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Genetics and Genomics of Longitudinal Lung Function Patterns in Asthmatics

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RUNNING HEAD

Genetics of Patterns of Longitudinal Lung Function

SUBJECT CODE: 1.18 (Asthma Genetics)

WORD COUNT: 4065

AT A GLANCE COMMENTARY

Scientific Knowledge on the Subject. In asthmatics, patterns of lung function growth and decline from early childhood through early adulthood, including reduced growth and early decline may be indicative of future chronic airway obstruction, including development of chronic obstructive pulmonary disease in later life. These patterns may also lead to asthma-chronic obstructive pulmonary disease overlap syndrome, as they identify young asthmatics meeting respiratory criteria for chronic obstructive pulmonary disease. A genetic investigation into these patterns is warranted.

What This Study Adds to the Field. We demonstrate evidence of a genetic effect on abnormal longitudinal lung function; integrating genetic, genomic, and DNA interaction data. Using replication populations, we present suggestive evidence that the minor allele of rs4445257 on chromosome 8 is a risk factor for Early Decline following Normal Growth of lung function, but protective of Early Decline following Reduced Growth.

This article has an online data supplement, which is accessible from this issue's table of content online at www.atsjournals.org

ABSTRACT

Rationale: Patterns of longitudinal lung function growth and decline in childhood asthma have been shown to be important in determining risk for future respiratory ailments including chronic airway obstruction and chronic obstructive pulmonary disease (COPD). **Objectives:** To determine the genetic underpinnings of lung function patterns in childhood asthmatics. **Methods:** We performed a genome-wide association study of 581 non-Hispanic white asthmatics that were previously classified by patterns of lung function growth and decline, (Normal Growth, Normal Growth with Early Decline, Reduced Growth, and Reduced Growth with Early Decline). The strongest association was also measured in two additional cohorts: a small asthma cohort and a large COPD meta-analysis cohort. Interaction between the genomic region encompassing the most strongly associated single nucleotide polymorphism (SNP) and nearby genes was assessed by two chromosomal conformation capture assays. **Measurements and Main Results:** An intergenic SNP (rs4445257) on chromosome 8 was strongly associated with the Normal Growth with Early Decline pattern compared to all other pattern groups ($p=6.7\times10^{-9}$, OR=2.8, 95% CI=2.4–3.4); replication analysis suggested this variant had opposite effects in Normal Growth with Early Decline and Reduced Growth with Early Decline pattern groups. Chromosomal conformation capture experiments indicated a chromatin interaction between rs4445257 and the promoter of the distal *CSMD3* gene. **Conclusions:** Early decline in lung function after normal growth is associated with a genetic polymorphism that may also be protective of early decline in reduced growth groups.

ABSTRACT WORD COUNT: 232

KEY WORDS: CSMD3, Asthma, COPD, asthma-COPD overlap syndrome, longitudinal lung function patterns, GWAS.

INTRODUCTION

The natural history of lung function, measured by forced expiratory volume in one second (FEV_1), in normal individuals is characterized by swift increase in adolescence, a leveling-off or plateauing in early adulthood, and a gradual decline into middle and old age (Figure 1)(1). In individuals with lung disease, including asthma, divergences from the canonical pattern can manifest as reduced growth, early decline, rapid decline, or a combination of these.(2) A pattern of FEV_1 growth and decline characterized by early decline has been associated with smoking and respiratory symptoms,(3, 4) and reduced level of lung function has been associated with increased incidence of later-life chronic obstructive pulmonary disease (COPD).(5)

Apart from the longitudinal patterns of lung growth and decline, reduced FEV_1 is of clinical importance, since this is associated to later chronic airway obstruction (CAO),(6-8) and is associated with increased mortality.(9) Reduced lung function is frequently associated with asthma incidence, including asthma recurrence and recurrent wheeze.(10) Airway function is of particular interest in young asthmatics, a population at risk for CAO.(8, 11-14)

A low level of lung function tends to remain stable during aging.(15) Low FEV_1, relative to a person's age, sex, height, and race/ethnicity, tends to persist and track with growth from infancy or early childhood and into adulthood.(16) Among genetic variants associated with asthma and COPD, some have subsequently been associated with rates of lung function decline among adults,(17) while other single nucleotide polymorphisms (SNPs) associated with reduced maximal lung function in the general population were not associated with decline of FEV_1 in a large meta-analysis.(18) Parallel genome-wide association studies

(GWAS) of lung function in asthmatic and in normal adults found little overlap among their strongest associations.(18, 19)

We have previously investigated the determinants of FEV_1 pattern and natural history of participants of the Childhood Asthma Management Program (CAMP) cohort, who were recruited at ages 5-12 years and followed for up to 18 years.(2) We report here a GWAS of the impact of SNPs on longitudinal lung function growth patterns. Association results were extended to the Dutch Asthma Genetics cohort of young-adult asthmatics. Further association of candidate genetic variants in a COPD GWAS meta-analysis cohort provided generalization of these effects to a later-life low-FEV_1 sample that realized the lung function endpoint projected for childhood asthmatics experiencing premature lung function decline.

Some of the results of this study have been previously reported in the form of an abstract.(20)

METHODS

COHORT METHODS

CAMP was a randomized, placebo-controlled trial of inhaled anti-inflammatory treatments for mild to moderate childhood asthma followed by three phases of observational follow-up; the trial and all follow-up phases included at least annual spirometry.(21, 22) 1041 participants enrolled in the trial between 1993 and 1995 at age 5-12 years; follow-up continued to 2012 when participants were age 22-30.

Pre-bronchodilator FEV_1 values obtained on non-asthmatic subjects in NHANES III(23) adjusted for age, race/ethnicity, gender and height were used to categorize CAMP participants into four patterns of lung function growth and decline: normal growth with a

normal plateau or maximum not yet reached (NG); normal growth with early decline (NG/ED); reduced growth with a normal plateau or maximum not yet reached (RG); and reduced growth with early decline (RG/ED). Normal Growth was defined as a FEV_1 growth curve predominantly above the 25^{th} percentile of NHANES III, while reduced growth was defined as a FEV_1 growth curve below the 25^{th} percentile. The presence of early decline was indicated by a decrease from maximal level earlier than expected per NHANES III normal FEV_1 growth curves. For further details, see McGeachie *et al*.(2)

Of 1041 CAMP participants, 63 were omitted for FEV_1 measures too sparse to classify and 29 were omitted for FEV_1 growth trajectories not matching any pattern. The 949 remaining participants were classified into one of the four patterns. Of these 949, 684 (72%) had at least one FEV_1 measurement at age 23 years or older; these 684 subjects were considered to have high-confidence pattern assignments (Figure 2).

CAMP GWAS

To preserve as many participants as possible for genetic association tests, we performed a GWAS on 581 CAMP White non-Hispanic patients who were successfully genotyped using either the Illumina 550 or Illumina 610 microarrays and had an initial pattern assignment but not necessarily a high-confidence classification. Genotypes were imputed using MaCH(24) to over 8 million SNPs by using phased genotype data from the 1000 Genomes v3 project at the Channing Division of Network Medicine. Genotype data was filtered for quality by limiting investigation to SNPs with a minor allele frequency of at least 0.05 and probability of Hardy-Weinberg equilibrium of at least 0.001. A logistic regression test was used to assess the additive association of each SNP to longitudinal lung

function growth pattern, using each group in turn a holding the other three groups as reference (NG vs. NG/ED + RG + RG/ED; NG/ED vs. NG + RG + RG/ED, RG vs. NG + NG/ED + RG/ED; and RG/ED vs. NG + NG/ED + RG). This resulted four separate GWAS being executed each with 6,116,380 SNPs and 581 total participants in the four FEV_1 category groups, with sex and age at enrollment included as covariates. Examination of ancestry-based principal components and a quantile-quantile plot with and without adjustment showed no evidence of population stratification (Figure E1, genome inflation factor = 0.994; lambda = 1.016); principal components were not adjusted in the final model. For comparison purposes, we also re-ran the GWAS using the intersection of the 581 genotyped CAMP subjects with the 684 high-confidence pattern-assigned CAMP subjects (N = 396), following the above methodology (Figure 2). SNP associations were calculated using PLINK 1.07.(25)

DUTCH ASTHMA GENETICS COHORT

A selection of 114 asthmatics taken from a cohort of 281 Dutch Asthma Genetics participants was used for replication based on longitudinal lung function data availability.(14) This cohort comprised subjects with longitudinal pre-bronchodilator FEV_1 ranging from ages 13 to 44 years. Subjects were chosen that had at least one FEV_1 value prior to the age of 25 years and at least 2 measurements prior to the age of 29 (median (range) 18 (6-40) measurements prior to the age of 29). Longitudinal pre-bronchodilator FEV_1 per subject were smoothed using LOESS splines (SPSS, IBM, version 22). A group of four asthma researchers (MJM, JMV, DSP, STW) classified each subject as either Early Decline (ED), No ED, or unclassifiable. Classifications were initially performed separately

and where discrepant compared to arrive at consensus classifications. This resulted in 91 total asthmatics classified as either ED or No ED. These subjects were then classified as RG or NG by comparison to NHANES III, as above. Genome-wide genotyping was previously available on 83 of the 91 selected asthmatics, from the Illumina 317 and the Illumina 370 Duo chips (Illumina Inc, San Diego, CA); the rs4445257 SNP passed quality control metrics. Complete details have been described previously.(26) Association of rs4445257 to ED was performed using a logistic regression test (SPSS, IBM, version 22).

COPD META-ANALYSIS GWAS

COPD GWAS results from a combined analysis of subjects from the National Emphysema Treatment Trial / Normative Aging Study (NETT/NAS), Norway GenKOLS, Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints (ECLIPSE), and COPDGene studies were used to replicate the association observed in CAMP with early longitudinal lung function decline. Greater detail on this meta-analysis has been reported previously.(27) Briefly, genotyping was performed on a total of 12,337 non-Hispanic white (N=9767) and African American (N=2570) subjects using Illumina platforms (HumanHap 550,Quad 610, or OmniExpress). These data were then imputed to 1000 Genomes Phase 1 v3 reference samples using MaCH(24) and minimac.(28) GWAS was performed separately in each cohort for both moderate to severe COPD (GOLD Grade 2 and above) and severe COPD (GOLD Grade 3 and above) adjusting for age, pack-years of smoking exposure, and principal components of genetic ancestry using PLINK 1.07,(25) and results were combined via fixed-effects meta-analysis using METAL (version 2010-08-01)(29).

GENOMIC VALIDATION

Our most strongly associated GWAS SNP was imputed in the CAMP cohort. We subsequently genotyped rs4445257 in CAMP using a TaqMan assay for allelic discrimination (Applied Biosystems), available as assay C__11868548_10. TaqMan analysis was performed using the QuantStudio 12K Flex Software (v 1.2.2) according to manufacturer's specifications.

Candidate genes from our GWAS analysis were assessed for differential expression in a sample of 366 human fetal lung tissues (post-conception age 54-137 days). Details of our fetal tissue sample collection and RNA isolation have been described previously.(30) Expression was measured using the Affymetrix GeneChip® Human Gene 1.0 ST array (Affymetrix). The complete microarray data are available through the Gene Expression Omnibus (GEO) of the National Center for Biotechnology Information (http://www.ncbi.nlm.nih.gov/geo/, accession number pending). Differential expression across post-conception age during human lung development was assessed by performing linear regression adjusted for gender and intra-uterine smoke exposure status.

Hi-C ANALYSIS OF NON-SMALL CELL LUNG CANCER CELLS NCIH460

Genome-wide chromosome conformation capture (Hi-C) was performed as described below using two biological replicates of NCIH460 cells.(31, 32) Hi-C libraries were sequenced on a Hi-Seq2000 Illumina platform (paired end, 50 bases each). Reads were mapped to the human genome (hg19) using a previously published iterative mapping procedure, and PCR duplicates were removed.(33) Chromatin interaction data were then binned in 40 kb bins, and the data were corrected for intrinsic biases such as mappability and

restriction site density, as described previously.(33) Hi-C interaction maps for biological replicates were highly concordant (Pearson correlation >0.9), and were pooled. Hi-C data were produced as part of the ENCODE project and will be made publicly available according to ENCODE data release standards. The data are also available in GEO (accession number pending).

The combined Hi-C dataset was used to determine the positions of Topologically Associating Domain (TAD) boundaries: contiguous regions where loci display relatively high interactions, separated by boundaries that prevent interactions across them. Hi-C data for chromosome 8 from position 111Mb to 118Mb (hg19 | chr8:111,000,000-118,000,000) were extracted from the genome-wide dataset to identify TAD boundaries in the relevant genomic region. The "insulation" score of each 40 kb bin was calculated by computing the average interaction signal within a square starting at the interaction matrix diagonal and extending 400 kb in each direction (10 bins x 10 bins), as described in more detail.(34, 35) This captured the number of interactions across a given bin. Relative insulation scores were obtained by dividing each insulation score by the average of all insulation scores. Local minima, representing TAD boundaries were then identified by scanning the entire region with a sliding window of size 800 kb and marking the midpoint of the 40 kb bin having the lowest insulation index value as a TAD boundary. Visual comparison of the insulation profile with the Hi-C interaction map confirmed the correct identification of TAD positions.

CIRCULARIZED CHROMATIN CONFORMATION CAPTURE (4C)

A circularized chromatin conformation capture (4C) assay was used to assess the binding of rs4445257 with the promoters of neighboring genes. 4C templates were generated

based on a published protocol with slight modifications.(36, 37) Human bronchial epithelial cells (Beas-2B cell line) were cross-linked with 2% formaldehyde for 10 min at room temperature. After cross-linking, cell nuclei were isolated and DNA was digested with a primary restriction enzyme recognizing a 4-bp restriction site, MboI (NEB, cat. no. R0147). This was followed by proximity ligation. A secondary restriction enzyme digestion was performed with a 4-bp restriction enzyme (NlaIII) (NEB, cat. no. R0125) recognizing a different sequence than the primary enzyme, followed again by proximity ligation. Approximately 100ng template was used for the subsequent PCR reaction, with conditions as follows: 95°C denaturing for 3 minutes and 30 cycles of 95°C for 30 seconds; annealing at 56°C for 30 seconds; and extension at 72°C for 1 minute followed by extension at 72°C for 5 minutes. Primers used in 4C-PCR are listed in Table E1.

RESULTS

We performed a discovery GWAS of each of four longitudinal lung function patterns (one group compared to the other three) in 581 non-Hispanic white CAMP subjects with both complete genotype and phenotype data (Figure 2). Baseline characteristics of this group are shown in Table 1. In the 581, we had 164 (28.2%) classified as Normal Growth (NG), 116 (20.0%) as Early Decline (ED), 155 (26.7%) as Reduced Growth (RG), and 117 (20.1%) as RG with ED; additionally 29 (4.99%) had sparse data or an undeterminable pattern. The group of 581 used in GWAS was not significantly different from the remainder of the CAMP cohort (Table E2), apart from racial homogeneity, and a lower proportion of sparse/undetermined patterns. We have previously conducted a misclassification analysis of

pattern assignment in this cohort, finding that two qualified pulmonologists had high agreement on pattern determination (kappa = .92 and .89, for two replicates).(2) Additionally, this reference includes more details of the baseline and longitudinal differences between pattern groups.

For GWAS statistical significance, we chose a threshold of $p < 1.25 * 10^{-8}$, representing the standard GWAS cutoff of $p < 5 * 10^{-8}$,(38) adjusted for 4 separate GWAS. We found evidence of a strong genetic association for the NG/ED pattern on the long-arm of chromosome 8 (Figure E2), represented by the SNP rs4445257 ($P = 6.7 * 10^{-9}$, Figure 3, Table 2). Each minor allele (G) conferred an odds ratio (OR) of 2.83 [2.35-3.39] of membership in the NG/ED pattern compared with the reference allele (T). Parallel analyses of the other three categories did not result in any genetic signals associated with FEV_1 pattern at the genome-wide significance level ($P = 1.25 * 10^{-8}$). The SNP rs4445257 lies between the *Cub and Sushi multiple domain 3* (*CSMD3*) and *trichorhinophalangeal syndrome I* (*TRPS1*) genes, and has moderate prevalence in populations of European ancestry (minor allele G, frequency 28%; reference allele T). This SNP was imputed from CAMP genotypes with very high confidence (MaCH imputation r^2 value of 0.99). Subsequent direct genotyping of this SNP in CAMP confirmed the imputed association, although attenuated ($P=7.9*10^{-6}$, OR=2.22 [1.86-2.66]), with 26.5 discordant alleles and 10 missing genotypes. A sensitivity analysis using only subjects with the smaller high-confidence phenotypes (N = 396) resulted in less significant associations overall, but rs4445257 nonetheless remained the strongest signal ($P=2.2*10^{-6}$, Figure E3).

We then performed a generalization analysis of our strongest signal in two additional respiratory disease cohorts which display related but distinct lung-function phenotypes. We

first assessed rs4445257 for association with NG/ED in a cohort of 83 Dutch asthmatics. Of Dutch subjects successfully classified into the four lung function patterns, 16 had NG, four had NG/ED, 38 had RG, and 25 RG/ED. Since few subjects had the NG/ED phenotype, we combined NG/ED and RG/ED into one category and observed a nearly significant protective effect for ED of the G minor allele of rs4445257, when compared to the two no-decline groups (P=0.051, OR=0.38 per minor allele). This observed effect was in the opposite direction from our discovery asthma cohort. To further elucidate the role of rs4445257, we tested association with COPD case status (P=0.0487) in a large meta-analysis of COPD cohorts(27) (6633 cases, 5704 controls). The association with COPD was stronger when restricted to patients with severe COPD phenotypes (3497 cases, 5704 controls, P=0.016). Importantly, however, the minor allele was protective of COPD (OR 0.89 [0.84-0.93] and OR 0.91 [0.88-0.95] in severe COPD); again in the opposite direction of effect from our discovery cohort (Table 2).

Since the Dutch Cohort was composed of mostly RG/ED rather than NG/ED, we conducted an interaction analysis of rs4445257 with Reduced Growth in CAMP, as follows. We used joint ED (combining NG/ED and RG/ED) as a phenotype, and using RG as a covariate, using a regression composed like: ED = RG + SNP + RG*SNP (Table 2). We observed significant effects of rs4445257 on ED where minor alleles predisposed to ED ($P=5.6*10^{-6}$, OR=11.5 [6.7-19.8]); of RG on ED ($P=2.8*10^{-4}$, OR=6.4 [3.8-10.7]) where RG predisposed to ED; and also a significant interaction effect of rs4445257 and RG, where minor alleles of the SNP in the presence of RG were protective of ED ($2.7*10^{-4}$, OR=0.27 [0.19-0.39]). This interaction model provided a better fit than the model with just rs4445257 ($P=8.3*10^{-4}$, likelihood ratio test). In stratified analysis within the NG group, rs4445257 was

421 significantly associated with ED (P=1.4*10^{-6}, OR=3.1 [2.4, 3.9]); but within the RG group,
422 rs4445257 was non-significant (P=0.51, OR=0.83 [0.63-1.1]). This evidence shows that
423 rs4445257 may interact with RG in its effect on ED; it may be a risk factor for ED in cases of
424 Normal Growth, but did not have a significant protective effect in cases of Reduced Growth.
425 To identify possible biological mechanisms of rs4445257, we used chromatin
426 experiments to localize its interactions to nearby genes. The SNP rs4445257 is located 633
427 kilobases (Kb) from the nearest gene (*CSMD3*) and over 1.4 megabases (Mb) from the
428 nearest gene in the other direction (*TRPS1*), making direct assignment of a relevant target
429 gene difficult. We applied the Hi-C methodology in the small-cell lung cancer cell line
430 NCIH460 to identify interaction domains (TADs) and their boundaries.(39) Figure 4 shows
431 the Hi-C interaction map of an 8 Mb region surrounding rs4445257. rs4445257 was located
432 in a large TAD (bp 114,440,001 to 115,800,001, chromosome 8, GRCh37.p13), with the
433 *CSMD3* promoter located in the 40 Kb bin that contained the TAD boundary. *TRPS1* was
434 located in a different TAD separated from rs4445257 by a cluster of TAD boundaries. To
435 confirm the interaction of rs4445257 with *CSMD3*, we performed a 4C assay followed by
436 PCR to assess the possible chromatin interaction between rs4445257 and the promoter of
437 *CSMD3* in Beas-2b cells, a bronchial epithelial cell line. Consistent with the Hi-C data, we
438 observed PCR products amplified from primer pairs targeting rs4445257 and the promoter of
439 *CSMD3*, in contrast to pairs targeting rs4445257 and the *TRPS1* promoter (Figure E4). This
440 indicates that chromatin arrangement brings rs4445257 in contact with the *CSMD3* promoter,
441 enabling a possible molecular interaction between the two loci. Together, these physical
442 interaction results strongly implicated *CSMD3* as the relevant target gene of rs4445257.
443 The public GTEx project database indicated significant evidence that rs4445257 is an

444 eQTL for *CSMD3* in nerve tissue (P=0.009).(40) In a sample of bronchial epithelial cells
445 from 45 asthmatics from the ABRIDGE cohort (cite), a neighboring SNP, rs73706006, in
446 high LD with rs4445257 (r^2 >= .99) showed significant association with the expression of
447 *CSMD3* (P=0.0004, Figure E5). In both GTEx and ABRIDGE, minor alleles were associated
448 with a decrease in expression.

449 The fact that at least reduced lung function trajectories appear to be set early in
450 life(16) suggests a possible developmental role for *CSMD3*. Therefore, we investigated the
451 role of the *CSMD3* gene in human lung development using genome-wide gene expression
452 profiles available from 366 human fetal lung tissue samples.(30) *CSMD3* demonstrated lower
453 expression as post-conception age of the sample was higher (P=0.007), indicating a potential
454 role in lung programming that manifests later in life, or a gene with multiple separate effects
455 in the lung.

456 To determine if previous SNP and gene associations with asthma and/or lung function
457 related phenotypes were also associated with longitudinal lung function patterns, we
458 performed a look up of known SNPs in our GWAS results (Tables E4, E5, E6, and E7). Of
459 484 identified SNPs, 436 were assayed or imputed in our CAMP cohort. For each of these,
460 we report the association strength with Normal Growth (Table E4), NG/ED (Table E5), RG
461 (Table E6), and RG/ED (Table E7). None of these SNPs reached statistical significance after
462 multiple testing correction for 436 tests.

463

464 DISCUSSION

465 Finding genetic associations to abnormal longitudinal lung function patterns may help
466 to identify patients at risk for chronic airway obstruction and the genetic effects that

467 influence airway disease. The SNP rs4445257 was associated with early lung function
468 decline in two asthma cohorts, and also associated with COPD. In a model including RG and
469 an interaction term, there was a positive effect of interaction, suggesting that this SNP may
470 operate differently in cohorts with reduced growth before reaching lung function plateau in
471 early adulthood, and with normal growth with normal lung function plateau. While false
472 positive associations may explain our observed results, we hypothesize that rs4445257 minor
473 alleles are protective of early lung function decline in the presence of reduced lung function
474 growth, while being a risk factor for early decline in the presence of normal lung function
475 growth. Thus, this SNP may interact with an unknown genomic or environmental factor that
476 correlates with maximally-attained FEV_1 (*i.e.,* RG vs. NG), which would also account for the
477 allele's observed interaction effect with RG on ED in the CAMP cohort.(41) The interaction
478 of two genomic loci (our rs4445257 locus and another, unknown locus associated with RG)
479 is perhaps likely in light of the polygenic and pleiotropic genomic architecture of complex
480 diseases and traits.(42) While longitudinal data would be required to make a definitive
481 assessment, it is possible the COPD cohort is one where the RG phenotype dominates;
482 similar to the cohorts discussed by Lange *et al.*(5) The complex genetic relationship
483 uncovered here parallels the complex phenotypic development that characterizes mild and
484 moderate persistent asthma from childhood into adulthood. That other SNPs previously
485 associated with asthma and lung-function related phenotypes were not associated with
486 longitudinal lung function patterns may indicate that the conditions have separate genetic
487 etiologies, and that longitudinal phenotypes are different from cross-sectional ones.

488 The SNP rs4445257 was part of a major locus of high association with the NG/ED
489 category (Figure 3); a locus between *CSMD3* and *TRPS1* and functionally linked to *CSMD3*

through Hi-C and 4C experiments. Together, these results suggested potential regulation of the expression of *CSMD3* by a narrow region containing rs4445257. This region contains several SNPs in high LD with rs4445257, including rs73706006 4kbps away (Figure 3). More research would be required to determine if other variants in this region effect *CSMD3* expression.

The *CSMD3* gene has not previously been associated with conditions related to lung function or to respiratory diseases, such as asthma or COPD. *CSMD3* encodes a transmembrane protein that is primarily expressed in the brain, nervous tissue, and testis, (UniGene(43), GTEx(40)), although *CSMD3* expression has also been observed in lung tissue (Illumina Body Map,(44) Human Protein Atlas(45)). Although its biological function is unclear,(46) CSMD3 encodes a protein structurally similar to that of *CSMD1*, which itself has been implicated in asthma-COPD overlap syndrome.(47) In lung carcinomas, mutations in *CSMD3* were found (48) and suppression of *CSMD3* in airway epithelial cells resulted in increased proliferation of those cells in culture.(48)

Gene-expression pathway analysis of brain tissue has implicated *CSMD3* in *gamma*-aminobutyric acid (GABA)-ergic neuronal fate and neuronal development.(46) GABA signaling is primarily responsible for maintenance of muscle tone,(49) including airway smooth muscle tone.(50, 51) There is growing evidence that airway smooth muscle tone is a predisposing factor for airway hyper-responsiveness,(52, 53) and may contribute to reduced pre-bronchodilator lung volume in asthmatics.(54) It is possible that rs4445257 influences *CSMD3* expression to affect airway epithelial proliferation and related epithelial integrity and/or airway smooth muscle tone – either of which predisposes for asthma, asthma exacerbations, and lower lung function; however, further investigation is needed to address

513 such possibilities.

514 The present study has several limitations. Our best interpretation of our results lead to
515 an unusual mixed effect of rs4445257 on early decline of FEV_1, where it appears to
516 predispose to ED in the presence of NG but be protective for early decline in the presence of
517 RG. Larger sample sizes would be helpful in evaluating this effect further, as would
518 additional cohorts with detailed longitudinal lung function measured throughout adolescence
519 and young adulthood; although samples meeting these criteria are difficult to obtain. The
520 COPD generalization cohort, while large, does not contain longitudinal pulmonary function
521 assessments over extended time periods, and as such we cannot accurately assess lung
522 function patterns in that group. Therefore we are unable to determine if this population is
523 predominantly a cohort of RG, as would be consistent with our hypothesis, or of ED, or of
524 rapid decline, and this or a combination of these patterns resulted in COPD. Finally, our
525 chromatin studies have demonstrated that the action of rs4445257 on *CSMD3*'s promoter is
526 likely, and some evidence of association to *CSMD3* expression was found in GTEx data, but
527 further work would be required to verify this and determine what exact variant is the
528 functional variant.

529 Early decline of FEV_1 after normal growth is potentially associated with a genetic
530 polymorphism (rs4445257) that may be protective of early decline in reduced growth groups.
531 This SNP physically interacts with the *CSMD3* promoter *in vitro*, and is associated with
532 expression of the *CSMD3* gene.

533

References

1. Speizer FE, Tager IB. Epidemiology of chronic mucus hypersecretion and obstructive airways disease. *Epidemiologic reviews* 1979; 1: 124-142.
2. McGeachie MJ, Yates KP, Zhou X, Guo F, Sternberg AL, Van Natta ML, Wise RA, Szefler SJ, Sharma S, Kho AT, Cho MH, Croteau-Chonka DC, Castaldi PJ, Jain G, Sanyal A, Zhan Y, Lajoie BR, Dekker J, Stamatoyannopoulos J, Covar RA, Zeiger RS, Adkinson NF, Williams PV, Kelly HW, Grasemann H, Vonk JM, Koppelman GH, Postma DS, Raby BA, Houston I, Lu Q, Fuhlbrigge AL, Tantisira KG, Silverman EK, Tonascia J, Weiss ST, Strunk RC, Group CR. Patterns of Growth and Decline in Lung Function in Persistent Childhood Asthma. *N Engl J Med* 2016; 374: 1842-1852.
3. Tager IB, Segal MR, Speizer FE, Weiss ST. The natural history of forced expiratory volumes. Effect of cigarette smoking and respiratory symptoms. *Am Rev Respir Dis* 1988; 138: 837-849.
4. Wang X, Mensinga TT, Schouten JP, Rijcken B, Weiss ST. Determinants of maximally attained level of pulmonary function. *Am J Respir Crit Care Med* 2004; 169: 941-949.
5. Lange P, Celli B, Agusti A, Boje Jensen G, Divo M, Faner R, Guerra S, Marott JL, Martinez FD, Martinez-Camblor P, Meek P, Owen CA, Petersen H, Pinto-Plata V, Schnohr P, Sood A, Soriano JB, Tesfaigzi Y, Vestbo J. Lung-Function Trajectories Leading to Chronic Obstructive Pulmonary Disease. *N Engl J Med* 2015; 373: 111-122.
6. Weiss S, Speizer F. Epidemiology and natural history. 1997.
7. Fletcher C. The natural history of chronic bronchitis and emphysema: An eight-year study of early chronic obstructive lung disease in working men in London. New York: Oxford University Press; 1976.
8. Vonk JM, Jongepier H, Panhuysen CI, Schouten JP, Bleecker ER, Postma DS. Risk factors associated with the presence of irreversible airflow limitation and reduced transfer coefficient in patients with asthma after 26 years of follow up. *Thorax* 2003; 58: 322-327.
9. Young RP, Hopkins R, Eaton TE. Forced expiratory volume in one second: not just a lung function test but a marker of premature death from all causes. *The European respiratory journal* 2007; 30: 616-622.
10. Sears MR, Greene JM, Willan AR, Wiecek EM, Taylor DR, Flannery EM, Cowan JO, Herbison GP, Silva PA, Poulton R. A longitudinal, population-based, cohort study of childhood asthma followed to adulthood. *The New England journal of medicine* 2003; 349: 1414-1422.
11. Ulrik CS. Outcome of asthma: longitudinal changes in lung function. *Eur Respir J* 1999; 13: 904-918.
12. Jamrozik E, Knuiman MW, James A, Divitini M, Musk AW. Risk factors for adult-onset asthma: a 14-year longitudinal study. *Respirology* 2009; 14: 814-821.
13. Svanes C, Sunyer J, Plana E, Dharmage S, Heinrich J, Jarvis D, de Marco R, Norback D, Raherison C, Villani S, Wjst M, Svanes K, Anto JM. Early life origins of chronic obstructive pulmonary disease. *Thorax* 2010; 65: 14-20.

14. Dijkstra A, Vonk JM, Jongepier H, Koppelman GH, Schouten JP, ten Hacken NH, Timens W, Postma DS. Lung function decline in asthma: association with inhaled corticosteroids, smoking and sex. *Thorax* 2006; 61: 105-110.
15. Grol MH, Gerritsen J, Vonk JM, Schouten JP, Koeter GH, Rijcken B, Postma DS. Risk factors for growth and decline of lung function in asthmatic individuals up to age 42 years. A 30-year follow-up study. *American journal of respiratory and critical care medicine* 1999; 160: 1830-1837.
16. Stern DA, Morgan WJ, Wright AL, Guerra S, Martinez FD. Poor airway function in early infancy and lung function by age 22 years: a non-selective longitudinal cohort study. *Lancet* 2007; 370: 758-764.
17. Poon AH, Houseman EA, Ryan L, Sparrow D, Vokonas PS, Litonjua AA. Variants of Asthma and Chronic Obstructive Pulmonary Disease Genes and Lung Function Decline in Aging. *J Gerontol A Biol Sci Med Sci* 2013.
18. Imboden M, Bouzigon E, Curjuric I, Ramasamy A, Kumar A, Hancock DB, Wilk JB, Vonk JM, Thun GA, Siroux V, Nadif R, Monier F, Gonzalez JR, Wjst M, Heinrich J, Loehr LR, Franceschini N, North KE, Altmuller J, Koppelman GH, Guerra S, Kronenberg F, Lathrop M, Moffatt MF, O'Connor GT, Strachan DP, Postma DS, London SJ, Schindler C, Kogevinas M, Kauffmann F, Jarvis DL, Demenais F, Probst-Hensch NM. Genome-wide association study of lung function decline in adults with and without asthma. *The Journal of allergy and clinical immunology* 2012; 129: 1218-1228.
19. Postma DS, Meyers DA, Jongepier H, Howard TD, Koppelman GH, Bleecker ER. Genomewide screen for pulmonary function in 200 families ascertained for asthma. *Am J Respir Crit Care Med* 2005; 172: 446-452.
20. McGeachie MJ, Yates KP, Cho MH, Croteau-Chonka DC, Castaldi PJ, Silverman EK, Zhou X, Wise RA, Tonascia J, Sternberg AL, Van Natta ML, Weiss ST, Strunk RC. Phenotypic And Genetic Risk Factors For Reduced Growth And Early Decline In FEV1 Into Early Adulthood In Childhood Asthmatics. A13 THE GENOME AND ASTHMA IN 2014: American Thoracic Society; 2014. p. A1004-A1004.
21. The Childhood Asthma Management Program (CAMP): design, rationale, and methods. Childhood Asthma Management Program Research Group. *Control Clin Trials* 1999; 20: 91-120.
22. Long-term effects of budesonide or nedocromil in children with asthma. The Childhood Asthma Management Program Research Group. *N Engl J Med* 2000; 343: 1054-1063.
23. Hankinson JL, Odencrantz JR, Fedan KB. Spirometric reference values from a sample of the general U.S. population. *American journal of respiratory and critical care medicine* 1999; 159: 179-187.
24. Li Y, Willer CJ, Ding J, Scheet P, Abecasis GR. MaCH: using sequence and genotype data to estimate haplotypes and unobserved genotypes. *Genet Epidemiol* 2010; 34: 816-834.
25. Purcell S, Neale B, Todd-Brown K, Thomas L, Ferreira MA, Bender D, Maller J, Sklar P, de Bakker PI, Daly MJ, Sham PC. PLINK: a tool set for whole-genome association and population-based linkage analyses. *Am J Hum Genet* 2007; 81: 559-575.
26. Portelli MA, Siedlinski M, Stewart CE, Postma DS, Nieuwenhuis MA, Vonk JM, Nurnberg P, Altmuller J, Moffatt MF, Wardlaw AJ, Parker SG, Connolly MJ, Koppelman GH, Sayers I. Genome-wide protein QTL mapping identifies human

plasma kallikrein as a post-translational regulator of serum uPAR levels. *FASEB J* 2014; 28: 923-934.
27. Cho MH, McDonald ML, Zhou X, Mattheisen M, Castaldi PJ, Hersh CP, Demeo DL, Sylvia JS, Ziniti J, Laird NM, Lange C, Litonjua AA, Sparrow D, Casaburi R, Barr RG, Regan EA, Make BJ, Hokanson JE, Lutz S, Dudenkov TM, Farzadegan H, Hetmanski JB, Tal-Singer R, Lomas DA, Bakke P, Gulsvik A, Crapo JD, Silverman EK, Beaty TH. Risk loci for chronic obstructive pulmonary disease: a genome-wide association study and meta-analysis. *Lancet Respir Med* 2014; 2: 214-225.
28. Howie B, Fuchsberger C, Stephens M, Marchini J, Abecasis GR. Fast and accurate genotype imputation in genome-wide association studies through pre-phasing. *Nature genetics* 2012; 44: 955-959.
29. Willer CJ, Li Y, Abecasis GR. METAL: fast and efficient meta-analysis of genomewide association scans. *Bioinformatics* 2010; 26: 2190-2191.
30. Sharma S, Tantisira K, Carey V, Murphy AJ, Lasky-Su J, Celedon JC, Lazarus R, Klanderman B, Rogers A, Soto-Quiros M, Avila L, Mariani T, Gaedigk R, Leeder S, Torday J, Warburton D, Raby B, Weiss ST. A role for Wnt signaling genes in the pathogenesis of impaired lung function in asthma. *American journal of respiratory and critical care medicine* 2010; 181: 328-336.
31. Lieberman-Aiden E, van Berkum NL, Williams L, Imakaev M, Ragoczy T, Telling A, Amit I, Lajoie BR, Sabo PJ, Dorschner MO, Sandstrom R, Bernstein B, Bender MA, Groudine M, Gnirke A, Stamatoyannopoulos J, Mirny LA, Lander ES, Dekker J. Comprehensive mapping of long-range interactions reveals folding principles of the human genome. *Science* 2009; 326: 289-293.
32. Belton JM, McCord RP, Gibcus JH, Naumova N, Zhan Y, Dekker J. Hi-C: a comprehensive technique to capture the conformation of genomes. *Methods* 2012; 58: 268-276.
33. Imakaev M, Fudenberg G, McCord RP, Naumova N, Goloborodko A, Lajoie BR, Dekker J, Mirny LA. Iterative correction of Hi-C data reveals hallmarks of chromosome organization. *Nat Methods* 2012; 9: 999-1003.
34. Crane E, Bian Q, McCord RP, Lajoie BR, Wheeler BS, Ralston EJ, Uzawa S, Dekker J, Meyer BJ. Condensin-driven remodelling of X chromosome topology during dosage compensation. *Nature* 2015; 523: 240-244.
35. Smith EM, Lajoie BR, Jain G, Dekker J. Invariant TAD Boundaries Constrain Cell-Type-Specific Looping Interactions between Promoters and Distal Elements around the CFTR Locus. *Am J Hum Genet* 2016; 98: 185-201.
36. van de Werken HJ, Landan G, Holwerda SJ, Hoichman M, Klous P, Chachik R, Splinter E, Valdes-Quezada C, Oz Y, Bouwman BA, Verstegen MJ, de Wit E, Tanay A, de Laat W. Robust 4C-seq data analysis to screen for regulatory DNA interactions. *Nat Methods* 2012; 9: 969-972.
37. Simonis M, Kooren J, de Laat W. An evaluation of 3C-based methods to capture DNA interactions. *Nat Methods* 2007; 4: 895-901.
38. Genome-wide association study of 14,000 cases of seven common diseases and 3,000 shared controls. *Nature* 2007; 447: 661-678.
39. Dixon JR, Selvaraj S, Yue F, Kim A, Li Y, Shen Y, Hu M, Liu JS, Ren B. Topological domains in mammalian genomes identified by analysis of chromatin interactions. *Nature* 2012; 485: 376-380.

40. The Genotype-Tissue Expression (GTEx) project. *Nature genetics* 2013; 45: 580-585.
41. Lin PI, Vance JM, Pericak-Vance MA, Martin ER. No gene is an island: the flip-flop phenomenon. *Am J Hum Genet* 2007; 80: 531-538.
42. Lee SH, Yang J, Goddard ME, Visscher PM, Wray NR. Estimation of pleiotropy between complex diseases using single-nucleotide polymorphism-derived genomic relationships and restricted maximum likelihood. *Bioinformatics* 2012; 28: 2540-2542.
43. Pontius JU, Wagner L, Schuler G. UniGene: a unified view of the transcriptome. The NCBI Handbook. Bethesda, MD: National Center for Biotechnology Information; 2003.
44. Petryszak R, Burdett T, Fiorelli B, Fonseca NA, Gonzalez-Porta M, Hastings E, Huber W, Jupp S, Keays M, Kryvych N, McMurry J, Marioni JC, Malone J, Megy K, Rustici G, Tang AY, Taubert J, Williams E, Mannion O, Parkinson HE, Brazma A. Expression Atlas update--a database of gene and transcript expression from microarray- and sequencing-based functional genomics experiments. *Nucleic acids research* 2014; 42: D926-932.
45. Uhlen M, Oksvold P, Fagerberg L, Lundberg E, Jonasson K, Forsberg M, Zwahlen M, Kampf C, Wester K, Hober S, Wernerus H, Bjorling L, Ponten F. Towards a knowledge-based Human Protein Atlas. *Nature biotechnology* 2010; 28: 1248-1250.
46. Pandey AK, Lu L, Wang X, Homayouni R, Williams RW. Functionally enigmatic genes: a case study of the brain ignorome. *PLoS One* 2014; 9: e88889.
47. Hardin M, Cho M, McDonald ML, Beaty T, Ramsdell J, Bhatt S, van Beek EJ, Make BJ, Crapo JD, Silverman EK, Hersh CP. The clinical and genetic features of COPD-asthma overlap syndrome. *Eur Respir J* 2014; 44: 341-350.
48. Liu P, Morrison C, Wang L, Xiong D, Vedell P, Cui P, Hua X, Ding F, Lu Y, James M, Ebben JD, Xu H, Adjei AA, Head K, Andrae JW, Tschannen MR, Jacob H, Pan J, Zhang Q, Van den Bergh F, Xiao H, Lo KC, Patel J, Richmond T, Watt MA, Albert T, Selzer R, Anderson M, Wang J, Wang Y, Starnes S, Yang P, You M. Identification of somatic mutations in non-small cell lung carcinomas using whole-exome sequencing. *Carcinogenesis* 2012; 33: 1270-1276.
49. Watanabe M, Maemura K, Kanbara K, Tamayama T, Hayasaki H. GABA and GABA receptors in the central nervous system and other organs. *Int Rev Cytol* 2002; 213: 1-47.
50. Gallos G, Townsend E, Yim P, Virag L, Zhang Y, Xu D, Bacchetta M, Emala CW. Airway epithelium is a predominant source of endogenous airway GABA and contributes to relaxation of airway smooth muscle tone. *American journal of physiology Lung cellular and molecular physiology* 2013; 304: L191-197.
51. Mizuta K, Xu D, Pan Y, Comas G, Sonett JR, Zhang Y, Panettieri RA, Jr., Yang J, Emala CW, Sr. GABAA receptors are expressed and facilitate relaxation in airway smooth muscle. *American journal of physiology Lung cellular and molecular physiology* 2008; 294: L1206-1216.
52. Price D, Fromer L, Kaplan A, van der Molen T, Roman-Rodriguez M. Is there a rationale and role for long-acting anticholinergic bronchodilators in asthma? *NPJ Prim Care Respir Med* 2014; 24: 14023.

53. Canning BJ, Woo A, Mazzone SB. Neuronal modulation of airway and vascular tone and their influence on nonspecific airways responsiveness in asthma. *J Allergy (Cairo)* 2012; 2012: 108149.
54. Kelly VJ, Brown NJ, Sands SA, Borg BM, King GG, Thompson BR. Effect of airway smooth muscle tone on airway distensibility measured by the forced oscillation technique in adults with asthma. *J Appl Physiol (1985)* 2012; 112: 1494-1503.

FIGURE LEGENDS

Figure 1. Longitudinal lung function trajectories. Possible lung function trajectories over a person's lifetime are shown; the lung function plotted for each age is the percentage of the maximum FEV_1 obtained for a normal individual x 100 (maximum usually attained in the 18-30 year range). Normal lung function growth and decline ("Normal Growth") is characterized by a steep increase in adolescence, a plateau in early adulthood, and a gradual decline into old age. Abnormal trajectories ("Reduced Growth", "Early Decline", "Reduced Growth w/ Early Decline") are also shown. The red dotted line and red brace indicate levels of FEV_1 that meet spirometric criteria for COPD GOLD stages 2 and 3.

Figure 2. Diagram of included populations. CAMP is the primary discovery population, the Dutch cohort and COPD meta-analysis cohort were used for generalization of the association to related lung-function cohorts.

Figure 3. Locus plot of SNP associations with Normal Growth and Early Decline (NG/ED) on chromosome 8. The peak at rs4445257 is ~633kbps upstream from *CSMD3* and ~1.4Mbps downstream from *TRPS1*. Color indicates linkage disequilibrium from rs4445257 (r^2).

Figure 4. Hi-C interaction data (40 kb bins) in NCI-H460 lung epithelium cells on chromosome 8 from 110Mbps to 118Mbps. Clear domains of increased chromatin interaction are observed as triangles that correspond to TADs, separated by boundaries. The

744 dark line through the heatmap represents the TAD insulation score calculated from the Hi-C
745 data. Dips in the plot represent domain boundaries that are also indicated as green blocks at
746 the bottom of the heatmap. SNP rs4445257 is shown with a blue highlighted arrow in the
747 genome snapshot under the heatmap, and is located in a large domain. The promoter of
748 *CSMD3* is at the boundary of this domain, indicating possible interaction with the SNP; the
749 promoter of *TRPS1* is located in a different domain.
750

TABLES

Table 1.

	Normal Growth (n = 164, 28.2%)	Normal Growth Early Decline (n = 116, 20.0%)	Reduced Growth (n = 155, 26.7%)	Reduced Growth Early Decline (n = 117, 20.1%)	P
Sex (n Male, %)	89 (54.27%)	71 (61.21%)	106 (68.39%)	70 (59.83%)	0.081
Race (n White, %)	164 (100.00%)	116 (100.00%)	155 (100.00%)	117 (100.00%)	-
Age (yrs)	8.44 (+/- 2.20)	9.21 (+/- 2.02)	8.56 (+/- 2.10)	9.44 (+/- 2.01)	< 0.001
Age at Diagnosis	3.30 (+/- 2.49)	3.40 (+/- 2.48)	2.66 (+/- 2.32)	2.99 (+/- 2.34)	0.041
Height (cm), randomization	130.42 (+/- 14.00)	136.18 (+/- 13.31)	131.03 (+/- 13.21)	136.33 (+/- 13.40)	< 0.001
Height (cm), end of trial	152.64 (+/- 13.10)	158.07 (+/- 14.05)	153.64 (+/- 13.99)	158.30 (+/- 12.91)	< 0.001
Weight (kg), randomization	31.11 (+/- 10.96)	35.88 (+/- 11.30)	30.31 (+/- 10.34)	33.78 (+/- 10.62)	< 0.001
Weight (kg), end of trial	49.98 (+/- 15.28)	56.41 (+/- 17.19)	48.19 (+/- 16.03)	53.61 (+/- 16.30)	< 0.001
BMI, randomization	17.80 (+/- 2.94)	19.01 (+/- 3.37)	17.19 (+/- 2.95)	17.78 (+/- 2.97)	< 0.001
BMI, end of trial	20.93 (+/- 3.87)	22.23 (+/- 4.56)	19.89 (+/- 4.05)	21.04 (+/- 4.57)	< 0.001
Treatment Group (n Steroids, %)	43 (26.22%)	36 (31.03%)	45 (29.03%)	37 (31.62%)	0.75
ED/Hosp through trial (n)	0.71 (+/- 1.51)	0.47 (+/- 1.04)	0.97 (+/- 1.89)	0.61 (+/- 1.40)	0.053
Serum IgE	2.59 (+/- 0.67)	2.48 (+/- 0.73)	2.59 (+/- 0.65)	2.73 (+/- 0.71)	0.052
Eosinophils	2.43 (+/- 0.61)	2.45 (+/- 0.65)	2.50 (+/- 0.50)	2.62 (+/- 0.41)	0.028
PC20 (log mg/ml)	0.24 (+/- 1.22)	0.36 (+/- 1.14)	-0.03 (+/- 1.06)	-0.23 (+/- 1.18)	< 0.001
Pre-BD FEV_1	1.70 (+/- 0.48)	1.87 (+/- 0.48)	1.50 (+/- 0.42)	1.61 (+/- 0.41)	< 0.001
Post-BD FEV_1	1.84 (+/- 0.51)	2.01 (+/- 0.50)	1.66 (+/- 0.44)	1.81 (+/- 0.45)	< 0.001
Pre-BD FEV_1 %-predicted	101.93 (+/- 12.15)	100.11 (+/- 11.84)	86.88 (+/- 12.21)	85.65 (+/- 12.71)	< 0.001
Post-BD FEV_1 %-predicted	110.25 (+/- 12.05)	107.96 (+/- 11.05)	97.00 (+/- 10.74)	96.05 (+/- 10.67)	< 0.001
Bronchodilator Response (%)	0.09 (+/- 0.07)	0.08 (+/- 0.09)	0.12 (+/- 0.11)	0.13 (+/- 0.11)	< 0.001

Descriptive characteristics of the CAMP cohort, by lung function pattern. Randomization and End of Trial time points are ~48 months apart. All measures taken at baseline unless otherwise indicated. P-values computed by two-sided ANOVA test. Standard deviations shown in parentheses. BD: Bronchodilator. BMI: Body Mass Index. Treatment Group: CAMP Trial arm, one of placebo, Nedocramil, or Budesonide. ED/Hosp: number of emergency department or hospitalizations required for asthma during trial period. PC20: Methacholine concentration required for a 20% reduction in airway volume. Bronchodilator response computed as (post-BD FEV1 – pre-BD FEV1) / pre-BD FEV1.

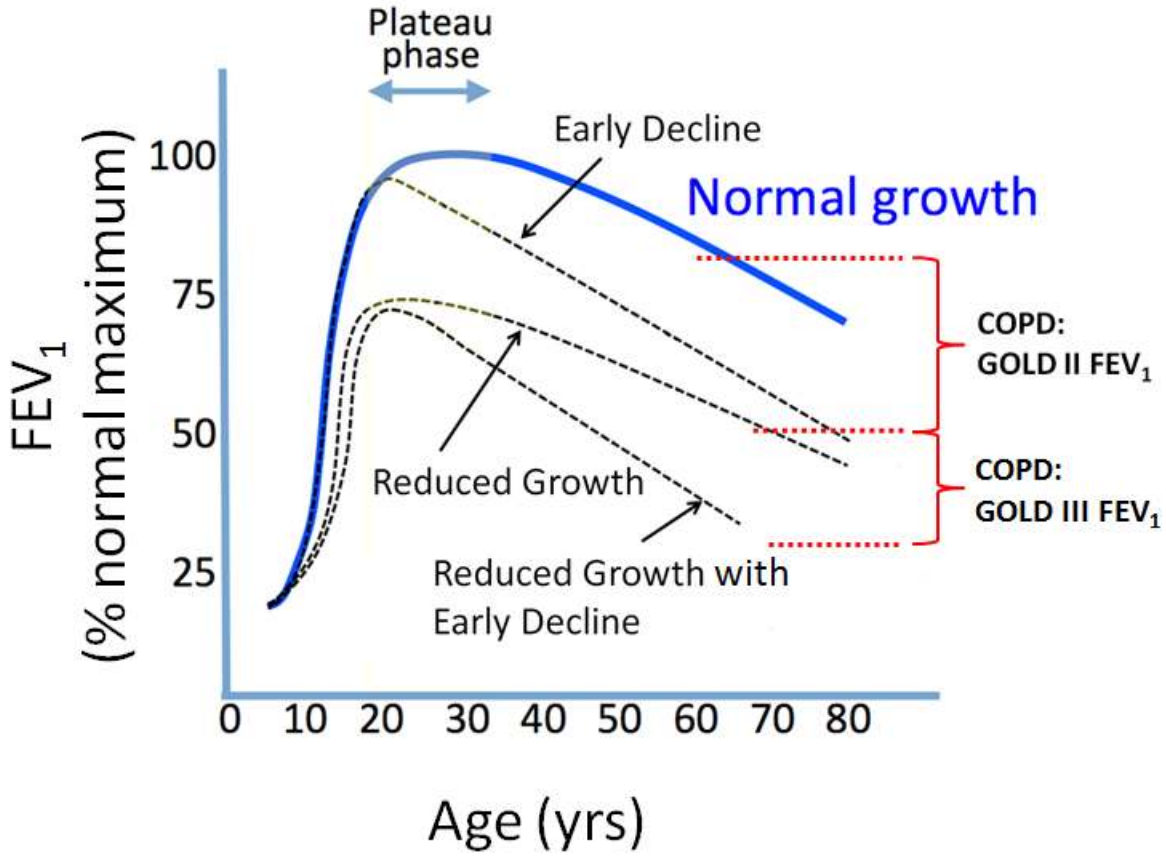
761 Table 2.

CAMP	p-value	odds ratio (minor allele G)
Base Model		
NG/ED vs. (NG + RG + RG/ED)	$6.7 * 10^{-9}$	2.83 [2.35-3.39]
Interaction Analysis (multiple regression)		
(NG/ED + RG/ED) vs. (NG + RG)		
rs4445257	$5.6 * 10^{-6}$	11.5 [6.7-19.8]
RG/ED vs. NG/ED	$2.8 * 10^{-4}$	6.4 [3.8-10.7]
rs4445257 * (RG/ED vs. NG/ED)	$2.7 * 10^{-4}$	0.27 [0.19-0.39]
likelihood ratio of interaction vs. base model	$8.3 * 10^{-4}$	
Stratified Analysis		
NG/ED vs. NG	$1.4 * 10^{-6}$	3.1 [2.4, 3.9]
RG/ED vs. RG	0.51	0.83 [0.63-1.1]
Dutch Asthma Cohort		
(NG/ED + RG/ED) vs. (NG + RG)	0.051	0.38
COPD Meta Analysis		
COPD Case vs. Control	0.0487	0.89 [0.84-0.93]
Severe COPD Cases vs. Control	0.016	0.91 [0.88-0.95]

762 Association tests of SNP rs4445257. All tests are logistic regression. P-values less than 0.05 are statistically
763 significant. NG: Normal Growth pattern (without Early Decline). NG/ED: Normal Growth with Early Decline
764 pattern. RG: Reduced Growth pattern (without Early Decline). RG/ED: Reduced Growth with Early Decline
765 pattern.
766

767 FIGURES

768 Figure 1.



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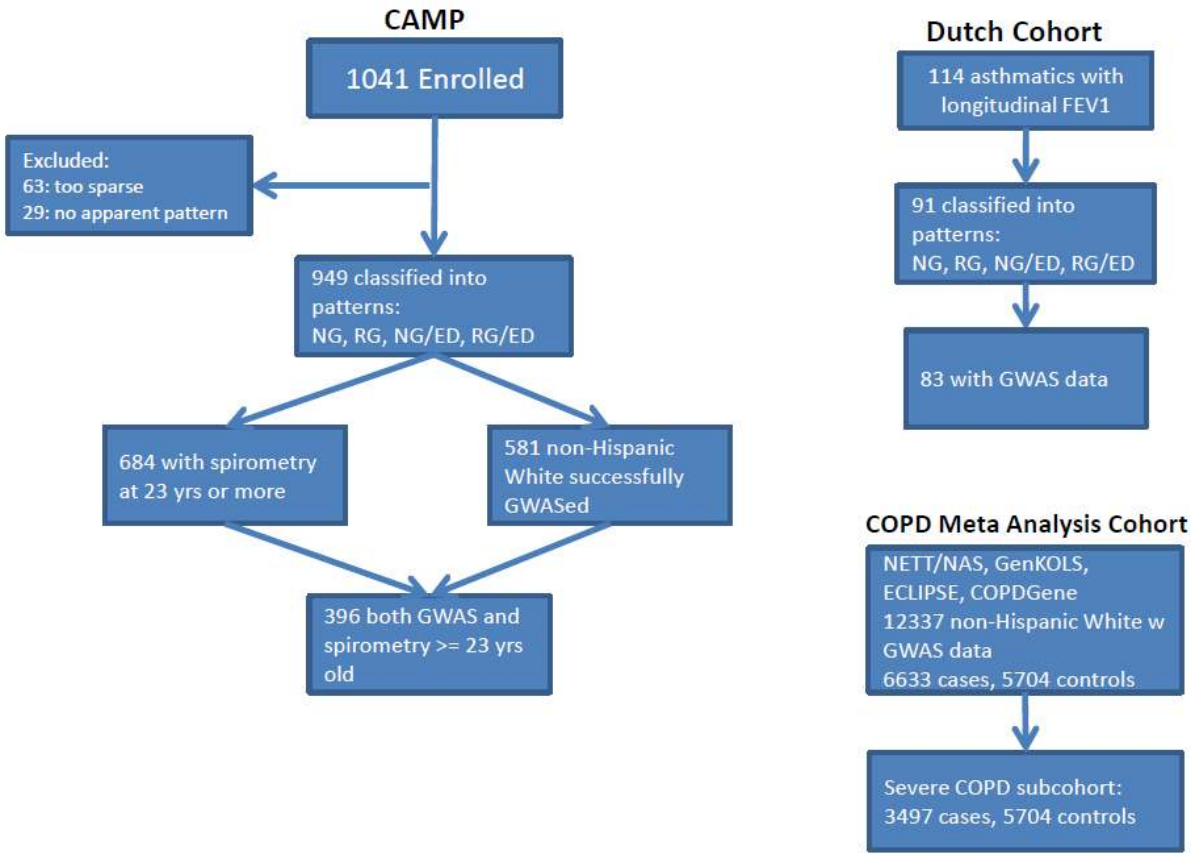
771 Figure 2.



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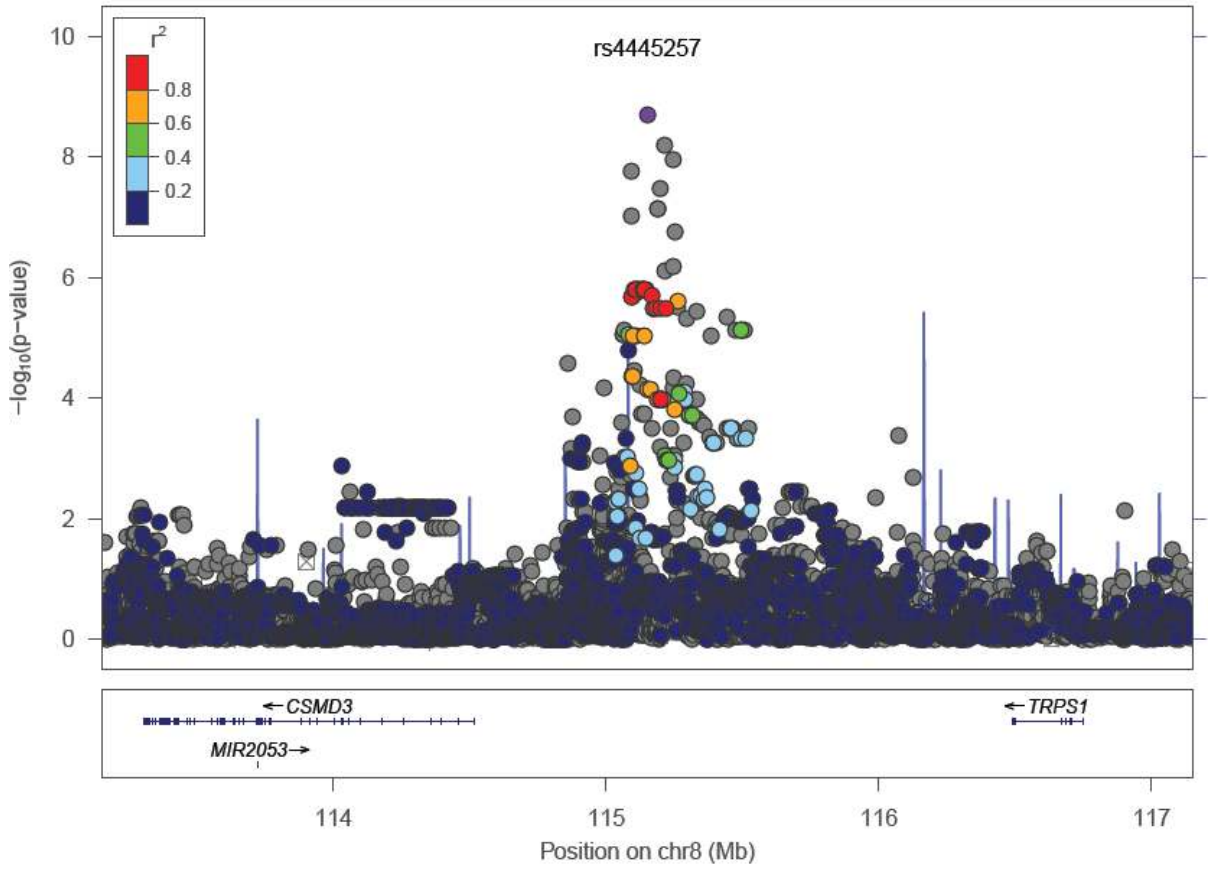
774 Figure 3.



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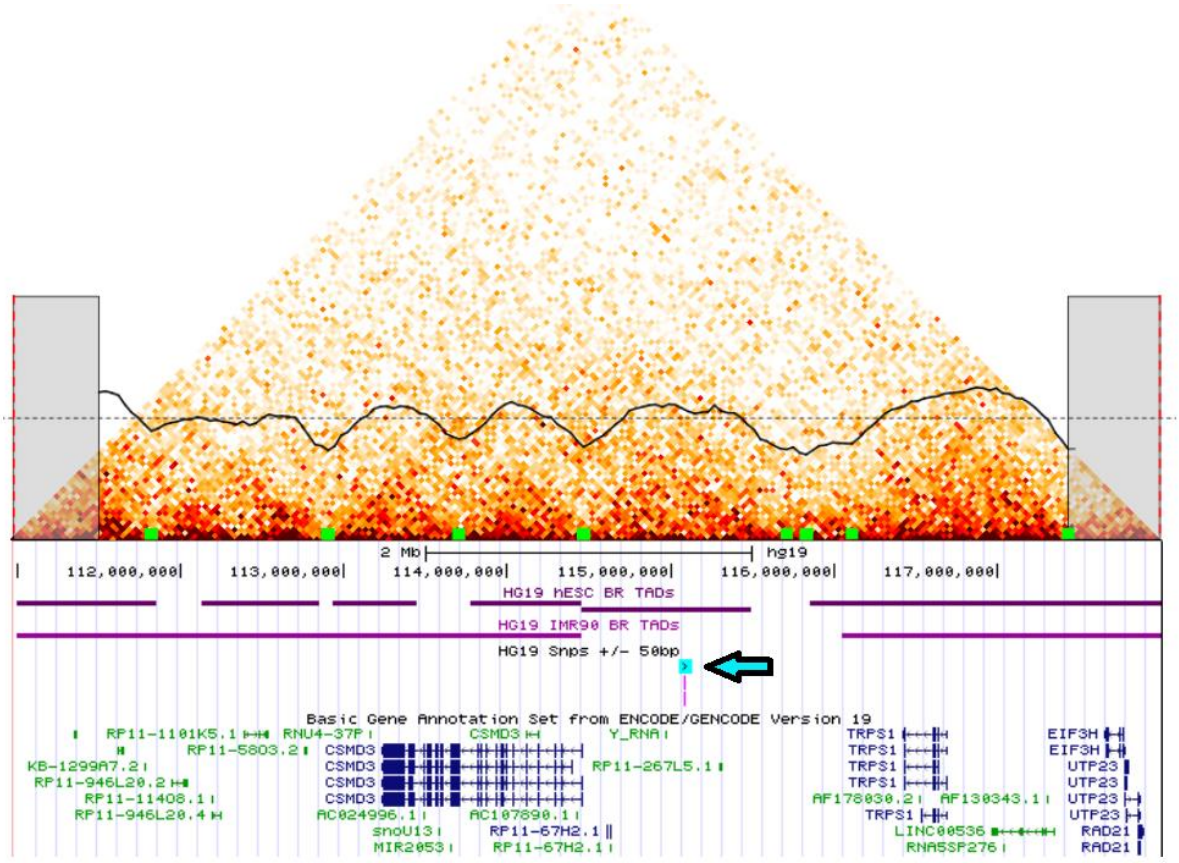
777 Figure 4.



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Genetics and Genomics of Longitudinal Lung Function Patterns in Asthmatics

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ONLINE DATA SUPPLEMENT

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Additional Methods

Asthma BRIDGE Gene Expression Methods

We used gene expression data form 45 samples of bronchial epithelial cells of the the Chicago Asthma Genetics Study (CAG), a contributor to the Asthma BioRepository for Integrative Genomic Exploration (Asthma BRIDGE). Asthma BRIDGE is an open-access collection of DNA from a variety of asthma-relevant primary cell samples from subjects participating in ongoing genetic studies of asthma, matched to extensive clinical phenotype data and genome-wide SNP genotype and gene expression data. Gene expression data for all samples in Asthma BRIDGE was measured using Illumina Human HT-12 v4 arrays, according to manufacturers' protocol (Illumina, San Diego CA). A final set of 47,009 RNA probes passed a set of standard quality control metrics assessed at the Channing Division of Network Medicine at Brigham and Women's Hospital. Genotype data on CAG study participants was provided through the EVE consortium, and have been described previously.(1)

The CAG study was designed to identify genes that influence risk for asthma or asthma-related phenotypes in families representing diverse ethnic groups. Subject recruitment, genotyping and quality control in this cohort have been described previously.(1) Within Asthma BRIDGE, gene expression was measured in bronchial epithelial cells obtained via endobronchial brushings from subjects with mild-moderate or severe asthma from the CAG study.

Expression changes of *CSMD3* by alleles of rs73706006 were computed using regression tests. Expression data was first quantile-normalized. Regression tests were conducted using *CSMD3* expression as the dependant variable, including covariates for age and sex.

Previously Associated SNPs

We used the NHGRI GWAS Catalog(2) to identify SNPs and genes associated with asthma and related traits in the literature. We considered all studies listed that contained the phrases “asthma”, “COPD”, “chronic obstructive pulmonary”, “lung function”, “FEV1”, “FVC”, or “forced expiratory volume.” We tested SNPs identified from the NHGRI Catalog in two ways: 1) SNPs that were listed as strongly associated through GWAS to one of these phenotypes; and 2) SNPs that were expression quantitative trait loci (eQTL) for genes that were so associated. This allows for the possibility that the listed SNP might not be the functional SNP, or that the particular listed SNP would not be available in our own GWAS. eQTL SNPs were identified for genes through the GTEx project Lung Tissue database of identified eQTLs,(3) and also from the Hao *et al.* list of identified lung tissue eQTLs.(4) Each SNP so identified was then tested for association with each of the four longitudinal lung function patterns (NG, NG/ED, RG, RG/ED) using the same GWAS design as before.

Additional Figures

Figure E1.

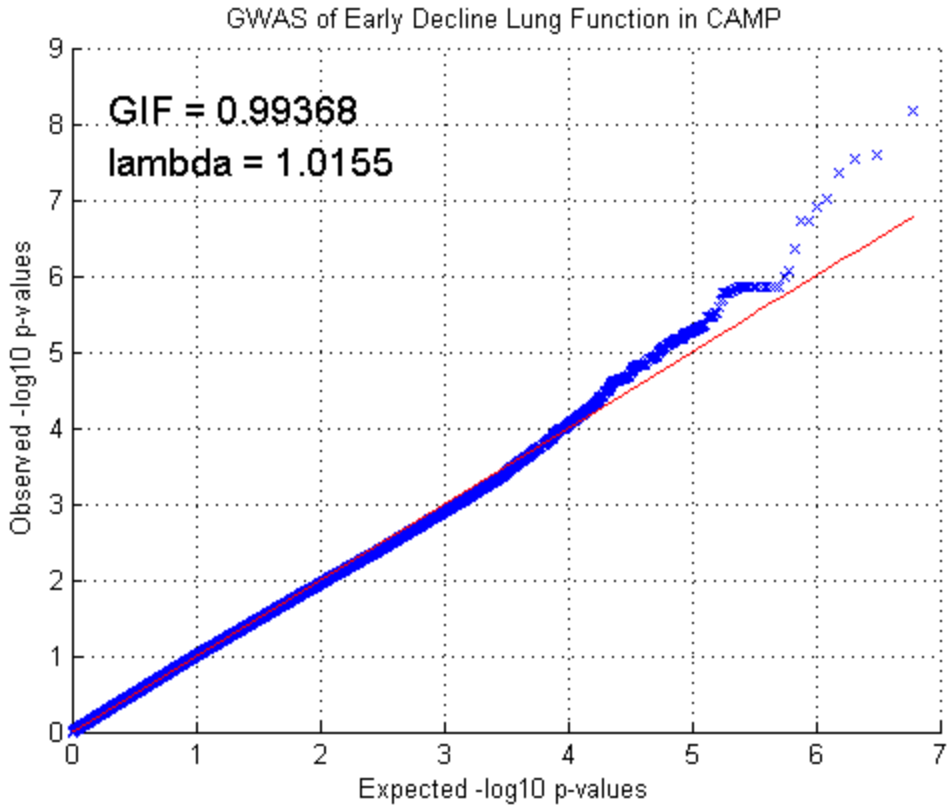


Figure E1. Quantile-Quantile plot of Normal Growth with Early Decline GWAS. The Genome Inflation Factor (GIF) is 0.99 and lambda is 1.015; this indicates little to no stratification and a general suitability of the null hypothesis of each SNP being unassociated with Normal Growth with Early Decline.

Figure E2.

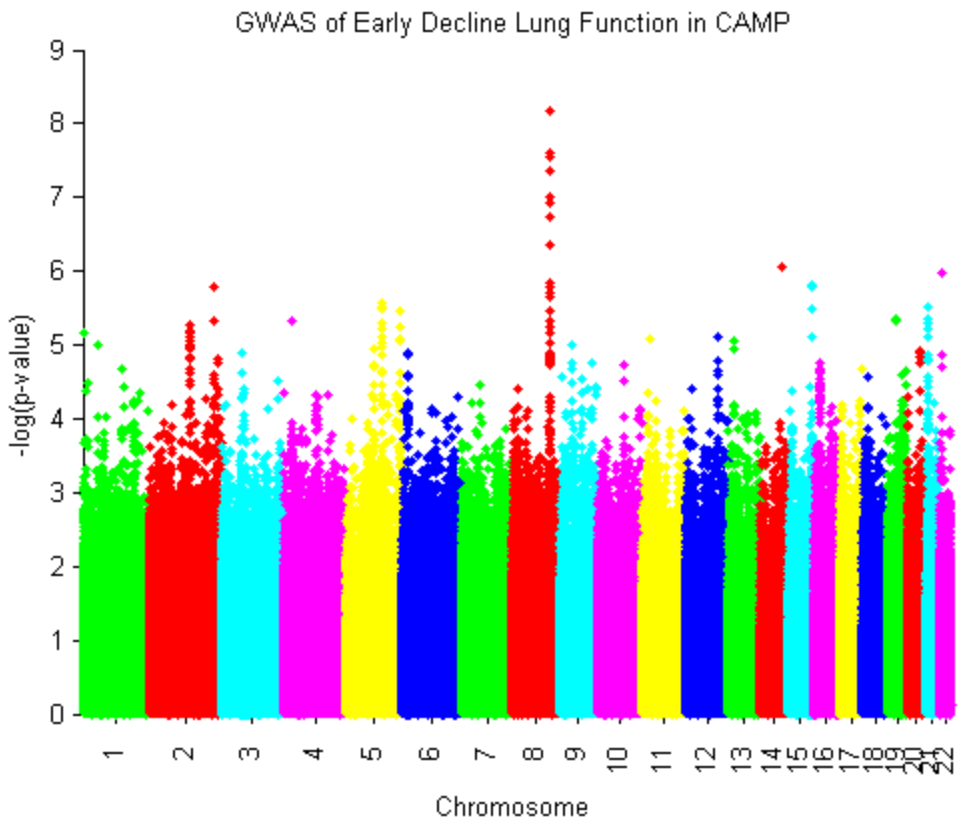
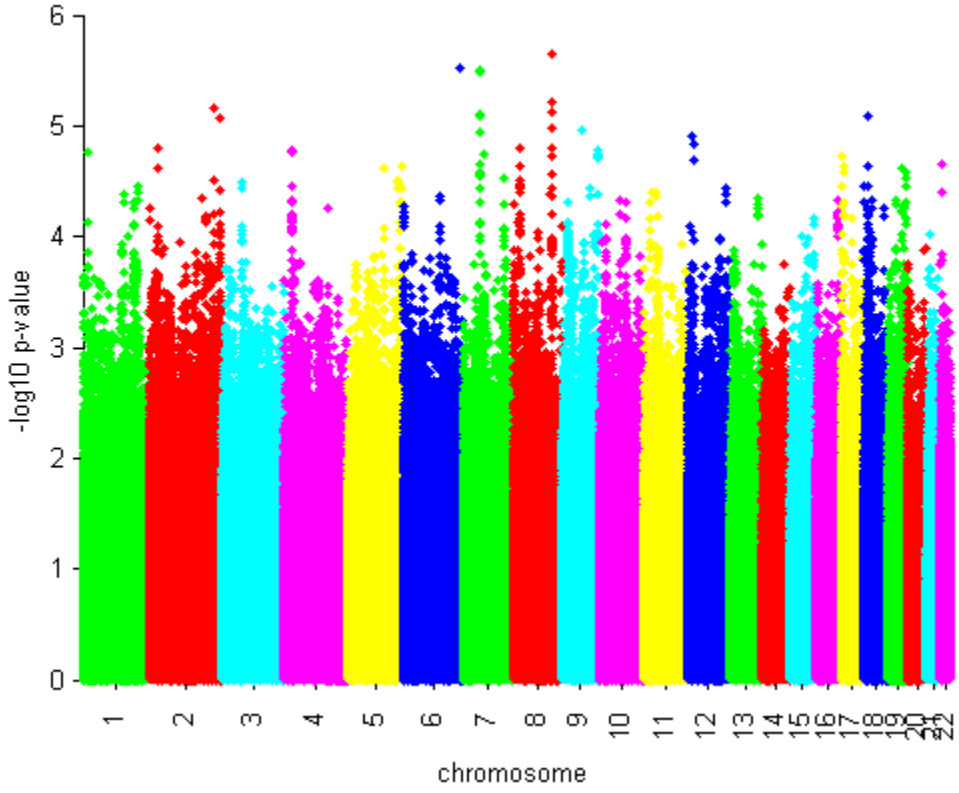


Figure E2. Manhattan Plot of GWAS for Normal Growth with Early Decline vs. the other three lung function growth patterns (N=581). The large peak in chromosome 8 is genome-wide significant (rs4445257, P=6.7*10^{-9}) and located between genes *CSMD3* and *TRPS1*. No other region reached genome-wide significance.

393 Figure E3.
394



395

396 Figure E3. Manhattan plot of the CAMP GWAS of Normal Growth with Early Decline vs.
397 the other three lung function patterns, limited to those patients with high-confidence pattern
398 assignment and full genotyping data (N=396). With a smaller sample size, this GWAS
399 displays attenuated signals compared to the larger GWAS (Figure E2), although the same
400 SNP, rs4445257, remains the most strongly associated SNP ($P=2.2*10^{-6}$).
401

Figure E4.

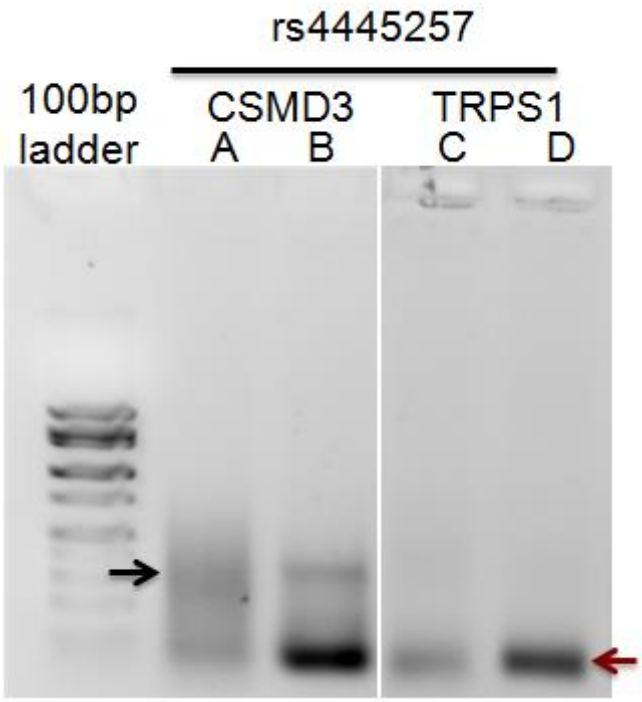
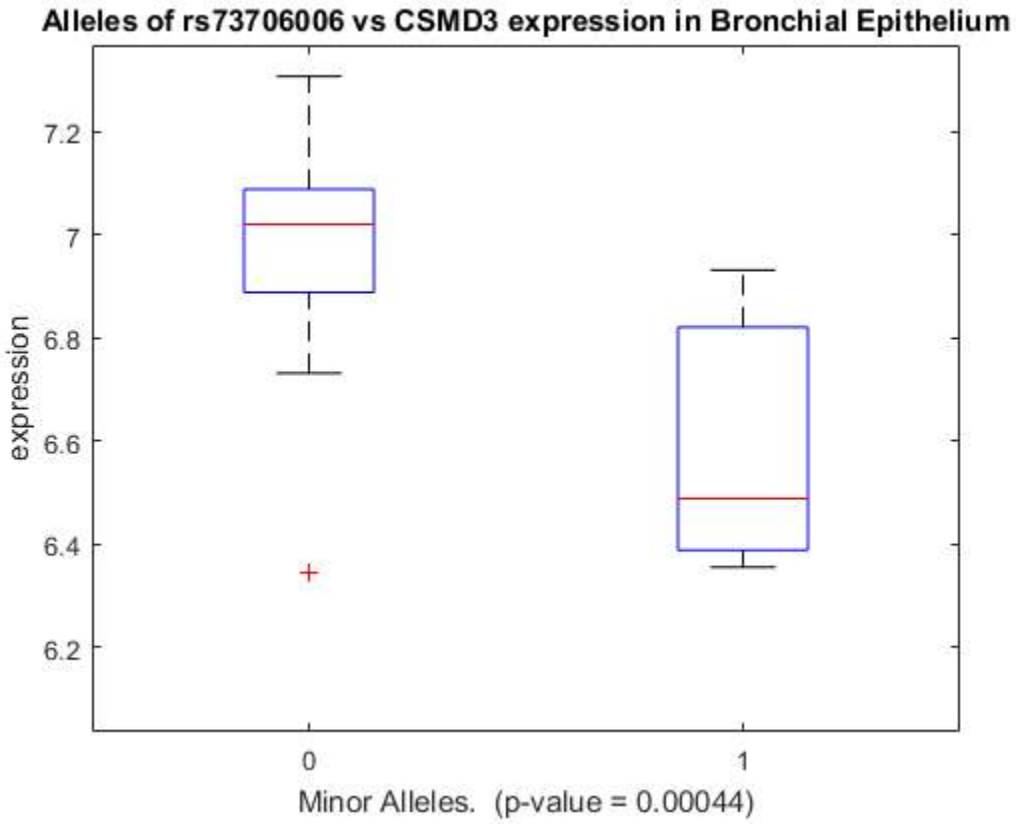


Figure E4. Chromatin interactions nearby rs4445257. Circularized chromatin conformation capture (4C) assay was performed in Beas-2B cells and PCR was amplified using primer targeting rs4445257 paired with either primers recognizing *CSMD3* promoter (columns A and B) or TRPS1 promoter (columns C and D). The black arrow indicates target chromatin interaction between rs4445257 and the promoter of *CSMD3*. The red arrow indicates primer dimers. Primer pairs used in the PCR are listed in Table S1. A: primers 1 and 4; B: primers 2 and 3; C: primers 5 and 2; D: primers 6 and 1. Primer sequences are listed in the Table E1.

413 Figure E5.

414



415

416 Figure E5. We show a neighboring SNP, rs73706006, which is in high LD with rs4445257

417 (r^2 >= .99). This showed significant association with quantile-normalized expression of

418 *CSMD3* in a sample of bronchial epithelial cells (n = 45).

419

Additional Tables

Table E1. Primers used in 4C-PCR experiment.

ID	Name	Sequence	Genomic Location(hg19)	Comments
1	rs4445257-reverse	CAACCCTTACTGGAATATTCTAACTTACG	CHR:8 - 115082237-115082265	Span rs4445257
2	rs4445257-forward	CCAGTAAGGGTTGAAATTATCATACTATCC	CHR:8 + 115082253 115082282	Span rs4445257
3	CSMD3-reverse (1)	GGAGTTTATCAGAGAGCAGAGGTGG	CHR:8 - 114449355 114449379	Promoter of CSMD3
4	CSMD3-Forward (2)	CGGTCCTGGCCCAAATCTTTCAATG	CHR:8 + 114450237 114450261	Promoter of CSMD3
5	TRPS1-reverse (1)	CGCCACCATCTTTCGGGCTG	CHR:8 - 116680802 116680821	Promoter of TRPS1
6	TRPS1-forward (2)	GCGCATTACGTCAGTTTCAAGACACC	CHR:8 + 116681194 116681219	Promoter of TRPS1

Table E2.

	Not Included mean (+/- std)	Included mean (+/- std)	p-value
Sex, N male (%)	274 (59.57%)	347 (59.72%)	0.96
Race (N, %)			
Non-Hispanic White	130 (28.26%)	581 (100.00%)	< 0.001
African American	138 (30.00%)	0 (0.00%)	< 0.001
Hispanic	98 (21.30%)	0 (0.00%)	< 0.001
Asian/other	94 (20.43%)	0 (0.00%)	< 0.001
Age	9.04 (+/- 2.09)	8.87 (+/- 2.14)	0.19
Age at asthma diagnosis	3.03 (+/- 2.41)	3.10 (+/- 2.46)	0.68
Treatment Group			
Budesonide (N, %)	139 (30.22%)	172 (29.60%)	0.83
Nedocramil (N, %)	141 (30.65%)	171 (29.43%)	0.67
Serum Immunoglobulin E (log count)	2.65 (+/- 0.67)	2.60 (+/- 0.68)	0.22
Serum Eosinophils (log count)	2.50 (+/- 0.50)	2.50 (+/- 0.55)	0.91
Airway Hyperresponsiveness (log PC20)	0.14 (+/- 1.16)	0.07 (+/- 1.18)	0.33
pre-FEV1 (% predicted)	93.56 (+/- 14.38)	93.90 (+/- 14.18)	0.7
post-FEV1 (% predicted)	102.78 (+/- 12.64)	103.12 (+/- 12.68)	0.66
Bronchodilator Response (%)	11 (+/- 10)	11 (+/- 10)	0.76
Height (cm)	134.03 (+/- 13.74)	133.17 (+/- 13.86)	0.32
Body Mass Index (kg/m2)	18.51 (+/- 3.94)	17.90 (+/- 3.14)	0.0057
Any Asthma Emergency Department Visits / Hospitalizations (N, %)	173 (37.61%)	179 (30.81%)	0.021
Lung Function Growth Pattern (N, %)			
Normal Growth	104 (22.61%)	164 (28.23%)	0.04
Normal Growth, Early Decline	99 (21.52%)	116 (19.97%)	0.54
Reduced Growth	103 (22.39%)	155 (26.68%)	0.11
Reduced Growth, Early Decline	91 (19.78%)	117 (20.14%)	0.89
Sparse/Undetermined	63 (13.70%)	29 (4.99%)	< 0.001

Table E2. Comparison of baseline characteristics of subjects included in the genome-wide association analysis from CAMP. Subjects included for GWAS were not significantly different from subjects not include, apart from being racially homogenous and slightly lower BMI. FEV1: Forced Expiratory Volume in 1 second. Airway hyperresponsiveness:

methacholine required to induce 20% drop in FEV1. Pre-FEV1: pre-bronchodilator forced expiratory volume in 1 second. Post-FEV1: post-bronchodilator forced expiratory volume in 1 second. Bronchodilator Response ((Post-FEV1 - Pre-FEV1)/Pre-FEV1).

435 Table E3.

SNP	p-value	eQTL for Gene?	Disease / Phenotype	Reference
rs6667220	0.4451	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs8676	0.6731	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12566129	0.08023	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7521681	0.7889	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs17020055	0.02867	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2169077	0.04573	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4845783	0.9833	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4129267	0.4447	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs10917727	0.002938	'NUF2'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs3001089	0.5157	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs4652523	0.8198	'XPR1'	'Asthma or atopy (interaction)'	'Ege MJ; J Allergy Clin Immunol:1/1/2011'
rs1337167	0.3082	'CRB1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2786098	0.2452	[]	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs6657275	0.0193	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4846480	0.0511	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6684205	0.05112	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4658627	0.618	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs13031619	0.8038	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs4849975	0.9067	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11902059	0.9074	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17445240	0.9055	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13418767	0.9511	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13384889	0.8898	[]	'Response to inhaled corticosteroid treatment in	'Park TJ; Clin Chim Acta:4/30/2014'

			asthma (percentage change of FEV1)'	
rs6754459	0.9537	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1965732	0.9365	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17017879	0.9796	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10173297	0.4547	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs7558370	0.4456	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13395090	0.1593	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11123610	0.529	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs2544523	0.4983	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7569716	0.2791	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6545758	0.9261	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs7608976	0.8161	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs11892869	0.8272	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs13407913	0.8273	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2033654	0.8385	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs713587	0.9958	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs1530016	0.2431	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs848512	0.7006	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12474201	0.1488	'SOCS5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2037723	0.9218	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs4399750	0.3836	'IL18R1'	'Asthma'	'Mathias RA; J Allergy Clin Immunol:11/10/2009'

rs4090473	0.4016	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs11679900	0.4002	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1997466	0.3875	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1362349	0.3868	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs3771180	0.7272	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs13408661	0.7267	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs10197862	0.7481	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9807989	0.7854	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs3771166	0.7981	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13013415	0.9502	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs10928927	0.01618	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs1441147	0.972	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs295137	0.0547	[]	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs995521	0.5318	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3769441	0.8366	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs733054	0.9711	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7607644	0.7443	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4673301	0.4162	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs3856342	0.05637	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287420	0.03905	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287419	0.04438	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287417	0.03892	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12464878	0.03655	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs4673533	0.03549	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3856349	0.03434	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10490318	0.1856	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12468557	0.1764	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs7684	0.2985	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2371442	0.9518	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2371475	0.2768	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4673659	0.1941	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4106226	0.88	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'

rs1063281	0.2522	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3791978	0.1863	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1843834	0.9204	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7607230	0.394	'DOCK10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9815663	0.9043	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4450798	0.4123	'WNT7A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1124480	0.4769	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6771632	0.9363	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs33794	0.4237	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs7614311	0.6924	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9864288	0.1959	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9290213	NA	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs8179966	0.9296	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs2713768	0.8716	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs56238310	0.9523	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6770144	0.3775	'CD96'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2705520	0.2964	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs4687833	0.8116	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12107539	0.1605	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6440972	0.6144	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1317830	0.7074	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4833095	0.6642	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3860068	0.3553	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs6840214	0.7438	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7677281	0.8287	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs3017908	0.6724	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs9224	0.8099	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs2609260	0.4313	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'

rs4416442	0.9756	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1964516	0.4501	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs7671167	0.6511	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs1982346	0.2976	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs1472066	0.4786	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs11726993	0.284	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12509365	0.8385	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs725882	0.8328	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs13136171	0.1623	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs55645543	0.1221	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs7655841	0.6479	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1494978	0.7155	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs1450439	0.9084	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs10007052	0.8689	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3775595	0.1043	'RNF150'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs7686660	0.8223	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3805236	0.688	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10519717	0.01949	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs1828591	0.9835	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs13118928	0.9535	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs13141641	0.9009	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4508864	0.03526	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs13130318	0.1142	'FGB'	'Asthma'	'Schauberger EM; J Allergy Clin Immunol:6/20/2011'
rs10044254	0.4927	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs702519	0.08549	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs6881702	0.5087	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs1588265	0.3096	[]	'Asthma'	'Himes BE; Am J Hum Genet:5/7/2009'
rs2434364	0.6268	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs3853750	0.687	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'

rs1837253	0.2253	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3806933	0.1081	'TSLP'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1438673	0.5144	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1876672	0.006687	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10043228	0.002046	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs712579	0.403	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs1582430	0.005454	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3091338	0.2996	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242103	0.1419	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12521097	0.2646	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs162907	0.5232	'SLC22A4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7737937	0.02808	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs162899	0.006936	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242109	0.6541	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631367	0.6486	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631360	0.6469	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs200838	0.6457	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2073643	0.6801	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs886285	0.1921	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2252405	0.119	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11745587	0.6703	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11957350	0.4321	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2549003	0.9024	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs2548999	0.8969	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs2244012	0.3544	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6871536	0.335	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1295686	0.4169	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13181561	0.967	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6867913	0.9523	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs9324871	1	'NDFIP1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs11135380	0.4346	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

rs13219839	0.1705	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs6597156	0.9079	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs3823158	0.549	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3130559	0.5168	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs1265093	0.4199	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2074488	0.2197	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2395471	0.7746	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3931670	0.6884	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9266629	0.3135	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7741091	0.5711	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2248462	0.9608	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2857709	0.9229	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs204993	0.5387	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs404860	0.0409	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3129943	0.7947	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3117098	0.9708	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9268516	0.6299	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs3129890	0.775	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9272346	0.2645	[]	'Asthma'	'Lasky-Su J; Clin Exp Allergy:12/4/2012'
rs1142333	0.2749	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273349	0.1241	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273373	0.3105	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7775228	0.8286	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9275698	0.2391	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9500927	0.9789	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs987870	0.8526	[]	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs1042151	0.3531	[]	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9394152	0.6414	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs9296092	0.7663	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs210181	0.4414	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7775861	0.6137	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'

rs791062	0.1271	'MAP3K7'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2811670	0.05586	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs652520	0.6206	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2473967	0.4707	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12528035	0.1277	'T'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6456042	0.4827	[]	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs9791644	0.7005	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6967330	0.9928	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs17152490	0.9567	'CDHR3'	'Asthma'	'Anantharaman R; BMC Med Genet:12/21/2011'
rs7807337	0.545	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1733858	0.4412	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2945232	0.2413	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6601306	0.1129	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs6982751	0.3435	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4618656	0.8165	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4841507	0.3936	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6987059	0.6373	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2638663	0.05624	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9297216	0.3573	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1425902	0.2143	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7006821	0.7503	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7009110	0.06742	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9298338	0.7992	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3863246	0.9327	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7814319	0.8138	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6469488	0.6237	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs3019885	0.4475	[]	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs903614	0.8035	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'

rs4361792	0.3199	'COL22A1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs6988229	0.5247	[]	'Asthma (bronchodilator response)'	'Duan QL; Pharmacogenomics J:3/19/2013'
rs343496	0.7033	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1342326	0.5928	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2381416	0.6815	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs928413	0.7481	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs3780215	0.5142	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2154091	0.7286	'SLC24A2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs16937883	0.6063	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs10511903	0.7363	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs10970976	0.9789	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6476362	0.6736	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs4879926	0.6457	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs2378383	0.4767	[]	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs2807303	0.1746	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4877504	0.0745	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11141597	0.4837	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs10819643	0.147	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs10818854	0.1318	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8177636	0.4389	'IL15RA'	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs12722602	0.4914	'IL2RA'	'Asthma (bronchodilator response)'	'Drake KA; J Allergy Clin Immunol:8/29/2013'
rs41295115	0.6823	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11259403	0.6735	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs10906922	0.9405	'PRKCQ'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10508372	0.09434	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12358699	0.4744	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs2816826	0.4763	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10761662	0.01669	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs7922491	0.3664	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs1471384	0.5894	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

rs10762058	0.9096	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs4747192	0.1735	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs4747195	0.1789	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs11000017	0.1065	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1923539	0.4867	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7078012	0.3394	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3923564	0.05866	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11201062	0.01257	'SFTPD'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs12220777	0.852	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs728616	0.8839	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3851050	0.8936	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17100316	0.9284	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7067644	0.5323	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs6585424	0.9061	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2819950	0.4984	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12266096	0.2371	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17518932	0.8166	'PLCE1'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs10786478	0.8512	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7070985	0.3303	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883221	0.8665	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs11189905	0.2777	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12258897	0.2785	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883234	0.2882	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4752066	0.5484	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs17642749	0.553	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs11146205	0.7618	'JAKMIP3'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs954820	0.7682	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs286891	0.9318	'EHF'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'

rs7929679	0.5967	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7104829	0.5441	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12286436	0.5441	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs56898019	0.5441	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60774328	0.5441	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60346281	0.5441	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7117883	0.1468	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2513071	0.9524	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2463822	0.8932	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3741240	0.5404	'SCGB1A1'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2077224	0.895	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17157266	0.04549	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11603160	0.9451	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs11235674	0.5568	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs1970739	0.1013	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs7130588	0.9268	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs626750	0.5663	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs11214966	0.01087	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2155805	0.8723	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs3863298	0.6594	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs17744026	0.524	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs1557480	0.575	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1557479	0.2479	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511504	0.5317	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511781	0.5199	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12574281	0.3071	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7929151	0.3089	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs4468361	0.519	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2856329	0.2916	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs11049300	0.1934	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2069408	0.01206	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs773107	0.2604	'CDK2'	'Asthma'	'Du R; J Allergy Clin

				Immunol:11/1/2011'
rs1701704	0.463	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs17605016	0.4537	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11174267	0.8412	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1545305	0.8889	'FAM19A2'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs11835157	0.148	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10860757	0.007691	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs7953249	0.8586	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2071190	0.02198	'HNF1A'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs504677	0.2608	'P2RX7'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs3751143	0.1522	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9319321	0.7207	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2555603	0.1387	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs7328278	0.429	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs9534578	0.3035	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1323555	0.7547	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs9539157	0.7267	'PCDH20'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4884502	0.1044	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1930336	0.1312	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs814141	0.6659	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs7323507	0.9997	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17657012	0.2995	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs3186565	0.1649	'PELI2'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs17832777	0.8718	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'

rs7147624	0.01317	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12434854	0.9915	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs3825640	0.0867	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs10220309	0.673	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs754388	0.8477	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs10142119	0.31	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs4778214	0.5601	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs8026587	0.749	'SCG3'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs17525472	0.5928	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs9630426	0.5455	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs11071559	0.8407	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4774388	0.3316	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs744910	0.411	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs17294280	0.4308	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7181556	0.7278	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7166081	0.6299	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4436747	0.1345	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3817092	0.1129	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs11858836	0.2041	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs13180	0.5819	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs8034191	0.1849	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs28675338	0.2738	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6495307	0.01757	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12911602	0.01757	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12901300	0.0182	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3743077	0.01815	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12914385	0.0819	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs3813565	0.2295	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs17803698	0.3978	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs11642009	0.7933	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'

rs62026376	0.4285	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs150063	0.1021	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs8050136	0.8574	[]	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs2388639	0.08371	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12149070	0.9688	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6565143	0.393	'CDH13'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6563898	0.6717	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs16963518	0.126	'ATP2C2'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs8048576	0.4717	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9895098	0.9323	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4077990	0.9818	'RAP1GAP2'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs10521233	0.897	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs12946510	0.2196	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12450323	0.6262	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2305480	0.3415	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs11078927	0.378	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2290400	0.6391	'GSDMB'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7216389	0.5492	[]	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs4794820	0.1028	'ORMDL3'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs6503525	0.07363	[]	'Asthma'	'Ferreira MA; Eur J Hum Genet:12/8/2010'
rs3894194	0.2156	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7212938	0.3787	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4239225	0.8344	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3859192	0.8509	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3859191	0.8524	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56326707	0.8635	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56030650	0.9173	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2326017	0.07441	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8074700	0.04506	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'

rs12453935	0.7679	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs2847605	0.4193	'YES1'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1291183	0.2439	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs643507	0.9374	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs16943366	0.0326	'CDH2'	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs879500	0.1475	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12455557	0.5801	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs9951925	0.832	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12984174	0.6509	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs12461312	0.6307	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs393548	0.9988	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs7937	0.6669	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs4802091	0.5967	'EGLN2'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs11668505	0.731	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs2288884	0.2342	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs7255485	0.0691	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3752120	0.2339	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs3450	0.2055	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs12151270	0.01759	'ZNF841'	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs17779382	0.01727	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs12460587	0.1836	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs11666341	0.1386	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs10411428	0.1633	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs16984547	0.7656	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs7253428	0.7499	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'

rs17272882	0.7342	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs10404342	0.7217	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12151012	0.5887	'ZNF71'	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4815617	0.8195	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6097169	0.7613	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs6099208	0.4318	'TFAP2C'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6099314	0.2558	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6090309	0.228	'CHRNA4'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs2823743	0.9617	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6517368	0.3783	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs743428	0.8767	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs762375	0.1459	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2284033	0.6603	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs58667	0.3367	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs2742621	0.3913	'UPK3A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs5771242	0.1831	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

Table E3. Known Asthma, COPD, or Lung Function SNPs' Association with Normal Growth Pattern. SNPs previously associated with asthma, COPD, or lung-function related phenotypes from GWAS contained in the NHGRI GWAS Catalog(2) of published GWAS are shown. SNPs which are eQTLs for genes named in those same NHGRI entries are also shown. eQTLs are determined by GTEx(3) lung tissue eQTL lists and by Hao *et al.*(4) lung tissue eQTLs.

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SNP	p-value	eQTL for Gene?	Disease / Phenotype	Reference
rs6667220	0.007283	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs8676	0.1044	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12566129	0.5891	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7521681	0.8418	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs17020055	0.5441	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2169077	0.236	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4845783	0.4935	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4129267	0.04563	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs10917727	0.2808	'NUF2'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs3001089	0.4586	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs4652523	0.4358	'XPR1'	'Asthma or atopy (interaction)'	'Ege MJ; J Allergy Clin Immunol:1/1/2011'
rs1337167	0.421	'CRB1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2786098	0.3924	[]	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs6657275	0.7808	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4846480	0.6324	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6684205	0.6321	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4658627	0.3828	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs13031619	0.2541	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs4849975	0.771	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11902059	0.757	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17445240	0.6706	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13418767	0.6267	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13384889	0.7699	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs6754459	0.719	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'

rs1965732	0.7934	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17017879	0.9218	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10173297	0.9319	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs7558370	0.9109	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13395090	0.907	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11123610	0.6696	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs2544523	0.7279	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7569716	0.8948	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6545758	0.1801	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs7608976	0.2894	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs11892869	0.1091	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs13407913	0.1092	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2033654	0.1142	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs713587	0.1386	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs1530016	0.5522	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs848512	0.1197	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12474201	0.03539	'SOCS5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2037723	0.7556	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs4399750	0.7732	'IL18R1'	'Asthma'	'Mathias RA; J Allergy Clin Immunol:11/10/2009'
rs4090473	0.7448	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs11679900	0.7461	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1997466	0.7662	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1362349	0.7675	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs3771180	0.8836	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs13408661	0.8837	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs10197862	0.8134	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9807989	0.6799	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'

rs3771166	0.6899	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13013415	0.8782	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs10928927	0.3883	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs1441147	0.726	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs295137	0.2251	[]	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs995521	0.7461	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3769441	0.7716	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs733054	0.5797	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7607644	0.8859	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4673301	0.9614	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs3856342	0.3474	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287420	0.914	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287419	0.8022	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287417	0.9148	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12464878	0.9308	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs4673533	0.9387	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3856349	0.948	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10490318	0.9639	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12468557	0.01955	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs7684	0.2216	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2371442	0.7239	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2371475	0.3963	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4673659	0.7952	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4106226	0.348	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs1063281	0.7154	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3791978	0.5455	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1843834	0.02143	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7607230	0.5535	'DOCK10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9815663	0.1718	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4450798	0.4285	'WNT7A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1124480	0.7952	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6771632	0.4095	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

rs33794	0.3373	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs7614311	0.9455	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9864288	0.1731	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9290213	NA	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs8179966	0.6189	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs2713768	0.7635	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs56238310	0.1041	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6770144	0.0622	'CD96'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2705520	0.6883	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs4687833	0.04907	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12107539	0.2495	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6440972	0.8625	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1317830	0.1637	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4833095	0.3954	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3860068	0.8423	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs6840214	0.7989	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7677281	0.4891	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs3017908	0.3527	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs9224	0.3107	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs2609260	0.7446	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs4416442	0.7401	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1964516	0.9134	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs7671167	0.9761	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs1982346	0.251	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs1472066	0.6366	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs11726993	0.7436	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12509365	0.2189	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs725882	0.07994	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs13136171	0.5308	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs55645543	0.833	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'

rs7655841	0.02906	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1494978	0.5555	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs1450439	0.8243	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs10007052	0.8324	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3775595	0.2222	'RNF150'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs7686660	0.7362	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3805236	0.7919	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10519717	0.5123	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs1828591	0.5796	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs13118928	0.6202	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs13141641	0.4367	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4508864	0.01566	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs13130318	0.004885	'FGB'	'Asthma'	'Schauberger EM; J Allergy Clin Immunol:6/20/2011'
rs10044254	0.5774	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs702519	0.8182	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs6881702	0.8099	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs1588265	0.7821	[]	'Asthma'	'Himes BE; Am J Hum Genet:5/7/2009'
rs2434364	0.481	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs3853750	0.2742	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1837253	0.002076	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3806933	0.07062	'TSLP'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1438673	0.02436	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1876672	0.01313	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10043228	0.1299	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs712579	0.1264	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs1582430	0.01938	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3091338	0.3389	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242103	0.3206	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12521097	0.1638	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs162907	0.2549	'SLC22A4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7737937	0.549	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'

rs162899	0.7996	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242109	0.09593	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631367	0.097	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631360	0.09714	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs200838	0.09728	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2073643	0.1405	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs886285	0.743	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2252405	0.9467	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11745587	0.2616	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11957350	0.7814	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2549003	0.3397	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs2548999	0.3401	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs2244012	0.7244	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6871536	0.4863	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1295686	0.05838	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13181561	0.06925	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6867913	0.8899	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs9324871	0.6575	'NDFIP1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs11135380	0.1603	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs13219839	0.2403	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs6597156	0.5195	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs3823158	0.5885	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3130559	0.1639	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs1265093	0.4545	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2074488	0.5377	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2395471	0.7291	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3931670	0.7872	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9266629	0.6769	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7741091	0.7487	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2248462	0.1723	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J

				Med:9/23/2010'
rs2857709	0.946	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs204993	0.5003	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs404860	0.5196	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3129943	0.07541	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3117098	0.3041	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9268516	0.04668	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs3129890	0.003053	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9272346	0.2285	[]	'Asthma'	'Lasky-Su J; Clin Exp Allergy:12/4/2012'
rs1142333	0.2403	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273349	0.5439	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273373	0.3199	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7775228	0.5551	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9275698	0.5613	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9500927	0.1008	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs987870	0.1749	[]	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs1042151	0.09787	[]	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9394152	0.7584	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs9296092	0.6868	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs210181	0.8942	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7775861	0.1675	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs791062	0.3499	'MAP3K7'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2811670	0.4282	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs652520	0.9295	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2473967	0.73	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12528035	0.000608	'T'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6456042	0.2972	[]	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs9791644	0.3883	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6967330	0.7401	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs17152490	0.6446	'CDHR3'	'Asthma'	'Anantharaman R; BMC Med Genet:12/21/2011'
rs7807337	0.5167	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1733858	0.4694	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2945232	0.4098	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'

rs6601306	0.2623	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs6982751	0.8896	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4618656	0.2916	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4841507	0.5727	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6987059	0.5966	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2638663	0.41	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9297216	0.3276	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1425902	0.5263	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7006821	0.03209	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7009110	0.3643	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9298338	0.7869	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3863246	0.6821	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7814319	0.1651	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6469488	0.8514	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs3019885	0.9968	[]	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs903614	0.9274	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs4361792	0.69	'COL22A1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs6988229	0.5536	[]	'Asthma (bronchodilator response)'	'Duan QL; Pharmacogenomics J:3/19/2013'
rs343496	0.0636	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1342326	0.4108	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2381416	0.3593	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs928413	0.5182	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs3780215	0.9404	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2154091	0.1471	'SLC24A2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs16937883	0.3717	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs10511903	0.482	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs10970976	0.7247	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6476362	0.3673	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs4879926	0.2013	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs2378383	0.445	[]	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs2807303	0.7838	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin

				Immunol:12/30/2013'
rs4877504	0.7551	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11141597	0.1836	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs10819643	0.3316	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs10818854	0.5717	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8177636	0.5051	'IL15RA'	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs12722602	0.7753	'IL2RA'	'Asthma (bronchodilator response)'	'Drake KA; J Allergy Clin Immunol:8/29/2013'
rs41295115	0.8388	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11259403	0.614	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs10906922	0.2813	'PRKCQ'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10508372	0.5816	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12358699	0.5284	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs2816826	0.09628	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10761662	0.2769	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs7922491	0.06734	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs1471384	0.2659	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs10762058	0.4681	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs4747192	0.1924	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs4747195	0.07677	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs11000017	0.01252	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1923539	0.3268	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7078012	0.8929	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3923564	0.003983	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11201062	0.000763	'SFTPD'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs12220777	0.2614	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs728616	0.2485	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3851050	0.8006	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17100316	0.3061	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7067644	0.08054	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs6585424	0.5027	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'

rs2819950	0.1474	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12266096	0.1596	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17518932	0.09137	'PLCE1'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs10786478	0.05221	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7070985	0.2552	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883221	0.06416	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs11189905	0.2985	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12258897	0.2974	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883234	0.3076	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4752066	0.0731	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs17642749	0.4272	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs11146205	0.3077	'JAKMIP3'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs954820	0.1618	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs286891	0.323	'EHF'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs7929679	0.9992	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7104829	0.8343	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12286436	0.8343	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs56898019	0.8343	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60774328	0.8343	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60346281	0.8343	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7117883	0.9785	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2513071	0.1907	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2463822	0.1357	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3741240	0.6024	'SCGB1A1'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2077224	0.3577	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17157266	0.8877	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11603160	0.1256	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs11235674	0.06453	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs1970739	0.1112	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin

				Immunol:5/2/2012'
rs7130588	0.725	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs626750	0.4365	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs11214966	0.1046	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2155805	0.4392	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs3863298	0.2636	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs17744026	0.2901	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs1557480	0.5045	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1557479	0.2195	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511504	0.8056	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511781	0.7909	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12574281	0.9622	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7929151	0.9221	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs4468361	0.692	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2856329	0.8854	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs11049300	0.7403	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2069408	0.02985	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs773107	0.0265	'CDK2'	'Asthma'	'Du R; J Allergy Clin Immunol:11/1/2011'
rs1701704	0.04458	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs17605016	0.6984	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11174267	0.2465	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1545305	0.881	'FAM19A2'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs11835157	0.8369	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10860757	0.07879	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs7953249	0.1433	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2071190	0.4807	'HNF1A'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs504677	0.8996	'P2RX7'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs3751143	0.8175	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9319321	0.4911	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2555603	0.4228	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs7328278	0.132	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs9534578	0.5179	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1323555	0.5745	[]	'Response to inhaled corticosteroid	'Park TJ; Clin Chim Acta:4/30/2014'

			treatment in asthma (percentage change of FEV1)'	
rs9539157	0.003206	'PCDH20'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4884502	0.2405	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1930336	0.06938	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs814141	0.7011	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs7323507	0.7774	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17657012	0.7612	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs3186565	0.5378	'PELI2'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs17832777	0.4246	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7147624	0.733	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12434854	0.5344	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs3825640	0.3149	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs10220309	0.5731	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs754388	0.1403	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs10142119	0.4718	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs4778214	0.6178	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs8026587	0.9888	'SCG3'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs17525472	0.4963	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs9630426	0.00745	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs11071559	0.394	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4774388	0.733	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs744910	0.3955	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs17294280	0.9802	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7181556	0.938	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7166081	0.7651	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4436747	0.7817	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3817092	0.2287	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'

rs11858836	0.6137	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs13180	0.6577	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs8034191	0.7431	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs28675338	0.7655	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6495307	0.8189	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12911602	0.8191	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12901300	0.828	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3743077	0.8239	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12914385	0.8247	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs3813565	0.9475	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs17803698	0.04648	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs11642009	0.6157	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs62026376	0.9029	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs150063	0.2151	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs8050136	0.7453	[]	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs2388639	0.9263	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12149070	0.1739	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6565143	0.9953	'CDH13'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6563898	0.5146	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs16963518	0.6278	'ATP2C2'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs8048576	0.8404	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9895098	0.3152	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4077990	0.441	'RAP1GAP2'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs10521233	0.5225	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs12946510	0.3432	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12450323	0.5871	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2305480	0.5182	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs11078927	0.5429	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2290400	0.8965	'GSDMB'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7216389	0.9721	[]	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs4794820	0.524	'ORMDL3'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs6503525	0.9064	[]	'Asthma'	'Ferreira MA; Eur J Hum Genet:12/8/2010'
rs3894194	0.8219	[]	'Asthma'	'Moffatt MF; N Engl J

				Med:9/23/2010'
rs7212938	0.4417	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4239225	0.623	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3859192	0.6216	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3859191	0.624	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56326707	0.641	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56030650	0.7259	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2326017	0.1632	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8074700	0.8399	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs12453935	0.7446	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs2847605	0.9114	'YES1'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1291183	0.07616	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs643507	0.9256	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs16943366	0.01352	'CDH2'	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs879500	0.5144	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12455557	0.05477	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs9951925	0.8811	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12984174	0.3763	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs12461312	0.6603	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs393548	0.07464	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs7937	0.9288	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs4802091	0.6762	'EGLN2'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs11668505	0.006049	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs2288884	0.09069	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs7255485	0.5634	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3752120	0.09065	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs3450	0.1577	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs12151270	0.4447	'ZNF841'	'Body mass index (asthmatics)'	'Melen E; Clin Exp

				Allergy:4/1/2013'
rs17779382	0.453	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs12460587	0.29	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs11666341	0.1566	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs10411428	0.06462	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs16984547	0.08383	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs7253428	0.1789	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs17272882	0.3682	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs10404342	0.4049	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12151012	0.3449	'ZNF71'	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4815617	0.3318	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6097169	0.7229	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs6099208	0.6412	'TFAP2C'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6099314	0.315	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6090309	0.786	'CHRNA4'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs2823743	0.344	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6517368	0.4158	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs743428	0.149	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs762375	0.214	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2284033	0.8064	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs58667	0.4556	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs2742621	0.791	'UPK3A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs5771242	0.03971	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

Table E4. Known Asthma, COPD, or Lung Function SNPs' Association with Normal Growth with Early Decline Pattern. SNPs previously associated with asthma, COPD, or lung-function related phenotypes from GWAS contained in the NHGRI GWAS Catalog(2) of published GWAS are shown. SNPs which are eQTLs for genes named in those same

NHGRI entries are also shown. eQTLs are determined by GTEx(3) lung tissue eQTL lists and by Hao *et al.*(4) lung tissue eQTLs.

454 Table E5.

SNP	p-value	eQTL for Gene?	Disease / Phenotype	Reference
rs6667220	0.05261	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs8676	0.9792	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12566129	0.5742	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7521681	0.5725	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs17020055	0.4222	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2169077	0.1253	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4845783	0.9086	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4129267	0.8786	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs10917727	0.1653	'NUF2'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs3001089	0.719	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs4652523	0.4378	'XPR1'	'Asthma or atopy (interaction)'	'Ege MJ; J Allergy Clin Immunol:1/1/2011'
rs1337167	0.08404	'CRB1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2786098	0.08646	[]	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs6657275	0.1844	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4846480	0.1515	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6684205	0.1519	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4658627	0.4339	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs13031619	0.9574	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs4849975	0.9135	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11902059	0.9022	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17445240	0.7714	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of	'Park TJ; Clin Chim Acta:4/30/2014'

			FEV1)'	
rs13418767	0.7215	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13384889	0.9013	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs6754459	0.6528	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1965732	0.6046	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17017879	0.8074	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10173297	0.6654	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs7558370	0.1582	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13395090	0.09364	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11123610	0.7999	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs2544523	0.5608	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7569716	0.6386	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6545758	0.8554	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs7608976	0.2305	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs11892869	0.2939	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs13407913	0.2938	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2033654	0.2415	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'

rs713587	0.2837	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs1530016	0.0408	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs848512	0.9242	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12474201	0.959	'SOCS5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2037723	0.6997	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs4399750	0.9312	'IL18R1'	'Asthma'	'Mathias RA; J Allergy Clin Immunol:11/10/2009'
rs4090473	0.9616	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs11679900	0.96	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1997466	0.9389	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1362349	0.9378	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs3771180	0.6506	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs13408661	0.6505	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs10197862	0.7234	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9807989	0.6427	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs3771166	0.6543	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13013415	0.3921	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs10928927	0.1504	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs1441147	0.4842	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs295137	0.02937	[]	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs995521	0.01726	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3769441	0.8873	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs733054	0.7046	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7607644	0.5442	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4673301	0.08777	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs3856342	0.1189	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287420	0.1545	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'

rs2287419	0.2703	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287417	0.1534	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12464878	0.1349	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs4673533	0.1267	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3856349	0.1182	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10490318	0.05258	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12468557	0.000239	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs7684	0.2081	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2371442	0.1943	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2371475	0.06253	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4673659	0.06099	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4106226	0.7477	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs1063281	0.934	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3791978	0.8958	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1843834	0.2027	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7607230	0.4499	'DOCK10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9815663	0.2485	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4450798	0.5679	'WNT7A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1124480	0.5001	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6771632	0.7057	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs33794	0.01215	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs7614311	0.7376	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9864288	0.3998	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9290213	NA	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs8179966	0.1703	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs2713768	0.3345	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs56238310	0.554	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6770144	0.5136	'CD96'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2705520	0.3437	[]	'Asthma (childhood onset)'	'Ding L; Hum

				Genomics:7/5/2013'
rs4687833	0.8378	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12107539	0.9601	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6440972	0.7235	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1317830	0.7439	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4833095	0.5686	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3860068	0.8063	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs6840214	0.3868	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7677281	0.2152	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs3017908	0.913	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs9224	0.5933	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs2609260	0.458	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs4416442	0.5993	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1964516	0.9375	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs7671167	0.9575	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs1982346	0.4961	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs1472066	0.4289	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs11726993	0.8417	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12509365	0.5533	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs725882	0.5076	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs13136171	0.6465	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs55645543	0.2725	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs7655841	0.003107	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1494978	0.5783	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'

rs1450439	0.7955	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs10007052	0.7617	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3775595	0.2206	'RNF150'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs7686660	0.04579	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3805236	0.9851	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10519717	0.8306	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs1828591	0.662	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs13118928	0.6155	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs13141641	0.8249	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4508864	0.2754	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs13130318	0.7651	'FGB'	'Asthma'	'Schauberger EM; J Allergy Clin Immunol:6/20/2011'
rs10044254	0.06161	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs702519	0.1889	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs6881702	0.7702	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs1588265	0.399	[]	'Asthma'	'Himes BE; Am J Hum Genet:5/7/2009'
rs2434364	0.8917	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs3853750	0.03895	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1837253	0.7028	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3806933	0.02935	'TSLP'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1438673	0.08402	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1876672	0.9865	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10043228	0.407	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs712579	0.9813	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs1582430	0.812	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3091338	0.4331	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242103	0.3273	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12521097	0.05821	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs162907	0.8332	'SLC22A4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin

				Immunol:12/30/2013'
rs7737937	0.4586	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs162899	0.07997	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242109	0.02763	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631367	0.03023	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631360	0.03092	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs200838	0.03156	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2073643	0.1186	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs886285	0.1775	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2252405	0.1689	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11745587	0.1173	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11957350	0.3601	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2549003	0.2189	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs2548999	0.2176	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs2244012	0.5654	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6871536	0.5402	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1295686	0.2461	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13181561	0.2905	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6867913	0.2253	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs9324871	0.8884	'NDFIP1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs11135380	0.1705	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs13219839	0.4405	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs6597156	0.4049	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs3823158	0.7762	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3130559	0.1152	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs1265093	0.9882	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2074488	0.8965	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'

rs2395471	0.4029	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3931670	0.466	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9266629	0.06375	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7741091	0.3255	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2248462	0.5798	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2857709	0.7302	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs204993	0.4287	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs404860	0.3051	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3129943	0.3614	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3117098	0.02564	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9268516	0.01663	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs3129890	0.9172	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9272346	0.05743	[]	'Asthma'	'Lasky-Su J; Clin Exp Allergy:12/4/2012'
rs1142333	0.06089	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273349	0.02613	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273373	0.06595	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7775228	0.755	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9275698	0.5307	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9500927	0.7785	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs987870	0.5846	[]	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs1042151	0.9916	[]	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9394152	0.5973	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs9296092	0.5102	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs210181	0.7105	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7775861	0.06425	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs791062	0.3849	'MAP3K7'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2811670	0.1995	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs652520	0.513	[]	'Chronic obstructive pulmonary	'Kim DK; Am J Respir Crit Care

			disease-related biomarkers'	Med:11/9/2012'
rs2473967	0.9774	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12528035	0.3885	'T'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6456042	0.207	[]	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs9791644	0.2997	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6967330	0.06553	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs17152490	0.3811	'CDHR3'	'Asthma'	'Anantharaman R; BMC Med Genet:12/21/2011'
rs7807337	0.6397	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1733858	0.04954	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2945232	0.1205	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6601306	0.9217	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs6982751	0.401	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4618656	0.1487	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4841507	0.334	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6987059	0.4032	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2638663	0.4334	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9297216	0.9378	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1425902	0.3915	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7006821	0.05496	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7009110	0.03788	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9298338	0.9346	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3863246	0.4488	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7814319	0.06508	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6469488	0.6133	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs3019885	0.8547	[]	'Asthma'	'Noguchi E; PLoS

				Genet:7/21/2011'
rs903614	0.5148	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs4361792	0.6898	'COL22A1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs6988229	0.5141	[]	'Asthma (bronchodilator response)'	'Duan QL; Pharmacogenomics J:3/19/2013'
rs343496	0.1405	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1342326	0.5528	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2381416	0.636	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs928413	0.762	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs3780215	0.4184	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2154091	0.7387	'SLC24A2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs16937883	0.9867	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs10511903	0.6856	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs10970976	0.2724	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6476362	0.5426	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs4879926	0.2053	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs2378383	0.2078	[]	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs2807303	0.00425	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4877504	0.00137	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11141597	0.2039	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs10819643	0.2443	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs10818854	0.3647	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8177636	0.08376	'IL15RA'	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs12722602	0.306	'IL2RA'	'Asthma (bronchodilator response)'	'Drake KA; J Allergy Clin Immunol:8/29/2013'
rs41295115	0.9772	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11259403	0.2992	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs10906922	0.7577	'PRKCQ'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10508372	0.9365	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12358699	0.1769	[]	'Lung function (forced expiratory	'Ong BA; PLoS One:9/2/2013'

			volume in 1 second to forced vital capacity ratio)'	
rs2816826	0.591	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10761662	0.03889	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs7922491	0.8816	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs1471384	0.365	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs10762058	0.4017	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs4747192	0.2054	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs4747195	0.2932	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs11000017	0.8723	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1923539	0.8787	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7078012	0.08929	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3923564	0.7621	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11201062	0.627	'SFTPD'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs12220777	0.204	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs728616	0.6525	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3851050	0.4831	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17100316	0.7192	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7067644	0.4802	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs6585424	0.5273	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2819950	0.4557	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12266096	0.2277	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17518932	0.01611	'PLCE1'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs10786478	0.01842	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7070985	0.01745	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883221	0.07253	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'

rs11189905	0.0178	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12258897	0.01835	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883234	0.01986	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4752066	0.3162	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs17642749	0.8748	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs11146205	0.2171	'JAKMIP3'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs954820	0.4273	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs286891	0.7127	'EHF'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs7929679	0.8929	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7104829	0.2563	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12286436	0.2563	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs56898019	0.2563	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60774328	0.2563	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60346281	0.2563	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7117883	0.8399	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2513071	0.7503	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2463822	0.7223	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3741240	0.0737	'SCGB1A1'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2077224	0.4733	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17157266	0.4155	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11603160	0.8697	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs11235674	0.04817	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs1970739	0.5803	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs7130588	0.2882	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs626750	0.2994	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs11214966	0.2577	[]	'Asthma'	'Torgerson DG; Nat

				Genet:7/31/2011'
rs2155805	0.1993	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs3863298	0.2397	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs17744026	0.8763	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs1557480	0.7474	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1557479	0.6846	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511504	0.8943	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511781	0.8806	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12574281	0.919	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7929151	0.7711	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs4468361	0.1938	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2856329	0.4259	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs11049300	0.4107	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2069408	0.3108	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs773107	0.5182	'CDK2'	'Asthma'	'Du R; J Allergy Clin Immunol:11/1/2011'
rs1701704	0.3974	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs17605016	0.1115	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11174267	0.6588	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1545305	0.8877	'FAM19A2'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs11835157	0.5883	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10860757	0.5715	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs7953249	0.6271	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2071190	0.4949	'HNF1A'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs504677	0.7177	'P2RX7'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs3751143	0.8543	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9319321	0.4605	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2555603	0.906	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp

				Allergy:4/1/2013'
rs7328278	0.1763	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs9534578	0.9646	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1323555	0.8187	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs9539157	0.02971	'PCDH20'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4884502	0.01488	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1930336	0.9969	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs814141	0.8244	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs7323507	0.9112	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17657012	0.8347	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs3186565	0.8248	'PELI2'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs17832777	0.722	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7147624	0.2227	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12434854	0.6352	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs3825640	0.08738	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs10220309	0.4094	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs754388	0.2584	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs10142119	0.1717	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs4778214	0.7773	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs8026587	0.5196	'SCG3'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs17525472	0.2538	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs9630426	0.9679	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol

				Genet:5/13/2014'
rs11071559	0.5526	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4774388	0.4366	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs744910	0.7974	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs17294280	0.5165	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7181556	0.2251	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7166081	0.1874	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4436747	0.631	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3817092	0.8039	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs11858836	0.9799	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs13180	0.6777	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs8034191	0.7223	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs28675338	0.6035	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6495307	0.8701	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12911602	0.8702	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12901300	0.874	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3743077	0.8695	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12914385	0.7109	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs3813565	0.8137	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs17803698	0.1359	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs11642009	0.3725	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs62026376	0.4721	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs150063	0.9361	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs8050136	0.1981	[]	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs2388639	0.7228	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12149070	0.05735	[]	'Chronic obstructive pulmonary	'Kim DK; Am J Respir Crit Care

			disease-related biomarkers'	Med:11/9/2012'
rs6565143	0.4753	'CDH13'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6563898	0.01773	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs16963518	0.5281	'ATP2C2'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs8048576	0.7545	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9895098	0.9436	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4077990	0.988	'RAP1GAP2'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs10521233	0.07926	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs12946510	0.4554	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12450323	0.3439	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2305480	0.4722	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs11078927	0.5354	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2290400	0.3405	'GSDMB'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7216389	0.2871	[]	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs4794820	0.1178	'ORMDL3'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs6503525	0.04307	[]	'Asthma'	'Ferreira MA; Eur J Hum Genet:12/8/2010'
rs3894194	0.08485	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7212938	0.1816	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4239225	0.6732	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3859192	0.681	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3859191	0.681	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56326707	0.6807	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56030650	0.6793	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2326017	0.3957	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8074700	0.3851	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs12453935	0.4763	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

rs2847605	0.9491	'YES1'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1291183	0.2734	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs643507	0.2618	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs16943366	0.7786	'CDH2'	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs879500	0.5431	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12455557	0.9855	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs9951925	0.2312	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12984174	0.7135	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs12461312	0.1452	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs393548	0.6587	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs7937	0.05882	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs4802091	0.5377	'EGLN2'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs11668505	0.04658	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs2288884	0.8884	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs7255485	0.03734	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3752120	0.8885	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs3450	0.5106	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs12151270	0.03838	'ZNF841'	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs17779382	0.03578	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs12460587	0.5374	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs11666341	0.4946	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs10411428	0.973	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs16984547	0.08672	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'

rs7253428	0.6222	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs17272882	0.9577	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs10404342	0.321	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12151012	0.38	'ZNF71'	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4815617	0.4302	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6097169	0.9578	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs6099208	0.2346	'TFAP2C'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6099314	0.8731	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6090309	0.08393	'CHRNA4'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs2823743	0.1503	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6517368	0.8756	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs743428	0.0738	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs762375	0.6689	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2284033	0.31	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs58667	0.5301	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs2742621	0.85	'UPK3A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs5771242	0.4789	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

Table E5. Known Asthma, COPD, or Lung Function SNPs' Association with Reduced Growth Pattern. SNPs previously associated with asthma, COPD, or lung-function related phenotypes from GWAS contained in the NHGRI GWAS Catalog(2) of published GWAS are shown. SNPs which are eQTLs for genes named in those same NHGRI entries are also shown. eQTLs are determined by GTEx(3) lung tissue eQTL lists and by Hao *et al.*(4) lung tissue eQTLs.

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465 Table E6.

SNP	p-value	eQTL for Gene?	Disease / Phenotype	Reference
rs6667220	0.8266	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs8676	0.3267	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12566129	0.8235	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7521681	0.04742	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs17020055	0.7368	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2169077	0.18	'VAV3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4845783	0.7396	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4129267	0.1063	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs10917727	0.6053	'NUF2'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs3001089	0.2594	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs4652523	0.2296	'XPR1'	'Asthma or atopy (interaction)'	'Ege MJ; J Allergy Clin Immunol:1/1/2011'
rs1337167	0.537	'CRB1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2786098	0.7401	[]	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs6657275	0.9855	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4846480	0.9149	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6684205	0.9154	'TGFB2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4658627	0.1607	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs13031619	0.5837	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs4849975	0.4954	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11902059	0.4955	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17445240	0.8175	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13418767	0.9691	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13384889	0.5247	[]	'Response to inhaled corticosteroid treatment in	'Park TJ; Clin Chim Acta:4/30/2014'

			asthma (percentage change of FEV1)'	
rs6754459	0.1392	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1965732	0.5819	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs17017879	0.7518	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10173297	0.7694	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs7558370	0.4474	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs13395090	0.8041	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs11123610	0.7819	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs2544523	0.3678	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7569716	0.37	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6545758	0.5716	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs7608976	0.5595	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs11892869	0.7389	'ADCY3'	'Asthma'	'Galanter JM; J Allergy Clin Immunol:1/7/2014'
rs13407913	0.7388	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2033654	0.6536	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs713587	0.9959	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs1530016	0.4672	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs848512	0.1747	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12474201	0.4086	'SOCS5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2037723	0.5449	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs4399750	0.2525	'IL18R1'	'Asthma'	'Mathias RA; J Allergy Clin Immunol:11/10/2009'

rs4090473	0.2666	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs11679900	0.2899	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1997466	0.3089	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs1362349	0.3102	'IL1RL1'	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs3771180	0.7216	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs13408661	0.7212	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs10197862	0.6261	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9807989	0.3897	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs3771166	0.4191	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13013415	0.4795	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs10928927	0.5482	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs1441147	0.84	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs295137	0.8633	[]	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs995521	0.1912	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3769441	0.7651	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs733054	0.6491	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7607644	0.5952	'SPATS2L'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4673301	0.02203	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs3856342	0.7051	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287420	0.3293	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287419	0.2326	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2287417	0.33	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12464878	0.34	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs4673533	0.3451	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3856349	0.3503	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10490318	0.8339	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12468557	0.7498	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs7684	0.2051	'CPS1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs2371442	0.02722	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2371475	0.03529	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs4673659	0.5781	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4106226	0.3306	'ERBB4'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'

rs1063281	0.2822	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3791978	0.2219	'TNS1'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1843834	0.4846	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7607230	0.3186	'DOCK10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9815663	0.7908	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4450798	0.4726	'WNT7A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1124480	0.4283	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6771632	0.2097	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs33794	0.1385	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs7614311	0.3288	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9864288	0.3291	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9290213	NA	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs8179966	0.7808	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs2713768	0.731	'ABI3BP'	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs56238310	0.2841	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6770144	0.01304	'CD96'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2705520	0.02878	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs4687833	0.08196	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12107539	0.8535	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6440972	0.6437	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1317830	0.8214	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4833095	0.02231	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs3860068	0.5551	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs6840214	0.855	'KLHL5'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7677281	0.9482	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs3017908	0.7519	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'

rs9224	0.6797	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs2609260	0.8214	'FAM13A'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs4416442	0.1064	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1964516	0.1392	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs7671167	0.1967	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs1982346	0.3353	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs1472066	0.3153	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs11726993	0.14	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs12509365	0.833	'SYNPO2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs725882	0.2304	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs13136171	0.9029	'ANXA5'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs55645543	0.2437	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs7655841	0.3749	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1494978	0.9797	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs1450439	0.3671	[]	'Forced expiratory volume in 1 second'	'Liao SY; Genet Epidemiol:7/8/2014'
rs10007052	0.762	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3775595	0.07744	'RNF150'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs7686660	0.07516	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3805236	0.5245	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10519717	0.003118	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs1828591	0.2471	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs13118928	0.286	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs13141641	0.2915	'HHIP'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4508864	0.3713	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs13130318	0.8836	'FGB'	'Asthma'	'Schauberger EM; J Allergy Clin Immunol:6/20/2011'
rs10044254	0.2522	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs702519	0.9197	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs6881702	0.3378	'PDE4D'	'Asthma (childhood onset)'	'Ricci G; PLoS One:2/16/2011'
rs1588265	0.726	[]	'Asthma'	'Himes BE; Am J Hum Genet:5/7/2009'
rs2434364	0.3061	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of	'Park TJ; Clin Chim Acta:4/30/2014'

			FEV1)'	
rs3853750	0.9575	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1837253	0.03961	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3806933	0.3226	'TSLP'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1438673	0.1207	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1876672	0.9853	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs10043228	0.731	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs712579	0.2019	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs1582430	0.8138	'COMMD10'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3091338	0.2349	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242103	0.1894	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12521097	0.3285	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs162907	0.9953	'SLC22A4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7737937	0.5091	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs162899	0.2399	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11242109	0.9589	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631367	0.9224	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2631360	0.9066	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs200838	0.8927	'SLC22A5'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2073643	0.8253	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs886285	0.9402	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2252405	0.8673	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11745587	0.9722	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs11957350	0.7193	'C5orf56'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs2549003	0.8707	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs2548999	0.8731	'RAD50'	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs2244012	0.8662	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6871536	0.9176	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1295686	0.7981	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs13181561	0.4806	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6867913	0.2227	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs9324871	0.9006	'NDFIP1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'

rs11135380	0.8497	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs13219839	0.101	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs6597156	0.3089	'CDYL'	'Asthma'	'Karunas AS; Mol Biol (Mosk):11/1/2011'
rs3823158	0.5018	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3130559	0.2927	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs1265093	0.2721	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2074488	0.376	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2395471	0.4124	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3931670	0.8334	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9266629	0.5034	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7741091	0.2641	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2248462	0.02469	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2857709	0.6629	'HLA-C'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs204993	0.4223	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs404860	0.6063	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3129943	0.9407	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs3117098	0.2831	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9268516	0.7378	[]	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs3129890	0.01948	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9272346	0.1914	[]	'Asthma'	'Lasky-Su J; Clin Exp Allergy:12/4/2012'
rs1142333	0.2074	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273349	0.4542	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs9273373	0.296	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7775228	0.8924	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9275698	0.8559	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs9500927	0.1034	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs987870	0.3138	[]	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs1042151	0.004175	[]	'Aspirin exacerbated respiratory disease in asthmatics'	'Park BL; Hum Genet:11/21/2012'
rs9394152	0.8593	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs9296092	0.9678	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'

rs210181	0.1897	'HLA-DQA1'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7775861	0.8571	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs791062	0.1767	'MAP3K7'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2811670	0.9389	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs652520	0.2018	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2473967	0.9903	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12528035	0.2733	'T'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6456042	0.2268	[]	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs9791644	0.9467	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6967330	0.07802	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs17152490	0.2634	'CDHR3'	'Asthma'	'Anantharaman R; BMC Med Genet:12/21/2011'
rs7807337	0.8848	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1733858	0.1866	'MKLN1'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2945232	0.2215	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6601306	0.9922	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs6982751	0.9033	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4618656	0.9816	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4841507	0.2942	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6987059	0.3982	'XKR6'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2638663	0.9998	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs9297216	0.9015	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1425902	0.02073	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs7006821	0.1636	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7009110	0.6321	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs9298338	0.3893	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3863246	0.6606	'ZBTB10'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs7814319	0.04464	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs6469488	0.8849	[]	'Bronchodilator response in asthma (inhaled corticosteroid	'Wu AC; J Allergy Clin Immunol:11/23/2013'

			treatment interaction)'	
rs3019885	0.2219	[]	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs903614	0.2601	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs4361792	0.472	'COL22A1'	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs6988229	0.05164	[]	'Asthma (bronchodilator response)'	'Duan QL; Pharmacogenomics J:3/19/2013'
rs343496	0.631	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs1342326	0.6608	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2381416	0.3975	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs928413	0.3891	[]	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs3780215	0.2555	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs2154091	0.4796	'SLC24A2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs16937883	0.7683	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs10511903	0.2864	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs10970976	0.2332	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6476362	0.8691	'ACO1'	'Aspirin intolerance in asthmatics'	'Kim JH; PLoS One:11/3/2010'
rs4879926	0.05767	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs2378383	0.8589	[]	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs2807303	0.141	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4877504	0.06476	'TLE4'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11141597	0.2355	[]	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs10819643	0.8115	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs10818854	0.1044	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8177636	0.7307	'IL15RA'	'Asthma'	'Sleiman PM; N Engl J Med:12/23/2009'
rs12722602	0.6199	'IL2RA'	'Asthma (bronchodilator response)'	'Drake KA; J Allergy Clin Immunol:8/29/2013'
rs41295115	0.7823	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11259403	0.164	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs10906922	0.9434	'PRKCQ'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10508372	0.8107	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs12358699	0.981	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'

rs2816826	0.3182	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs10761662	0.6276	'PRKG1'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs7922491	0.1613	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs1471384	0.3943	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs10762058	0.871	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs4747192	0.1153	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs4747195	0.1761	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs11000017	0.5412	'PSAP'	'Asthma (childhood, severe)'	'Bonnelykke K; Nat Genet:11/17/2013'
rs1923539	0.2371	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7078012	0.1332	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3923564	0.3679	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11201062	0.2369	'SFTPD'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs12220777	0.6356	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs728616	0.3601	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3851050	0.3216	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17100316	0.9171	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7067644	0.2765	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs6585424	0.5821	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2819950	0.3922	'ANXA11'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12266096	0.08062	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17518932	0.3651	'PLCE1'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs10786478	0.3984	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7070985	0.8692	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883221	0.543	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs11189905	0.8303	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12258897	0.8223	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs10883234	0.8282	'HPSE2'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4752066	0.7264	[]	'Pulmonary function in	'Li X; J Allergy Clin

			asthmatics'	Immunol:3/27/2013'
rs17642749	0.9612	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs11146205	0.9323	'JAKMIP3'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs954820	0.4519	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs286891	0.4907	'EHF'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs7929679	0.9995	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7104829	0.5582	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs12286436	0.5582	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs56898019	0.5582	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60774328	0.5582	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs60346281	0.5582	'APIP'	'Asthma'	'Ramasamy A; PLoS One:9/28/2012'
rs7117883	0.1891	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2513071	0.1451	'ASRGL1'	'Asthma'	'Li X; J Allergy Clin Immunol:6/11/2012'
rs2463822	0.1786	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs3741240	0.7581	'SCGB1A1'	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2077224	0.3624	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs17157266	0.6887	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs11603160	0.01922	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs11235674	0.2782	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs1970739	0.2461	'P2RY2'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs7130588	0.4948	[]	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs626750	0.2844	[]	'Chronic obstructive pulmonary disease (severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs11214966	0.05285	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2155805	0.438	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs3863298	0.6119	'C11orf71'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs17744026	0.983	[]	'IgE levels in asthmatics (D.p. specific) '	'Kim JH; PLoS One:8/13/2013'
rs1557480	0.9872	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs1557479	0.8955	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511504	0.1327	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs2511781	0.1234	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs12574281	0.276	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'
rs7929151	0.3444	'NTM'	'Asthma (childhood onset)'	'Ding L; Hum Genomics:7/5/2013'

rs4468361	0.222	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2856329	0.9286	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs11049300	0.4465	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2069408	0.9265	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs773107	0.1599	'CDK2'	'Asthma'	'Du R; J Allergy Clin Immunol:11/1/2011'
rs1701704	0.08362	[]	'Asthma'	'Hirota T; Nat Genet:7/31/2011'
rs17605016	0.462	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs11174267	0.9519	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs1545305	0.4492	'FAM19A2'	'Asthma'	'Noguchi E; PLoS Genet:7/21/2011'
rs11835157	0.7746	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs10860757	0.0875	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs7953249	0.619	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs2071190	0.2714	'HNF1A'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs504677	0.1194	'P2RX7'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs3751143	0.0438	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9319321	0.6205	[]	'Asthma (toluene diisocyanate-induced)'	'Kim SH; Clin Exp Allergy:2/1/2009'
rs2555603	0.2831	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs7328278	0.1508	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs9534578	0.9035	[]	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1323555	0.3806	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs9539157	0.8704	'PCDH20'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs4884502	0.658	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs1930336	0.9501	[]	'Response to inhaled corticosteroid treatment in asthma (percentage change of FEV1)'	'Park TJ; Clin Chim Acta:4/30/2014'
rs814141	0.9379	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

rs7323507	0.7552	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs17657012	0.08924	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs3186565	0.5243	'PELI2'	'Asthma (childhood onset)'	'Hancock DB; PLoS Genet:8/28/2009'
rs17832777	0.4059	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs7147624	0.1172	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12434854	0.8129	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs3825640	0.2677	'FUT8'	'Asthma'	'DeWan AT; J Allergy Clin Immunol:10/1/2010'
rs10220309	0.1857	[]	'Lung function (forced expiratory volume in 1 second)'	'Ong BA; PLoS One:9/2/2013'
rs754388	0.5956	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs10142119	0.8829	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs4778214	0.1024	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs8026587	0.7993	'SCG3'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs17525472	0.2066	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs9630426	0.04806	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs11071559	0.2627	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs4774388	0.8919	'RORA'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs744910	0.5752	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs17294280	0.9883	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7181556	0.1324	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs7166081	0.1054	'SMAD3'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4436747	0.4539	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3817092	0.3755	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs11858836	0.2092	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs13180	0.5737	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Nat Genet:2/21/2010'
rs8034191	0.2249	[]	'Chronic obstructive pulmonary disease'	'Pillai SG; PLoS Genet:3/20/2009'
rs28675338	0.04707	[]	'Chronic obstructive pulmonary disease'	'Siedlinski M; Thorax:6/16/2011'
rs6495307	0.0752	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'

rs12911602	0.07508	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12901300	0.07369	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs3743077	0.07301	'CHRNA5'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs12914385	0.1107	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs3813565	0.3062	'IREB2'	'Asthma (bronchodilator response)'	'Himes BE; PLoS Genet:7/5/2012'
rs17803698	0.2604	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs11642009	0.1431	'CLEC16A'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs62026376	0.07898	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs150063	0.4411	[]	'Lung function (forced expiratory volume in 1 second to forced vital capacity ratio)'	'Ong BA; PLoS One:9/2/2013'
rs8050136	0.08802	[]	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs2388639	0.1061	[]	'Asthma (corticosteroid response)'	'Park HW; J Allergy Clin Immunol:1/31/2014'
rs12149070	0.7653	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6565143	0.6955	'CDH13'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs6563898	0.2934	[]	'IgE levels in asthmatics (D.f. specific) '	'Kim JH; PLoS One:8/13/2013'
rs16963518	0.1858	'ATP2C2'	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs8048576	0.4144	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs9895098	0.749	[]	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs4077990	0.9787	'RAP1GAP2'	'Asthma (sex interaction)'	'Myers RA; Hum Mol Genet:5/13/2014'
rs10521233	0.0243	[]	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs12946510	0.7524	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs12450323	0.4586	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2305480	0.6496	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs11078927	0.6898	[]	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs2290400	0.5171	'GSDMB'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7216389	0.5599	[]	'Asthma'	'Moffatt MF; Nature:7/26/2007'
rs4794820	0.6836	'ORMDL3'	'Asthma (childhood onset)'	'Forno E; J Allergy Clin Immunol:5/2/2012'
rs6503525	0.8417	[]	'Asthma'	'Ferreira MA; Eur J Hum Genet:12/8/2010'
rs3894194	0.4772	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs7212938	0.194	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs4239225	0.2312	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'

rs3859192	0.2263	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs3859191	0.2267	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56326707	0.2293	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs56030650	0.2429	'GSDMA'	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs2326017	0.0271	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs8074700	0.2782	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs12453935	0.677	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs2847605	0.7023	'YES1'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs1291183	0.1261	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs643507	0.4748	[]	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs16943366	0.3029	'CDH2'	'Asthma'	'Tantisira KG; Am J Respir Crit Care Med:4/26/2012'
rs879500	0.9506	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs12455557	0.3643	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs9951925	0.2561	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs12984174	0.4631	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs12461312	0.7677	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs393548	0.7491	'IL12RB1'	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs7937	0.3955	[]	'Chronic obstructive pulmonary disease'	'Cho MH; Hum Mol Genet:11/11/2011'
rs4802091	0.6758	'EGLN2'	'Asthma'	'Torgerson DG; Nat Genet:7/31/2011'
rs11668505	0.8185	[]	'Lung function (forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'
rs2288884	0.6746	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs7255485	0.8378	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'
rs3752120	0.6748	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs3450	0.3551	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs12151270	0.3547	'ZNF841'	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs17779382	0.3514	'ZNF432'	'Asthma or chronic obstructive pulmonary disease'	'Smolonska J; Eur Respir J:7/3/2014'

rs12460587	0.7181	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs11666341	0.6078	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs10411428	0.7235	[]	'Bronchodilator response in asthma (inhaled corticosteroid treatment interaction)'	'Wu AC; J Allergy Clin Immunol:11/23/2013'
rs16984547	0.9373	[]	'Asthma'	'Wan YI; Thorax:5/5/2012'
rs7253428	0.1353	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs17272882	0.2646	'ZNF665'	'Body mass in chronic obstructive pulmonary disease'	'Wan ES; Am J Respir Cell Mol Biol:10/29/2010'
rs10404342	0.5559	[]	'IgE levels in asthmatics'	'Kim JH; PLoS One:8/13/2013'
rs12151012	0.982	'ZNF71'	'Body mass index (asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs4815617	0.4709	[]	'Asthma'	'Li X; J Allergy Clin Immunol:2/1/2010'
rs6097169	0.4306	[]	'Body mass index (non-asthmatics)'	'Melen E; Clin Exp Allergy:4/1/2013'
rs6099208	0.9207	'TFAP2C'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs6099314	0.6034	[]	'Chronic obstructive pulmonary disease (moderate to severe)'	'Cho MH; Lancet Respir Med:2/7/2014'
rs6090309	0.6262	'CHRNA4'	'Asthma'	'Ferreira MA; Lancet:9/10/2011'
rs2823743	0.1603	[]	'Chronic obstructive pulmonary disease-related biomarkers'	'Kim DK; Am J Respir Crit Care Med:11/9/2012'
rs6517368	0.07385	[]	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs743428	0.7369	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs762375	0.8393	'SIM2'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs2284033	0.8855	[]	'Asthma'	'Moffatt MF; N Engl J Med:9/23/2010'
rs58667	0.3595	[]	'Pulmonary function in asthmatics'	'Li X; J Allergy Clin Immunol:3/27/2013'
rs2742621	0.5279	'UPK3A'	'Asthma and hay fever'	'Ferreira MA; J Allergy Clin Immunol:12/30/2013'
rs5771242	0.7561	[]	'Lung function (forced expiratory flow between 25% and 75% of forced vital capacity)'	'Ong BA; PLoS One:9/2/2013'

Table E6. Known Asthma, COPD, or Lung Function SNPs' Association with Reduced Growth with Early Decline Pattern. SNPs previously associated with asthma, COPD, or lung-function related phenotypes from GWAS contained in the NHGRI GWAS Catalog(2) of published GWAS are shown. SNPs which are eQTLs for genes named in those same

NHGRI entries are also shown. eQTLs are determined by GTEx(3) lung tissue eQTL lists and by Hao *et al.*(4) lung tissue eQTLs.

Additional References

1. Torgerson DG, Ampleford EJ, Chiu GY, Gauderman WJ, Gignoux CR, Graves PE, Himes BE, Levin AM, Mathias RA, Hancock DB, Baurley JW, Eng C, Stern DA, Celedon JC, Rafaels N, Capurso D, Conti DV, Roth LA, Soto-Quiros M, Togias A, Li X, Myers RA, Romieu I, Van Den Berg DJ, Hu D, Hansel NN, Hernandez RD, Israel E, Salam MT, Galanter J, Avila PC, Avila L, Rodriquez-Santana JR, Chapela R, Rodriguez-Cintron W, Diette GB, Adkinson NF, Abel RA, Ross KD, Shi M, Faruque MU, Dunston GM, Watson HR, Mantese VJ, Ezurum SC, Liang L, Ruczinski I, Ford JG, Huntsman S, Chung KF, Vora H, Li X, Calhoun WJ, Castro M, Sienra-Monge JJ, del Rio-Navarro B, Deichmann KA, Heinzmann A, Wenzel SE, Busse WW, Gern JE, Lemanske RF, Jr., Beaty TH, Bleecker ER, Raby BA, Meyers DA, London SJ, Mexico City Childhood Asthma S, Gilliland FD, Children's Health S, study H, Burchard EG, Genetics of Asthma in Latino Americans Study SoG-E, Admixture in Latino A, Study of African Americans AG, Environments, Martinez FD, Childhood Asthma R, Education N, Weiss ST, Childhood Asthma Management P, Williams LK, Study of Asthma P, Pharmacogenomic Interactions by R-E, Barnes KC, Genetic Research on Asthma in African Diaspora S, Ober C, Nicolae DL. Meta-analysis of genome-wide association studies of asthma in ethnically diverse North American populations. *Nat Genet* 2011; 43: 887-892.
2. Welter D, MacArthur J, Morales J, Burdett T, Hall P, Junkins H, Klemm A, Flicek P, Manolio T, Hindorff L, Parkinson H. The NHGRI GWAS Catalog, a curated resource of SNP-trait associations. *Nucleic Acids Res* 2014; 42: D1001-1006.
3. The Genotype-Tissue Expression (GTEx) project. *Nature genetics* 2013; 45: 580-585.
4. Hao K, Bosse Y, Nickle DC, Pare PD, Postma DS, Laviolette M, Sandford A, Hackett TL, Daley D, Hogg JC, Elliott WM, Couture C, Lamontagne M, Brandsma CA, van den Berge M, Koppelman G, Reicin AS, Nicholson DW, Malkov V, Derry JM, Suver C, Tsou JA, Kulkarni A, Zhang C, Vessey R, Opiteck GJ, Curtis SP, Timens W, Sin DD. Lung eQTLs to help reveal the molecular underpinnings of asthma. *PLoS genetics* 2012; 8: e1003029.