NA	NA	0.4503	++	4.32E-05	COL25A1	intronic
rs1948230	4	118,788,006	a	6.61E-06	1.90E-05	1000000	NA	NA	0.5091	++	4.97E-05		
rs2635315	4	118,788,364	a	6.61E-06	1.90E-05	1000000	NA	NA	0.5039	--	5.06E-05		
rs2635317	4	118,789,530	t	6.61E-06	1.90E-05	1000000	NA	NA	0.5502	--	4.31E-05		

rs2635197	4	118,789,754	c	6.61E-06	1.90E-05	1000000	NA	NA	0.5287	++	4.64E-05
rs2635196	4	118,790,081	a	6.61E-06	1.90E-05	1000000	NA	NA	0.5333	++	4.57E-05
rs2087440	4	118,792,183	a	6.61E-06	1.90E-05	1000000	NA	NA	0.5728	--	3.98E-05
rs2087439	4	118,792,233	t	6.60E-06	1.90E-05	1000000	NA	NA	NA	+?	1.90E-05
rs2087438	4	118,792,234	c	6.59E-06	1.90E-05	1000000	NA	NA	0.6994	--	2.47E-05
rs6537439	4	148,158,894	t	7.80E-06	6.80E-05	397000	NA	NA	0.6077	++	1.13E-04
rs6537443	4	148,159,478	a	8.53E-06	7.20E-05	375248	NA	NA	0.6074	++	1.19E-04
rs6817074	4	148,159,611	a	9.43E-06	7.20E-05	375248	NA	NA	0.6068	++	1.19E-04
chr4:148160043	4	148,160,043	a	9.65E-06	7.20E-05	375248	NA	NA	0.6072	--	1.19E-04
rs6836532	4	148,160,135	a	9.75E-06	7.20E-05	375248	NA	NA	0.6072	++	1.19E-04
rs6813768	4	148,160,463	a	9.84E-06	7.20E-05	375248	NA	NA	0.6072	--	1.19E-04
rs6814170	4	148,160,675	a	9.84E-06	7.20E-05	375248	NA	NA	0.6072	--	1.19E-04
rs6824712	4	148,160,995	t	9.84E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs6824739	4	148,161,042	t	9.84E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs6844507	4	148,161,678	t	9.84E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs10519851	4	148,162,035	a	9.84E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs7670899	4	148,162,714	a	9.84E-06	7.20E-05	375248	NA	NA	0.612	--	1.17E-04
rs7691974	4	148,162,759	a	9.84E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
chr4:148162870	4	148,162,870	t	9.84E-06	7.20E-05	375248	NA	NA	0.4782	--	1.57E-04
rs60390452	4	148,162,932	a	9.84E-06	7.20E-05	375248	NA	NA	NA	+?	7.20E-05
rs34796695	4	148,163,633	t	9.84E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs6839970	4	148,163,930	a	9.84E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
chr4:148163977	4	148,163,977	a	9.84E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs6840175	4	148,164,036	a	9.85E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs6815361	4	148,164,074	t	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs6814104	4	148,164,150	a	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs2043701	4	148,164,258	t	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs6845909	4	148,164,259	t	9.85E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs35499765	4	148,164,422	a	9.85E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs35859497	4	148,164,434	c	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs17022310	4	148,164,717	a	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs55711907	4	148,164,846	t	9.85E-06	7.20E-05	375248	NA	NA	NA	+?	7.20E-05
rs56969270	4	148,165,184	c	9.85E-06	7.20E-05	375248	NA	NA	NA	+?	7.20E-05
rs13133649	4	148,165,542	t	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
chr4:148165555	4	148,165,555	a	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs17022319	4	148,165,677	t	9.84E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs17022322	4	148,165,771	a	9.84E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs56296602	4	148,166,215	t	9.84E-06	7.20E-05	375248	NA	NA	NA	-?	7.20E-05
rs13117377	4	148,166,516	a	9.84E-06	7.20E-05	375248	NA	NA	0.6075	--	1.19E-04
rs59064455	4	148,166,607	a	9.84E-06	7.20E-05	375248	NA	NA	NA	-?	7.20E-05
rs3789145	4	148,166,725	t	9.84E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs3789146	4	148,166,780	c	9.84E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04
rs3789148	4	148,166,815	t	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04

rs35228001	4	148,166,969	t	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04	
rs34077264	4	148,167,030	a	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04	
rs3747683	4	148,167,087	c	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04	
rs3747684	4	148,167,137	t	9.85E-06	7.20E-05	375248	NA	NA	0.6075	++	1.19E-04	
rs3747685	4	148,167,317	t	9.85E-06	7.20E-05	375248	NA	NA	0.6077	++	1.19E-04	
rs3804193	4	148,167,835	a	9.85E-06	7.20E-05	375248	NA	NA	0.6079	++	1.19E-04	
rs3747686	4	148,169,262	t	9.85E-06	7.20E-05	375248	NA	NA	0.6079	--	1.19E-04	
rs3747688	4	148,169,324	a	9.67E-06	7.20E-05	375248	NA	NA	0.6008	++	1.21E-04	
rs13103097	4	148,192,250	t	1.47E-06	9.00E-06	1000000	7.71E-06	2463587	0.3696	--	1.41E-05	
rs17022415	4	148,194,362	c	1.50E-06	9.00E-06	1000000	NA	NA	0.3723	++	1.65E-05	
rs17022424	4	148,194,667	t	1.52E-06	9.00E-06	1000000	NA	NA	0.2304	--	8.96E-06	
rs13102548	4	148,199,254	a	1.31E-08	2.00E-06	1000000	8.98E-07	21151000	0.4637	++	2.90E-06	
rs10461282	4	148,202,501	a	1.60E-06	9.00E-06	1000000	7.71E-06	2463587	0.3539	--	1.33E-05	
rs6849485	4	148,202,603	t	2.34E-06	1.40E-05	1000000	2.05E-05	928567	0.6757	++	2.91E-05	
rs11100936	4	148,203,315	a	1.66E-06	9.00E-06	1000000	7.71E-06	2463587	0.3501	++	1.31E-05	
chr4:148208963	4	148,208,963	a	1.90E-08	2.00E-06	1000000	1.18E-06	16121000	0.4477	++	3.48E-06	
chr4:148210080	4	148,210,080	t	3.11E-06	1.70E-05	1000000	NA	NA	0.3254	--	2.46E-05	
rs34504426	4	148,210,249	a	2.20E-06	7.00E-06	1000000	5.67E-06	3351284	0.3251	++	8.91E-06	
rs13144278	4	148,212,727	c	6.40E-06	1.90E-05	1000000	NA	NA	0.3559	++	3.07E-05	
rs1507500	4	148,213,152	a	6.95E-06	1.90E-05	1000000	NA	NA	0.3647	--	3.17E-05	
rs34157591	4	148,218,889	a	7.30E-06	1.90E-05	1000000	NA	NA	0.3533	--	3.04E-05	
rs17022539	4	148,220,967	a	9.99E-06	3.48E-05	775000	NA	NA	0.1703	++	2.37E-05	
chr4:153917757	4	153,917,757	a	1.43E-06	1.30E-05	1000000	NA	NA	NA	+?	1.30E-05	TIGD4
rs12332147	5	20,600,936	a	7.99E-08	2.00E-06	1000000	1.68E-06	11301000	0.5736	++	4.41E-06	
rs57202385	5	20,603,669	a	1.46E-06	2.00E-06	1000000	1.18E-06	16091000	NA	-?	1.18E-06	
rs62419788	6	104,544,716	a	9.18E-06	2.10E-05	1000000	NA	NA	NA	+?	2.10E-05	
chr6:135052239	6	135,052,239	t	8.52E-08	1.40E-05	1000000	NA	NA	0.9828	--	1.63E-06	
rs55834466	7	84,581,915	a	7.99E-07	2.00E-06	1000000	1.45E-06	13071000	NA	+?	1.45E-06	SEMA3D intronic
rs993312	7	84,585,780	a	8.33E-07	2.00E-06	1000000	1.45E-06	13071000	0.9734	+-	8.25E-05	SEMA3D intronic
chr7:84586824	7	84,586,824	a	8.31E-07	2.00E-06	1000000	NA	NA	0.9732	+-	1.05E-04	SEMA3D
rs62462173	7	84,591,780	c	8.24E-07	2.00E-06	1000000	1.45E-06	13071000	NA	-?	1.45E-06	
rs2159576	7	84,594,966	t	8.47E-07	3.00E-06	1000000	1.34E-06	14171000	0.9711	+-	7.38E-05	
rs62462187	7	84,599,573	a	6.81E-06	8.00E-06	1000000	6.01E-06	3162662	NA	-?	6.01E-06	
chr7:84600098	7	84,600,098	a	7.61E-07	2.00E-06	1000000	1.45E-06	13071000	0.9876	++	1.25E-07	
chr7:108748207	7	108,748,207	t	5.75E-06	2.00E-05	1000000	NA	NA	0.741	+-	1.27E-04	
rs9969336	7	108,753,794	t	6.07E-06	2.00E-05	1000000	NA	NA	0.7063	+-	1.11E-04	
chr7:108754290	7	108,754,290	a	7.44E-08	3.29E-05	821000	NA	NA	NA	-?	3.29E-05	
rs10241388	7	108,754,405	a	1.37E-06	1.10E-05	1000000	2.29E-05	828782	NA	-?	2.29E-05	
rs7784033	7	108,755,525	t	6.12E-06	2.00E-05	1000000	NA	NA	NA	-?	2.00E-05	
rs10257229	7	108,756,291	a	6.16E-06	2.00E-05	1000000	NA	NA	0.7022	+-	1.09E-04	
rs56695851	7	108,757,948	a	7.78E-06	2.00E-05	1000000	NA	NA	NA	+?	2.00E-05	
rs12154676	7	108,809,316	t	5.18E-07	2.30E-05	1000000	NA	NA	NA	-?	2.30E-05	
chr7:108844748	7	108,844,748	c	7.65E-08	7.00E-06	1000000	4.20E-06	4521474	NA	-?	4.20E-06	

chr7:108860630	7	108,860,630	a	2.44E-06	3.23E-05	836000	NA	NA	0.6233	++	5.39E-05		
rs7789903	7	108,861,303	t	2.75E-06	3.23E-05	836000	NA	NA	0.7754	--	2.92E-05		
chr7:108866148	7	108,866,148	a	3.08E-06	3.23E-05	836000	NA	NA	0.6508	--	4.88E-05		
chr7:108867820	7	108,867,820	a	2.74E-06	3.23E-05	836000	NA	NA	0.6518	--	4.86E-05		
chr7:108875463	7	108,875,463	t	1.94E-06	5.00E-06	1000000	5.20E-06	3656672	0.6129	--	1.05E-05		
chr7:108878526	7	108,878,526	t	8.64E-06	2.20E-05	1000000	NA	NA	0.8377	++	1.46E-05		
chr7:108878937	7	108,878,937	t	8.37E-06	2.20E-05	1000000	NA	NA	0.8405	++	1.43E-05		
chr8:2924955	8	2,924,955	a	8.93E-06	2.10E-05	1000000	NA	NA	0.5691	+-	7.09E-05	CSMD1	
rs7005969	8	2,926,103	a	8.94E-06	2.10E-05	1000000	NA	NA	0.5691	+-	7.09E-05	CSMD1	intronic
rs13282034	8	5,568,776	t	6.34E-06	8.00E-06	1000000	5.63E-06	3375236	0.9179	++	2.07E-06		
rs62492833	8	10,446,927	t	5.23E-06	2.60E-05	1000000	NA	NA	NA	+?	2.60E-05		
chr8:10466274	8	10,466,274	t	8.97E-09	8.00E-06	1000000	7.00E-06	2713834	NA	+?	7.00E-06		
rs10995653	10	65,271,603	c	4.85E-06	1.30E-05	1000000	1.57E-05	1207488	0.2857	--	1.95E-05		
rs10822221	10	65,271,665	c	4.77E-06	1.30E-05	1000000	NA	NA	0.2856	++	1.63E-05		
rs4498863	10	65,272,716	a	1.69E-06	1.30E-05	1000000	NA	NA	0.2833	++	1.61E-05		
rs10509197	10	65,276,235	a	1.29E-06	1.30E-05	1000000	NA	NA	0.2801	++	1.59E-05		
rs10822222	10	65,276,852	t	1.29E-06	1.30E-05	1000000	NA	NA	0.2802	++	1.59E-05		
rs12250694	10	65,277,688	a	1.31E-06	1.30E-05	1000000	NA	NA	NA	+?	1.30E-05		
rs12358127	10	65,279,120	a	1.34E-06	1.30E-05	1000000	NA	NA	NA	-?	1.30E-05		
rs12358159	10	65,279,436	a	1.35E-06	1.30E-05	1000000	NA	NA	NA	-?	1.30E-05		
rs10995654	10	65,280,043	a	1.36E-06	1.30E-05	1000000	NA	NA	0.281	++	1.60E-05		
rs12358860	10	65,284,378	t	1.41E-06	2.00E-05	1000000	NA	NA	0.2813	--	2.39E-05		
rs10995665	10	65,293,480	a	1.71E-06	2.00E-05	1000000	NA	NA	0.2843	++	2.42E-05		
rs16918975	10	65,296,932	a	1.70E-06	2.00E-05	1000000	NA	NA	0.3378	--	3.00E-05		
rs10822233	10	65,298,955	a	1.70E-06	2.00E-05	1000000	NA	NA	0.3378	++	3.00E-05		
rs10822234	10	65,299,212	t	1.68E-06	2.00E-05	1000000	NA	NA	0.3378	++	3.00E-05		
rs10822235	10	65,299,496	t	1.67E-06	2.00E-05	1000000	NA	NA	0.3379	--	3.00E-05		
rs10822236	10	65,299,499	t	1.67E-06	2.00E-05	1000000	NA	NA	0.3379	--	3.00E-05		
rs10822237	10	65,299,718	t	1.67E-06	2.00E-05	1000000	NA	NA	0.3379	--	3.00E-05		
rs10995667	10	65,300,957	a	1.66E-06	2.00E-05	1000000	NA	NA	0.3379	++	3.00E-05		
rs12354746	10	65,303,033	t	1.59E-06	2.20E-05	1000000	NA	NA	0.3373	++	3.27E-05		
rs7074842	10	65,303,043	t	1.59E-06	2.20E-05	1000000	NA	NA	0.3349	--	3.24E-05		
chr10:65303849	10	65,303,849	t	1.84E-06	2.00E-05	1000000	NA	NA	0.3375	++	3.00E-05		
chr10:65305391	10	65,305,391	c	1.84E-06	2.20E-05	1000000	NA	NA	0.3141	--	2.99E-05		
chr10:65312643	10	65,312,642	c	1.78E-06	2.20E-05	1000000	NA	NA	0.3954	++	4.06E-05		
chr10:65320945	10	65,320,944	t	1.85E-06	2.20E-05	1000000	NA	NA	0.2891	--	2.70E-05		
chr10:65323081	10	65,323,081	t	1.85E-06	2.20E-05	1000000	NA	NA	0.2876	--	2.68E-05		
rs4746410	10	65,327,693	c	1.86E-06	2.20E-05	1000000	NA	NA	0.2838	++	2.64E-05		
rs4746413	10	65,333,793	t	1.88E-06	2.20E-05	1000000	NA	NA	0.2808	--	2.61E-05		
rs4746414	10	65,333,845	c	1.88E-06	2.20E-05	1000000	NA	NA	0.2874	++	2.68E-05		
rs4746415	10	65,333,909	t	1.88E-06	2.20E-05	1000000	NA	NA	0.2808	++	2.61E-05		
chr10:65338630	10	65,338,629	c	1.90E-06	2.20E-05	1000000	NA	NA	0.2815	++	2.62E-05		
chr10:65343741	10	65,343,740	a	3.88E-06	2.88E-05	939000	NA	NA	0.2534	++	2.98E-05		

rs12354946	10	65,348,856	t	8.86E-06	6.01E-05	449550	NA	NA	0.2376	++	5.57E-05		
rs7923279	10	68,100,678	t	4.97E-07	1.00E-05	1000000	5.54E-06	3432122	8.1E-05	++	3.34E-08	CTNNA3	intronic
rs7923078	10	68,100,834	a	5.10E-07	1.00E-05	1000000	5.54E-06	3432122	6.5E-05	--	3.02E-08	CTNNA3	intronic
rs7895190	10	68,100,898	t	1.76E-06	7.00E-06	1000000	6.45E-06	2946135	2.1E-05	++	2.19E-08	CTNNA3	intronic
rs6480203	10	68,118,409	a	6.10E-07	9.00E-06	1000000	5.71E-06	3330326	9.9E-05	--	3.79E-08	CTNNA3	intronic
rs57434776	10	68,118,729	a	6.11E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	intronic
rs7077450	10	68,118,845	a	6.11E-07	9.00E-06	1000000	NA	NA	9.9E-05	++	6.37E-08	CTNNA3	intronic
rs35834193	10	68,118,954	a	6.11E-07	9.00E-06	1000000	NA	NA	9.9E-05	++	6.38E-08	CTNNA3	intronic
rs10997305	10	68,119,046	a	6.11E-07	9.00E-06	1000000	NA	NA	9.7E-05	--	6.31E-08	CTNNA3	intronic
rs10997306	10	68,119,237	t	6.11E-07	9.00E-06	1000000	NA	NA	9.9E-05	++	6.38E-08	CTNNA3	intronic
rs10997307	10	68,119,438	t	6.11E-07	9.00E-06	1000000	NA	NA	9.5E-05	--	6.26E-08	CTNNA3	intronic
rs10822877	10	68,120,068	t	6.11E-07	9.00E-06	1000000	NA	NA	8.5E-05	--	5.94E-08	CTNNA3	intronic
chr10:68120857	10	68,120,857	a	6.11E-07	9.00E-06	1000000	NA	NA	NA	+?	9.00E-06	CTNNA3	
chr10:68120912	10	68,120,912	c	6.11E-07	9.00E-06	1000000	NA	NA	NA	+?	9.00E-06	CTNNA3	
chr10:68120980	10	68,120,980	a	6.11E-07	9.00E-06	1000000	NA	NA	NA	+?	9.00E-06	CTNNA3	
rs59787457	10	68,121,076	a	6.11E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs60469910	10	68,121,123	a	5.37E-06	1.13E-04	238044	NA	NA	NA	+?	1.13E-04	CTNNA3	Intronic
rs12241710	10	68,121,298	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	+?	9.00E-06	CTNNA3	Intronic
rs10822884	10	68,121,744	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs4745913	10	68,121,873	t	6.14E-07	9.00E-06	1000000	NA	NA	NA	+?	9.00E-06	CTNNA3	Intronic
rs4745914	10	68,121,874	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs10822886	10	68,122,743	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	+?	9.00E-06	CTNNA3	Intronic
rs12260621	10	68,123,508	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs4313463	10	68,124,053	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs4313464	10	68,124,155	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs4313465	10	68,124,237	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs4313466	10	68,124,265	a	6.14E-07	9.00E-06	1000000	NA	NA	NA	-?	9.00E-06	CTNNA3	Intronic
rs4300298	10	68,124,522	a	6.14E-07	9.00E-06	1000000	NA	NA	6.1E-05	++	5.12E-08	CTNNA3	Intronic
rs10822887	10	68,124,816	t	6.14E-07	9.00E-06	1000000	NA	NA	7.9E-05	++	5.76E-08	CTNNA3	Intronic
rs12258078	10	68,125,734	t	6.14E-07	9.00E-06	1000000	NA	NA	7.9E-05	--	5.76E-08	CTNNA3	Intronic
rs10822888	10	68,127,030	a	6.14E-07	9.00E-06	1000000	NA	NA	7.9E-05	--	5.76E-08	CTNNA3	Intronic
rs10822889	10	68,127,141	a	6.14E-07	9.00E-06	1000000	NA	NA	7.9E-05	++	5.76E-08	CTNNA3	Intronic
rs10997317	10	68,128,487	t	7.16E-07	9.00E-06	1000000	NA	NA	7.9E-05	--	5.77E-08	CTNNA3	Intronic
rs10822891	10	68,128,623	a	7.93E-07	9.00E-06	1000000	NA	NA	6E-05	--	5.08E-08	CTNNA3	Intronic
rs10822892	10	68,128,918	t	9.19E-07	9.00E-06	1000000	NA	NA	7.9E-05	--	5.77E-08	CTNNA3	Intronic
rs6480205	10	68,129,251	a	1.07E-06	9.00E-06	1000000	NA	NA	0.00029	--	1.06E-07	CTNNA3	Intronic
rs12263747	10	68,129,879	a	1.36E-06	9.00E-06	1000000	NA	NA	7.9E-05	--	5.77E-08	CTNNA3	intronic
rs12249685	10	68,130,780	t	1.75E-06	9.00E-06	1000000	NA	NA	7.9E-05	++	5.77E-08	CTNNA3	Intronic
rs12414771	10	68,130,925	t	1.93E-06	9.00E-06	1000000	NA	NA	7.9E-05	--	5.77E-08	CTNNA3	Intronic
rs12413382	10	68,131,052	t	2.03E-06	9.00E-06	1000000	NA	NA	7.9E-05	++	5.77E-08	CTNNA3	Intronic
rs10822894	10	68,131,233	a	2.35E-06	9.00E-06	1000000	NA	NA	7.9E-05	--	5.77E-08	CTNNA3	Intronic
rs10822895	10	68,131,719	a	2.47E-06	9.00E-06	1000000	NA	NA	7.9E-05	--	5.77E-08	CTNNA3	Intronic
rs10997318	10	68,132,549	a	3.02E-06	9.00E-06	1000000	NA	NA	7.9E-05	++	5.77E-08	CTNNA3	Intronic

rs10997319	10	68,132,747	t	3.17E-06	9.00E-06	1000000	NA	NA	7.9E-05	--	5.77E-08	CTNNA3	Intronic
rs12252238	10	68,156,507	t	8.23E-06	4.42E-05	611000	NA	NA	4.5E-05	++	2.87E-07	CTNNA3	Intronic
rs4565928	11	95,969,294	a	4.49E-06	3.07E-04	88000	NA	NA	NA	-?	3.07E-04		
chr11:95975025	11	95,975,025	a	5.14E-06	2.09E-04	129000	NA	NA	0.9038	--	8.47E-05		
rs4762983	12	61,595,497	a	5.67E-06	2.90E-05	932000	NA	NA	0.6722	++	4.07E-05	PPM1H	intronic
chr12:115523109	12	115,523,109	t	9.90E-06	8.55E-05	315684	NA	NA	NA	-?	8.55E-05		
rs7978398	12	120,085,838	t	6.39E-06	4.00E-06	1000000	1.45E-06	13151000	0.2357	+-	1.51E-05	P2RX7	intronic
rs11065464	12	120,086,518	a	5.40E-06	5.00E-06	1000000	1.95E-06	9751000	0.2032	++	2.28E-05	P2RX7	intronic
rs11065466	12	120,089,131	a	4.35E-06	1.00E-05	1000000	7.90E-06	2403767	NA	-?	7.90E-06	P2RX7	intronic
rs7958311	12	120,089,738	a	3.40E-06	6.00E-06	1000000	4.89E-06	3888208	0.08952	++	9.84E-05	P2RX7	coding
rs36116291	13	50,244,969	a	7.24E-06	5.02E-04	53784	NA	NA	NA	+?	5.02E-04	DLEU7	intronic
rs275891	13	63,360,306	c	9.49E-06	3.23E-05	837000	NA	NA	0.5494	++	9.70E-05		
rs56715541	13	63,425,910	t	9.92E-06	2.60E-05	1000000	NA	NA	NA	-?	2.60E-05		
rs9598666	13	63,426,180	a	9.70E-06	2.60E-05	1000000	NA	NA	0.718	++	3.06E-05		
rs9598668	13	63,427,164	a	9.51E-06	2.60E-05	1000000	NA	NA	0.7414	--	2.77E-05		
rs9598669	13	63,427,823	c	9.44E-06	2.60E-05	1000000	NA	NA	0.7407	++	2.78E-05		
rs9592301	13	63,428,925	t	9.38E-06	2.60E-05	1000000	NA	NA	0.739	--	2.80E-05		
rs9598670	13	63,429,310	a	7.29E-06	1.80E-05	1000000	1.10E-05	1734285	0.9272	++	2.17E-04		
rs9592302	13	63,430,694	t	8.75E-06	2.60E-05	1000000	NA	NA	0.7357	--	2.84E-05		
rs9592303	13	63,430,821	a	8.65E-06	2.60E-05	1000000	NA	NA	0.7357	++	2.84E-05		
rs4638447	13	63,431,689	t	8.01E-06	2.60E-05	1000000	NA	NA	0.7357	--	2.84E-05		
rs12583658	13	63,432,025	a	7.86E-06	2.60E-05	1000000	NA	NA	0.7356	--	2.84E-05		
rs9598672	13	63,432,127	t	7.61E-06	2.60E-05	1000000	NA	NA	0.7356	--	2.84E-05		
rs9598673	13	63,432,447	t	7.64E-06	2.60E-05	1000000	NA	NA	0.7122	--	3.14E-05		
rs1335799	13	63,433,065	t	6.01E-06	1.80E-05	1000000	1.10E-05	1734285	0.9291	++	2.21E-04		
rs34577157	13	63,433,319	t	7.73E-06	2.60E-05	1000000	NA	NA	0.7356	--	2.84E-05		
rs11839947	13	63,433,373	a	7.77E-06	2.60E-05	1000000	NA	NA	0.7355	--	2.84E-05		
rs34070869	13	63,434,683	a	7.84E-06	2.60E-05	1000000	NA	NA	0.7353	++	2.85E-05		
rs12877717	13	63,436,204	a	7.85E-06	2.60E-05	1000000	NA	NA	0.7352	--	2.85E-05		
rs4884530	13	63,436,726	a	7.96E-06	2.60E-05	1000000	NA	NA	NA	+?	2.60E-05		
rs9592305	13	63,438,382	t	8.03E-06	2.60E-05	1000000	NA	NA	0.7349	++	2.85E-05		
chr13:63439987	13	63,439,987	a	8.05E-06	2.60E-05	1000000	NA	NA	0.7348	--	2.85E-05		
rs7986137	13	63,440,813	a	8.09E-06	2.60E-05	1000000	NA	NA	0.7348	--	2.85E-05		
rs7986818	13	63,440,918	a	8.12E-06	2.60E-05	1000000	NA	NA	0.7648	++	2.50E-05		
rs7987985	13	63,441,009	t	8.15E-06	2.60E-05	1000000	NA	NA	0.7346	--	2.86E-05		
rs7987993	13	63,441,026	t	8.19E-06	2.60E-05	1000000	NA	NA	0.7345	--	2.86E-05		
rs12877430	13	63,441,208	t	6.34E-06	1.80E-05	1000000	1.10E-05	1734285	0.9291	++	2.21E-04		
rs35003850	13	63,441,574	a	8.41E-06	2.60E-05	1000000	NA	NA	0.7344	--	2.86E-05		
chr13:63441741	13	63,441,741	a	8.70E-06	2.60E-05	1000000	NA	NA	0.7344	++	2.86E-05		
rs17375864	13	63,443,540	t	9.05E-06	2.60E-05	1000000	NA	NA	0.7343	--	2.86E-05		
rs7337474	13	63,444,758	a	9.12E-06	2.60E-05	1000000	NA	NA	0.7343	++	2.86E-05		
rs7337869	13	63,444,984	c	9.14E-06	2.60E-05	1000000	NA	NA	NA	+?	2.60E-05		

rs9598675	13	63,445,057	a	9.19E-06	2.60E-05	1000000	NA	NA	NA	+?	2.60E-05	
rs9598676	13	63,445,110	a	9.97E-06	2.60E-05	1000000	NA	NA	0.7343	--	2.86E-05	
rs2172786	13	63,473,835	a	1.73E-06	9.00E-06	1000000	6.17E-06	3078830	0.9113	+-	1.20E-04	
rs9598692	13	63,473,876	t	1.18E-06	1.30E-05	1000000	6.49E-06	2928189	0.7428	--	7.49E-06	
rs9598693	13	63,474,033	t	1.46E-06	1.10E-05	1000000	7.03E-06	2701870	0.9151	++	2.65E-06	
rs9598694	13	63,474,061	t	1.74E-06	9.00E-06	1000000	6.17E-06	3078830	0.9135	+-	1.22E-04	
rs4883728	13	63,475,086	t	1.75E-06	9.00E-06	1000000	NA	NA	0.9142	+-	1.66E-04	
rs9598695	13	63,475,498	a	1.75E-06	9.00E-06	1000000	NA	NA	0.9139	+-	1.65E-04	
rs9592311	13	63,475,533	a	1.75E-06	9.00E-06	1000000	NA	NA	0.9154	+-	1.68E-04	
rs4884534	13	63,476,666	a	1.76E-06	9.00E-06	1000000	6.17E-06	3078830	0.9153	+-	1.24E-04	
rs35860226	13	63,476,842	a	1.20E-06	1.30E-05	1000000	6.49E-06	2928189	0.7525	++	7.15E-06	
rs9598696	13	63,477,070	t	2.06E-06	7.00E-06	1000000	5.64E-06	3366254	0.9433	+-	1.51E-04	
rs9592312	13	63,477,412	a	1.76E-06	9.00E-06	1000000	6.17E-06	3078830	0.9157	+-	1.24E-04	
rs9598697	13	63,478,806	t	4.43E-07	1.30E-05	1000000	4.91E-06	3866252	0.7599	++	5.32E-06	
rs12716710	13	63,479,111	a	2.71E-06	2.50E-05	1000000	NA	NA	0.9156	+-	3.80E-04	
rs1389927	13	63,479,223	t	2.71E-06	2.50E-05	1000000	NA	NA	0.7608	--	2.45E-05	
rs9592313	13	63,479,876	t	1.78E-06	9.00E-06	1000000	NA	NA	0.9164	+-	1.69E-04	
rs9598698	13	63,480,031	c	1.78E-06	9.00E-06	1000000	6.17E-06	3078830	0.9168	+-	1.25E-04	
rs9598699	13	63,480,203	c	4.46E-07	1.30E-05	1000000	4.91E-06	3866252	0.4045	--	1.07E-05	
rs62014289	14	39,165,406	t	7.57E-06	9.70E-05	278442	NA	NA	NA	+?	9.70E-05	
chr19:41221799	19	41,221,799	t	9.65E-06	3.91E-05	512000	NA	NA	0.3422	++	5.66E-05	THAP8
chr19:41223650	19	41,223,650	c	8.69E-06	3.91E-05	512000	NA	NA	0.3427	--	5.67E-05	THAP8
rs56270047	19	41,225,075	t	8.49E-06	3.91E-05	512000	NA	NA	NA	+?	3.91E-05	THAP8 intronic
chr19:41231593	19	41,231,593	a	8.45E-06	3.91E-05	512000	NA	NA	0.3434	--	5.69E-05	THAP8
chr19:41246318	19	41,246,318	a	7.60E-06	2.92E-05	686000	NA	NA	0.3403	++	4.29E-05	WDR62
rs12151323	19	41,262,471	a	7.04E-06	2.92E-05	686000	NA	NA	0.3296	--	4.12E-05	WDR62 intronic
rs2301735	19	41,269,390	a	7.11E-06	2.92E-05	686000	NA	NA	0.3009	++	3.68E-05	WDR62 intronic
chr19:41277478	19	41,277,478	a	7.16E-06	2.92E-05	686000	NA	NA	0.2704	--	3.25E-05	WDR62
rs2231566	19	41,297,392	a	7.26E-06	2.92E-05	686000	NA	NA	0.2499	++	2.92E-05	POLR2I intronic

Supplemental Table E1. Top SNPs with CAMP p-values, CAMP permutation p-values, and CARE p-values. Effect Direction shows effect direction for major allele first in CAMP and then in CARE, where ‘?’ indicates the SNP was not available in the CARE imputation. CAMP permutation p-values were computed in two stages; with only those SNPs taken forward that both a) requiring 1 million permutation in stage one, and b) not in tight LD with other nearby SNPs.

Supplemental Table E2.

SNP	position (bp)	p-val eQTL	p-val metal
rs4609495	67700951	0.009603	0.1067
rs10997024	67701424	0.150665	0.9586
rs10997025	67701793	0.111807	0.9587
rs12414970	67702149	0.650513	0.7476
rs10822786	67702846	0.337544	0.1639
rs10997027	67703000	0.104096	0.9594
rs10997028	67703034	0.104096	0.9595
rs4745897	67703222	0.291291	0.1074
rs4746568	67703312	0.337544	0.1642
rs10997029	67704040	0.056088	0.9558
rs10997030	67704373	0.94841	0.2266
rs10762045	67704564	0.01977	0.1068
rs10822787	67705479	0.045013	0.1101
rs10822788	67705486	0.045013	0.1103
rs10733819	67705761	0.337544	0.1683
rs4575151	67706497	0.337544	0.183
rs4440927	67706510	0.337544	0.1885
rs4576715	67706860	0.045013	0.1352
rs10997032	67707902	0.054553	0.2088
rs12763572	67708943	0.018802	0.1369
rs7073268	67709058	0.190001	0.1919
rs12763441	67709096	0.018802	0.1374
rs4548513	67710331	0.587204	0.1923
rs10822789	67710845	0.587204	0.1927
rs10822790	67710886	0.496321	0.1378
rs10822791	67711541	0.727316	0.138
rs6480157	67711643	0.116939	0.1747
rs34240190	67711668	0.496321	0.1379
rs4607959	67712140	0.678345	0.194
rs12784693	67712341	0.727316	0.1375
rs12784842	67712453	0.727316	0.1297
rs55774806	67712640	0.266528	0.2745
rs4630184	67712674	0.899384	0.1894
rs4294477	67712827	0.044222	0.9641
rs36042802	67712915	0.044222	0.9636
rs12415751	67713180	0.108093	0.8507
rs7899712	67713269	0.423087	0.1939
rs7899732	67713313	0.044222	0.8342
rs12569810	67713848	0.044222	0.9608
rs10762046	67714367	0.628918	0.1352
rs10740228	67714637	0.562374	0.1939
rs10822792	67715589	0.452291	0.1348
rs10430507	67715689	0.562987	0.194
rs10430508	67715769	0.562987	0.194
rs10430509	67715789	0.118789	0.1758
rs7907021	67718202	0.69702	0.194
rs7907443	67718516	0.69702	0.194
rs9804181	67719585	0.047612	0.1203
rs9804182	67719635	0.183195	0.2343
rs10740229	67720465	0.464696	0.1939
rs10740230	67720527	0.464696	0.1938
rs10997035	67720539	0.044551	0.1315
rs10762047	67720764	0.464696	0.1937

rs12416001	67720840	0.159822	0.8523
rs10762048	67720950	0.464696	0.1936
rs10740231	67721037	0.464696	0.1935
rs12776817	67721681	0.218553	0.9396
rs10762049	67721828	0.361472	0.1871
rs10997037	67722072	0.000528	0.1292
rs12220215	67722347	0.053354	0.9358
rs7898688	67723357	0.639112	0.6092
rs10822793	67723605	0.048784	0.07346
rs10997040	67723720	0.000528	0.1271
rs10762050	67724031	0.048784	0.1931
rs10822794	67724045	0.000528	0.1262
rs10997041	67724081	0.053354	0.6761
rs10762051	67724488	0.001227	0.1258
rs12357109	67724975	0.013723	0.1153
rs57808710	67725346	0.053354	0.9267
rs10997042	67725533	0.053354	0.9069
rs56358271	67725824	0.261674	0.7615
rs12411324	67726007	0.440881	0.8466
rs10822795	67726668	0.000755	0.02067
rs10740233	67726675	0.060079	0.151
rs1911485	67727027	0.002253	0.06488
rs1911486	67727069	0.000755	0.01402
rs10997044	67727449	0.000755	0.01432
rs4354602	67727871	0.152369	0.1333
rs7920917	67728460	0.06107	0.6661
rs10822797	67729011	0.010505	0.01436
rs10822798	67729214	0.019061	0.01512
rs4381266	67729490	0.240646	0.1103
rs9787469	67729493	0.77445	0.4989
rs7902281	67729710	0.210116	0.0764
rs7902418	67729823	0.018931	0.004396
rs7923305	67730682	0.198889	0.1221
rs10822799	67731210	0.008198	0.02225
rs6480158	67731885	0.198889	0.1337
rs9787470	67732962	0.72531	0.6003
rs10997047	67733305	0.19988	0.3717
rs10997048	67733324	0.004136	0.01418
rs10822800	67734450	0.00323	0.01663
rs7085547	67734600	0.204905	0.1979
rs7101241	67734650	0.211846	0.5832
rs10822801	67735676	0.02129	0.01418
rs12412858	67735735	0.797311	0.972
rs7897609	67735757	0.211846	0.6283
rs4523585	67736409	0.02129	0.01875
rs7077010	67736583	0.211846	0.6272
rs10762052	67736821	0.019061	0.01882
rs10762053	67736862	0.019061	0.0187
rs10733820	67737208	0.019061	0.01732
rs10997051	67737445	0.211846	0.6269
rs10762054	67737575	0.019061	0.01879
rs10822802	67737717	0.019061	0.03389
rs12785119	67738293	0.211846	0.6609
rs12785125	67738303	0.211846	0.6605
rs7922890	67739359	0.083715	0.003008
rs4531353	67739878	0.40675	0.6081
rs1955298	67741043	0.000493	0.119
rs34105606	67741580	0.264574	0.4084

rs4509652	67741619	0.321775	0.7385
rs4370821	67741996	0.311098	0.577
rs4370822	67742090	0.307251	0.5529
rs10762055	67742384	0.000994	0.3305
rs10997054	67742532	0.030109	0.6325
rs10740234	67742607	0.011947	0.173
rs10997055	67743249	0.380154	0.04932
rs4434898	67743387	0.179529	0.006554
rs10822803	67743421	0.616429	0.7132
rs4259733	67743493	0.153721	0.06315
rs11817731	67743812	0.8941	0.9456
rs10822804	67745038	0.260371	0.3875
rs7094708	67745304	0.917848	0.04041
rs10822805	67745745	0.260371	0.3695
rs4447054	67746239	0.475839	0.2072
rs2394206	67746469	0.24311	0.1833
rs9633543	67747298	0.894296	0.0598
rs10997056	67747330	0.260371	0.5981
rs4615911	67747460	0.550886	0.164
rs4620604	67747461	0.616976	0.163
rs10997057	67747770	0.475839	0.2022
rs55708751	67748229	0.028986	0.02458
rs4297361	67748487	0.450054	0.1966
rs5013446	67748676	0.450054	0.1838
rs12415478	67748938	0.696208	0.1682
rs7088181	67749179	0.238657	0.435
rs34378762	67749249	0.894367	0.09831
rs7072330	67749316	0.250986	0.1915
rs6480159	67749354	0.770532	0.3058
rs17511	67749511	0.677349	0.2271
rs10762056	67749843	0.593746	0.07117
rs7916529	67750211	0.099431	0.2556
rs55868838	67750265	0.09408	0.1025
rs59332626	67750636	0.09408	0.1011
rs56382717	67750740	0.09408	0.1011
rs7920730	67751247	0.533211	0.06631
rs12414892	67751424	0.70849	0.1523
rs60721708	67751533	0.706421	0.5521
rs35891270	67752221	0.531732	0.0729
rs10822806	67752397	0.19142	0.4311
rs12416656	67752490	0.595842	0.05367
rs10997062	67752691	0.572819	0.04714
rs10822807	67752906	0.572819	0.04724
rs10822808	67753129	0.572819	0.06404
rs2135732	67754983	0.300509	0.4848
rs16922823	67755168	0.706421	0.2234
rs10822809	67755331	0.709717	0.4888
rs16922827	67755359	0.70849	0.1587
rs16922829	67755493	0.293569	0.06687
rs2174721	67755682	0.939436	0.05311
rs7911836	67756141	0.939436	0.04821
rs7912160	67756597	0.700465	0.8173
rs10822810	67757412	0.830382	0.06114
rs12098465	67757732	0.171283	0.3449
rs10762057	67758354	0.970116	0.9958
rs10762058	67758514	0.630203	0.5541
rs10762059	67758612	0.936657	0.9945
rs10997064	67758777	0.821308	0.2438

rs10997065	67758826	0.189848	0.695
rs10762060	67759247	0.808785	0.2738
rs7918347	67759307	0.250886	0.385
rs7918597	67759516	0.970116	0.959
rs12355570	67760373	0.918321	0.1392
rs7070355	67761103	0.620125	0.1492
rs7086405	67761267	0.317125	0.4613
rs7086774	67761308	0.941208	0.2716
rs7086534	67761316	0.821054	0.1483
rs12413952	67761318	0.876283	0.2429
rs10762061	67761479	0.496898	0.2429
rs12766321	67762025	0.978032	0.3268
rs10822812	67762511	0.563859	0.1388
rs7096924	67763753	0.807215	0.6176
rs7100806	67764340	0.729509	0.3262
rs10733821	67764528	0.961711	0.6171
rs7896705	67765179	0.933395	0.994
rs7913428	67765238	0.490113	0.2418
rs7075798	67765880	0.702995	0.3154
rs4592316	67766225	0.551471	0.9591
rs4746570	67766473	0.755769	0.3596
rs57126226	67766570	0.477822	0.09846
rs10740235	67767288	0.282386	0.8051
rs10762062	67767328	0.246431	0.2986
rs57750876	67767970	0.929919	0.7729
rs4465265	67768692	0.755769	0.4848
rs7099551	67769371	0.702995	0.4825
rs12412358	67769639	0.929919	0.9842
rs6480160	67769763	0.755769	0.4435
rs4281384	67771727	0.049148	0.5079
rs10450294	67772215	0.265352	0.3925
rs10450284	67772339	0.416262	0.3627
rs10740236	67772482	0.333165	0.3337
rs10762063	67772536	0.333165	0.3332
rs10740237	67772711	0.298391	0.9418
rs10740238	67772746	0.438003	0.3339
rs10740239	67772751	0.438003	0.3343
rs10997070	67773246	0.447931	0.3657
rs10997071	67773297	0.447931	0.2401
rs4443960	67773852	0.432588	0.5858
rs9732127	67773926	0.475679	0.7408
rs36012367	67774477	0.749842	0.9352
rs61485770	67774540	0.477822	0.1072
rs56855040	67774542	0.894409	0.6122
rs4288661	67776083	0.346181	0.4076
rs34451190	67776204	0.86013	0.4968
rs4408218	67776810	0.478162	0.3478
rs34000981	67777133	0.749842	0.9724
rs4628574	67777150	0.237065	0.4708
rs4258278	67777354	0.237065	0.5152
rs4264055	67777440	0.414059	0.9299
rs4545429	67777473	0.414059	0.986
rs4418682	67777489	0.414059	0.932
rs4459177	67777502	0.414059	0.9315
rs12415733	67778169	0.804607	0.7694
rs4463744	67778486	0.414059	0.9496
rs4271280	67778853	0.414059	0.9299
rs12762103	67779420	0.285482	0.4003

rs34872438	67780355	0.814425	0.4961
rs2394200	67780428	0.576453	0.3483
rs10822817	67780777	0.414059	0.9088
rs10762064	67780784	0.237065	0.3451
rs10762065	67780883	0.368329	0.912
rs4375337	67782060	0.615401	0.3617
rs4237308	67782489	0.236587	0.3783
rs57645480	67783086	0.428137	0.09268
rs10997073	67783601	0.656338	0.3879
rs10822818	67783742	0.543078	0.6847
rs10997074	67783949	0.543078	0.8884
rs12771621	67783979	0.656338	0.706
rs12573282	67784487	0.543078	0.6829
rs2893986	67785209	0.557726	0.6832
rs10997075	67785457	0.557726	0.6827
rs10822819	67785552	0.582704	0.6824
rs10822820	67785623	0.468972	0.6821
rs34439213	67786291	0.790067	0.423
rs10822822	67786302	0.561593	0.6704
rs10997076	67786444	0.561593	0.6814
rs4309050	67787371	0.27715	0.4139
rs12769894	67787417	0.527971	0.4109
rs7092766	67787508	0.552573	0.6804
rs61867315	67787745	0.505005	0.9655
rs10740240	67787949	0.482948	0.2898
rs10997077	67788329	0.483594	0.4143
rs7920664	67788456	0.666828	0.2869
rs2394203	67788777	0.706844	0.276
rs2394202	67788806	0.242228	0.4242
rs2394201	67788853	0.706844	0.276
rs34364129	67789472	0.490717	0.994
rs10997079	67789705	0.483594	0.7768
rs10997080	67789908	0.86178	0.2943
rs10997081	67790022	0.86178	0.2938
rs10762066	67790054	0.242228	0.3943
rs10997084	67790671	0.71242	0.3163
rs10997085	67790673	0.71242	0.3139
rs4369299	67790861	0.426806	0.8879
rs12784445	67790877	0.498041	0.9853
rs12783343	67790902	0.258492	0.6235
rs10997086	67791066	0.440509	0.3309
rs59621516	67791260	0.750927	0.7472
rs10997087	67791284	0.440509	0.2926
rs10997088	67791488	0.440509	0.2857
rs12784625	67791532	0.314126	0.9805
rs56158177	67791555	0.314126	0.9466
rs56401910	67791556	0.314126	0.9487
rs12785157	67791805	0.356513	0.972
rs10997089	67791919	0.505002	0.3066
rs10997090	67792278	0.243234	0.2708
rs12766936	67792375	0.356513	0.9675
rs10997091	67792477	0.451142	0.5596
rs10997092	67792479	0.451142	0.262
rs4475821	67792650	0.754095	0.2768
rs12775011	67793486	0.32527	0.3643
rs4746571	67794035	0.754095	0.2698
rs10997093	67794616	0.754095	0.2743
rs7897679	67795787	0.754095	0.2679

rs7914106	67795847	0.694081	0.9492
rs4630185	67796422	0.754095	0.2672
rs4465260	67796621	0.256003	0.8011
rs4300297	67796701	0.618624	0.3948
rs61867317	67796722	0.913341	0.9812
rs4259731	67797050	0.754095	0.266
rs3935847	67797223	0.754095	0.247
rs2394205	67797579	0.750755	0.368
rs4387243	67797617	0.718895	0.9465
rs10733822	67798130	0.738046	0.2548
rs61867318	67798200	0.913341	0.956
rs12783543	67798399	0.539302	0.3521
rs10762068	67798620	0.873521	0.2693
rs1948944	67798651	0.367489	0.4424
rs61867319	67798721	0.913341	0.7399
rs6480161	67799313	0.32845	0.66
rs7922816	67799659	0.741603	0.6939
rs7922817	67799661	0.741603	0.6941
rs7908379	67799789	0.456053	0.8708
rs56127430	67799823	0.838369	0.104
rs7895266	67800122	0.850821	0.2738
rs57414918	67800826	0.774767	0.104
rs10997094	67800884	0.850821	0.2743
rs10997095	67800889	0.850821	0.2745
rs10997096	67801191	0.551917	0.392
rs10997097	67802542	0.850821	0.2751
rs10740241	67803127	0.378691	0.1787
rs10822824	67803176	0.378691	0.1789
rs7084947	67803540	0.716771	0.2762
rs10997098	67803912	0.350364	0.3518
rs28429824	67804337	0.738049	0.2414
rs7913481	67804467	0.441113	0.4271
rs4378283	67804815	0.647964	0.9249
rs16922911	67805726	0.770705	0.241
rs59640127	67805938	0.951375	0.1175
rs57227004	67805953	0.571366	0.7473
rs16922912	67805980	0.865761	0.2896
rs2252529	67806006	0.993207	0.2799
rs61867337	67806046	0.972278	0.7968
rs2921934	67806335	0.993207	0.2802
rs16922913	67806455	0.875607	0.2862
rs17261420	67806839	0.310081	0.3906
rs2441718	67806967	0.278078	0.8049
rs4381268	67807506	0.439565	0.2815
rs10509269	67807779	0.346891	0.2358
rs2939946	67807973	0.76375	0.2415
rs2939947	67808364	0.995997	0.2826
rs2921943	67808396	0.959593	0.2825
rs2939948	67808417	0.995997	0.2823
rs16922917	67808578	0.423371	0.2332
rs9414918	67808605	0.959593	0.2765
rs16922919	67808641	0.933757	0.8797
rs9414919	67808728	0.972575	0.2811
rs12761828	67809148	0.887085	0.6934
rs2441719	67809395	0.719163	0.2776
rs16922922	67809556	0.391332	0.1583
rs2421452	67809936	0.732921	0.7169
rs2007116	67810026	0.732921	0.9808

rs2421453	67810071	0.733142	0.2277
rs2007114	67810076	0.733142	0.227
rs7093298	67810633	0.415273	0.7432
rs16922923	67810943	0.967795	0.2283
rs17176679	67811043	0.445715	0.9828
rs2456754	67811654	0.517537	0.2686
rs2456753	67811833	0.548563	0.3294
rs2441720	67812047	0.548563	0.3293
rs2921944	67812099	0.186923	0.969
rs9414922	67812453	0.186923	0.9645
rs9414923	67812501	0.221	0.9638
rs9414924	67812644	0.221	0.9631
rs2456755	67813153	0.295276	0.9592
rs9414925	67813505	0.987793	0.3266
rs9415840	67813638	0.759032	0.5974
rs2456756	67814032	0.548269	0.9553
rs9415842	67815011	0.152328	0.4432
rs4483479	67815082	0.259851	0.9533
rs12785128	67815935	0.954965	0.6916
rs4559574	67816527	0.386765	0.129
rs2441721	67817356	0.94355	0.325
rs56119285	67817462	0.892589	0.1158
rs4426045	67818133	0.088819	0.3865
rs2441722	67818136	0.665596	0.2529
rs55786735	67819168	0.892589	0.1185
rs55782498	67819339	0.892589	0.119
rs59620788	67819722	0.386765	0.1348
rs60048031	67819745	0.406234	0.7583
rs56664086	67819880	0.892589	0.7584
rs2456729	67819898	0.62398	0.2629
rs58495333	67819968	0.99644	0.7587
rs2921933	67820130	0.440085	0.9007
rs2939942	67820257	0.618317	0.359
rs2221571	67820427	0.160068	0.4414
rs12414395	67820502	0.863121	0.2633
rs1911480	67820735	0.863121	0.2635
rs2441725	67820945	0.618317	0.363
rs2441726	67821861	0.42768	0.2646
rs12415185	67822413	0.910317	0.2642
rs1911481	67822751	0.473342	0.3663
rs7893510	67822762	0.910317	0.2646
rs7897082	67822959	0.910317	0.2647
rs12763064	67823196	0.107552	0.7118
rs2456731	67823560	0.160068	0.4415
rs2456732	67823678	0.160068	0.4415
rs2456733	67823877	0.160068	0.441
rs2394207	67824547	0.574607	0.1871
rs10509262	67824837	0.841677	0.2667
rs2456736	67825061	0.160068	0.4409
rs16922947	67825107	0.841677	0.2667
rs2456737	67825340	0.160838	0.9317
rs2456738	67825422	0.160068	0.4404
rs34992774	67825501	0.590453	0.8074
rs2456739	67825591	0.847248	0.3047
rs7086111	67825981	0.310157	0.2668
rs10997103	67826120	0.452093	0.4685
rs1948945	67826502	0.790111	0.2747
rs58585347	67827352	0.279366	0.1363

rs16922955	67827508	0.959331	0.2684
rs16922959	67827600	0.011213	0.2435
rs1911482	67827702	0.708075	0.3213
rs10509263	67827754	0.848997	0.84
rs1911483	67827826	0.091121	0.3389
rs2456740	67828174	0.708075	0.2768
rs10509264	67828260	0.121655	0.9793
rs2441715	67828897	0.235	0.3131
rs2441716	67829153	0.77607	0.9298
rs56287506	67829278	0.191588	0.1226
rs12413110	67829411	0.132004	0.7595
rs2456741	67829658	0.931095	0.2778
rs2456742	67830171	0.986932	0.2814
rs2456743	67830350	0.609267	0.7485
rs2441717	67830432	0.500054	0.1291
rs2921935	67831046	0.724519	0.2709
rs2456744	67832127	0.527366	0.7479
rs2456745	67832216	0.486259	0.8099
rs2456746	67832401	0.529492	0.7488
rs2456747	67832587	0.486259	0.9852
rs2456748	67833023	0.776752	0.755
rs2441751	67833110	0.776752	0.7552
rs2441752	67833362	0.49039	0.3263
rs2456749	67833760	0.776752	0.7541
rs2456750	67834450	0.71369	0.468
rs2441754	67834540	0.481847	0.5408
rs16922995	67834721	0.495517	0.5448
rs2456751	67835059	0.229739	0.3201
rs2441755	67835273	0.094158	0.6345
rs2441756	67835312	0.075836	0.4108
rs7895932	67835597	0.244204	0.6743
rs2456752	67836074	0.220198	0.3466
rs16923011	67836343	0.981652	0.675
rs16923012	67836382	0.981652	0.6746
rs12257722	67836729	0.981652	0.6836
rs1911484	67836897	0.380526	0.6538
rs16923015	67837138	0.981652	0.684
rs16923016	67837160	0.981652	0.684
rs7079889	67837298	0.802981	0.51
rs1955299	67837388	0.383635	0.3137
rs4304652	67838185	0.480201	0.4893
rs10997107	67838558	0.893193	0.6854
rs1911487	67838622	0.480201	0.4881
rs12782380	67838775	0.09536	0.4939
rs1948946	67838960	0.292758	0.7125
rs10509265	67839079	0.889283	0.5012
rs12572342	67839323	0.984168	0.7019
rs12572348	67839429	0.984168	0.702
rs12776959	67839723	0.889283	0.4994
rs4746573	67839913	0.365077	0.5037
rs3858142	67840277	0.469113	0.4021
rs13376967	67840378	0.984168	0.7025
rs13376837	67840557	0.984168	0.7026
rs13376842	67840619	0.984168	0.7029
rs1911488	67840805	0.676939	0.4335
rs7914875	67840953	0.22624	0.5095
rs56138970	67841315	0.544165	0.304
rs55902601	67841423	0.544165	0.3041

rs1911489	67841513	0.544165	0.4232
rs1911490	67841809	0.544165	0.4078
rs1911491	67841919	0.544165	0.4079
rs12251169	67842144	0.402434	0.7038
rs12251548	67842710	0.402434	0.7038
rs7923627	67842893	0.964	0.5094
rs7907157	67843023	0.544165	0.4078
rs12260942	67843219	0.402732	0.7033
rs12261047	67843353	0.402732	0.7031
rs12268035	67843488	0.402732	0.6251
rs12268050	67843536	0.558673	0.5857
rs1995668	67843645	0.545639	0.4074
rs12261314	67843795	0.558673	0.5858
rs12255268	67844003	0.558673	0.5861
rs7072354	67844408	0.464526	0.4032
rs61867353	67844508	0.722239	0.3612
rs7088439	67844556	0.558673	0.5877
rs7088590	67844636	0.464526	0.4032
rs7088844	67844779	0.464526	0.4002
rs2394209	67844883	0.464526	0.4335
rs7092415	67844979	0.417162	0.4044
rs2893987	67844989	0.495205	0.584
rs2394210	67845029	0.417162	0.4035
rs2394211	67845054	0.418838	0.6279
rs2394212	67845176	0.603334	0.5886
rs2394213	67845228	0.516056	0.5887
rs2394214	67845262	0.422923	0.4037
rs4454602	67845417	0.422923	0.4038
rs2394215	67845456	0.422923	0.4038
rs2441714	67845694	0.504621	0.2647
rs7920543	67845859	0.422923	0.3679
rs34143047	67845871	0.722239	0.3292
rs61187082	67845879	0.518546	0.7628
rs6480164	67845912	0.422923	0.4043
rs4116303	67846165	0.422923	0.4025
rs55821101	67846208	0.506587	0.7636
rs6480165	67846221	0.422923	0.4052
rs10997108	67846511	0.506587	0.5904
rs7098029	67846610	0.545639	0.411
rs4746578	67846860	0.545639	0.4112
rs4746579	67846894	0.545639	0.4112
rs4746580	67846899	0.973091	0.5701
rs7086056	67846949	0.545639	0.4115
rs4746581	67847151	0.606765	0.2569
rs4746582	67847334	0.973091	0.5701
rs34923835	67848351	0.545639	0.4065
rs7899122	67848852	0.973091	0.5706
rs7895515	67848879	0.545639	0.4122
rs7910117	67848941	0.508022	0.4121
rs7910651	67849101	0.905239	0.5916
rs4746583	67849578	0.86768	0.571
rs4746584	67849670	0.817574	0.5712
rs4746585	67849719	0.817574	0.5712
rs12255111	67849720	0.984574	0.5487
rs10997109	67849976	0.928979	0.4126
rs35177325	67850116	0.670486	0.5627
rs12256824	67850208	0.959414	0.5923
rs12256773	67850286	0.959414	0.5925

rs12264563	67850312	0.758586	0.3872
rs12256891	67850313	0.83507	0.3872
rs35813003	67850368	0.924514	0.3094
rs11812555	67850379	0.924514	0.3094
rs34178937	67850399	0.924514	0.3094
rs11816343	67850423	0.574788	0.3642
rs12257145	67850749	0.925813	0.4135
rs12774486	67850972	0.782749	0.5716
rs12774506	67851005	0.782749	0.5716
rs4402183	67851402	0.938946	0.7676
rs61867354	67851464	0.836529	0.4945
rs7096789	67851684	0.134245	0.5935
rs6480167	67852220	0.685285	0.2946
rs56227625	67852502	0.784945	0.3646
rs7909738	67852582	0.842456	0.3093
rs61867356	67852640	0.495321	0.3093
rs57084890	67852802	0.809427	0.3093
rs61867358	67852832	0.546831	0.3645
rs35751604	67852954	0.358629	0.5635
rs10822827	67853020	0.818569	0.7532
rs10997113	67853460	0.680111	0.5941
rs61867161	67853850	0.546831	0.3644
rs61867162	67853916	0.546831	0.3643
rs12570846	67853922	0.680111	0.5941
rs34056410	67854199	0.546831	0.5568
rs10997114	67854247	0.818569	0.8537
rs7076973	67854500	0.680111	0.5943
rs7077262	67854697	0.76093	0.4076
rs56410956	67855077	0.675565	0.3642
rs55724402	67855078	0.551468	0.3642
rs12776592	67855224	0.710787	0.4076
rs12777260	67855253	0.616504	0.564
rs12778610	67855390	0.10446	0.4076
rs12778624	67855405	0.641203	0.5441
rs12777012	67855434	0.172191	0.4081
rs12777167	67855464	0.723774	0.506
rs12252714	67855656	0.13673	0.4083
rs4584464	67855659	0.504193	0.8837
rs12778111	67855692	0.508308	0.5641
rs12245834	67855717	0.103109	0.3877
rs12267524	67855830	0.103109	0.4082
rs12783614	67856032	0.393127	0.5448
rs4333909	67856038	0.651904	0.4118
rs4333910	67856116	0.699037	0.5954
rs4451605	67856139	0.878223	0.4082
rs4341425	67856317	0.878223	0.408
rs4592317	67856449	0.868392	0.3375
rs60882168	67856556	0.831635	0.3089
rs7911158	67856695	0.677023	0.5961
rs7896268	67856743	0.875532	0.408
rs7910970	67856857	0.810597	0.408
rs7914340	67856899	0.810597	0.4077
rs4320848	67857301	0.810597	0.408
rs11812580	67857496	0.810597	0.4078
rs55869850	67857521	0.824536	0.7716
rs11814588	67857524	0.810597	0.3085
rs10997115	67857654	0.824536	0.7716
rs4746586	67857680	0.810597	0.3084

rs4746587	67857717	0.559738	0.3625
rs11812640	67857779	0.466753	0.3624
rs4746588	67857992	0.810597	0.4078
rs10997118	67858254	0.824536	0.772
rs10997119	67858274	0.824536	0.772
rs10822830	67858751	0.818015	0.007708
rs7392948	67858950	0.466753	0.9102
rs7392960	67859015	0.810597	0.308
rs7392964	67859059	0.466753	0.7204
rs7393975	67859427	0.450403	0.3079
rs35346298	67860891	0.469247	0.3603
rs12246960	67861051	0.683398	0.007674
rs34247065	67861089	0.158193	0.3585
rs12268554	67861118	0.558554	0.3076
rs35462499	67861188	0.533567	0.3601
rs35213302	67861223	0.742182	0.3557
rs7909457	67861550	0.678134	0.3075
rs12416564	67861581	0.742182	0.3599
rs7909558	67861586	0.522084	0.7764
rs12241195	67862150	0.592667	0.5885
rs7898691	67862221	0.734172	0.3599
rs12241295	67862257	0.63478	0.7769
rs7913571	67862282	0.369851	0.5742
rs7913822	67862332	0.369851	0.3597
rs12241415	67862335	0.554131	0.7769
rs7913940	67862412	0.504116	0.397
rs7913951	67862450	0.504116	0.8329
rs12766513	67862602	0.440346	0.471
rs4469771	67862720	0.460396	0.3074
rs4271281	67862925	0.468028	0.3075
rs4489634	67863075	0.504116	0.3597
rs7478398	67864292	0.4915	0.4147
rs7478419	67864383	0.282278	0.4073
rs2939913	67864405	0.662577	0.1901
rs7476500	67864445	0.250162	0.307
rs7476520	67864553	0.295672	0.3563
rs7476920	67864948	0.30148	0.4073
rs7474793	67864986	0.30148	0.3069
rs4320844	67865477	0.312462	0.3069
rs7912534	67865563	0.497788	0.3589
rs7912695	67865728	0.5007	0.3589
rs6480168	67865860	0.326901	0.3069
rs56239371	67865937	0.538095	0.207
rs12249575	67866124	0.400357	0.7794
rs4341426	67866136	0.326901	0.379
rs12264217	67866249	0.400357	0.7796
rs61867208	67866254	0.5007	0.3586
rs12264327	67866409	0.400357	0.7798
rs12249834	67866488	0.400357	0.78
rs2456661	67866858	0.889887	0.2971
rs10997128	67867402	0.3894	0.3067
rs10822832	67867451	0.3894	0.3067
rs12251943	67867619	0.417218	0.7804
rs11817125	67867779	0.651711	0.3581
rs4746590	67867885	0.651711	0.358
rs34129307	67867969	0.218725	0.355
rs12781320	67868317	0.218725	0.5517
rs6480170	67868451	0.3894	0.4075

rs7909108	67868495	0.417218	0.6035
rs7909006	67868512	0.3894	0.4075
rs4393215	67868769	0.3894	0.4108
rs4522057	67868796	0.3894	0.3578
rs4628575	67868813	0.417218	0.7818
rs4522058	67868851	0.3894	0.3064
rs4603198	67868963	0.417218	0.6043
rs4642967	67869054	0.3894	0.4076
rs7097799	67869225	0.3894	0.4078
rs2456667	67869261	0.520774	0.7837
rs10400123	67869747	0.3894	0.4004
rs2456668	67870105	0.3894	0.4246
rs7068502	67870183	0.3894	0.4077
rs4447055	67870302	0.3894	0.4078
rs28659796	67870367	0.417218	0.6049
rs28664174	67870496	0.417218	0.6051
rs2135701	67870512	0.3894	0.4078
rs2135702	67870562	0.3894	0.4078
rs61867209	67870829	0.673417	0.357
rs2441747	67870992	0.785101	0.3021
rs12256734	67871178	0.3894	0.4078
rs28360742	67871505	0.829482	0.6055
rs4492695	67871549	0.140242	0.5512
rs4271282	67871577	0.3894	0.408
rs12263819	67871647	0.678748	0.6058
rs4603191	67871659	0.3894	0.408
rs2456669	67871675	0.936163	0.7939
rs4269830	67871762	0.6091	0.4084
rs35223778	67872111	0.6091	0.4083
rs35365024	67872139	0.6091	0.4082
rs2102355	67872617	0.561387	0.306
rs2089396	67872662	0.54803	0.306
rs11814953	67872777	0.74628	0.3562
rs11814959	67872829	0.814781	0.3562
rs2089397	67872857	0.786596	0.4892
rs2089398	67872861	0.768453	0.8377
rs11497937	67873991	0.618038	0.3582
rs11497938	67874068	0.663657	0.4825
rs11497939	67874215	0.640955	0.3478
rs9414930	67874233	0.459081	0.6381
rs11497940	67874253	0.64856	0.302
rs11497941	67874396	0.594878	0.7891
rs7092414	67875027	0.577313	0.007636
rs7092678	67875193	0.64856	0.5299
rs10997130	67877506	0.793449	0.347
rs10997132	67877593	0.434946	0.413
rs10997133	67878895	0.874955	0.5498
rs10762069	67878960	0.858382	0.3925
rs10762070	67878964	0.857486	0.3926
rs10762071	67879072	0.968187	0.4102
rs7087155	67879503	0.898883	0.6136
rs7071151	67879613	0.968187	0.4103
rs12765845	67879895	0.942748	0.5603
rs6480171	67879978	0.890001	0.4104
rs1911313	67880095	0.890001	0.4111
rs1911314	67880428	0.570249	0.4111
rs1911315	67880600	0.591423	0.4129
rs10822833	67880697	0.623431	0.6121

rs4746591	67880719	0.14275	0.691
rs2456671	67880736	0.622324	0.2831
rs4746592	67880898	0.79013	0.4136
rs4746593	67880962	0.584062	0.4133
rs12773076	67881146	0.747816	0.5689
rs12774929	67881295	0.747816	0.5634
rs35329815	67881422	0.607869	0.5628
rs4746594	67881496	0.131598	0.4117
rs10997135	67881612	0.128434	0.612
rs7100690	67882017	0.103589	0.411
rs7084917	67882173	0.103589	0.4109
rs7100634	67882231	0.103589	0.4106
rs7100872	67882269	0.103589	0.4102
rs12416534	67882278	0.649043	0.5601
rs12782315	67882472	0.073445	0.4094
rs12572563	67882507	0.280964	0.6523
rs4603199	67882913	0.427771	0.3062
rs7071493	67883088	0.693469	0.5588
rs12415869	67883922	0.956467	0.4079
rs59690812	67884064	0.890333	0.7914
rs57621080	67884149	0.728253	0.7914
rs7901478	67884265	0.645424	0.4065
rs4579830	67884312	0.839686	0.5557
rs61661679	67884392	0.767079	0.7913
rs61171817	67884411	0.767079	0.7912
rs4745898	67884479	0.668924	0.4046
rs56061393	67884573	0.477058	0.7912
rs55710693	67884601	0.767079	0.7912
rs55692435	67884621	0.767079	0.7912
rs4745899	67884682	0.950709	0.5527
rs4237309	67884834	0.706259	0.4031
rs12777558	67884958	0.508604	0.5516
rs12777566	67884976	0.759135	0.4022
rs1911318	67885161	0.280634	0.6114
rs1911319	67885335	0.152319	0.6114
rs1911320	67885358	0.152319	0.6114
rs1911321	67885425	0.769378	0.4004
rs35455889	67885518	0.89645	0.5481
rs59407414	67886198	0.986575	0.791
rs7086879	67886745	0.661939	0.5458
rs58361112	67887127	0.94186	0.791
rs61588725	67887378	0.496343	0.791
rs1911322	67887691	0.60099	0.7211
rs1911323	67887766	0.408217	0.8333
rs1911324	67887829	0.636086	0.668
rs12251519	67887903	0.683849	0.6519
rs11592249	67888398	0.356151	0.7682
rs10997137	67888667	0.683849	0.6519
rs6480174	67888819	0.838954	0.5402
rs10997138	67889071	0.781216	0.6114
rs6480175	67889202	0.806966	0.6649
rs10997139	67889770	0.969032	0.392
rs1911325	67889868	0.419433	0.3914
rs1911326	67889985	0.389272	0.3904
rs10997140	67890414	0.389272	0.3254
rs10997141	67890790	0.266329	0.6116
rs61867238	67890945	0.979099	0.4581
rs10997144	67891243	0.266329	0.6117

rs10997145	67891313	0.266329	0.6117
rs2921945	67891555	0.07713	0.2292
rs12413847	67891571	0.377088	0.3399
rs61867239	67891662	0.859693	0.4495
rs56107882	67891823	0.903257	0.7923
rs16923095	67892065	0.58716	0.297
rs10997148	67892454	0.686163	0.3717
rs12243127	67892882	0.479169	0.6498
rs7917556	67893051	0.786361	0.6288
rs56112527	67893245	0.79319	0.7973
rs7903280	67893455	0.86485	0.3598
rs56826263	67893590	0.667321	0.354
rs12771507	67893595	0.568208	0.4903
rs34010917	67893640	0.899599	0.3299
rs7095004	67893702	0.583798	0.6219
rs7079141	67893739	0.795434	0.4618
rs10822835	67894275	0.466575	0.7645
rs4745900	67894599	0.88244	0.8286
rs2441727	67894892	0.762415	0.1926
rs2456664	67895601	0.997914	0.3
rs1911303	67896186	0.719725	0.3029
rs1911301	67896795	0.084594	0.3034
rs2135700	67898468	0.035199	0.1974
rs2135699	67898565	0.035199	0.1981
rs12413950	67900085	0.736886	0.6885
rs2456665	67901017	0.057326	0.1978
rs1911297	67901829	0.056677	0.1992
rs1911296	67902257	0.181686	0.6601
rs2441729	67903118	0.107052	0.1988
rs2441730	67903283	0.112478	0.1983
rs2921929	67905945	0.230531	0.3433
rs2921930	67905980	0.098237	0.204
rs2456660	67906583	0.094669	0.2039
rs11817581	67907149	0.133212	0.386
rs2441731	67907742	0.771062	0.3407
rs2441733	67908441	0.514855	0.2008
rs2456662	67909550	0.060046	0.2006
rs10997164	67910342	0.934248	0.2796
rs2441735	67910379	0.640544	0.5663
rs2441736	67910652	0.042935	0.1823
rs2456663	67911059	0.08396	0.1332
rs10997168	67911418	0.934248	0.21
rs10822837	67912678	0.776411	0.376
rs2456672	67913368	0.036416	0.6777
rs2441737	67914149	0.462549	0.6998
rs2456673	67914567	0.099135	0.1626
rs1911339	67916270	0.08161	0.6795
rs2441740	67919328	0.08161	0.7806
rs1911340	67921396	0.624309	0.3598
rs4130918	67922473	0.555387	0.4033
rs9415856	67923327	0.08161	0.544
rs10822838	67923660	0.781869	0.2486
rs2441744	67923979	0.08161	0.5426
rs1911341	67924088	0.54457	0.4364
rs2456677	67924703	0.54457	0.44
rs2441745	67924819	0.592509	0.1932
rs2456678	67924834	0.763069	0.205
rs2441746	67924837	0.981292	0.2052

rs2456679	67925031	0.991931	0.4439
rs2456680	67925103	0.659786	0.8529
rs2456681	67925500	0.981292	0.8552
rs2456682	67925573	0.088643	0.9361
rs1911342	67927326	0.82557	0.9759
rs1911343	67927636	0.002933	0.9477
rs2456683	67928394	0.152863	0.7318
rs4617474	67928930	0.819993	0.9038
rs2456684	67929691	0.749474	0.7696
rs17179265	67930312	0.790286	0.9374
rs2441749	67930536	0.949872	0.7097
rs17264446	67931110	0.842166	0.9357
rs55856935	67931381	0.842166	0.7718
rs59341614	67931401	0.842166	0.7724
rs10822839	67932207	0.168552	0.3362
rs10822840	67932243	0.204789	0.3655
rs10822841	67932521	0.0997	0.2948
rs1911344	67932539	0.91229	0.9186
rs2441748	67932577	0.949872	0.7906
rs12764890	67932797	0.949942	0.7288
rs1911345	67933029	0.937753	0.7229
rs10997203	67933353	0.34905	0.02478
rs1911346	67933993	0.937753	0.7959
rs1911347	67934190	0.937753	0.7945
rs1911348	67934316	0.937753	0.7946
rs17179489	67934623	0.937753	0.8389
rs10997204	67934630	0.286863	0.1474
rs17264684	67935403	0.937753	0.7672
rs17179615	67935582	0.937753	0.7954
rs2441734	67936046	0.990076	0.7293
rs999286	67936348	0.935731	0.9402
rs10997206	67936361	0.209382	0.2319
rs1911349	67936430	0.93682	0.7969
rs60269902	67936729	0.503852	0.02413
rs1911350	67936849	0.849531	0.7968
rs11594307	67937004	0.452583	0.7969
rs56666422	67937055	0.452583	0.8894
rs56262229	67937660	0.616215	0.8893
rs4287242	67938010	0.533683	0.7971
rs4606369	67938091	0.475645	0.7915
rs4611094	67938105	0.309522	0.7972
rs4359087	67938271	0.357482	0.7972
rs4611095	67938287	0.357482	0.7974
rs56299411	67938575	0.357482	0.8885
rs55638229	67938589	0.357482	0.8884
rs61869361	67938603	0.168757	0.8351
rs56310027	67938678	0.309522	0.8884
rs55891531	67938800	0.309522	0.8882
rs4746597	67939882	0.533683	0.798
rs12219186	67940169	0.283183	0.4206
rs55790108	67940174	0.533683	0.8875
rs55881146	67940232	0.479189	0.8874
rs7893676	67940638	0.692878	0.2403
rs7067740	67940644	0.617953	0.7986
rs1911352	67941096	0.098142	0.002924
rs59819992	67941272	0.776813	0.887
rs1911353	67941296	0.063228	0.5692
rs12256215	67941321	0.617953	0.7274

rs12248619	67941495	0.617953	0.701
rs61224100	67941510	0.776813	0.8867
rs11597952	67941662	0.776813	0.7011
rs10997207	67941751	0.617953	0.7992
rs12258032	67941865	0.807279	0.2353
rs11596357	67941873	0.776813	0.7993
rs11596358	67941877	0.776813	0.7994
rs10997208	67942163	0.890545	0.2537
rs10997209	67942183	0.497781	0.7995
rs12265118	67942309	0.497781	0.7996
rs10997210	67942381	0.890545	0.2534
rs12250552	67942427	0.497781	0.7997
rs12258360	67942446	0.497781	0.7992
rs12250608	67942456	0.495469	0.7991
rs12265245	67942457	0.495469	0.7982
rs10997211	67942899	0.497781	0.7969
rs10997212	67942909	0.751729	0.4167
rs57916658	67943268	0.713577	0.0237
rs10430465	67943712	0.751729	0.4159
rs12218999	67943809	0.687517	0.2515
rs10430510	67944124	0.544118	0.2513
rs7896205	67944527	0.497781	0.786
rs7911046	67944731	0.497781	0.785
rs7091178	67945109	0.762763	0.08924
rs12766160	67945111	0.402722	0.7857
rs2660040	67945587	0.369039	0.1878
rs2660041	67945603	0.274984	0.1263
rs2660042	67946339	0.621002	0.5459
rs10762073	67946462	0.868343	0.2651
rs2660043	67946942	0.701894	0.1987
rs2631199	67947038	0.677669	0.544
rs10509267	67947835	0.839501	0.2572
rs1911355	67948325	0.451602	0.5402
rs10762074	67948871	0.677669	0.4687
rs10762075	67948977	0.677669	0.4691
rs2631201	67950061	0.727732	0.05492
rs2035602	67950736	0.656402	0.1502
rs4396177	67951043	0.656402	0.1409
rs4548514	67951101	0.656402	0.1505
rs4394727	67951123	0.656402	0.1504
rs7923033	67952512	0.714245	0.1504
rs997225	67952976	0.714245	0.1503
rs2660044	67953241	0.695137	0.5448
rs16923204	67953708	0.781044	0.0003483
rs2939914	67954023	0.904037	0.1213
rs35338318	67954170	0.781044	0.5622
rs2939915	67954648	0.695137	0.4953
rs2939916	67954761	0.904037	0.06066
rs2939917	67954767	0.849295	0.7132
rs2660045	67955531	0.904469	0.09985
rs2631203	67956779	0.879431	0.1221
rs2660046	67957036	0.835873	0.9312
rs7090322	67957765	0.951525	0.0922
rs2660003	67958456	0.799108	0.1182
rs2931266	67959154	0.716122	0.08975
rs2939905	67959162	0.608735	0.4972
rs2631219	67959496	0.612836	0.1317
rs2660002	67959692	0.612836	0.1177

rs1386144	67960076	0.793011	0.1176
rs10997220	67960600	0.482947	0.1757
rs2631217	67962374	0.869483	0.9797
rs2660000	67962609	0.696983	0.3367
rs2659999	67963036	0.568661	0.03614
rs2659998	67963084	0.987912	0.1534
rs2659997	67963349	0.592028	0.03609
rs2659996	67963372	0.592028	0.05222
rs7902417	67963679	0.488727	0.001391
rs2659995	67963700	0.802985	0.1051
rs9663743	67963814	0.488727	0.001397
rs35813695	67963982	0.942864	0.554
rs2660011	67964632	0.601312	0.05284
rs10822842	67965072	0.385171	0.0003721
rs1552410	67965315	0.888912	0.05355
rs2631215	67965692	0.550711	0.06691
rs12765274	67966067	0.816751	0.5529
rs10997222	67966612	0.385171	0.0004183
rs12413328	67967251	0.409515	0.00174
rs1352168	67967563	0.699493	0.06537
rs1352167	67967839	0.699493	0.06206
rs2631214	67968052	0.714559	0.05604
rs10997223	67968418	0.331539	0.0004407
rs10997225	67968806	0.331539	0.0004398
rs2660010	67968850	0.698752	0.05938
rs2660009	67969112	0.441787	0.3392
rs2660007	67969885	0.994661	0.05573
rs2660006	67969901	0.441787	0.3511
rs2631213	67969934	0.994661	0.05434
rs1486525	67970713	0.314643	0.0004265
rs2631212	67971200	0.441787	0.3512
rs10822843	67972095	0.491167	0.9161
rs10997226	67972252	0.792275	0.02672
rs10997227	67972567	0.582175	0.06005
rs2660005	67972844	0.441787	0.3053
rs1911304	67974096	0.441787	0.3514
rs34637609	67974162	0.949174	0.5674
rs35892477	67974280	0.949174	0.5691
rs2660004	67974666	0.582175	0.05906
rs2931265	67975025	0.441787	0.3499
rs2939906	67975033	0.582175	0.05237
rs2939907	67975117	0.441787	0.6021
rs2931264	67975294	0.441787	0.3499
rs2931263	67975456	0.441787	0.35
rs2939908	67975650	0.441787	0.1928
rs2939909	67976298	0.441787	0.3504
rs2631210	67976638	0.441787	0.3504
rs1911291	67976820	0.441787	0.3504
rs1911361	67976917	0.441787	0.3504
rs10997228	67978785	0.301032	0.009342
rs10822844	67978903	0.416308	0.0003001
rs2659986	67978979	0.606766	0.00777
rs4746598	67979174	0.441787	0.3592
rs2659988	67979461	0.441787	0.358
rs2659989	67980199	0.441787	0.3582
rs10997229	67980226	0.225319	0.001791
rs728235	67980591	0.77997	0.009463
rs2939910	67981294	0.441787	0.36

rs2939911	67981482	0.441787	0.3601
rs10997231	67981580	0.77299	0.001582
rs12762077	67983159	0.674032	0.2856
rs7895917	67983644	0.441787	0.3601
rs7912769	67983685	0.441787	0.3598
rs2660027	67984543	0.441787	0.36
rs2660026	67984565	0.441787	0.3602
rs1911312	67984809	0.441787	0.3636
rs963244	67985229	0.311769	0.0004585
rs2660024	67986034	0.647872	0.04992
rs1015486	67986406	0.11182	0.3607
rs1015485	67986422	0.11182	0.3608
rs10997232	67987089	0.290816	0.001762
rs1015484	67987416	0.11182	0.5255
rs10997233	67987821	0.216944	0.6826
rs10997234	67989418	0.128776	0.1308
rs1843666	67990005	0.989907	0.3661
rs2631205	67990332	0.044785	0.5314
rs1486524	67990643	0.043897	0.5327
rs2660020	67991607	0.35622	0.3156
rs2631206	67991624	0.887181	0.3654
rs35348088	67992281	0.942164	0.2615
rs2660019	67993319	0.887181	0.3968
rs991987	67994406	0.446272	0.3858
rs10997235	67994441	0.213148	0.1298
rs12778001	67994676	0.893903	0.6791
rs2631207	67994830	0.446272	0.3908
rs2631208	67995124	0.058109	0.656
rs60424434	67995832	0.127263	0.3043
rs1386142	67995999	0.561298	0.3596
rs1386143	67996030	0.617184	0.3588
rs35789926	67996255	0.93782	#N/A
rs2631209	67996307	0.553801	0.3584
rs7095723	67997019	0.313828	0.4514
rs7077638	67997021	0.313855	0.4615
rs11594859	67998034	0.127263	0.9208
rs1911294	67998490	0.400432	0.3379
rs12779355	67998550	0.247463	0.4623
rs7919283	67998925	0.472662	0.3641
rs7919076	67998942	0.542885	0.4729
rs7919336	67999188	0.472662	0.3599
rs2174712	67999297	0.591731	0.2894
rs10997238	67999650	0.657251	0.1332
rs10997239	67999908	0.680709	0.47
rs12780366	68000048	0.472662	0.3968
rs11595197	68000420	0.549751	0.4282
rs11595237	68000570	0.136366	0.9398
rs11597859	68001384	0.980974	0.2282
rs12248465	68001636	0.702541	0.4751
rs1843668	68001868	0.369528	0.2974
rs1843667	68001986	0.37546	0.7168
rs10822846	68002073	0.104164	0.3668
rs7094712	68002272	0.777705	0.415
rs10822847	68002427	0.195473	0.2856
rs10997241	68002674	0.08638	0.569
rs56927182	68003948	0.621189	0.6946
rs57308908	68004012	0.621189	0.6945
rs55927151	68004409	0.534361	0.6947

rs61867463	68004919	0.534361	0.6946
rs12256594	68005260	0.534361	0.3633
rs12264380	68005272	0.534361	0.3502
rs2840117	68005391	0.315377	0.3702
rs2129280	68005535	0.26443	0.3502
rs61867464	68006002	0.312452	0.7206
rs10997242	68006301	0.913409	0.002991
rs11816835	68006347	0.315377	0.3474
rs11816867	68006630	0.315377	0.3464
rs1911359	68006713	0.315377	0.3461
rs4360589	68006865	0.315377	0.4219
rs4420161	68006945	0.315377	0.3801
rs4525108	68006991	0.315377	0.3798
rs4543881	68007093	0.315377	0.3795
rs12268642	68007407	0.454064	0.3773
rs2631225	68007522	0.540294	0.000324
rs12268762	68007572	0.388425	0.3371
rs12268773	68007641	0.388425	0.3353
rs10997244	68007773	0.388425	0.3362
rs10997245	68007928	0.388425	0.3361
rs61867465	68007951	0.454064	0.666
rs11812295	68008028	0.388425	0.3354
rs57939286	68008089	0.454064	0.6652
rs2659990	68010018	0.566966	0.0002615
rs1072892	68011335	0.285029	0.05596
rs10997248	68011460	0.270571	0.03753
rs1906077	68011865	0.34064	0.0003218
rs12414942	68011891	0.533698	0.003533
rs4390241	68011896	0.423636	0.3823
rs1911309	68012427	0.873948	0.4437
rs1586377	68012614	0.328322	0.05797
rs2631223	68012847	0.420709	0.0005376
rs57152739	68012964	0.754143	0.06194
rs2631222	68012970	0.427582	0.0005382
rs2660016	68013174	0.582448	0.0005372
rs2931267	68013446	0.582448	0.0005627
rs2221565	68013458	0.582448	0.0005362
rs1911310	68013585	0.844738	0.006172
rs10822850	68014187	0.472734	0.007397
rs2631220	68016050	0.076565	0.05868
rs61867495	68016096	0.664335	0.6
rs10997250	68016965	0.270571	0.06605
rs10997251	68017064	0.428535	0.582
rs2221566	68017543	0.082927	0.06329
rs1486528	68019086	0.056272	0.04866
rs1486527	68019381	0.949348	0.3489
rs7912401	68020197	0.434334	0.001905
rs10997252	68020388	0.944358	0.3176
rs4746600	68022177	0.833389	0.316
rs61311885	68023113	0.765838	0.6424
rs12570390	68023382	0.218867	0.04334
rs12572725	68023685	0.218867	0.04338
rs1911338	68023745	0.120349	0.06639
rs12220506	68023902	0.58583	0.004212
rs4746601	68024267	0.748935	0.3086
rs2631200	68024370	0.120483	0.06762
rs60254944	68025472	0.830795	0.5101
rs2605495	68025513	0.120483	0.06711

rs55902702	68025591	0.830795	0.5098
rs1158119	68025972	0.236984	0.00371
rs61462030	68026151	0.926808	0.5095
rs1911336	68026461	0.734512	0.2241
rs10997253	68028343	0.531716	0.0008457
rs1911335	68029367	0.987438	0.3011
rs1911334	68029582	0.888207	0.3005
rs10997256	68030418	0.587313	0.00416
rs10822851	68031414	0.587313	0.004146
rs1911332	68033007	0.323605	0.2495
rs10762077	68033092	0.059434	0.04508
rs2605498	68033127	0.227106	0.000502
rs6480182	68034046	0.587313	0.004123
rs2605499	68034895	0.895321	0.09428
rs2660039	68035252	0.895321	0.06356
rs12248171	68036020	0.587313	0.004137
rs61867497	68036392	0.995736	0.6286
rs61867498	68036876	0.995736	0.6282
rs2605500	68037310	0.984872	0.07412
rs2660038	68037783	0.312551	0.0004534
rs1911331	68039064	0.35481	0.002169
rs2605502	68039065	0.934274	0.2001
rs10762078	68039829	0.081226	0.04655
rs2660035	68040051	0.537562	0.1849
rs11813492	68040073	0.931374	0.2818
rs2660034	68040186	0.934274	0.07668
rs10997259	68040339	0.322624	0.8351
rs7100269	68040503	0.2943	0.1837
rs2394216	68040796	0.294228	0.0004192
rs61867499	68040904	0.924857	0.6345
rs2660031	68042253	0.263606	0.0004028
rs7900938	68042555	0.746331	0.1063
rs2605503	68042627	0.495278	0.5279
rs4746603	68043103	0.779888	0.06929
rs10997260	68043409	0.268289	0.7007
rs1911328	68043812	0.435835	0.7485
rs7909235	68044090	0.588183	0.1752
rs7909166	68044302	0.358099	0.07113
rs7090742	68045673	0.358099	0.06942
rs10822852	68045806	0.967441	0.08304
rs10509270	68046104	0.95737	0.0819
rs1876306	68046869	0.909082	0.6828
rs2605504	68047067	0.909082	0.9471
rs12260229	68047174	0.475433	0.4031
rs11817280	68047533	0.643766	0.6202
rs10822853	68048169	0.748764	0.8471
rs9665640	68049327	0.867428	0.0005296
rs9665647	68049366	0.535646	0.5179
rs2394219	68050116	0.535646	0.05353
rs11595657	68050599	0.553531	0.8507
rs2605505	68050616	0.589561	0.1009
rs2660047	68050661	0.832235	0.8596
rs35786771	68050852	0.233891	0.06175
rs10997263	68052141	0.589561	0.1004
rs9664633	68052538	0.535646	0.1005
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rs10822854	68053547	0.367614	0.1005
rs16923325	68053833	0.213584	0.3851

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rs10822855	68053953	0.33583	0.1003
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rs7914986	68054005	0.866558	0.8122
rs10822858	68054019	0.33583	0.1002
rs4143861	68054110	0.043304	0.158
rs6480186	68055059	0.173033	0.06198
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rs10822859	68055688	0.381409	0.09969
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rs10822861	68055752	0.381409	0.05131
rs10997266	68056591	0.08158	0.09089
rs2394218	68056854	0.08158	0.09092
rs2394217	68056967	0.091728	0.09396
rs4746604	68057796	0.221639	0.08982
rs10997267	68058126	0.300254	0.0666
rs7917448	68058800	0.224565	0.08957
rs12764931	68059190	0.494093	0.8186
rs10997269	68059454	0.275034	0.09246
rs10997270	68059548	0.275034	0.0892
rs10997271	68059582	0.275034	0.08909
rs10997272	68059917	0.339416	0.06417
rs10740242	68060228	0.343755	0.06408
rs7077038	68060356	0.938186	0.8621
rs7077296	68060431	0.938186	0.8625
rs7077544	68060453	0.476192	0.07
rs10762079	68060554	0.343755	0.2247
rs4746605	68060782	0.343755	0.2086
rs4746606	68061108	0.343755	0.1327
rs4745903	68061179	0.343755	0.1325
rs4746607	68061235	0.343755	0.1324
rs2394220	68061643	0.357168	0.1355
rs2394221	68061701	0.357168	0.2071
rs2394222	68061813	0.739509	0.251
rs4269831	68061943	0.419546	0.2065
rs12784066	68062015	0.205037	0.07393
rs10740243	68062092	0.447579	0.4707
rs7086365	68062147	0.394061	0.635
rs7086853	68062222	0.325014	0.5773
rs10997273	68062471	0.205037	0.07314
rs7087050	68062557	0.473952	0.1313
rs7087176	68062594	0.473952	0.1309
rs7087723	68062765	0.346503	0.2185
rs10997274	68062926	0.593805	0.007306
rs6480187	68063268	0.351918	0.1888
rs7091807	68063305	0.21144	0.06732
rs4746608	68063376	0.974931	0.1471
rs4746610	68063439	0.789929	0.2494
rs12258674	68064060	0.773139	0.001716
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rs12780976	68065297	0.713945	0.007551
rs7893164	68065576	0.564523	0.001559
rs7072222	68066289	0.793022	0.02001
rs10997277	68066809	0.373101	0.3142
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rs12218587	68067205	0.830358	0.8654
rs10762080	68067451	0.905407	0.01675
rs7918875	68067854	0.905407	0.01675
rs17274442	68068814	0.306054	0.4406
rs2894007	68068942	0.940247	0.01694
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rs2394258	68069165	0.940247	0.01747
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rs7919098	68069751	0.936415	0.0171
rs2394259	68070033	0.840564	0.06605
rs17274526	68070424	0.976239	0.002908
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rs745451	68071037	0.872852	0.01683
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rs4344385	68073129	0.709132	0.01603
rs4471324	68073195	0.709132	0.01658
rs10762081	68074141	0.579103	0.009894
rs10997283	68074388	0.791347	0.8851
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rs2394262	68075760	0.612914	0.0246
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rs2894011	68077867	0.748421	0.01461
rs2394263	68077956	0.748421	0.01453
rs2394264	68078316	0.748421	0.01441
rs2394265	68078527	0.748421	0.01436
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rs2894013	68078602	0.738447	0.0172
rs7082924	68078894	0.748421	0.01429
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rs7907997	68079516	0.748421	0.01416
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rs4745905	68080681	0.748421	0.01181
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rs4543876	68080943	0.752172	0.01388
rs10822865	68081263	0.748421	0.01378
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rs56263512	68083535	0.511205	0.03584
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rs4746619	68084512	0.711464	0.977
rs2394267	68084795	0.721695	0.01077
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rs2394270	68085541	0.689588	0.01058
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rs1007739	68086704	0.721695	0.01056
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rs2394272	68086965	0.720148	0.01054
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rs7918660	68090519	0.916159	0.01171
rs56778532	68090533	0.461841	0.1089
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rs7906474	68091525	0.871447	0.009303
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rs6480196	68092351	0.963712	0.00919
rs10733824	68092801	0.963712	0.009177
rs10740245	68092805	0.959848	0.00916
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rs4745909	68093340	0.939774	0.009096
rs4746621	68093364	0.939774	0.009068
rs4745910	68093583	0.939774	0.006419
rs4745911	68093585	0.939774	0.006403
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rs2894016	68094396	0.944125	0.008888
rs10509273	68094727	0.519212	0.01102
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rs10740247	68096630	0.92513	0.008571
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rs7901234	68097197	0.92513	0.00852
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rs4143860	68101023	0.442616	0.03906
rs7911942	68101037	0.63758	0.009665
rs7912736	68101610	0.939232	0.0000968
rs2894017	68101887	0.964515	0.00009098
rs2394282	68102018	0.486538	0.02126
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rs2394283	68102217	0.005293	0.9776
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rs2394285	68102254	0.964515	0.00009752
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rs16923387	68104421	0.301161	0.9709
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rs2394286	68104467	0.63758	0.01025
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rs7912799	68104899	0.9613	0.00009626
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rs7913038	68105076	0.751796	0.00005994
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rs2394288	68105945	0.964525	0.00005955
rs10822871	68106174	0.935734	0.00005938
rs12266050	68106693	0.935463	0.00005883
rs12243484	68106802	0.935463	0.00005867
rs10740248	68107070	0.053	0.01056
rs10997294	68107147	0.069734	0.00005864
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rs4746624	68109306	0.087844	0.00005976
rs4746625	68109364	0.087844	0.00006234
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rs4746629	68109740	0.093694	0.00006431
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rs4447056	68111418	0.1043	0.00006517
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rs4428960	68111688	0.1043	0.00006548
rs4495782	68111770	0.1043	0.0000656
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rs4460712	68112017	0.1043	0.00006572
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rs10997297	68112087	0.004235	8.603E-09
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rs2394293	68113199	0.110516	0.00006683
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rs4463746	68114938	0.025322	0.001167
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rs10997302	68115339	0.004578	0.000017
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rs10822874	68116585	0.42881	0.02269
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rs10740255	68117841	0.052866	0.00008782
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rs10822877	68120068	0.022408	3.063E-10
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rs10822878	68120293	0.117229	0.00002324
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rs12355282	68147025	0.745805	0.02302
rs4746633	68147031	0.699487	#N/A
rs4745917	68147075	0.699487	#N/A
rs4746634	68147338	0.329143	0.01461
rs12412158	68147780	0.699487	#N/A
rs34219497	68148069	0.699487	#N/A
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rs12783153	68148520	0.699487	#N/A
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rs748704	68151100	0.164468	0.6971
rs10997359	68151557	0.869752	#N/A
rs10997360	68151563	0.869752	#N/A
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rs10997361	68152460	0.410254	0.02885
rs12772886	68152668	0.869752	#N/A
rs12356854	68152671	0.085535	0.304
rs10997362	68152717	0.869752	#N/A
rs10997364	68153144	0.869752	#N/A
rs10997365	68153172	0.869752	#N/A
rs7908849	68153609	0.121679	0.7165
rs12780649	68153789	0.869752	#N/A
rs12781749	68153836	0.869752	#N/A
rs7912739	68154223	0.089664	0.6533
rs10997366	68154335	0.089664	0.6543
rs10822902	68154594	0.869752	#N/A
rs10997367	68154791	0.106876	0.7321
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rs10822903	68155021	0.084238	0.7357

rs10997368	68155411	0.084238	0.737
rs3998956	68155426	0.215029	0.01572
rs10997369	68155579	0.143861	0.6648
rs58932784	68156125	0.858398	#N/A
rs59425672	68156248	0.858398	#N/A
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rs12252238	68156507	0.028839	3.282E-09
rs16923494	68156508	0.858398	#N/A
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rs7909437	68157242	0.572525	0.001747
rs12254338	68157353	0.014278	5.013E-09
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rs2394302	68157718	0.984922	0.6822
rs2394303	68157884	0.984922	0.6832
rs2394304	68157963	0.984922	0.6841
rs1073477	68158271	0.831701	0.1889
rs1073478	68158347	0.374293	0.8209
rs7914410	68158728	0.335657	0.6949
rs35498856	68158779	0.75203	#N/A
rs34385378	68158782	0.75203	#N/A
rs4746635	68158874	0.335657	0.6989
rs10762095	68159341	0.318047	0.8245
rs61381466	68160490	0.891421	0.00001112
rs12357998	68160556	0.331916	0.7118
rs10762096	68160801	0.481986	0.01313
rs12774061	68160913	0.334243	0.7292
rs10509277	68160982	0.600821	0.5073
rs7903665	68161219	0.138432	0.9291
rs7083773	68162088	0.399671	0.9194
rs10762098	68162666	0.250999	0.7162
rs10762099	68162769	0.519597	0.9953
rs10822905	68163024	0.519597	0.9961
rs10762101	68163087	0.508213	0.9332
rs10997371	68163283	0.250999	0.6377
rs4525110	68163689	0.681895	0.7961
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rs4288663	68164810	0.634738	0.2043
rs4600111	68165147	0.460868	0.9985
rs4628576	68165403	0.460868	0.8282
rs61866044	68165755	0.53353	0.4347
rs7069165	68166075	0.219389	0.9356
rs7069204	68166149	0.018481	0.03143
rs7087253	68166291	0.2361	0.4919
rs4341429	68166848	0.018481	0.03166
rs4341430	68167094	0.128128	0.743
rs10430511	68167464	0.113716	0.8868
rs10822906	68167990	0.317371	0.2333
rs4633340	68168681	0.317371	0.3567
rs4534458	68168738	0.388006	0.5573
rs7092091	68169242	0.018481	0.03152
rs7092601	68169438	0.225896	0.9466
rs7092856	68169565	0.187943	0.9467
rs35032171	68169886	0.62273	0.5228
rs7919968	68170220	0.01818	0.1159
rs34945268	68171221	0.925454	0.9791
rs4604771	68171293	0.233289	0.9114
rs4284307	68171513	0.215245	0.6137
rs4417160	68171660	0.908593	0.302

rs10822907	68171895	0.274395	0.9312
rs4623779	68172360	0.37283	0.5492
rs4310509	68172429	0.37283	0.9316
rs7094812	68172860	0.37283	0.5488
rs10740256	68173258	0.82583	0.5005
rs10762102	68173569	0.37283	0.9322
rs4319399	68174323	0.37283	0.5474
rs12355629	68174493	0.920424	0.2297
rs4433471	68174741	0.37283	0.5465
rs55782235	68175646	0.511245	0.9234
rs55745337	68175861	0.511245	0.9234
rs10822908	68175936	0.021278	0.02427
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rs6480209	68177427	0.532579	0.2942
rs10733826	68179766	0.432338	0.5428
rs12268982	68180377	0.448776	0.5971
rs10997372	68180954	0.256325	0.7732
rs10733827	68181999	0.338461	0.526
rs4274126	68182396	0.733042	0.1801
rs7084231	68183442	0.243018	0.1493
rs35617498	68183444	0.628007	0.1498
rs34889339	68185662	0.628007	0.5564
rs36043252	68188641	0.728497	0.5195
rs35543803	68190093	0.728497	0.5649
rs4311951	68190451	0.593721	0.4347
rs59086739	68191602	0.047004	0.6451
rs7084050	68192426	0.875798	0.2112
rs7088152	68192931	0.807011	0.5097
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rs10762103	68193469	0.807011	0.5083
rs7902271	68194336	0.982762	0.6427
rs4436449	68194741	0.807011	0.5896
rs4483480	68194877	0.235765	0.405
rs4494211	68194973	0.35344	0.472
rs4495783	68195104	0.522156	0.4602
rs4275514	68195200	0.548863	0.6328
rs4359088	68195342	0.548863	0.6326
rs7083123	68195831	0.548863	0.6326
rs10400163	68196906	0.305793	0.6183
rs56996505	68197038	0.057456	0.6744
rs4423081	68197412	0.514128	0.3836
rs4328125	68197491	0.555986	0.4599
rs7899434	68197744	0.555986	0.4402
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rs7899588	68197838	0.158065	0.5083
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rs4332418	68198360	0.838027	0.4596
rs10997375	68198830	0.215997	0.5729
rs60062247	68198960	0.299145	0.2596
rs4512726	68199086	0.633813	0.466
rs4501891	68199094	0.497486	0.4457
rs10822912	68199450	0.497486	0.4593
rs10822913	68199483	0.545697	0.4595
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rs5011814	68199990	0.545697	0.493
rs4554778	68200048	0.545697	0.459
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rs4506528	68200166	0.545697	0.4589
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rs10997377	68200563	0.424475	0.4589
rs7905894	68200694	0.356563	0.4589
rs4304650	68201076	0.356563	0.4588
rs4587627	68201191	0.356563	0.4588
rs4491118	68201266	0.356563	0.4587
rs4531354	68201584	0.063132	0.4587
rs4528203	68201848	0.476572	0.4927
rs4430404	68202016	0.709987	0.08616
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rs7072254	68202226	0.677977	0.432
rs7898284	68202797	0.476572	0.4586
rs10128225	68203314	0.476572	0.4586
rs7077447	68203417	0.476572	0.3946
rs4291568	68204946	0.15117	0.3595
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rs10997380	68212372	0.779222	0.3948
rs12218758	68212412	0.301308	0.5892
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rs4642969	68212913	0.301308	0.7318
rs4428961	68213122	0.301308	0.5886
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rs4477348	68216254	0.724098	0.2687
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rs55738481	68220562	0.21346	0.8336
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rs4509648	68237675	0.40977	0.2626
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rs7350441	68239229	0.665498	0.3908
rs4411189	68239815	0.439738	0.08905
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rs10822919	68240397	0.897344	0.421
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rs6480215	68241128	0.643645	0.2423
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rs4598555	68243522	0.129912	0.7387
rs10997394	68243738	0.831821	0.2303
rs59262910	68244973	0.4545	0.7521
rs4357588	68245284	0.181115	0.6876

rs7085996	68245644	0.763675	0.5422
rs11599789	68245752	0.450391	0.0367
rs12765010	68245955	0.555723	0.1603
rs4626963	68246027	0.336439	0.7867
rs12218365	68246083	0.550056	0.2134
rs4462227	68246174	0.833931	0.5078
rs6480217	68246720	0.563821	0.5416
rs12766194	68246806	0.302133	0.7078
rs6480218	68247023	0.459899	0.1507
rs7095065	68247194	0.667146	0.7522
rs7095347	68247375	0.914104	0.8664
rs4471328	68247434	0.835231	0.2618
rs4636542	68247475	0.790924	0.2616
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rs4130134	68247769	0.790924	0.2604
rs7099760	68248047	0.790924	0.2597
rs4259732	68248191	0.790924	0.2183
rs7100178	68248311	0.790924	0.2595
rs4630183	68248402	0.790924	0.2651
rs7100229	68248571	0.790924	0.2634
rs12251246	68248870	0.473513	0.3866
rs4746638	68248976	0.342382	0.03406
rs61868496	68249580	0.772863	0.3383
rs4517411	68249967	0.453368	0.4042
rs10997396	68249999	0.552634	0.4227
rs6480222	68250507	0.453368	0.4709
rs7084950	68250648	0.363939	0.2813
rs12763505	68251353	0.826519	0.1365
rs12765148	68251465	0.237742	0.03383
rs36107914	68251803	0.237742	0.03369
rs7917531	68252495	0.635541	0.2274
rs4325207	68252582	0.102643	0.4175
rs61435459	68252906	0.256907	0.3048
rs11813343	68252929	0.950646	0.146
rs10997397	68253930	0.060258	0.6408
rs6480223	68255508	0.581994	0.8462
rs7919760	68255922	0.947296	0.3075
rs6480224	68256031	0.661271	0.3803
rs10822921	68256253	0.960136	0.6799
rs7920397	68256446	0.487762	0.3517
rs4300299	68257430	0.087683	0.2654
rs3935965	68257440	0.941578	0.7505
rs4073245	68257564	0.75422	0.003902
rs4314952	68258546	0.880833	0.5947
rs6480225	68259153	0.979399	0.3611
rs7914707	68260412	0.581994	0.7203
rs7898324	68260430	0.895883	0.3095
rs7915138	68260668	0.989441	0.4038
rs10762111	68261688	0.827433	0.1869
rs12260366	68261908	0.330284	0.2051
rs10997400	68262009	0.448394	0.9191
rs12260617	68262316	0.670391	0.8022
rs10997401	68262411	0.843999	0.1831
rs7907221	68262558	0.843999	0.4079
rs4259735	68263343	0.843999	0.2304
rs7911777	68263688	0.88188	0.2486
rs10733830	68263922	0.827433	0.1217

rs10762112	68263997	0.670391	0.9628
rs7916501	68264736	0.670391	0.939
rs12257423	68264801	0.256176	0.5544
rs7904842	68264914	0.241526	0.1585
rs57228391	68265045	0.115339	0.1219
rs59726309	68265261	0.51211	0.9931
rs59122131	68265287	0.51211	0.6882
rs10997402	68265394	0.940293	0.3877
rs4462223	68265657	0.76567	0.2352
rs4518982	68265807	0.76567	0.2348
rs4518983	68266252	0.957535	0.1972
rs4421651	68266435	0.957535	0.2531
rs11591563	68267136	0.549803	0.3928
rs10997403	68267363	0.731844	0.9201
rs7902294	68268285	0.731844	0.9182
rs7902091	68268298	0.731844	0.9155
rs12765156	68268934	0.988514	0.5746
rs55801898	68269198	0.51532	0.09985
rs10997404	68269272	0.912609	0.7894
rs5019668	68270066	0.344448	0.9984
rs7918698	68270227	0.840657	0.2408
rs7919083	68270504	0.691809	0.2569
rs7919437	68270582	0.145671	0.2756
rs4746639	68271118	0.998617	0.3248
rs4486514	68271216	0.870782	0.6296
rs10159480	68272028	0.401308	0.1445
rs12762991	68272065	0.809539	0.218
rs12763021	68272819	0.870782	0.6593
rs56186337	68272829	0.764242	0.8079
rs12764476	68272838	0.766652	0.2165
rs10822923	68273008	0.476858	0.329
rs7093522	68273042	0.780414	0.2322
rs12250080	68273550	0.476858	0.2053
rs12355064	68273574	0.766652	0.2128
rs12355415	68273860	0.855247	0.3099
rs7098228	68274051	0.170024	0.2046
rs9787691	68274604	0.719136	0.2207
rs4592318	68275018	0.897941	0.2104
rs7476697	68275167	0.897941	0.2032
rs12782920	68275259	0.812184	0.6295
rs61866174	68275280	0.897941	0.03606
rs12783345	68275506	0.897941	0.036
rs7909911	68275538	0.203637	0.885
rs12355932	68275546	0.897941	0.03577
rs10128138	68276892	0.275417	0.6332
rs12358134	68276955	0.977598	0.2484
rs10762114	68277048	0.275417	0.6124
rs4237311	68277344	0.755522	0.6414
rs4515865	68277486	0.928299	0.6225
rs4746640	68277701	0.904282	0.5985
rs10762115	68277771	0.63934	0.5526
rs7099285	68278037	0.380414	0.5971
rs7099541	68278126	0.380414	0.5971
rs7083846	68278214	0.522343	0.5971
rs7083972	68278290	0.326626	0.377
rs4518984	68278665	0.013005	0.2733
rs7100391	68278753	0.215391	0.7985
rs7920568	68279409	0.583171	0.6214

rs10822924	68279457	0.583171	0.4304
rs12356847	68279815	0.51886	0.1877
rs10997406	68279951	0.079421	0.1345
rs10997407	68279997	0.079421	0.1144
rs35944058	68280327	0.973245	0.7017
rs10822925	68280366	0.079421	0.1094
rs10822926	68280720	0.079421	0.1137
rs10822927	68280804	0.079421	0.1135
rs10822928	68280816	0.079421	0.1131
rs10466005	68281057	0.404685	0.356
rs10997408	68281109	0.079421	0.1126
rs10466006	68281139	0.013005	0.2724
rs7089207	68281276	0.079421	0.1227
rs7089255	68281499	0.156367	0.1037
rs7073237	68281507	0.156367	0.1035
rs7089274	68281534	0.156367	0.1095
rs34740750	68281646	0.906648	0.1922
rs7089433	68281684	0.183585	0.109
rs12769330	68281875	0.183585	0.1012
rs12770469	68281946	0.183585	0.1085
rs10997411	68282198	0.2105	0.108
rs10997412	68282327	0.191045	0.1072
rs10822929	68282380	0.191045	0.1069
rs10822930	68282731	0.194116	0.1066
rs10822931	68282897	0.194116	0.1063
rs10997413	68283013	0.186579	0.106
rs10997414	68283015	0.186579	0.1057
rs10997415	68283048	0.191632	0.1055
rs7921788	68283357	0.723538	0.2703
rs7921848	68283620	0.101416	0.1045
rs4497282	68283650	0.087336	0.3344
rs7922094	68283754	0.085155	0.1005
rs7907580	68283801	0.083731	0.1005
rs4593895	68284019	0.083731	0.1007
rs10822932	68284309	0.302185	0.2505
rs10997416	68284671	0.103877	0.4622
rs10997417	68284684	0.76826	0.1821
rs10997418	68284773	0.103877	0.463
rs10997419	68284846	0.103877	0.4634
rs4378284	68285283	0.610118	0.9475
rs4255440	68285350	0.740335	0.2534
rs10997420	68285636	0.095392	0.4676
rs10997421	68285760	0.082719	0.4683
rs12767613	68285767	0.580461	0.1606
rs7899720	68285850	0.163077	0.401
rs7903497	68286093	0.163077	0.352
rs4388766	68286423	0.151663	0.1073
rs10997422	68286428	0.119328	0.3524
rs12773698	68286613	0.823105	0.1079
rs12775362	68286696	0.731828	0.1557
rs7904242	68286837	0.728277	0.1093
rs4615913	68287247	0.922783	0.3553
rs7893349	68287314	0.050807	0.3196
rs7893368	68287346	0.708456	0.1111
rs7908371	68287386	0.708456	0.1119
rs61866176	68287485	0.212375	0.04135
rs4478878	68287517	0.838769	0.344
rs10822933	68287567	0.708456	0.0933

rs7908648	68287648	0.708456	0.111
rs4592310	68287702	0.945296	0.6619
rs7893910	68287746	0.708456	0.1066
rs7908546	68287776	0.708456	0.1156
rs6480226	68288275	0.708456	0.1157
rs4614327	68288468	0.72833	0.3519
rs7088900	68288476	0.708456	0.1183
rs7089043	68288594	0.052253	0.04939
rs28690543	68289002	0.050807	0.02615
rs12764856	68289855	0.83559	0.4747
rs11593593	68289864	0.470204	0.2062
rs7898023	68290263	0.592483	0.2988
rs7897807	68290307	0.592483	0.2988
rs4285775	68290578	0.775602	0.3944
rs4409724	68290619	0.721119	0.3007
rs4522059	68290777	0.689641	0.3111
rs7901776	68290990	0.689641	0.3116
rs10997424	68291083	0.826594	0.3376
rs7902209	68291352	0.776074	0.1802
rs7902786	68291703	0.696402	0.4948
rs61641590	68291878	0.303363	0.775
rs4600112	68292132	0.803786	0.4934
rs4636543	68292133	0.803786	0.3851
rs4746643	68292500	0.75178	0.3842
rs4746644	68292516	0.60024	0.2786
rs7100900	68292773	0.489308	0.4052
rs9415863	68292935	0.489308	0.6253
rs9414943	68292998	0.489308	0.4627
rs9415864	68293279	0.684757	0.4639
rs11815828	68293283	0.591344	0.2049
rs1916377	68293342	0.481674	0.1705
rs9414944	68293418	0.688871	0.8422
rs1916378	68293538	0.433983	0.4544
rs59028993	68295091	0.576661	#N/A
rs59629178	68295126	0.576661	#N/A
rs9414945	68295381	0.937312	0.3669
rs9414946	68295581	0.798654	0.323
rs9415865	68295721	0.657576	0.6841
rs9414947	68295935	0.937312	0.3618
rs9414948	68296132	0.657576	0.6836
rs1916384	68296385	0.293534	0.8963
rs9415866	68296574	0.548522	0.9853
rs9299484	68296632	0.210963	0.2406
rs2394307	68296683	0.07887	0.8697
rs7476777	68296705	0.682692	0.84
rs4746645	68296969	0.381326	0.681
rs12764120	68297259	0.094428	0.5814
rs4745919	68297278	0.36061	0.4902
rs11818097	68297398	0.533226	0.5734
rs11818086	68297491	0.876503	0.5557
rs11818138	68297557	0.876503	0.5548
rs12770169	68297978	0.876503	0.4466
rs12769855	68298075	0.876503	0.827
rs7901912	68298086	0.030259	0.6262
rs12770050	68298155	0.876503	0.5484
rs35370998	68298437	0.876503	0.8242
rs12265531	68298565	0.876503	0.5473
rs12241456	68299104	0.030259	0.1455

rs1916386	68299261	0.840629	0.7692
rs1916387	68299268	0.840629	0.9831
rs1916388	68299440	0.840629	0.5064
rs4996086	68299978	0.840629	0.492
rs35945023	68300017	0.505935	0.5263
rs1880048	68300086	0.840629	0.4725
rs12266341	68300530	0.840629	0.5247
rs7918983	68300570	0.047146	0.7718
rs4746646	68300946	0.205281	0.9946
rs9414950	68301300	0.814285	0.3452
rs12779978	68301516	0.876503	0.524
rs9415867	68301604	0.205281	0.4782
rs12781257	68301605	0.106753	0.6902
rs17231483	68301789	0.213853	0.597
rs12262746	68302619	0.083141	0.09935
rs12769481	68303762	0.887258	0.5221
rs9415868	68303777	0.258721	0.4701
rs1344088	68303918	0.340646	0.8688
rs1344089	68304379	0.372945	0.9308
rs1916370	68304589	0.50497	0.7767
rs1916371	68304683	0.564028	0.7541
rs10762116	68304965	0.564028	0.7504
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rs10762118	68305076	0.564028	0.7389
rs58781856	68305181	0.018956	0.5561
rs1916373	68305381	0.790919	0.7837
rs58631764	68305863	0.011629	0.5575
rs6480229	68305973	0.034355	0.9622
rs6480230	68306141	0.047549	0.9626
rs6480231	68306287	0.038149	0.9654
rs6480232	68306315	0.062529	0.9867
rs6480233	68306574	0.023827	0.9875
rs6480234	68306900	0.020064	0.9739
rs6480235	68306986	0.683877	0.4692
rs56321915	68307644	0.011935	0.5832
rs7904145	68307696	0.056935	0.5563
rs1880046	68307817	0.010557	0.9856
rs10997427	68309042	0.004759	0.6282
rs16923649	68309869	0.354123	0.787
rs61520806	68310193	0.354123	0.4315
rs6480236	68310879	0.081073	0.5604
rs4142041	68310957	0.949123	0.8212
rs7897872	68311293	0.113416	0.5358
rs6480237	68313620	0.089992	0.609
rs1916375	68315439	0.016418	0.5867
rs1916376	68315688	0.052354	0.5253
rs16923665	68316478	0.354123	0.8025
rs12259204	68316523	0.043185	0.4938
rs1949735	68317180	0.795668	0.7167
rs12762007	68318102	0.565507	0.489
rs7072319	68318244	0.054153	0.4935
rs10822935	68318753	0.851712	0.7127
rs10822936	68319358	0.896359	0.7595
rs10997431	68320357	0.234275	0.6428
rs10997432	68320360	0.19461	0.6982
rs17231504	68320447	0.083492	0.6837
rs12416402	68320783	0.582242	0.8868
rs12242171	68321919	0.572547	0.3684

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rs12250363	68322528	0.585894	0.3648
rs12775867	68323743	0.489702	0.5626
rs10997434	68324107	0.105758	0.4893
rs7072747	68325211	0.775305	0.9074
rs10997435	68325809	0.589467	0.5962
rs1916381	68326457	0.589467	0.8284
rs1344202	68326458	0.723881	0.1603
rs1916382	68326492	0.589467	0.8283
rs4745920	68326794	0.589467	0.83
rs6480238	68328137	0.392391	0.5664
rs2394312	68328639	0.105758	0.4578
rs7908463	68328992	0.938448	0.8342
rs1925587	68330111	0.706471	0.8413
rs9731371	68330429	0.706471	0.5536
rs7076694	68331693	0.687891	0.5947
rs10997437	68331916	0.828767	0.7854
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rs10740262	68334250	0.097595	0.7993
rs12241627	68334287	0.365301	0.5235
rs12256713	68334831	0.531043	0.8241
rs7903531	68334873	0.757362	0.6256
rs7918371	68335020	0.757362	0.6262
rs7918505	68335130	0.097595	0.4649
rs7904215	68335364	0.94064	0.8536
rs7100328	68336498	0.531043	0.4509
rs10822939	68337079	0.80517	0.977
rs12243122	68338447	0.28937	0.406
rs10822940	68338448	0.926993	0.9973
rs10762119	68338505	0.097595	0.4942
rs10762120	68338633	0.794545	0.4976
rs10997439	68338852	0.3338	0.7853
rs1925584	68339217	0.493555	0.9679
rs9332406	68340205	0.569407	0.951
rs7902684	68340223	0.449238	0.9999
rs7087604	68342246	0.714567	0.4428
rs2182160	68343091	0.828753	0.5065
rs1916383	68344032	0.634572	0.5361
rs28529349	68344055	0.714567	0.4535
rs12775246	68344382	0.71306	0.6758
rs2140379	68344403	0.607044	0.6318
rs999186	68345373	0.596226	0.9609
rs2012171	68346903	0.851226	0.6603
rs1001016	68347044	0.51208	0.5688
rs12769870	68347401	0.333212	0.9865
rs7077924	68347443	0.323769	0.959
rs7094030	68347560	0.54913	0.9595
rs2140380	68348217	0.714567	0.4541
rs10822941	68348489	0.700874	0.958
rs16923756	68349086	0.797575	0.455
rs12773625	68349555	0.290694	0.9053
rs7903000	68349670	0.183295	0.9019
rs1925583	68349950	0.183295	0.9046
rs16923760	68350134	0.520745	0.6723
rs2394314	68350254	0.205197	0.7914
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rs7911919	68351711	0.655424	0.9716

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rs1925581	68352822	0.56039	0.4638
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rs2204245	68362662	0.50908	0.02968
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rs17231553	68364150	0.494984	0.02102
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rs2140384	68366584	0.893293	0.03476
rs10997448	68367396	0.893293	0.03409
rs10822946	68367545	0.328714	0.7076
rs7089854	68367848	0.405098	0.03134
rs7075547	68368035	0.881855	0.03021
rs61866209	68371380	0.242171	0.4016
rs10822947	68372246	0.644087	0.0395
rs10822948	68372263	0.644087	0.03955
rs10997449	68373236	0.644087	0.03962
rs11598787	68373991	0.625787	0.0171
rs7920070	68374060	0.845717	0.03932
rs7916590	68376915	0.57103	0.039
rs10822950	68378181	0.922788	0.03906
rs10762121	68378297	0.075918	0.02482
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rs1925568	68384703	0.206681	0.8357
rs1916389	68385994	0.505987	0.02723
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rs7082378	68387248	0.952821	0.03502
rs12761438	68388053	0.606131	0.3667
rs7085158	68389831	0.674166	0.0346
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rs7901288	68391583	0.099809	0.03334
rs1925562	68392092	0.123428	0.7492
rs7921811	68392261	0.046781	0.02581
rs2177352	68392592	0.036691	0.03333
rs7895022	68393319	0.505987	0.03332
rs10997454	68393441	0.0483	0.03328
rs7910104	68393685	0.94531	0.2527
rs7899256	68394244	0.500885	0.03812
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rs7914157	68394338	0.500885	0.03399
rs10997457	68396835	0.053721	0.03391

rs10997458	68396850	0.645369	0.05267
rs17297362	68397488	0.541842	0.06199
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rs2147883	68404904	0.116113	0.1256
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rs2394318	68410668	0.653715	0.09771
rs753047	68411019	0.96078	0.2963
rs61866216	68411038	0.713153	0.737
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rs733552	68411807	0.535378	0.156
rs942788	68411841	0.687414	0.1425
rs16923867	68412036	0.133892	0.4229
rs6480244	68412402	0.627535	0.6505
rs7092716	68412644	0.250192	0.2438
rs10997468	68412651	0.277198	0.326
rs34231128	68413328	0.250192	0.2459
rs12775004	68413670	0.110937	0.3716
rs4746651	68414390	0.905673	0.1277
rs11597970	68415553	0.350619	0.3644
rs61866224	68415622	0.283237	0.9037
rs35828223	68415765	0.283237	0.761
rs16923871	68415875	0.266731	0.2694
rs10997469	68416291	0.343155	0.2797
rs6480245	68416997	0.594362	0.9515
rs10762123	68417633	0.374198	0.4744
rs2840237	68417697	0.817649	0.3204
rs12254553	68417900	0.266731	0.26
rs10733833	68418477	0.374198	0.4701
rs56408036	68419330	0.536197	0.1913
rs1925607	68419439	0.536197	0.07384
rs12266823	68419878	0.536197	0.07389
rs16923897	68419896	0.276953	0.2345
rs4746652	68420061	0.275501	0.9301
rs1925608	68420418	0.349008	0.9798
rs10997471	68420721	0.305517	0.7891
rs7082306	68420761	0.33779	0.2346
rs8181381	68421551	0.374198	0.4683
rs10740264	68421919	0.454297	0.4654
rs2204243	68422857	0.374198	0.4561
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rs716546	68424595	0.374198	0.4582
rs716547	68424659	0.343155	0.2835
rs7478674	68424842	0.454297	0.4246
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rs1925610	68425183	0.374198	0.4212
rs10822954	68425767	0.343155	0.2568
rs9971243	68426851	0.182157	0.04111
rs1925611	68426924	0.988692	0.6817
rs10997476	68427922	0.057551	0.4612
rs9633546	68427969	0.917122	0.1762
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rs2140372	68428602	0.042882	0.6702
rs61866231	68428669	0.347588	0.06149
rs2140373	68428681	0.042882	0.6707
rs17279006	68428752	0.451643	0.9789
rs2140374	68428856	0.042882	0.6708
rs6480246	68428931	0.415738	0.74
rs7083516	68429526	0.471605	0.755
rs12779109	68429813	0.029234	0.6853
rs10997477	68430725	0.101873	0.3449
rs2204244	68431089	0.101873	0.2974
rs10997478	68431216	0.191329	0.2882
rs1925612	68432089	0.661447	0.3038
rs1925613	68432750	0.590547	0.5872
rs1925614	68432923	0.073895	0.5874
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rs10997480	68434193	0.844118	0.6181
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rs2140375	68435158	0.097281	0.6078
rs2140376	68435516	0.138219	0.6128
rs2140377	68435574	0.138219	0.199
rs1916372	68435692	0.138219	0.6224
rs1925618	68436523	0.096084	0.929
rs10762125	68436589	0.139022	0.2234
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rs1925619	68437441	0.296387	0.6829
rs10762126	68437999	0.139276	0.6795
rs7896690	68439082	0.048471	0.3692
rs4353167	68439532	0.984183	0.798
rs10822957	68439556	0.396421	0.5839
rs1925621	68439603	0.139276	0.7147
rs1925622	68439644	0.308718	0.7162
rs10822958	68441060	0.092828	0.9137
rs10822959	68441092	0.063798	0.7244
rs1925623	68441403	0.027185	0.7262
rs10997482	68441609	0.013676	0.3345
rs12098858	68442478	0.040382	0.7287
rs6480250	68442847	0.08224	0.9335
rs12771360	68444384	0.00146	0.3967
rs11594773	68445013	0.3816	0.7596
rs10997483	68445472	0.423438	0.76
rs7087677	68446343	0.27458	0.9424
rs7087739	68446587	0.263721	0.9336
rs7897274	68446763	0.885682	0.9357
rs7900575	68446911	0.535285	0.7328
rs7900716	68447019	0.639864	0.2786
rs12217378	68447518	0.318103	0.9269
rs4746653	68447667	0.061229	0.1846

rs4745923	68448032	0.885682	0.9361
rs17279293	68448072	0.639864	0.2935
rs10822960	68449642	0.835676	0.7619
rs7081061	68450280	0.418768	0.2604
rs10762127	68450890	0.885682	0.7685
rs10822961	68451085	0.885682	0.9381
rs17279376	68451882	0.590059	0.2635
rs2894024	68452435	0.528728	0.9176
rs2894025	68452535	0.805386	0.9154
rs10822962	68453090	0.797858	0.7218
rs4745924	68454540	0.299643	0.2432
rs17279432	68455217	0.388935	0.2652
rs4484988	68455550	0.49458	0.9442
rs10822963	68455572	0.797858	0.2378
rs10997484	68456470	0.870589	0.7026
rs1886725	68457911	0.820291	0.9464
rs4347275	68458282	0.695237	0.7189
rs17194435	68458303	0.148163	0.6679
rs10822964	68458368	0.785615	0.8241
rs10997485	68458948	0.259581	0.9018
rs7894887	68460075	0.24855	0.9016
rs11814075	68460752	0.957322	0.4482
rs10762128	68461532	0.897425	0.9199
rs10997487	68462256	0.309973	0.9018
rs1925627	68462921	0.427704	0.8635
rs10997489	68463308	0.462822	0.9017
rs1925628	68463747	0.506103	0.9017
rs1925629	68464057	0.556268	0.854
rs2394319	68464762	0.942893	0.9222
rs1925630	68465574	0.35987	0.4019
rs10762129	68466801	0.901155	0.824
rs1925631	68467962	0.991465	0.9577
rs10822965	68468019	0.214495	0.3995
rs942787	68468699	0.927804	0.9622
rs1925632	68469620	0.500294	0.8912
rs1925633	68470011	0.927804	0.9703
rs10997490	68470938	0.167859	0.4028
rs1952060	68472940	0.567755	0.898
rs7072706	68473207	0.178954	0.41
rs12772856	68474417	0.131581	0.3919
rs7911142	68476126	0.33243	0.889
rs7896376	68476231	0.33243	0.8735
rs62906660	68476266	0.040252	0.1719
rs10509278	68476319	0.695863	0.2136
rs10762130	68476643	0.55986	0.8563
rs4746654	68476694	0.498352	0.8578
rs4746655	68476753	0.599236	0.8568
rs17280088	68476804	0.172296	0.2153
rs10762131	68477243	0.476577	0.9985
rs10762132	68477364	0.476577	0.9999
rs10822966	68477496	0.476577	0.9995
rs7096693	68478221	0.369791	0.3979
rs10762133	68479411	0.667352	0.8519
rs7901878	68479748	0.573784	0.3635
rs12775219	68479908	0.681529	0.7577
rs7905097	68479995	0.66968	0.3786
rs1925604	68480394	0.661224	0.1135
rs1925603	68480659	0.719878	0.8379

rs4745925	68480790	0.937848	0.9952
rs12357338	68480951	0.662118	0.832
rs7909959	68481435	0.681878	0.5395
rs1925600	68481464	0.623806	0.8221
rs10762134	68481588	0.624987	0.4409
rs12765189	68482112	0.951411	0.2681
rs3818444	68482294	0.846935	0.8187
rs3818443	68482315	0.374146	0.9937
rs10822967	68482649	0.851861	0.8171
rs1925599	68483092	0.574413	0.8682
rs7904053	68483272	0.574413	0.8207
rs7908101	68483989	0.325261	0.942
rs1925598	68484518	0.70093	0.8182
rs2296418	68484658	0.758722	0.8179
rs1925597	68485549	0.758722	0.7779
rs1925596	68485554	0.758722	0.795
rs1925595	68485632	0.758722	0.7671
rs2764812	68486683	0.478899	0.3869
rs7098801	68487445	0.29173	0.2348
rs2147886	68488649	0.797902	0.8117
rs17195324	68490278	0.750753	0.531
rs1925594	68490458	0.70371	0.8196
rs2394320	68490687	0.532542	0.24
rs1925591	68490888	0.849494	0.9777
rs10822968	68490987	0.849494	0.9776
rs1925590	68491167	0.432169	0.7993
rs1925589	68491313	0.23607	0.7827
rs2182161	68491578	0.440183	0.4
rs1925588	68492141	0.229427	0.8364
rs1925586	68492322	0.209852	0.4176
rs1925585	68492476	0.96247	0.6879
rs1886724	68493514	0.849494	0.9873
rs2764810	68494632	0.208617	0.1802
rs12764110	68494633	0.428839	0.6654
rs2251000	68494777	0.185255	0.8439
rs10509279	68494799	0.371475	0.257
rs1925578	68494953	0.198691	0.3947
rs2764809	68495290	0.214162	0.3865
rs2764808	68495303	0.28953	0.3527
rs2394323	68497020	0.968423	0.5676
rs1925570	68497107	0.206268	0.3972
rs10822969	68497587	0.952159	0.9059
rs10822970	68497800	0.952159	0.9034
rs10997492	68498679	0.952159	0.8784
rs2764807	68498938	0.2783	0.1741
rs2764806	68499308	0.559033	0.3565
rs2147890	68500371	0.421437	0.3741
rs2147889	68500426	0.377569	0.174

Supplemental Table E2. SNPs considered for possible association with expression of CTNNA3. SNPs on chromosome 10 are listed, with their chromosomal position, p-value for association with CTNNA3 expression from ABRIDGE, and the raw meta-analysis p-value from CAMP and CARE. Meta-analysis p-value is from METAL and does not represent results of permutation testing in CAMP.

Supplemental Table E3.

Minor Allele Frequency Chart			Minor Allele Frequencies						
			CAMP		CARE	BioVU		HapMap	
SNP	Minor Allele	Gene	Eur. Anc	Afr. Am	Eur. Anc	Eur. Anc	Afr. Am	Hapmap CEU	HapMap YRI
rs993312	A	SEMA3D	24.20%	16.90%	22.80%	26.40%	18.10%	27%	13%
rs7915695	C	CTNNA3	9.30%	23.40%	10.30%	9.28%	19.80%	9.30%	32%

Supplemental Table E3. Minor Allele Frequencies (MAF) for top two SNPs. MAFs are shown across study populations, and stratified by race. HapMap values are provided as general population reference frequencies.

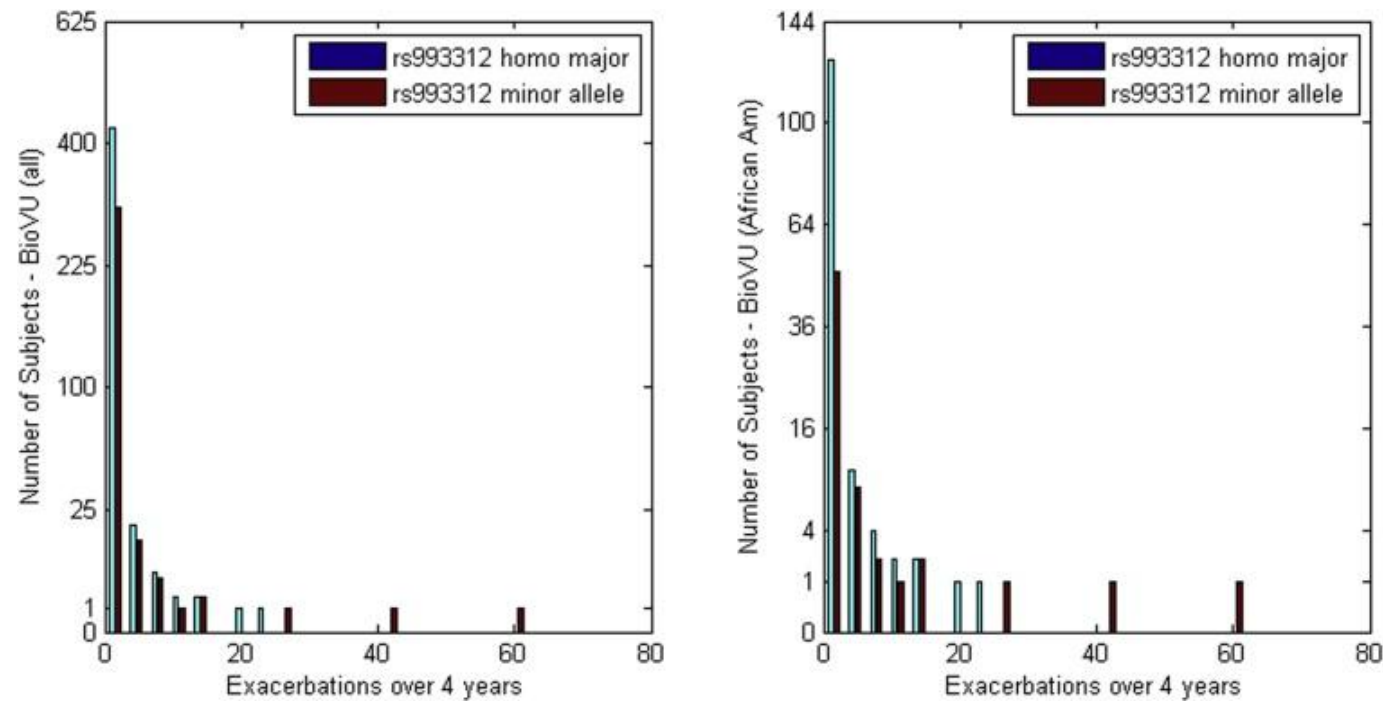


Fig E1

Michael J. McGeachie , Ann C. Wu , Sze Man Tse , George L. Clemmer , Joanne Sordillo , Blanca E. Himes , Jessica ...

***CTNNA3* and *SEMA3D* Promising loci for asthma exacerbation identified through multiple genome-wide association studies**

Journal of Allergy and Clinical Immunology, 2015

<http://dx.doi.org/10.1016/j.jaci.2015.04.039>

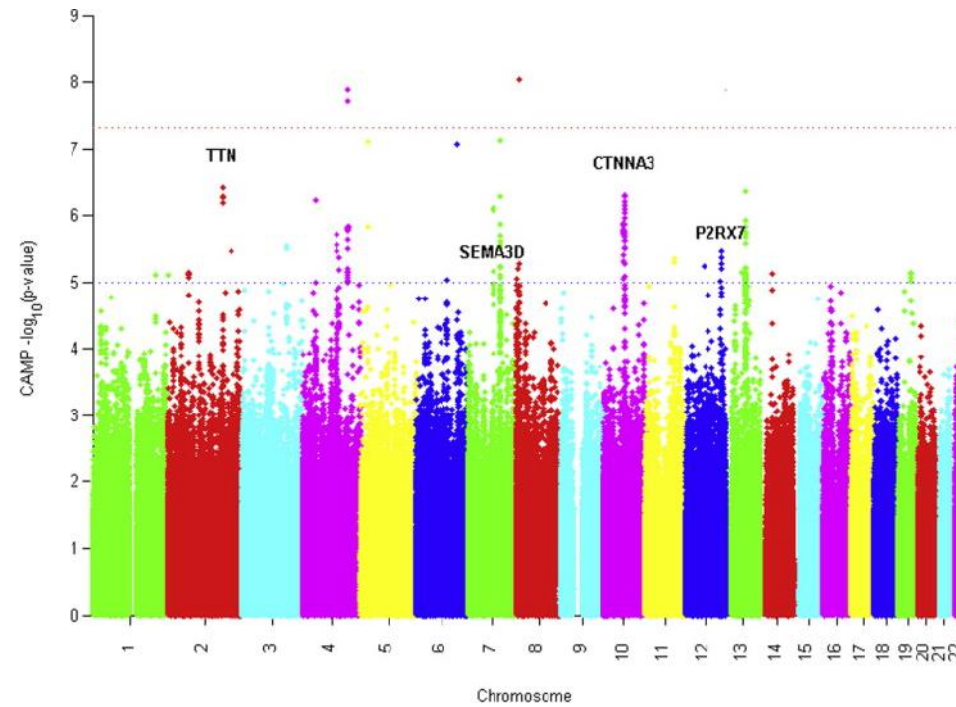


Fig E2

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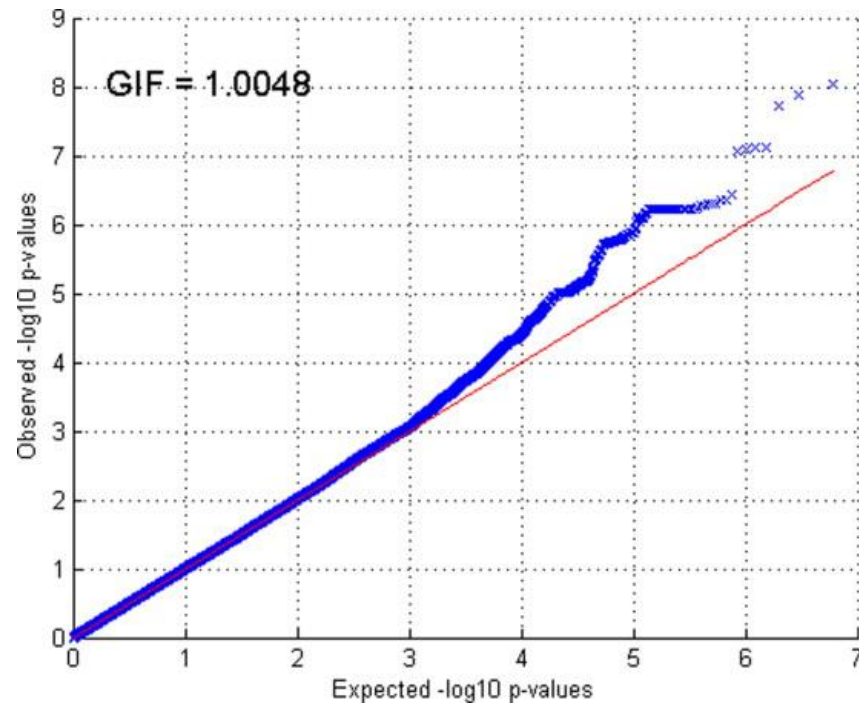


Fig E3

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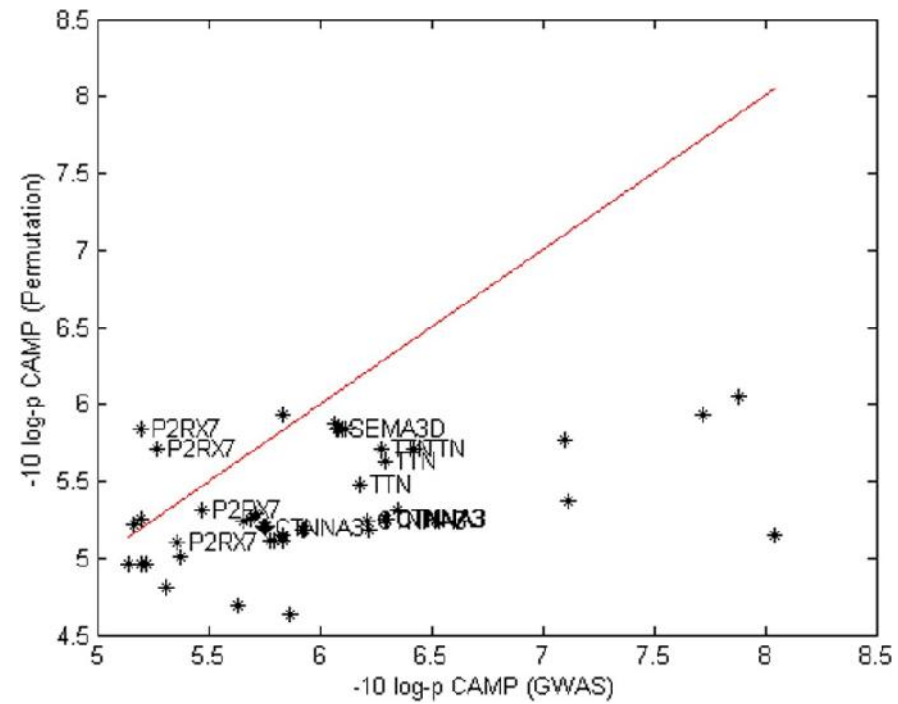


Fig E4

Michael J. McGeachie , Ann C. Wu , Sze Man Tse , George L. Clemmer , Joanne Sordillo , Blanca E. Himes , Jessica ...

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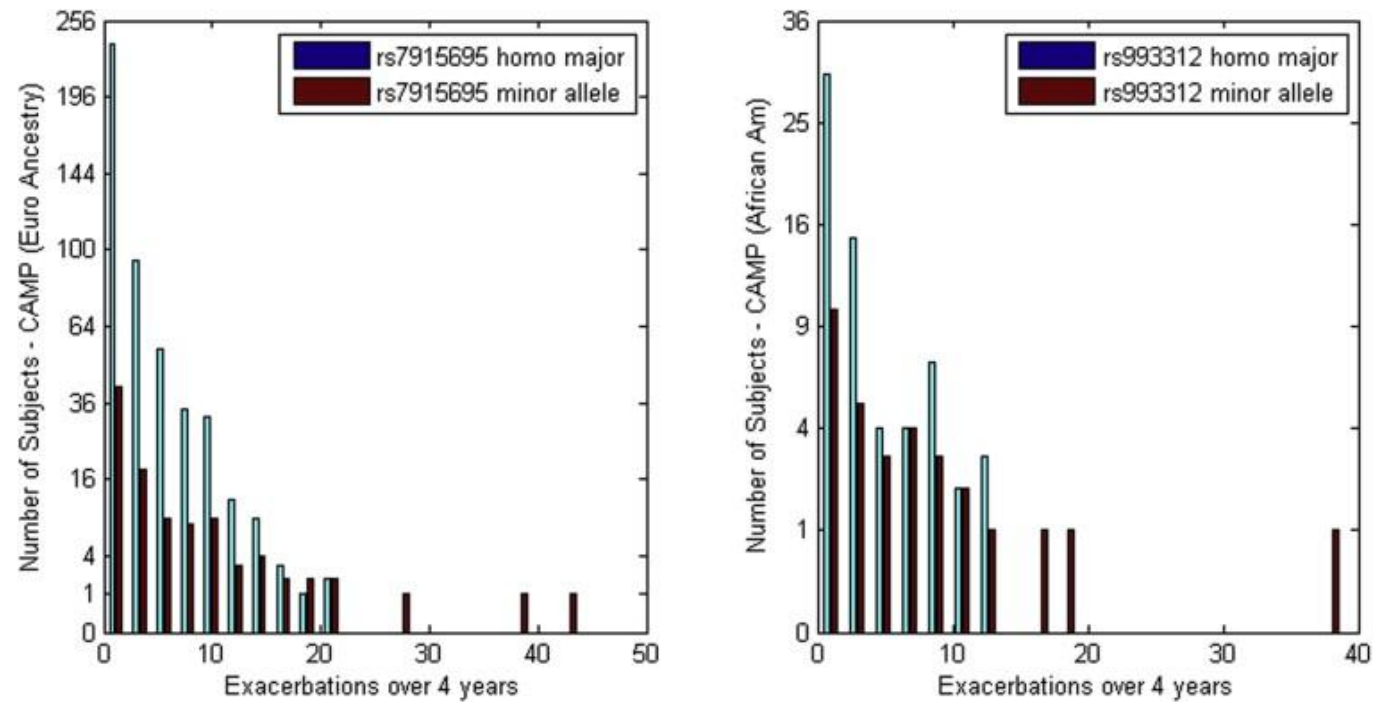


Fig E5

Michael J. McGeachie , Ann C. Wu , Sze Man Tse , George L. Clemmer , Joanne Sordillo , Blanca E. Himes , Jessica ...

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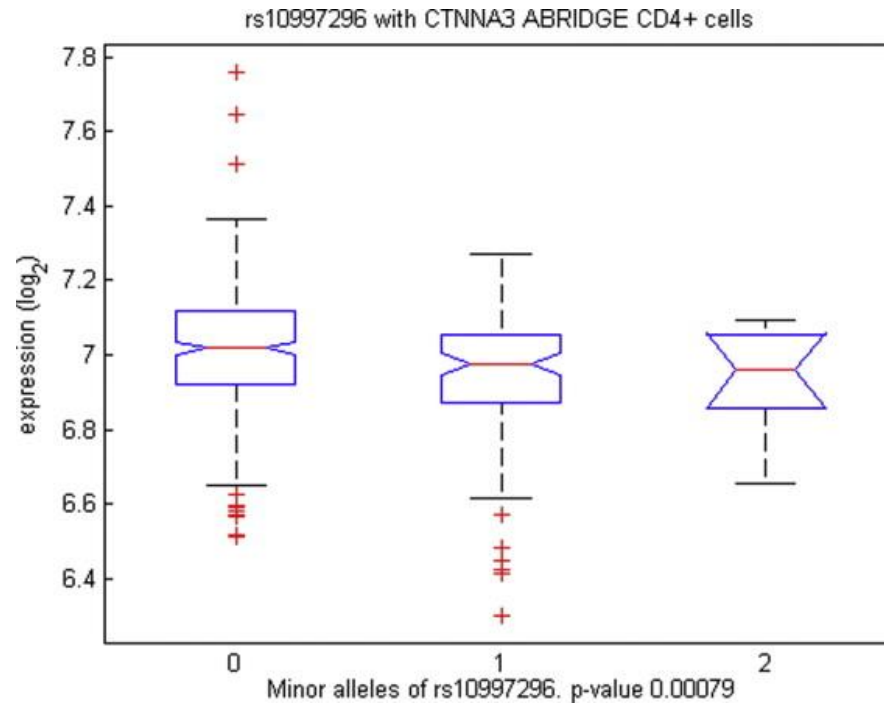


Fig E6

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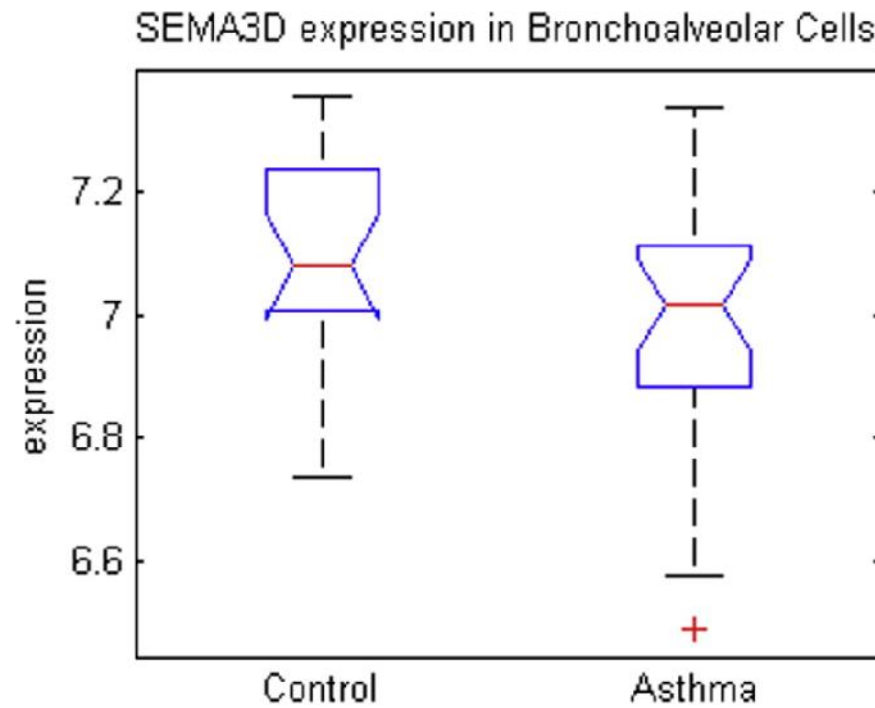


Fig E7

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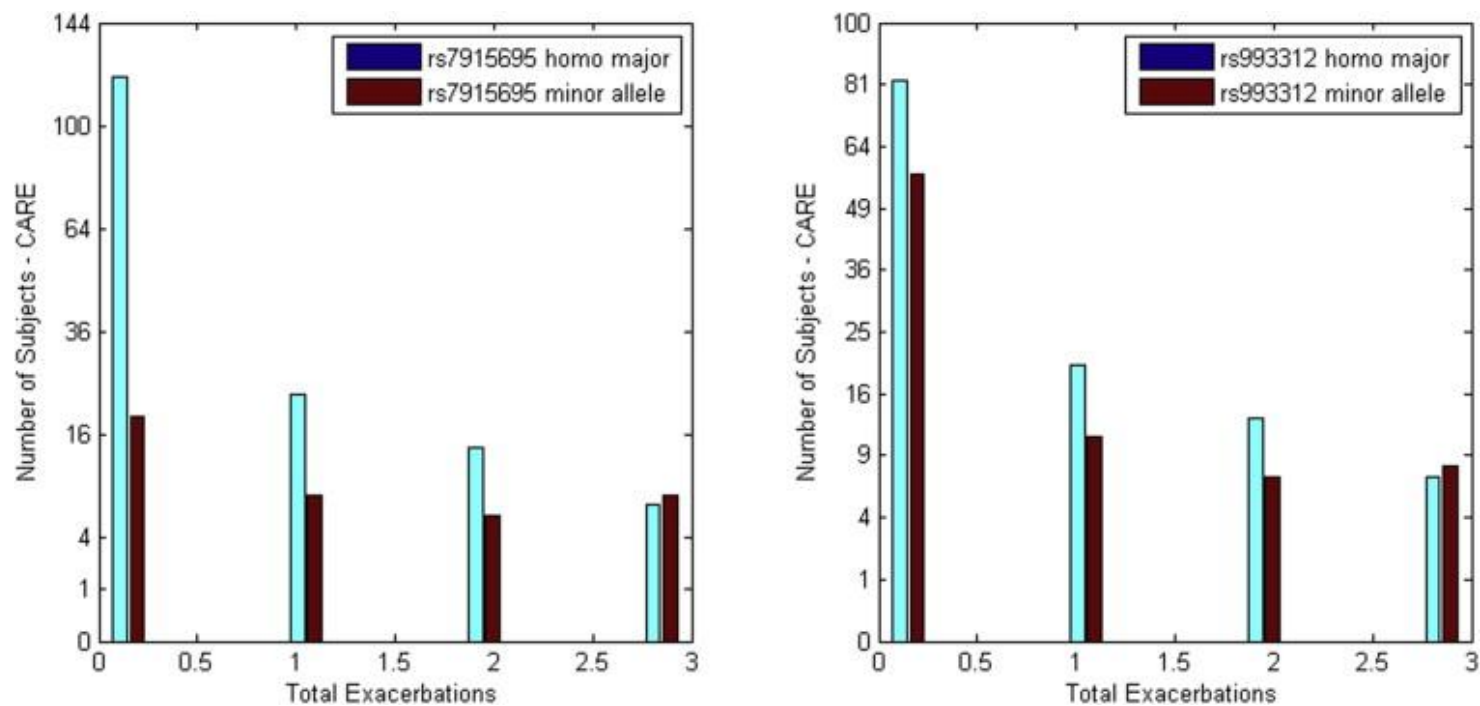


Fig E8

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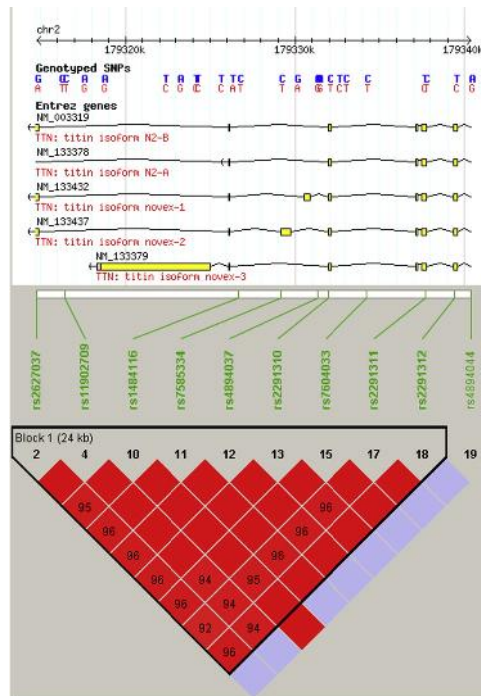


Fig E9

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